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(54) **Mechanism for flushing a toilet**

(57) A mechanism for a flushing device (40) for flushing a toilet, comprising at least one transfer means (41a, 41b) for transferring a force applied to the transfer means to an connecting member (44) for connecting the transfer means and an outlet valve. The flushing device comprises a longitudinal axis along which the connecting member is displaceable. The transfer means com-

prises a contact surface (42a, 42b) and a lifting means (43a, 43b) and is pivotally attached to the flushing device between the contact surface and the lifting means. The transfer means is arranged to transfer the force to the connecting member in the direction of the longitudinal axis of the flushing device when said force is applied to the contact surface in a direction outwardly from said longitudinal axis.

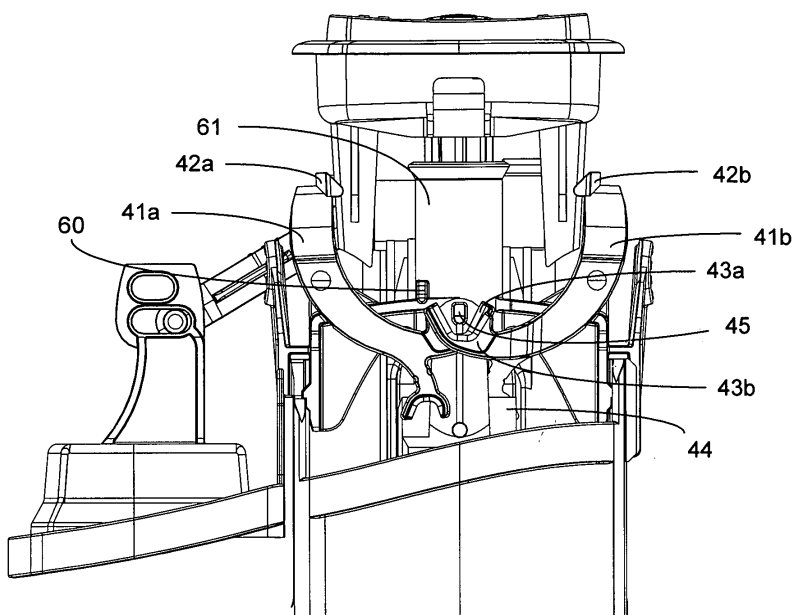


Fig. 5

Description

Technical Field of the Invention

[0001] The present invention relates to a mechanism for a device for flushing a toilet, comprising a transfer means for transferring a force applied thereto to a connecting member connecting the transfer means to an outlet valve.

Description of Related Art

[0002] Toilets typically include a toilet bowl, which is adapted to receive solid and liquid waste and water, and a cistern, which provides a reservoir for the water for flushing the waste from the bowl. A flushing device is mounted within the cistern, which is operable from the outside of the cistern to initiate the flushing. The flushing device may also be arranged to regulate the amount of water entering the bowl during the flushing process. A fill valve may be mounted in the cistern to refill the tank with a predetermined amount of water to be used during the next flushing process.

[0003] The flushing device may include a flush or outlet valve, one or several floating bodies and an actuation mechanism. By operation of the actuation mechanism, the outlet valve opens to release water from the cistern into the bowl and closes when the water reaches a predetermined lower level in the cistern. Similarly, a float valve opens when water is released from the cistern and closes when the water reaches a predetermined upper level in the cistern.

[0004] Dual-flush toilets may provide a selection between a flushing with a first water volume for liquid waste and a second water volume for solid waste. Such a dual-flush toilet includes a selection device accessible from on the outside of the cistern. The selection device is connected to the outlet valve at the bottom of the cistern. The selection device may be connected to the flushing device by shafts, which operate a lever connected to the outlet valve by a connecting member. Depression of a rocker button or separate buttons of the selection device depresses the lever in the direction of the longitudinal direction of the flushing device, whereby the connecting member lifts the outlet valve. The end of the shaft is in constant connection with the lever. With this design it is necessary to adjust the axial distance separating the outlet valve and the selection device in order to accommodate cisterns of various heights.

[0005] Cisterns made of porcelain typically have a variance in height depending on the manufacturing process. The variance for a typical porcelain cistern is ± 6 mm. However other ranges are possible depending on the size of the cistern.

[0006] The adjustability of the axial distance from the selection device to the outlet valve may be provided by an adjustable shaft extending downwardly from the selection device towards the lever. The length of the shaft

has to be determined and the shaft adjusted to accommodate a particular height of the cistern. The shaft may be adjusted by simply cutting it in an appropriate length. Unfortunately, once the shaft is cut, the flushing device is useless for taller cisterns. This procedure is cumbersome and has to be carried out for each installation. Alternatively, the shaft has threads that mate with threads of the lever, such that the shaft may be adjusted. However, also this procedure has to be carried out for each installation.

[0007] US-A-6 081 938 discloses a dual-flush toilet having a flushing device which is operated by a selection device mounted on top of the toilet. The selection unit is connected to the flushing device by means of a shaft operating a lever in the manner similar to that described above. Adjustability of the flushing device to cisterns of different height is provided in that a connecting member connecting the lever to the outlet valve is selectably adjustable by snap fittings. However, although this design reduces the problem of cutting the shaft, the height of the lifting means still has to be individually adjusted to cisterns of different height. This procedure is cumbersome, as the height of the connecting member has to be determined to accommodate a particular height of the cistern. This procedure has to be carried out for each installation.

Summary of the Invention

[0008] It is an object of the invention to provide a mechanism for a flushing device for flushing a toilet, which overcomes the above mentioned problems.

[0009] According to a first aspect, the invention achieves this object by a mechanism for a flushing device for flushing a toilet, comprising at least one transfer means for transferring a force applied to the transfer means to an connecting member) for connecting the transfer means and an outlet valve. The flushing device comprises a longitudinal axis along which the connecting member is displaceable. The transfer means comprises a contact surface and a lifting means and is pivotally attached to the flushing device between the contact surface and the lifting means. The transfer means is arranged to transfer the force to the connecting member in the direction of the longitudinal axis of the flushing device when said force is applied to the contact surface in a direction outwardly from said longitudinal axis.

[0010] The transfer means may be an arcuate lever. Furthermore, the contact surface of the transfer means may have an arcuate cross section.

[0011] The mechanism may be connected to an actuation unit having a rocker button connected to at least one leg, which is arranged to apply said force to the contact surface when the rocker button is depressed. The actuation unit may be detachably attached to the flushing device. The leg and the contact surface may be arranged to, in operation, cooperate in a mutually sliding relationship.

[0012] The mechanism may comprise a first and a second transfer means. The first transfer means may be arranged to actuate the connecting member to cause a flushing with a first volume of water when the force is applied to the contact surface of the first transfer means. The second transfer means may be arranged to actuate the connecting member to cause a flushing with a second volume of water, when the force is applied to the contact surface of the second transfer means.

[0013] A floating body may be displaceably connected to an outer periphery of the flushing device. The floating body is displaceable in the direction of the longitudinal axis of the flushing device and arranged to actuate a hook up mechanism for engagement with a protruding member. The floating body may be slideably attached to a displaceable shaft for regulating a flushing volume.

[0014] The mechanism may be provided at a first end of the flushing device, and the hook up mechanism may be pivotally connected to the flushing device at a second end thereof. The hook up mechanism is arranged to fail to engage a protruding member connected to the outlet valve when the connecting means and the outlet valve are moved a first distance and arranged to engage the protruding member when moved a second distance. Alternatively, the hook up mechanism is attached to an upper end of the displaceable shaft and arranged to engage the transfer means when actuated.

[0015] The mechanism according to the invention may comprise a means for displacing the connecting member a first distance when the first transfer means is actuated and a second distance when the second transfer means is actuated. A stopping member of the first or the second transfer means may be arranged to engage a displacement limiting member connected to the connecting member for limiting the amount of displacement of the connecting member and the outlet valve when the first transfer means is actuated.

[0016] According to a second aspect, the invention achieves the object by a toilet comprising a cistern, in which the mechanism for flushing the toilet according to the invention is mounted. The toilet may comprise a detachable cover for covering an opening of the cistern. The cover may have an opening into which an actuation unit is inserted and attached to the mechanism, which may be adjustably mounted to an outlet opening of the cistern for centering the flushing device to the opening of the cover.

[0017] Further embodiments of the invention are defined in the dependent claims.

[0018] It is an advantage of the invention that the mechanism is automatically adjusted to different heights of cisterns. Such different heights are due to tolerances in porcelain manufacturing. Also, it is an advantage that the quantity of water of the second flush volume may be easily adjusted simply by adjusting the height of the floating body, which is easily accessible from the top of the cistern. Furthermore, it is an advantage of the invention that it may automatically take care of radial misalign-

ment between the legs of the actuation unit and the transfer means. The mechanism can be used without the actuation unit. Thus, the toilet may be tested during manufacturing without mounting the actuation unit, which is an advantage as it saves time and thus reduces manufacturing costs. It is also an advantage that the flushing device may be mounted by a robot as no adjustment of height is necessary. As the actuation unit is removable and may fix the cover of the cistern, the flushing device is easily accessible and thus service-friendly. It is an advantage of the hook up mechanism that it is always surrounded by the water, so that it is not exposed to lime deposit, and comprises few parts, wherein it is cheap to manufacture.

[0019] It should be emphasized that the term "comprises/comprising" when used in this specification is taken to specify the presence of stated features, integers, steps or components but does not preclude the presence or addition of one or more other features, integers, steps, components or groups thereof.

Brief Description of the Drawings

[0020] Further objects, features and advantages of the invention will appear from the following detailed description of the invention, reference being made to the accompanying drawings, in which:

Fig. 1a is cross-sectional view of the mechanism according to the invention;

Fig. 1b is a cross sectional view of the mechanism of Fig. 1a in operation;

Fig. 2a, is a cross-sectional view of a second embodiment of a dual-flush mechanism according to the invention;

Fig. 2b is a cross-sectional view of the dual-flush mechanism of Fig. 2a in operation for a second flush volume;

Fig. 2c is a cross-sectional view of the dual-flush mechanism of Fig. 2a in operation for a flushing operation with a first flush volume;

Fig. 3a is a top-view of a first embodiment of an actuation unit and transfer means of a dual-flush mechanism according to the invention;

Fig. 3b is a top-view of a second embodiment of an actuation unit and transfer means of a dual-flush mechanism according to the invention;

Fig. 4 is a side view of a flushing device comprising the mechanism according to the invention;

Fig. 5 is a side-view of the mechanism according to the invention;

Fig. 6 is a side view of the mechanism of Fig. 5 in operation with a flushing operation with the first flush volume;

Fig. 7 is a side view of the mechanism of Fig. 5 in operation for a second flush volume;

Fig. 8 is a side view of the mechanism according to the invention and a cooperative hook-up mecha-

nism;

Fig. 9 is a side view of the mechanism and the hook-up mechanism where the hook-up mechanism is in operation for the second flush volume; and

Fig. 10 is a side view of an alternative embodiment of the hook up mechanism.

Detailed Description of Embodiments

[0021] Fig. 1 illustrates a mechanism for a flushing device for flushing a toilet. The flushing device may be mounted within a cistern of a toilet. The flushing device has a longitudinal axis extending vertically from the top of the cistern to the bottom thereof when mounted. The mechanism comprises a transfer means 1 having a contact surface 2 and a lifting means 3. The transfer means 1 may be provided by a substantially L-shaped or arcuate lever, which is pivotally attached to the flushing device between the contact surface 2 and the lifting means 3. The lifting means 3 is arranged to actuate the connecting member 4. The transfer means 1 is arranged to transfer a force applied to the contact surface 2 in a direction outwardly from the longitudinal axis of the flushing device to the connecting member 4. The direction of the force may e.g. be applied within a range of $\pm 60^\circ$ relatively to a normal to the longitudinal axis of the flushing device. However, the direction of the applied force may have a different range, such as up to $\pm 80^\circ$ or more depending on the design of the transfer means 1. The force applied to the contact surface 2 is transferred to the lifting means 3 when the transfer means is pivoted. The connecting member 4 is at a lower end connected to an outlet valve 49 (Fig. 8), which in a closed position prevents water from flowing out of the cistern. The connecting member 4 may be provided by e.g. a flexible wire or a rigid shaft. Alternatively, the connecting member 4 is a displaceable overflow pipe.

[0022] When the transfer means 1 is actuated, the lifting means 3 will actuate the connecting member 4 and the outlet valve towards the top of the cistern in the direction of the longitudinal axis of the flushing device, wherein water will flow out of the cistern.

[0023] The lifting means 3 may be provided by a free end of the transfer means 1, which is connected to the connecting member 4, e.g. by inserting said end into a hole of the connecting member 4. Alternatively, the lifting means is a hook, which is arranged to engage a boss of the connecting member 4.

[0024] An actuator unit 5 is accessible from outside the cistern. The actuator unit comprises a rocker button 6, which is pivotally attached to a frame, which may be inserted into a hole of the cover. The rocker button 6 comprises a leg 7, which in a mounted position is arranged to slideably contact the contact surface 2 when the rocker button 6 is depressed, wherein the leg 7 will pivot towards the contact surface 2. When the leg 7 and the contact surface 2 contacts, the force in the direction outwardly from the longitudinal axis of the flushing de-

vice will be applied to the contact surface 2. In response to the force, the transfer means 3 will pivot around its axis of pivoting, wherein the lifting means 3 will actuate the connecting member 4.

[0025] The mechanism according to the invention automatically adapts its length to cistern tolerances within a predetermined range. This range may e.g. be ± 6 mm, which is the normal variance at porcelain manufacturing of cisterns. However, the range may be different, to which the mechanism may be dimensioned. The automatic adaptation to different cistern heights is provided in that the transfer means is arranged to transfer the force in the direction outwardly from the longitudinal axis of the flushing device to a force in the direction of said axis. Thus, the leg 7 and the contact surface 2 may be detached and cooperative in a mutually sliding fashion.

[0026] The distance from the axis of pivoting of the actuation unit 5 to the position where the leg contacts the contact surface 2 and the length of the rocker button 6 controls the amount of displacement of the rocker button and the force for depressing it to initiate the flushing. Thus, the transfer means 7 and the actuation unit 5 may be adapted as desired in this respect.

[0027] Fig. 1b illustrates the mechanism of Fig. 1a in an actuated state. When the flushing is ended, the connecting member 4 urges the lifting means 3 downwards, wherein the contact surface 2 will return the rocker button 6 to its initial position.

[0028] The leg 7 and the contact surface 2 are detached until the actuator unit 5 is operated. By adjusting the distance between the pivoting planes of the actuator means 5 and the transfer means 1, the length of the leg 7 and the length of the transfer means from the pivoting axis to the top of the contact surface, the flushing device is automatically adjusted to cisterns of different heights within a predetermined range when the mechanism and the actuator unit are assembled.

[0029] Fig. 2a illustrates a second embodiment of the mechanism according to the invention, wherein a dual-flush mechanism is provided. The mechanism comprises a first and a second transfer means 1a, 1b, each comprising a contact surface 2a, 2b and a lifting means 3a, 3b corresponding to the transfer means of Fig. 1. An actuator unit 5a comprises a rocker button having a first and a second selection means 6a, 6b for selecting a first or a second flush volume respectively connected to a first and a second leg 7a, 7b. The selection means may be surfaces on a rocker button on respective sides of an axis of pivoting. Alternatively, two separate rocker buttons according to Fig. 1a is used.

[0030] Fig. 2b illustrates the dual-flush mechanism of Fig. 2a in use when the first selection means 6a is operated. The second leg 7b will be actuated towards the contact surface 2b of the second transfer means 1b, wherein the connecting member will be displaced a certain distance as will be further described below, and a flushing with the second flush volume is provided.

[0031] Fig. 2c illustrates the dual-flush mechanism of

Fig. 2a in use when the second selection means 6b is operated. The first leg 7a will be urged towards the contact surface 2a of the first transfer means 1a, wherein the connecting member will be displaced a certain distance as will be further described below, and a flushing operation with the first flush volume is provided.

[0032] Fig. 3a illustrates an actuation unit 15a seen from above together with first and second transfer means. In this embodiment, the contact surfaces 12a, 12b of the transfer means have a linear cross-section.

[0033] Fig. 3b illustrates an alternative embodiment of an actuation unit 25a shown from above with a dashed line, which is connected to a first and a second leg 27a, 27b, and a first and second transfer means. In this embodiment, the contact surfaces 22a, 22b of the transfer means have an arcuate cross-section. As illustrated, the actuation unit and thus the legs 27a, 27b may be radially misalignment and still be in contact when the actuation unit 25a is operated. The dual-flush actuator unit of Figs. 3a and 3b may be provided as single-flush actuator units.

[0034] Fig. 4 illustrates a flushing device 30 in more detail, and Fig. 5 is an enlarged view of a third embodiment of the mechanism according to the invention. The mechanism comprises in this embodiment a first and a second transfer means 41a, 41b, provided as arcuate levers. Each transfer means 41a, 41b comprises a contact surface 42a, 42b and a lifting means 43a, 43b. The transfer means 41a, 41b are pivotally attached to the flushing device 40 at a position between the contact surface 42a, 42b and the lifting means 43a, 43b. Each lifting means 43a, 43b is provided by a hook arranged to engage an engagement means 45, such as a boss, of the connecting member 44 when the transfer means 41a, 41b is actuated.

[0035] The amount of pivoting of the first transfer means 41a is limited by a protruding member 60 connected to a sleeve 61 rigidly connected the flushing device. The protruding member extends radially from the flange and is arranged limit the upwardly motion of the first lifting means 43a. If this protruding member 60 is removed, a flushing with the second flush volume is actuated from both the first and the second selection means 6a, 6b. A corresponding protruding member is connected to the sleeve 61 on an opposite side (not shown) for limiting the amount of pivoting of the second transfer means 41b.

[0036] A first floating body 48 (see Fig. 4) is connected to and acts on the connecting member 44. The first floating body 48 may be circumferentially arranged around the connecting member 44. The first floating body 48 may be axially adjustable relative the outlet valve 49 to adjust the quantity of water of the first flush volume. The first floating body 48 may be slideably attached to the connecting member 44 by ridges provided on the exterior of the connecting member 44 and mating ridges provided on an interior surface of the first floating body 48 facing the connecting member 44. Thus, the quantity of

the first flush volume may be regulated by adjusting the height of the first floating body 48 relative the outlet valve 49.

[0037] A second floating body 50 is displaceably arranged on the exterior of the flushing device. The second floating body 50 is axially adjustable relative the outlet valve 49. The second floating body 50 may be slideably attached to a shaft 51. Ridges of the second floating body 50 mate with ridges of the shaft 51. The second flush volume may be regulated by adjusting the height of the second floating body 50 relatively to the outlet valve 49. The second floating body 50 is easily accessible from the outside of the cistern when the cover is removed.

[0038] A hook up mechanism 52 is pivotally attached to the flushing device. The hook up mechanism 52 is in this embodiment a lever, which has a first portion with a first end 53 that extends from the axis of pivoting in the direction of the longitudinal axis of the flushing device 54. A second portion of the hook up mechanism 52 extends from the axis of pivoting substantially radially with regard to the longitudinal axis of the flushing device towards a first end of the shaft 51, to which it is attached. A second end of the shaft 51 is attached by a pin to an oblong hole of a flange 55 extending outwardly from the flushing device 40 and in the direction of the longitudinal axis of the flushing device 40. Thus, the shaft 51 and the hook up mechanism 52 are displaceable in the direction of the longitudinal axis of the flushing device as will be described below.

[0039] A third floating body 56 is pivotally connected to the flushing device 40 and operates an inlet valve. When the water after a flushing reaches a predetermined level within the cistern, the floating body closes the inlet valve.

[0040] Fig. 6a illustrates the actuation of a flushing operation with a first flush volume. When the flushing operation with the first flush volume is selected, i.e. the user depresses the second selection means 6b, the first leg 7a will exert a force on the contact surface 42a of the first transfer means 41a, as describer above. The second leg 7b is detached from the second contact surface 42b during the entire flushing operation with the first flush volume. The first transfer means 41a transfers the force to the first lifting means 43a, which engages the engagement means 45. The force applied to the engagement means 45 will urge the connecting member 44 in the direction of the longitudinal axis of the flushing device 40 towards the actuation unit. The first floating body 48 does not by itself have enough lifting force for lifting the connecting member 44 when surrounded by the water. However, when the outlet valve 49 is lifted sufficiently high, the water flowing out of cistern will exert a lifting force on the outlet valve 49 in the direction of the longitudinal axis of the flushing means 40. The lifting force exerted by the water on the outlet valve 49 together with the lifting force of the first floating body 48 will lift the connecting member 44.

[0041] Fig. 6b illustrates the hook-up mechanism 52 during the initiation of the flushing operation with the first flush volume when the first lifting means 43a is in its uppermost position.

[0042] In response to the lifting force from the first floating body 48 and the water, the first lifting means 43a and the engagement member 45 will disengage as the connecting member 44 will be displaced maximally a first distance, which is controlled such that the hook up mechanism 52 will not engage, as will be described below.

[0043] The maximum displacement of the connecting member 44 is controlled by a stopping member 57 and a displacement limiting means 58 for controlling the amount of water exiting the cistern as will be explained below. In this embodiment, the stopping member 57 is only operated when the flushing operation with the first flush volume is actuated. In this embodiment, stopping member 57 is part of the first transfer means 41a, and may be formed as a hook facing the outlet valve 49. The displacement limiting means 57 is connected to the connecting member 44, and is in this embodiment provided as a boss positioned in the longitudinal axis of the flushing device 40 below the engagement member 45. Thus, when the lifting means 43a and the engagement member 45 are disengaged, the connecting member 44 is further displaced such that the stopping member 57 and the displacement limiting means 58 engage. The maximum displacement of the connecting member 44 during a flushing operation with the first flush volume is thus determined by the distance the first lifting means 43a lifts the connecting member 44 plus the distance between the stopping member 57 and the displacement limiting means 58 when the first lifting means 43a and the engagement member 45 is in an engaged position and the first lifting means 43a is in its uppermost position.

[0044] In an alternative embodiment, the stopping member is attached to the second transfer means. When the first transfer means is actuated, the stopping member attached to the second transfer means engages the displacement limiting means. The maximum displacement of the connecting member is determined as described above.

[0045] Fig. 6c illustrates the hook-up mechanism 52 when the connecting member 44 is displaced the first distance, i.e. maximally displaced during the flushing operation with the first flush volume wherein the hook-up mechanism is still not engaged.

[0046] Fig. 7 illustrates a flushing operation with the second flush volume. When the second flush volume is selected, i.e. the user depresses the first selection means 6a, the second leg 7b will exert a force on the contact surface 42b of the second transfer means 41b, as described above. The first leg 7a is detached from the first contact surface 42a during the entire flushing operation with the second flush volume. The second transfer means 41b transfers the force to the second lifting

means 43b, which engages the engagement means 45. The force applied to the engagement means 45 will actuate the connecting member 44 in the direction of the longitudinal axis of the flushing device 40 towards the actuation unit. As described above, when the outlet valve 49 is lifted, the water flowing out of cistern will exert a lifting force on the outlet valve 49 in the direction of the longitudinal axis of the flushing means 40. The lifting force on the outlet valve 49 together with the lifting force of the first floating body 48 will lift the connecting member 44. In response thereto, the second lifting means 43b and the engagement member 45 disengage and the connecting member 44 is further displaced. The connecting member 44 will be displaced a second distance, which is larger than the first distance and which is controlled such that the hook up mechanism 52 will engage the protruding member 60, as will be described below. When the connecting member 44 is displaced the first distance during a flushing operation with the first flush volume, the hook up mechanism does not engage protruding member.

[0047] The maximum displacement of the connecting member 44 during the flushing operation with the second flush volume is controlled by a second stopping member. The connecting member 44 has flanges 62 (one shown) extending from the upper end of the connecting member 44 in the longitudinal direction of the flushing device 40. The second stopping member may be formed as one or two fixed bridges 63a, 63b, which enter between the flanges 62. Thus, when the connecting member 44 is displaced the bridge 63a, 63b terminates the upwardly motion of the connecting member 44 during a flushing operation with the second flush volume. The maximum displacement of the connecting member 44 during the flushing operation with the second flush volume is thus determined by the distance the second lifting means 43b lifts the connecting member 44 plus the distance between the bridge 63a, 63b and upper end of the connecting means 44 when the connecting means is in its lowermost position.

[0048] Figs. 8 and 9 illustrate the operation of the hook up mechanism. In Fig. 8, the outlet valve 49 is partly open. When the flushing operation with the first flush volume is selected, the connecting member 44 will be maximally displaced the first distance, as described above. The protruding member 59 extends in the radial direction of the connecting member 44 and is connected to the outlet valve 49 or the connecting member 44. The protruding member 59 is arranged such that it will not engage the hook up mechanism 52 during a flushing operation with the first flush volume due to the less displacement of the connecting member 44, but engage the hook up mechanism 52 during a flushing operation with the second flush volume. The first end 53 of the hook up mechanism 52 has a tapering, in which the protruding member 59 may be received. The length of the first portion of the hook up mechanism 52 to the tapering is longer than the maximum displacement of the pro-

truding member 59 during the flushing operation with the first flush volume, as illustrated in Fig. 6c. Thus, the hook up mechanism 52 and the protruding member 59 will not engage during the flushing operation with the first flush volume. Once the level of the water in the cistern is such that the lifting force of the water and the first floating body 48 is less than the force of gravity of the displaced parts of the flushing device 40, the outlet valve 49 will be closed.

[0049] Fig. 9 illustrates the hook-up mechanism 52 during a flushing operation with the second flush volume in an engaged position. When a flushing operation with the second flush volume is selected, the connecting member 44, and the protruding member 59, will be maximally displaced the second distance, wherein the hook up mechanism 52 and the protruding member 59 will engage. The second floating body 50 provides a lifting force on the shaft 51 when surrounded by water, which displaces the shaft 51 and pivots the hook up mechanism 52, and its first end 53, towards the protruding member 59. The displacement of the protruding member 59 during the flushing operation with the second flush volume is larger than a lower end of the tapering, but smaller than the upper end of the tapering.

[0050] Then second floating body 50 has a recess for housing water to limit its lifting force. Alternatively, the lifting force provided by the floating body 50 may be adjusted by adjusting its density. Thus, when the level of the water is at least partly below an upper end of the second floating body 50, the force of gravity of the second floating body 50 will return the hook up mechanism to its initial position, wherein the outlet valve 49 closes.

[0051] In Fig. 8, the first floating body 48 is adjusted for a flushing operation with the first volume, which comprises a first quantity of water, whereas in Fig. 4 it is adjusted for a flushing operation with the first flush volume, which comprises a second quantity of water. The second quantity being is larger than the first quantity. Similarly, in Fig. 4 the second floating body 50 is adjusted for a flushing operation with the second flush volume, which comprises a first quantity of water, whereas in Fig. 8 it is adjusted for a flushing operation with a second flush volume, which comprises a second quantity of water, the second quantity being larger than the first quantity. Thus, the quantity of water of the first flush volume may be smaller than the quantity of the second flush volume, or vice versa.

[0052] Fig. 10 illustrates an alternative embodiment of the hook up mechanism. The second transfer means 141b comprises an engagement member 159 directed outwardly from the longitudinal direction of the flushing device. The second floating body 150 is displaceably arranged on the exterior of the flushing device. The second floating body 150 is axially adjustable relative the outlet valve 49. The second flush volume may be regulated by adjusting the height of the second floating body 50 relatively to the outlet valve 49. The second floating body 150 may be slideably attached to the shaft 151.

Ridges of the second floating body 150 mate with ridges of the shaft 151. Alternatively, the shaft 150 and the second floating body 150 are arranged in a fixed relationship, wherein the shaft 151 is adjustably connected to the flushing device. The second floating body 150 is easily accessible from the outside of the cistern when the cover is removed. A detent 152 is pivotally connected to the flushing device and connected to the shaft 150 and the second floating body. The engagement member 159 and the detent 152 are arranged to engage during a flushing with the second flushing volume. When the second transfer means 141b is actuated, the second lifting means 143b urges the engagement means 145 and the connecting member 45 upwards, wherein the engagement member 159 and the detent 152 engage and the outlet valve 49 opens to release water. When the water level in the cistern is at least partly below the second floating body 150, the engagement member 159 and the detent 152 will disengage due to the force of gravity acting on the second floating body 150.

[0053] The flushing device comprising the mechanism according to the invention may be mounted within a cistern of a toilet. A bottom end of the flushing device may be adjustably mounted to an outlet opening of the cistern provided in the bottom thereof. By providing an elastomeric washer between the flushing device and the cistern where the device enters the outlet hole, the top of the flushing device may be radially adjustable.

[0054] The cover of the cistern has a hole, through which the actuator unit may be connected to the flushing device. The actuator unit may e.g. be snapfitted to the flushing device. If the opening of the cover and the bottom hole of the cistern are somewhat misaligned, the actuator assembly will center the flushing device to the hole of the cover when it fits into the flushing device. Furthermore, the actuator assembly may fix the cover to the cistern when it engages the flushing device.

[0055] In the description, relative terms, such as upper and lower, have been used for indicating the mutual relationship between different parts of the invention when positioned for operation. As is understood, the parts could have another mutual relationship when the invention is not positioned for operation.

[0056] The present invention has been described above with reference to specific embodiments. However, other embodiments than the above described are equally possible within the scope of the invention. The invention is only limited by the appended patent claims.

Claims

1. A mechanism for a flushing device (40) for flushing a toilet, comprising at least one transfer means (1, 1a, 1b, 41a, 41b) for transferring a force applied to the transfer means to an connecting member (4, 44) for connecting the transfer means and an outlet valve (49), the flushing device comprising a longi-

tudinal axis along which the connecting member is displaceable, the transfer means comprising a contact surface (2, 2a, 2b, 22a, 22b, 42a, 42b) and a lifting means (3, 3a, 3b, 43a, 43b) and being pivotally attached to the flushing device between the contact surface and the lifting means **characterized in that**

the transfer means is arranged to transfer the force to the connecting member in the direction of the longitudinal axis of the flushing device when said force is applied to the contact surface in a direction outwardly from said longitudinal axis.

2. The mechanism according to claim 1, wherein the transfer means is an arcuate lever (41a, 41b). 15
3. The mechanism according to claim 1 or 2, wherein the contact surface (22a, 22b) of the transfer means (2a, 2b) has an arcuate cross section. 20
4. The mechanism according to any of the previous claims, further comprising an actuation unit (5, 5a) having a rocker button (6, 6a, 6b) connected to at least one leg (7a, 7b), which is arranged to apply said force to the contact surface (2, 2a, 2b, 22a, 22b, 42a, 42b) when the rocker button is depressed. 25
5. The mechanism according to claim 4 or 5, wherein the actuation unit (5, 5a) is detachably attached to the flushing device. 30
6. The mechanism according to claim 4 or 5, wherein the leg (7a, 7b) and the contact surface (2, 2a, 2b, 22a, 22b, 42a, 42b) are arranged to, in operation, cooperate in a mutually sliding relationship. 35
7. The mechanism according to any of the previous claims, wherein the mechanism comprises a first and a second transfer means (1a, 1b, 41a, 41b), said first transfer means (1a, 41a) being arranged to actuate the connecting member (4, 44) to cause a flushing operation with a first flush volume when the force is applied to the contact surface (2a, 42a) of the first transfer means, and the second transfer means (42a, 42b) being arranged to actuate the connecting member to cause a flushing operation with a second flush volume when the force is applied to the contact surface (2b, 42b) of the second transfer means. 40 45 50
8. The mechanism according to any of the previous claims, wherein a floating body (50, 150) is displaceably connected to an outer periphery of the flushing device (40), said floating body being displaceable in the direction of the longitudinal axis of the flushing device and arranged to actuate a hook up mechanism (52, 152) for engagement with a protruding member (59, 159). 55

9. The mechanism according to claim 8, wherein the floating body (50, 150) is slideably attached to a displaceable shaft (51, 151) for regulating the quantity of water of a flushing.

10. The mechanism according to claim 8 or 9, wherein the mechanism is provided at a first end of the flushing device (40), and the hook up mechanism (52) is pivotally connected to the flushing device at a second end thereof, said hook up mechanism being arranged to fail to engage a protruding member (59) connected to the outlet valve (49) when the actuator and the outlet valve are displaced a first distance and arranged to engage the protruding member when displaced a second distance.

11. The mechanism according to any of the claims 7 to 10, wherein the mechanism comprises a means for displacing the connecting member (44) a first distance when the first transfer means (41a) is actuated and a second distance when the second transfer means (41b) is actuated.

12. The mechanism according to claim 11, wherein a stopping member (57) is arranged to engage a displacement limiting member (58) connected to the connecting member (44) for limiting the amount of displacement of the connecting member and the outlet valve (49) when the first transfer means is actuated.

13. A toilet comprising a cistern, in which the mechanism according to claim 1 for flushing the toilet is mounted.

14. The toilet according to claim 13, further comprising a cover for covering an opening of the cistern, said cover having an opening into which an actuation unit (5, 5a) is inserted and attached to the mechanism, which is adjustably mounted to an outlet opening of the cistern for centering the flushing device (40) to the opening of the cover.

15. Use of the mechanism according to any of the claims 1 to 13 for flushing a toilet.

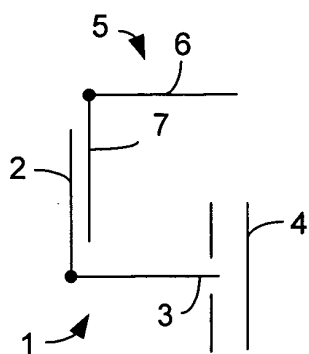


Fig. 1a

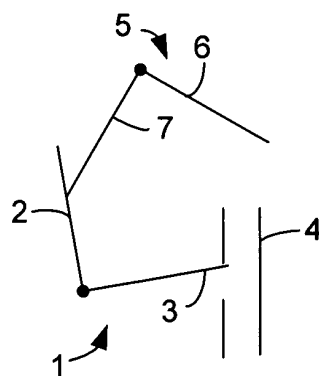


Fig. 1b

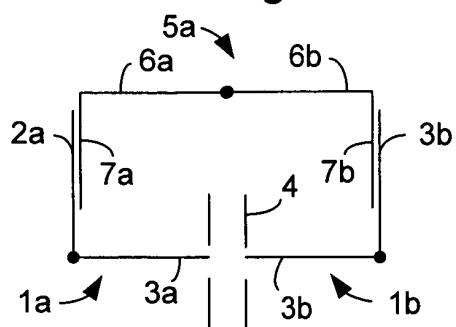


Fig. 2a

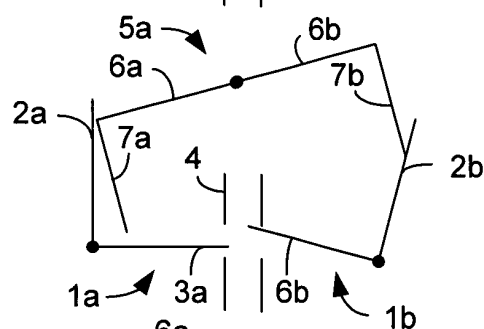


Fig. 2b

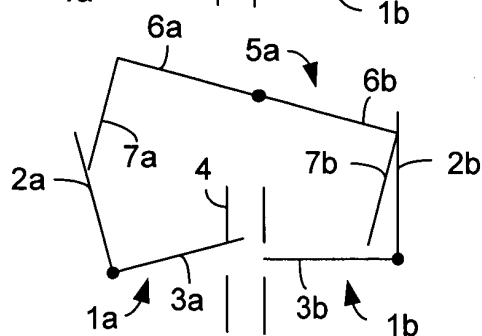


Fig. 2c

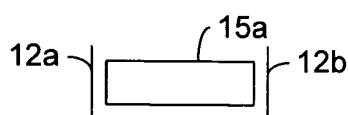


Fig. 3a

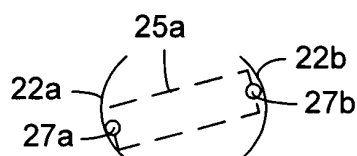


Fig. 3b

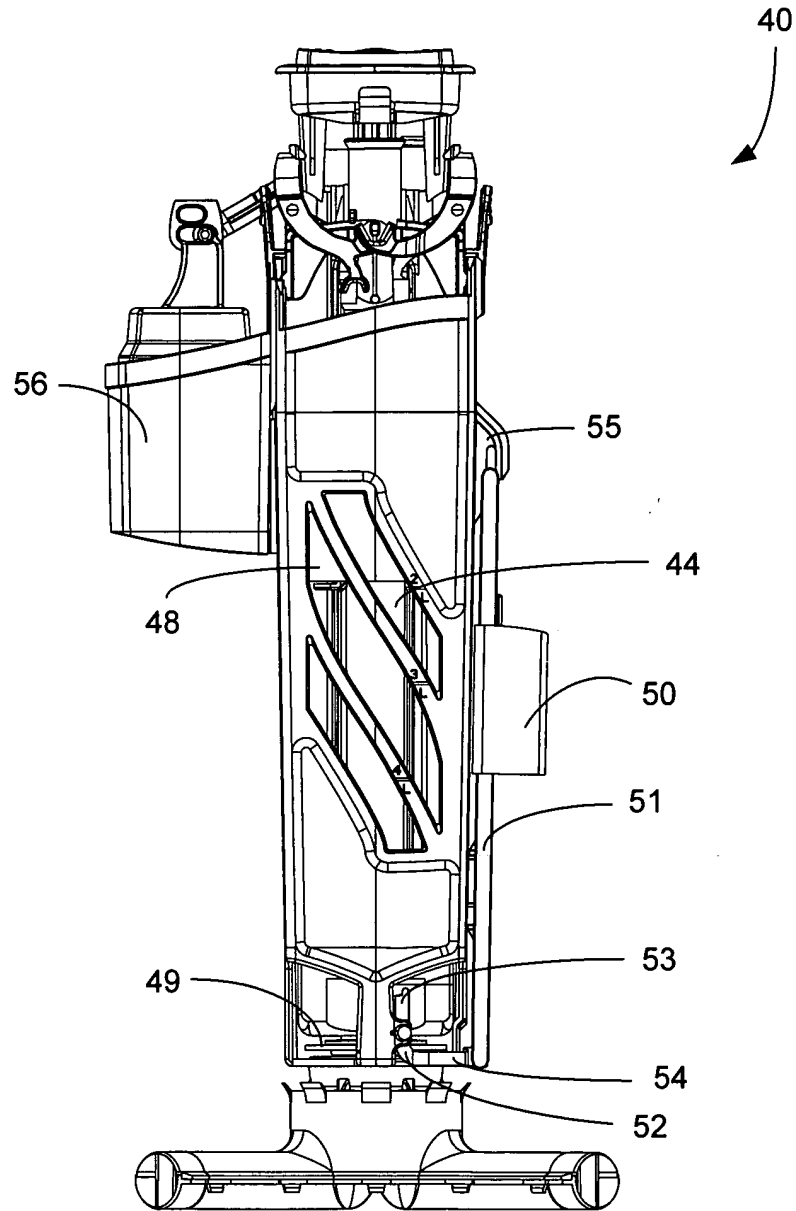


Fig. 4

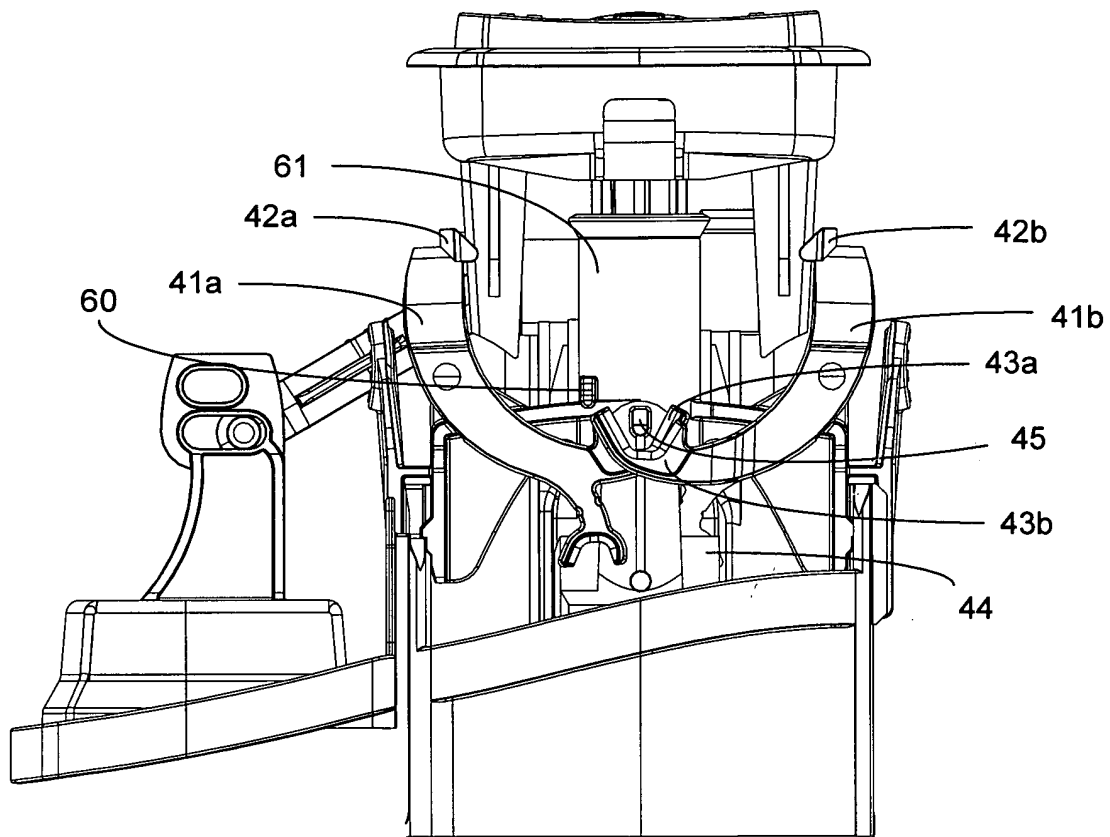


Fig. 5

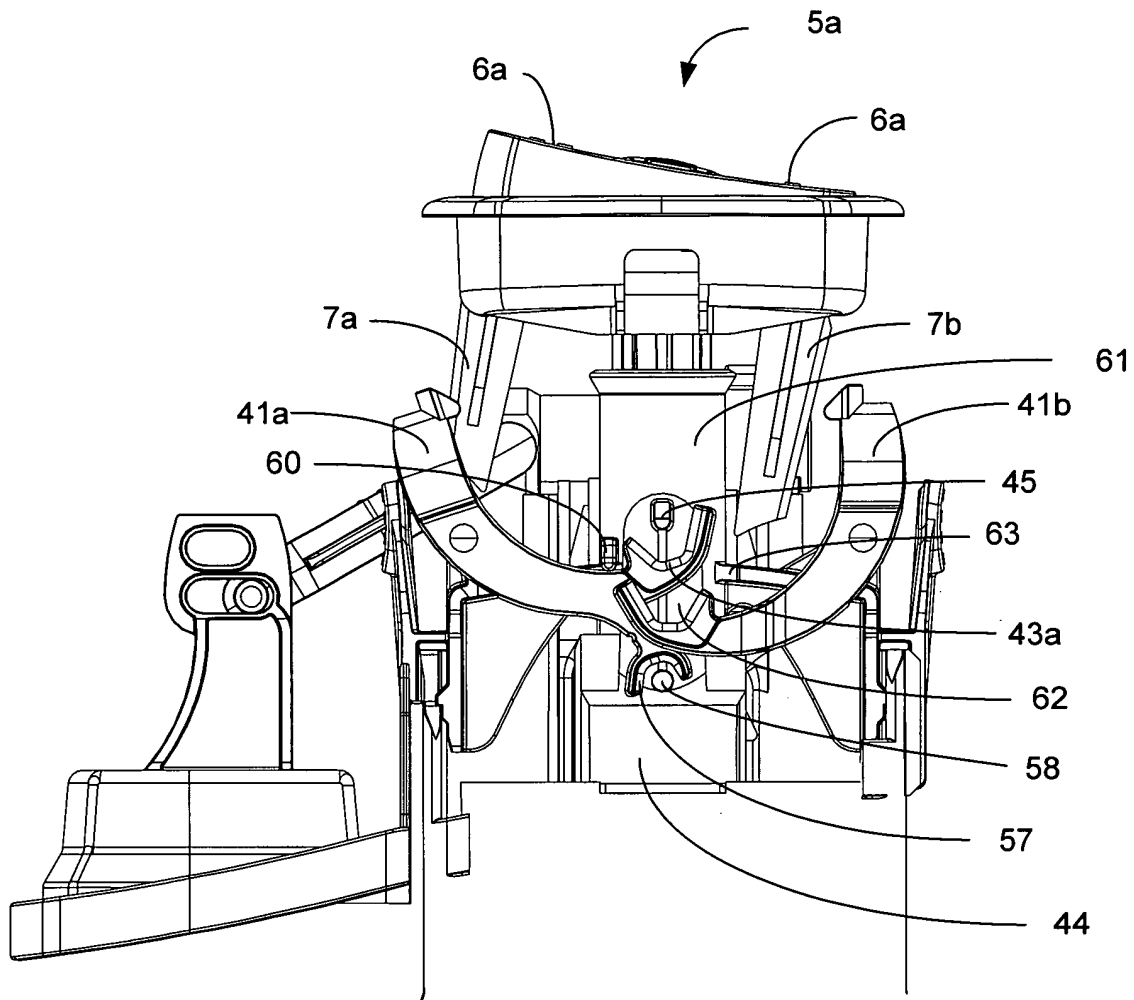


Fig. 6a

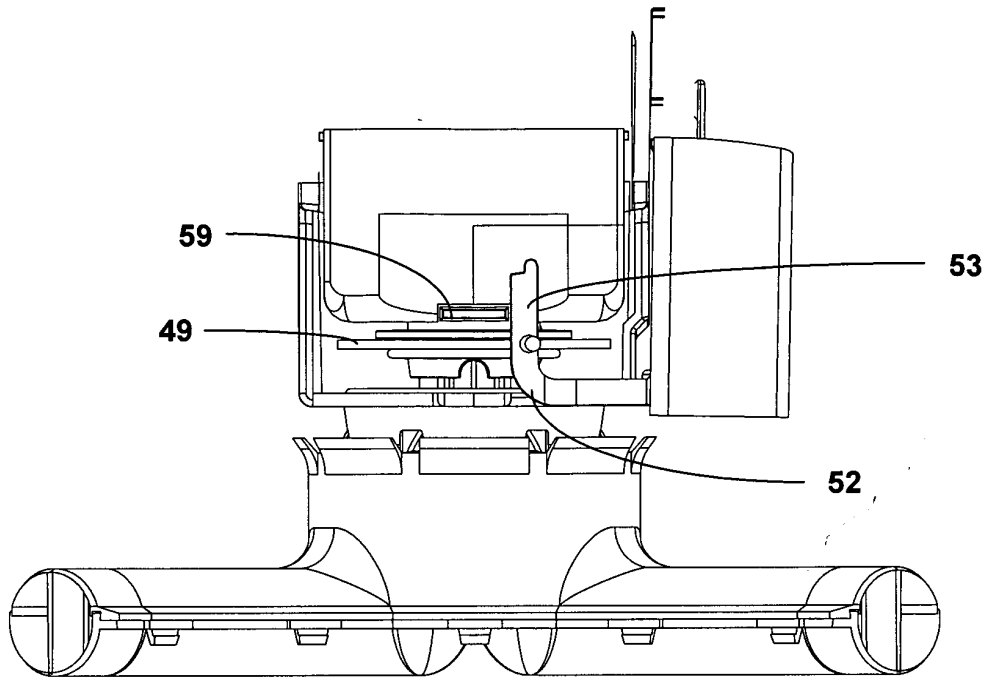


Fig. 6b

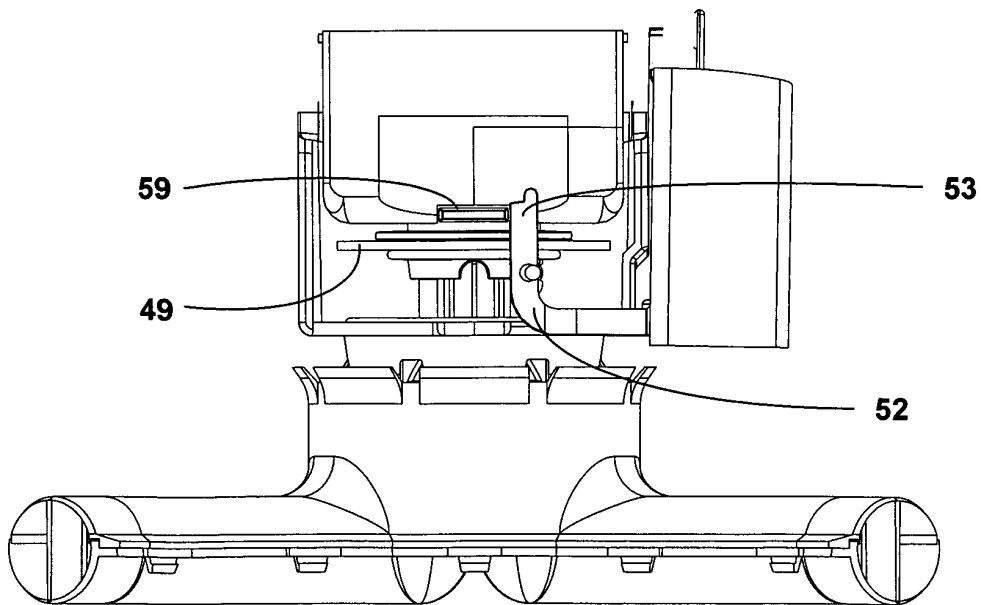


Fig. 6c

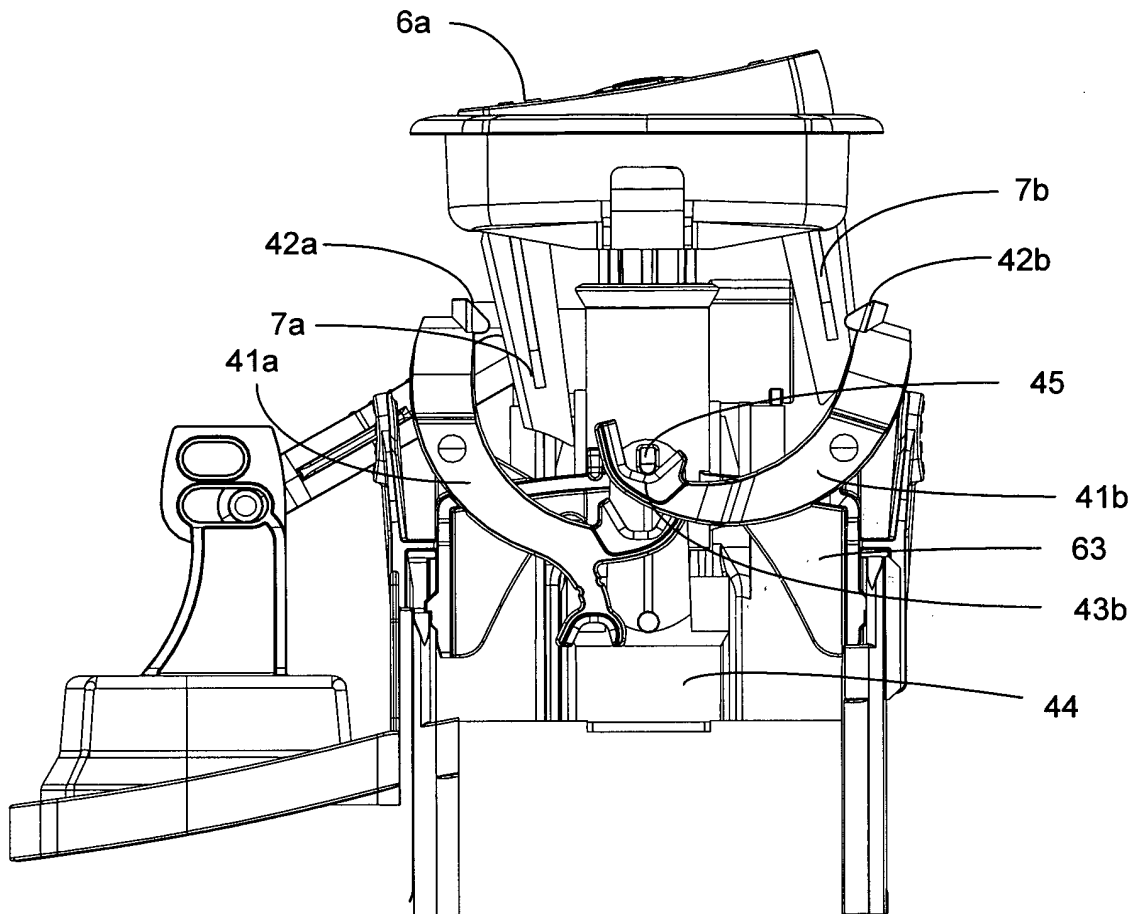


Fig. 7

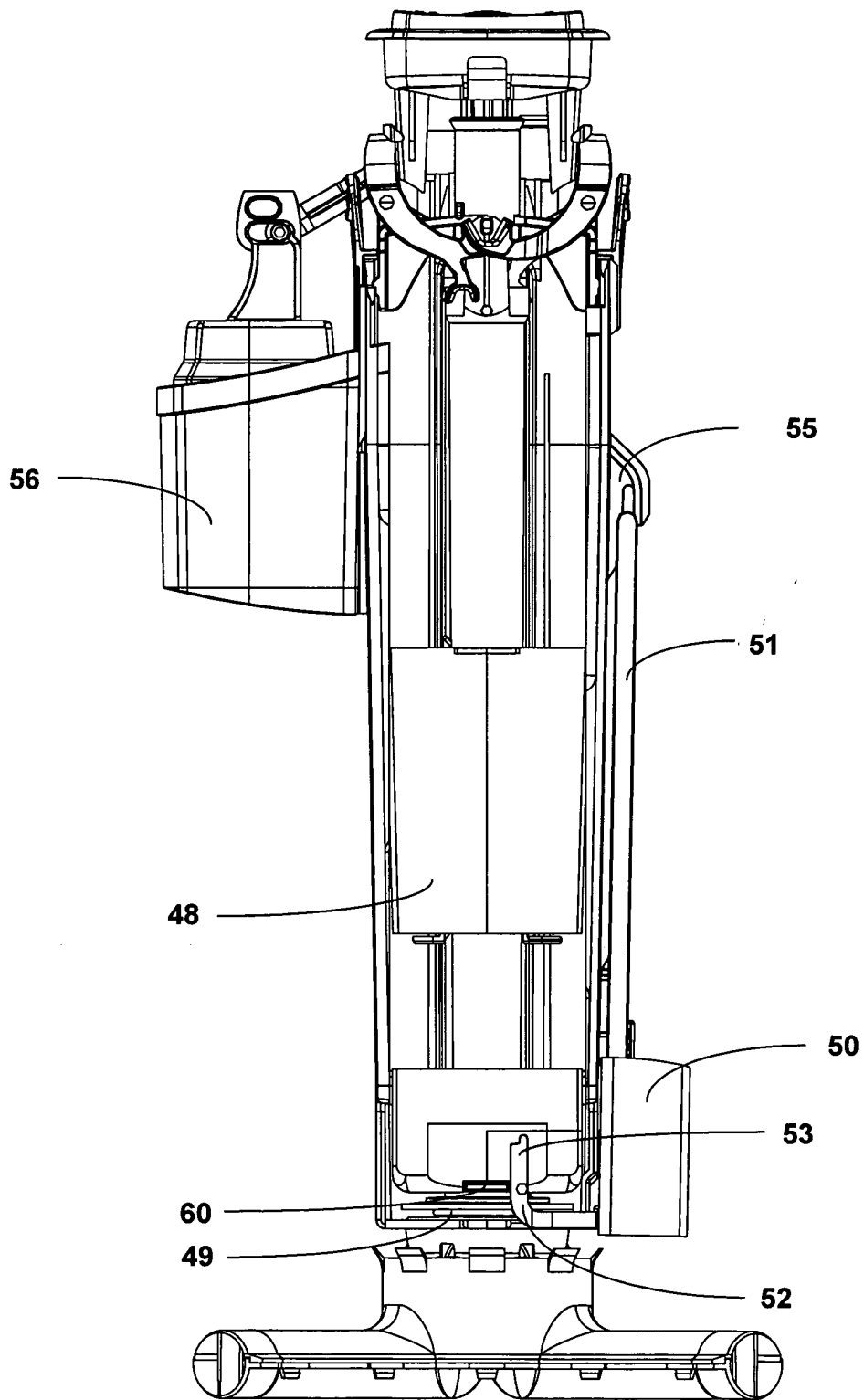


Fig. 8

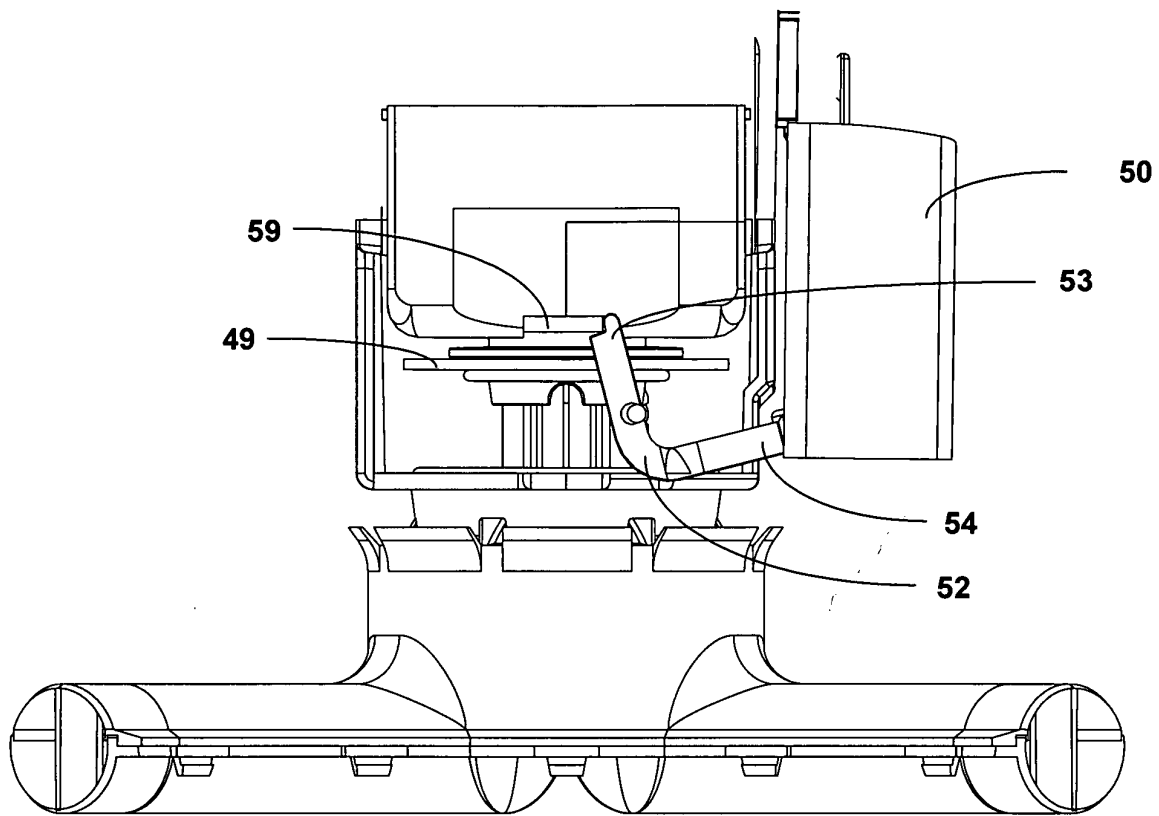


Fig. 9

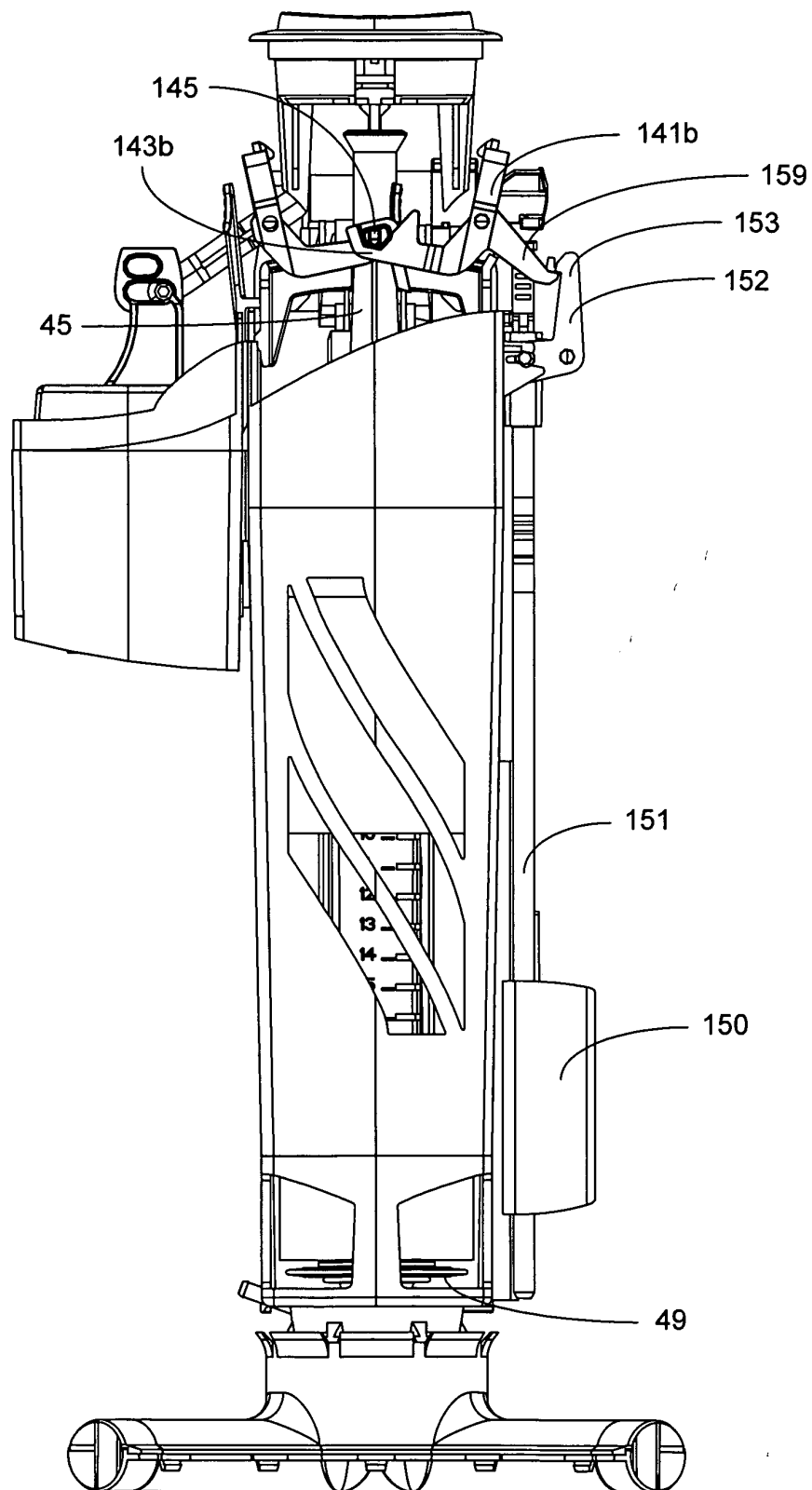


Fig. 10



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EUROPEAN SEARCH REPORT

Application Number
EP 04 01 0659

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.7)
X	EP 1 191 158 A (OLIVEIRA & IRMAO SA) 27 March 2002 (2002-03-27) * column 1, line 49 - column 2, line 46; figure 1 * -----	1-5, 13-15	E03D5/092
			TECHNICAL FIELDS SEARCHED (Int.Cl.7)
			E03D
The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 22 September 2004	Examiner De Coene, P
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document	

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22-09-2004

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		PL 349803 A1	25-03-2002

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