(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) **EP 2 098 649 A2**

(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
09.09.2009 Bulletin 2009/37

(51) Int Cl.:
E03D 1/14 *(2006.01)* ***E03D 1/33*** *(2006.01)*

(21) Application number: **09468002.2**

(22) Date of filing: **06.03.2009**

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

(30) Priority: **07.03.2008 SI 200800051**

(71) Applicant: **Kolektor Liv Predelava Plastike D.o.o.**
6230 Postojna (SI)

(72) Inventors:
- **Lenarcic, Janko**
  6257 Pivka (SI)
- **Gustincic, Matjaz F.**
  6230 Postojna (SI)

(74) Representative: **Golmajer Zima, Marjanca**
Patentna pisarna d.o.o.
Copova 14
P.O. Box 1725
1001 Ljubljana (SI)

(54) **Flush valve allowing a selection of a quantity of flush water in a toilet tank**

(57) Flush valve allowing a selection of a quantity of flush water in a toilet tank comprising a tubular housing (2) having two longitudinal slots (12) with shaped bearings in mutual distance, a closing bar (5) coaxially arranged within said housing and having two longidutinal ribs (14) comprising spaced notches (15) and/or indentations, wherein said closing bar (5) is arranged in a way that each slot (12) of said housing is aligned with each rib (14), and a horseshoe shaped float (9) having adequately shaped coaxial plugs and teeth, said plugs acting as hinges and allowing said float (9) to oscillate, wherein said float (9) is in permanent engagement with a bearing (13) of said slot of said housing (2) via plug and in sporadic engagement with a corresponding notch (15) of said rib (14) of said closing bar (5), wherein said tubular housing (2) has a chamber (22) of an adequate shape at its bottom end.

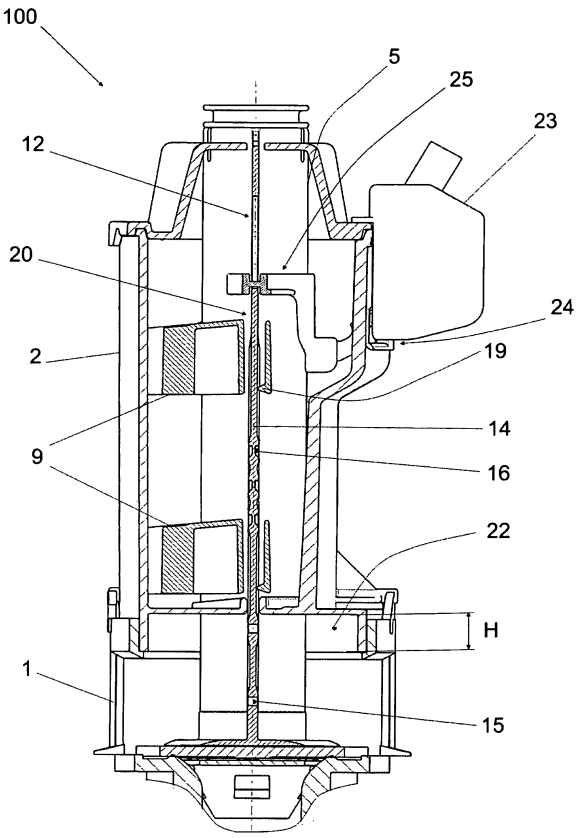

Fig. 1

EP 2 098 649 A2

Description

Subject of Invention

[0001] The subject of the present invention is a sink closing device allowing a selection of a quantity of flush water in a toilet tank.

Technical Problem

[0002] The technical problem solved by the present invention is how to construct such sink closing device in a toilet tank, preferably a toilet tank with a double sink, that will allow for a simple and evident manner of optional n-time changing / setting of a quantity of flush water, wherein there will be a possibility of interruption of flushing in a desired moment at a preset quantity of flush water and such closing device can be built in a toilet tank of any type without use of any tool also by the user himself, wherein the closing device must allow for complete assembling on an automatic line.

Prior Art

[0003] Toilet tanks of nowadays must not only meet strict regulations and tests about the quantity of flush water but also adapt to client's wishes. To keep water consumption at the lowest level possible, toilet tanks having a double sink are often used. Due to different shapes and capacity of toilet tanks and requirements regulating the quantity of flush water in individual countries there is a tendency for such sink closing devices that allow a selection of flush water quantity. Selection of flush water quantity may either be implemented upon final assembly of the sink closing device in the factory or may be set by a person specialised in installation. In case of a double sink one quantity may be selected, whereas the second quantity is fixed.

[0004] ES 1037249 (Singla Palacin) discloses a sink closing device allowing flushing of a toilet tank with a large and small quantity of flush water. The sink closing device comprises a multipart housing, a closing bar connected via arm mechanism with a triggering button for water flushing, a two-part float for a large quantity of flush water that is fixed in direction of the longitudinal axis of the closing device/bar and is hingedly connected within the housing, and a single-part float for a small quantity of flush water that is linked in a form-locking manner to the flushing bar via adequate tooth and a notch on the flushing bar. In axial direction the float may be moved in steps by the size of individual pre-set distances between individual notches. The large quantity of flush water is predetermined as a function of a toilet tank by the construction of the two-part float, move of the closing bar in axial direction and fixed height of fastening of the two-part float on the closing bar. Selection of large quantity of flush water cannot be changed subsequently. The same closing device cannot be built into another toilet tank of a different capacity or shape. The small quantity of flush water may be changed by moving the one-part upper float within tolerances allowed by the distances on the flushing bar, yet the quantity of change, i.e. new selected quantity is not evident from an individual move. The closing device consists of a large number of constituent elements formed in a way that assembling of the closing device cannot be performed on automatic lines, at least not completely.

[0005] EP 1650366A1 (Guaita de Lila) discloses a closing mechanism for large and small quantity of water, whereas the float for setting the large quantity of water is located within the housing of the closing mechanism and outside the float for selecting the small quantity of water is located outside the housing of the closing mechanism and is adapted to the external surface of the housing of the closing mechanism. The float of the large quantity of water is hinged by means of a hinge plug/hole to a determined fixed height of the housing and determines in co-operation with the step on the closing bar flushing of the large quantity of flush water. The quantity of water cannot be changed and is factory set by the height of the step on the closing bar as a function of the shape and size of the toilet tank.

[0006] The float of the small quantity of flush water has a built-in guide, in which a bar with a rack and elastic engaging element is guided in vertical direction. The bar of the lever engages with the latter. The lever is connected with the housing of the closing element of the sink via hinge. In open position of the closing device the transversal bar of the lever leans against the stage arranged on the circumference of the closing bar and the float keeps the closing device in open position due to the buoyant force. The small quantity of flush water may be changed by lifting/lowering the external float on the rack. The quantity of sink water may be changed from very small to considerably large, yet the user does not know what is the quantity for which he had actually changed and what is water consumption in each emptying of the toilet tank. The mechanism allowing the selection of water quantity is complicated, consisting of numerous mutually engaging parts. The minimum/maximum quantity of flush water is limited by the length of the bar defined by the height of the toilet tank. A mechanism constructed in this way does not allow for assembling on automatic lines, which is a must in the production of products of this type.

[0007] The large quantity of flush water cannot be changed by means of a float. Only the speed of water flow from the housing of the closing device may be changed by changing the size of light opening that is located as an additional element on the external surface of the housing of the closing device. This shortens the flushing time and consequently the quantity of flush water. The quantity of flush water changes only in the sense more/less, whereas such regulation lies within very narrow limits, is only approximate and is not fixed. Setting of flush water quantity is not precise and fails to meet the

requirements for repeatability in testing procedures of a toilet tank. Moreover, the engaging opening and the respective water display are additional elements in the assembly.

[0008] The described sink closing device consists of a multitude of constituent parts / subassemblies. The constituent parts are of very demanding shapes, which calls for extremely precise and expensive thermoplastic tools for injection moulding. Since the details are very demanding, it is difficult to ensure the required quality level in series production, which results in huge scrap and consequently higher production costs.

[0009] Regulation of the quantity of flush water can be carried out by the user, yet it is imprecise, complicated and the selection of the large quantity of flush water is thus normally performed by a professional upon the installation of the product. Moreover, the described closing device consists of numerous constituent parts of various types, which makes assembling on an automatic line impossible.

[0010] All described solutions share a common disadvantage, namely the quantity of flush water cannot be changed during flushing. In case of changed flush water the current flushing must be left to complete. Then the toilet tank needs to be opened and the quantity of flush water re-set, which setting remains unchanged until next new setting. Although re-setting of the quantity of flush water may be performed in a relatively simple way and optionally often, an intervention in the toilet tank / closing device is needed. Such sink closing device does not allow an interruption of flushing, specially of the large quantity of water, during the flushing procedure, e.g. should a user select the wrong knob for water triggering.

[0011] Unlike the above, the sink closing device renders it possible to interrupt the current flushing, however, such sink closing device only has one, factory set quantity of flush water. Unless the user interrupts flushing, the maximum quantity of flush water is flushed upon each flushing. Flush water consumption depends on user's consciousness. The sink closing device conceptually comprises a mechanism for triggering flush water that allows lifting, withholding and forced lowering of the closing bar. This is the reason why such mechanisms are normally very complex and consist of numerous constituent parts, which makes them impossible to be assembled on automatic lines. Moreover, such mechanism for triggering flush water needs a certain space for building in and is not suitable for being embedded into an optional type of toilet tank.

[0012] A special problem regarding the regulation of the quantity of flush water appears with toilet tanks for high installation, in which a double sink closing device cannot be built in, nor can interruption be implemented.

Solution to the Technical Problem

[0013] The described technical problem is solved by a sink closing device of the invention comprising a tubular housing having two longitudinal slots - preferably diametrically opposite - with shaped mutually spaced bearings, a coaxially arranged closing bar with two longitudinal ribs in said housing, said ribs comprising mutually spaced notches and/or indentations, wherein said closing bar is arranged in a way that each slot of said housing is aligned with each rib, and between said housing and said bar there is a horseshoe shaped float, each leg of which comprises a notch with an adequately shaped plug and a tooth, wherein said float is permanently form locked via plug with the bearing of the slot of said housing and sporadically form locked via tooth with the belonging notch of the rib of the closing bar. The plugs are coaxial and function as hinges allowing oscillation of said float around hinge axles. The housing, closing bar and float are mutually arranged in a way that the slots, ribs and plugs are mutually aligned and lie on a common axis perpendicular to the longitudinal A-A axis of the sink closing device / housing, which axis is simultaneously also the oscillation axis of the float, and preferably co-operates with the transversal central axis of the sink closing device / housing.

[0014] Upon triggering / lifting of the closing bar, the plug engages with its tooth into previously determined notch of the rib due to buoyant force exerted on said plug. When the water level in the toilet tank falls below the float due to water flowing through the flush opening of the toilet tank, the buoyant force is absent, the force of gravity of the float causes the latter to oscillate in opposite direction, wherein the tooth of said float unlatches from the notch of the rib and the closing bar returns to the closed position.

[0015] By slidingly moving the plug from one bearing into another within the slot of the housing and herewith moving the plug in height within said housing, the adequately shaped tooth in the flushing mode engages with another notch of the rib of the bar corresponding to the shift. A consequence of the changed height of the float is a changed time of presence of the buoyant force on the float and thus on the quantity of flush water. The distances between bearings are formed in a way to correspond to a certain quantity of flush water, the value of which is explicitely indicated on the housing.

[0016] Each bearing is designed to allow the plug to oscillate around its axis and simultaneously prevents the plug from moving up and down in the slot without any external force being exerted thereon. Should the plug be shifted from one bearing into another one, the bearing elastically moves apart and the plug slides down or up the slot.

[0017] A relatively weak buoyant force is sufficient for the operation of a plug constructed in this way and the size of the plug is adequate thereto. Due to a very small size of the plug more than one plug can be installed in the sink closing device of the invention, preferably two plugs in case of a double-sink toilet tank. In the latter case, two identical floats are arranged mutually vertically spaced, wherein each float has its own bearings in the same two slots of the housing and adequately belonging

notches and/or indentations in the same two ribs, which do mutually not overlap. Setting of a desired quantity of flush water is performed by slidingly pushing the plug up or down within the slot of the housing from one bearing into another one, preferably by hand. In case of two floats, each individual quantity of flush water may be set / changed in a simple way, independently on each other. The quantity of flush water may be changed any time without use of any tool and without any special expert knowledge.

[0018] In case of too strong buoyant force / too weak gravity force of the float that returns the closing device to the closed position, the float may have at least one indentation of an adequate size on its upper surface receiving water, which contributes to the total mass of the float and increases the gravity force acting against the buoyant force. A consequence of the small size of the float is also the design of the entire closing device of the toilet tank, which is reflected in diminished dimensions of the closing device, lower mass of the entire closing device and also savings in the production of each individual product.

[0019] Further, the technical problem is solved by a sink closing device having a tubular housing, wherein said tubular housing has an adapted open chamber on its bottom end towards the sink of the toilet tank, said chamber having space in height, which allows for an additional clearance/lifting of the closing bar in repeated activation of the manual mechanism for triggering flush water during current flushing. The space in height of the chamber is smaller than the distance between two adjacent notches / indentations on the rib of the closing bar. The tooth of the float is conical, which makes engagement with the notch and especially unlatching from the notch easier.

[0020] Upon water triggering, the mechanism for triggering flush water lifts the closing bar for the height of the previously set clearance and the tooth of the float engages with the notch / indentation on the rib of the closing bar. Flush water flows through the opening. Upon a repeated triggering of the same mechanism for triggering flush water, the mechanism acts on the closing bar again. The tooth of the float in this case unlatches from the notch of the rib and the closing bar shifts axially by the height of the clearance equalling the height of the down opened chamber adapted to the shape of the tubular housing. After the mechanism for triggering flush water is released, the closing bar shifts axially downwards due to its own gravity force. The shifting of the closing bar prevents the tooth of the float to engage with the notch of the rib of the closing bar. The closing bar shifts downwards to its initial position, i.e. to the flush opening of the toilet tank and closes it. Flowing out of flush water is interrupted.

[0021] The sink closing device of the invention makes it possible to install the mechanism for triggering flush water both on the upper part of the closing bar and in an adequate bearing on the external circumference of the tubular housing of the sink closing device. In the first instance, such sink closing device may be installed into a toilet tank for low installations in both on-wall and in-wall variants. In case of the mechanism with wire transfer of a known type that is connected to the closing bar in the area within the tubular housing via levers, the sink closing device of the invention can be built to any types of toilet tanks, regardless of the fact whether the toilet tank is meant for high or low installations, on-wall or in-wall variants, made of ceramics.

[0022] The sink closing device of the invention built into a toilet tank allows the user to select a large or small quantity of flush water and to interrupt flushing, especially in case of the large quantity of flush water.

[0023] The sink closing device has a single construction regardless of the type of toilet tank into which it will be installed. It can be installed into an optional toilet tank without having to perform any changes in the construction of individual component parts. The height of the closing device of the toilet tank specific for each type of toilet tank is individually adaptable by means of a telescopic upper end of the closing bar. The number of constituent parts is minimum and independent on the type of toilet tank. Tolerance in engagements between individual constituent parts is much more considerable than production tolerance of individual parts. This is the reason why the sink closing device can be produced on automatic lines that do not require a very precise positioning of individual parts. The sink closing device of the invention is thus not only adequate for large series production but also cost effective.

[0024] The invention will now be described in more detail by a description of an embodiment and the enclosed drawings, showing in:

Fig. 1 Sink closing device in initial position; longitudinal cross-section
Fig. 2 Housing of the sink closing device in perspective view
Fig. 3 Bar of the sink closing device in perspective view
Fig. 4 Float of the sink closing device in perspective view
Fig. 5 Sink closing device during release of a large quantity of flush water; longitudinal cross-section
Fig. 6 Sink closing device upon interruption of release of a large quantity of flush water; longitudinal cross-section
Fig. 7 Tooth of a float, partial section from Fig. 1

[0025] A sink closing device 100 allowing a selection of a quantity of flush water in a toilet tank comprises

- a fastening ring 1 for fastening said closing device 100 into a toilet tank not shown on figures,
- a tubular housing 2 having an element 3 on its bottom end for connection with said fastening ring of said toilet tank and having an element 3' on its upper end

for the connection with a cover 4 comprising a central opening,

- a closing bar 5 coaxially arranged within said housing 2, said bar having a conically shaped bottom end 6, with which it reaches into the release opening of the toilet tank, and a flange 7, and that has on its upper telescopically designed end 8 an element (not shown) with at least one lug for the engagement with the manual mechanism for triggering flush water, and
- at least one float 9, preferably two in the double sink closing device.

[0026] The tubular housing 2 of said closing device is constructed in a way that within a lateral surface area 10 of said housing there are two longitudinal slots 12 with shaped bearings 13, wherein said slots are parallel to each other and also to the longitudinal axis A-A of said housing 2 / said closing device 100, preferably diametrically opposed to to the transversal axis B-B of said housing 2 of said closing device 100. The location of each individual bearing 13 or rather the height of its distance from the bottom of the toilet tank (not shown) defines the quantity of flush water flowing from the toilet tank upon the closing device is triggered. Said bearings 13 are arranged in a pre-determined mutual distance.

[0027] Said closing bar 5 has two longitudinal ribs 14 extending substantially long the entire length of said closing bar 5, said ribs being preferably diametrically opposed. Said closing bar 5 is arranged within said housing 2 concentrically, so that each slot 12 of said housing 2 and each rib 14 of said bar 5 are aligned, preferably in a way that pairs slot/rib lie on the transversal axis B-B of said housing 2 or rather said closing device 100 of said bar. Each rib 14 comprises more than one notch 15 and/or more than one indentation 16, wherein said indentations 16 are arranged over said notches 15. Both notches 15 and indentations 16 are mutually spaced, the space corresponding to the distance of said bearings 13 in each slot 12 of said housing 2.

[0028] In the area between said housing 2 and said closing bar 5 there is a horseshoe shaped float 9, each end of which comprises a U-notch 17 extending on the height of said float 9. At its upper edge said float 9 has a plug 20 with its shape adapted to each external side of the bottom of said notch 17. Said plug 20 engages with a selected bearing 13 of said housing 2 and acts as a hinge allowing said float 9 to oscillate. Said plug 20 reaches through said bearing 13 or said notch 12 and ends with a member 21 for easier vertical movement of said float 9 within said slot 12. At the bottom side, a distal side 18 of said notch 17 has an adequate tooth 19 that is aligned with the bottom edge of said float 9, said tooth 19 reaching into said notch 17, yet not further than the centre of said notch 17. Said notch 17 acts as a guide to said rib 14 in lifting / lowering said closing bar 5 at a selected quantity of flush water and is a guide to said float 9 when setting the quantity of flush water parallel to the longitudinal axis A-A of said housing 2.

[0029] At a selected quantity of flush water said float 9 permanently engages with a selected bearing 13 of said slot 12 of said housing 2 via plug 20, and sporadically engages with a corresponding notch 15 of said rib 14 of said closing bar 5 via correspondingly shaped tooth 19. Upon triggering / lifting of said closing bar 5, said tooth 19 of said float 9 engages into a selected notch 15 of said rib 14 due to the buoyant force. When the water level in the toilet tank falls under said float 9 due to the water flowing through the sink opening, the buoyant force is no longer active and the gravity force of said float 9 causes it to oscillate in opposite direction, wherein said tooth 19 of said float 9 unlatches from said notch 15 of said rib 14 and said closing bar 5 is released and returns to the closed position.

[0030] The quantity of flush water changes if the height of said float 9 changes in said sink closing device. The height of said float 9 in said closing device may be changed by pushing said plug 20 vertically up or down by means of said member 21 from one bearing into another bearing, wherein said bearing 13 extends elastically.

[0031] Said float 9 may have one or more indentations of a certain shape on its upper side in order to increase the gravity force.

[0032] As the height of said float is small relative to the height of said closing bar, more than one float 9 may be arranged in height in the closing device of the invention. In this way more than one quantity of flush water may be selected independently, preferably two quantities of water in a toilet tank with a double sink. In such example the second float is identical to the first one in shape and size and is arranged at a distance above the first float, preferably in same direction. Said rib 12 of said closing bar 5 comprises indentations 16 in the area of said second float. Said indentations are mutually spaced, the spaces corresponding to the spaces of said bearings 13 within said slot 12 of said housing 2 and correspond to pre-set small quantities of flush water. Said indentations 16 and said notches 15 have a mutual distance allowing for said tooth to latch only at a selected quantity of flush water.

[0033] No tool neither special skills are needed to shift said float. It can be shifted any time without having to make an intervention in the construction of a toilet tank.

[0034] A sink closing device 100 allowing a selection of a quantity of flush water in a toilet tank comprises a fastening ring 1 for fastening said closing device into a toilet tank (not shown), a tubular housing 2 comprising two longitudinal slots 12, a closing bar 5 with two longitudinal ribs 14 comprising more than one notch 15 and at least one indentation 16 and at least one horseshoe shaped float 9, preferably two, in a double sink toilet tank, said toilet tank having two plugs 20 and teeth 19 of a corresponding shape, wherein said closing bar 5 is arranged within said housing 2 in a way that each rib 14 is aligned with each slot 12 of said housing 2 and each plug

20 of said float 9 is aligned with said rib 14 of said closing bar 5 and said slot 12 of said housing 2 and each slot 12, said rib 14 and said plug 20 lie on a common axis. On its bottom end said tubular housing 2 has a chamber 22 of an adequate shape, said chamber being open towards the sink of the toilet tank and having the height H smaller than the distance between two adjacent notches 15 / indentations 16 on said rib 14 of said closing bar 5. Said height H of said chamber 22 allows for an additional clearance/lifting of said closing bar 5 in repeated activation of a manual mechanism for triggering flush water during current flushing.

[0035] Said tooth 19 of said float is conically shaped, wherein a lateral surface 26 of said tooth facing the interior of said float is formed of two surfaces 26', 26" that embrace an angle α or β with their central line A of said tooth 19. The angle α being the angle between the central line A of said tooth and the belonging flat surface of said surface 26' is larger than the angle β which is the angle between the central line A of said tooth and the belonging flat surface of said surface 26". The angle α may assume values between 15° and 60°, preferably between 30° and 45°. The conical shape of said tooth 19, especially a less considerable tilt of said lateral surface 26" at the root of said tooth allows for said tooth to engage with said notch 15 and to maintain said closing bar in the open position. A more considerable tilt of said lateral surface 26' at the top of said tooth 19 increases the possibility of sliding of said lateral surface 26' of said tooth at the flange of said notch 15 and thus decreases the possibility of said tooth to engage with said notch 15 during the interruption of flushing.

[0036] The thickness of said tooth 19 at the root is smaller than the with of said notch 15 on said rib 14.

[0037] The mechanism for triggering flush water can be installed on the sink closing device of the invention via an element on the upper part of said closing bar. As shown in the embodiment, installation is also possible in a mechanism 23 with wire transfer of a known type to a bearing 24 on the external circumference of said tubular housing 2 of said sink closing device. Said mechanism 23 with wire transfer is connected with said closing bar 5 / each rib 14 of said closing bar via simple lever 25.

[0038] It is understandable that a man skilled in the art may design other embodiments based on the knowledge of the above disclosure without circumventing the essence of the invention defined in the appended claims.

Claims

1. Sink closing device allowing a selection of a quantity of flush water in a toilet tank comprising a fastening ring for fastening said closing device into a toilet tank, a housing, a closing bar coaxially arranged within said housing, said bar being in engagement with a flush water triggering mechanism via an element, and at least one float, preferably two floats in a double sink closing device, **characterised in that** it comprises a tubular housing (2) having two longitudinal slots (12), a closing bar (5) with two longitudinal ribs (14) comprising more than one notch (15) and at least one indentation (16), and at least one horseshoe shaped float (9) having adequately shaped plugs (20) and teeth (19), wherein said closing bar (5) is arranged within said housing (2) in a way that each rib (14) is aligned with each slot (12) of said housing (2) and each plug (20) of said float (9) is aligned with said rib (14) of said closing bar (5) and said slot (12) of said housing (2), wherein each slot (12), said rib (14) and said plug (20) lie on a common axis, perpendicular to the longitudinal axis (A-A) of said housing (2), preferably on a central axis (B-B) of said housing (2).

2. Sink closing device allowing a selection of a quantity of flush water in a toilet tank, preferably a double sink toilet tank comprising a fastening ring for fastening said closing device into a toilet tank, a housing, a closing bar coaxially arranged within said housing, said bar being in engagement with a flush water triggering mechanism via an element, and at least one float, preferably two floats, **characterised in that** it comprises a tubular housing (2) comprising two longitudinal slots (12), a closing bar (5) with two longitudinal ribs (14) having more than one notch (15) and more than one indentation (16), and two horseshoe shaped floats (9) having adequately shaped plugs (20) and teeth (19), wherein said closing bar (5) is arranged within said housing (2) in a way that each rib (14) is aligned with each slot (12) of said housing (2) and each plug (20) of said float (9) is aligned with said rib (14) of said closing bar (5) and said slot (12) of said housing (2), wherein each slot (12), said rib (14) and said plug (20) lie on the central axis (B-B) of said housing (2).

3. Sink closing device as claimed in Claims 1 or 2, **characterised in that** said tubular housing (2) has a chamber (22) of an adequate shape at its bottom end.

4. Sink closing device as claimed in Claims 1 or 2 and 3, **characterised in that** said longitudinal slot (12) of said housing (2) comprises more than one shaped, elastically extendable bearing (13), wherein said bearings are arranged at a previously defined mutual distance.

5. Sink closing device as claimed in Claims 1 or 2 and 4, **characterised in that** said float (9) is in permanent form locking engagement with said bearing (13) of said slot (12) of said housing (2) via plug (20), and in sporadic form locking engagement with a corresponding notch (15) of said rib (14) of said closing bar (5) via tooth (19).

6. Sink closing device as claimed in any preceding Claims, **characterised in that** said rib (14) of said closing bar comprises more than one notch (15) in mutual distance corresponding to the distance of said bearings (13) of said slot (12) and at least one indendation (16) arranged above said notches (15).

7. Sink closing device as claimed in Claim 1 or 2, **characterised in that** each rib (14) extends substantially along the entire length of said closing bar (5).

8. Sink closing device as claimed in Claim 1 or 2, **characterised in that** it comprises a horeshoe shaped float (9) and a U-notch (17) on each end extending in the height of said float (9).

9. Sink closing device as claimed in Claim 9, **characterised in that** it comprises a horseshoe shaped float (9) having on each external side of the bottom of said notch (17) at its upper edge a correspondingly shaped plug (20) with an element (21), wherein said plug (20) co-operates with a selected bearing (13) of said housing (2).

10. Sink closing device as claimed in Claim 8, 9, **characterised in that** said horseshoe shaped float (9) has at a distal side (18) of said U-notch (17) a correspondingly shaped tooth (19) reaching into the interior of said notch.

11. Sink closing device as claimed in any of preceding claims, **characterised in that** said floats are identical and arranged in mutual distance one above another.

12. Sink closing device as claimed in any of preceding claims, **characterised in that** said closing bar (5) has a telescopically designed upper end.

13. Sink closing device as claimed in Claim 3, **characterised in that** said chamber (22) has a height H that is smaller than a distance between two adjacent notches (15) of said rib (14) of said closing bar (5).

14. Sink closing device as claimed in Claims 3 and 13, **characterised in that** said chamber (22) is open towards the flush opening of said toilet tank.

15. Sink closing device as claimed in preceding Claims **characterised in that** said tooth (19) of said float (9) is designed conically, wherein a lateral surface (26) of said tooth facing the interior of said float is formed of two surfaces (26', 26") that embrace an angle (α, β) with the central line (A) of said tooth (19), with the angle (α) being larger than the angle (β).

16. Sink closing device as claimed in Claim 15, **characterised in that** said angle (α) between said central line (A) of said tooth (19) and the belonging surface (26') may assume values between 15° and 60°.

17. Sink closing device as claimed in Claim 16, **characterised in that** said angle (α) between said central line (A) of said tooth (19) and the belonging surface (26') may assume values between 30° and 45°.

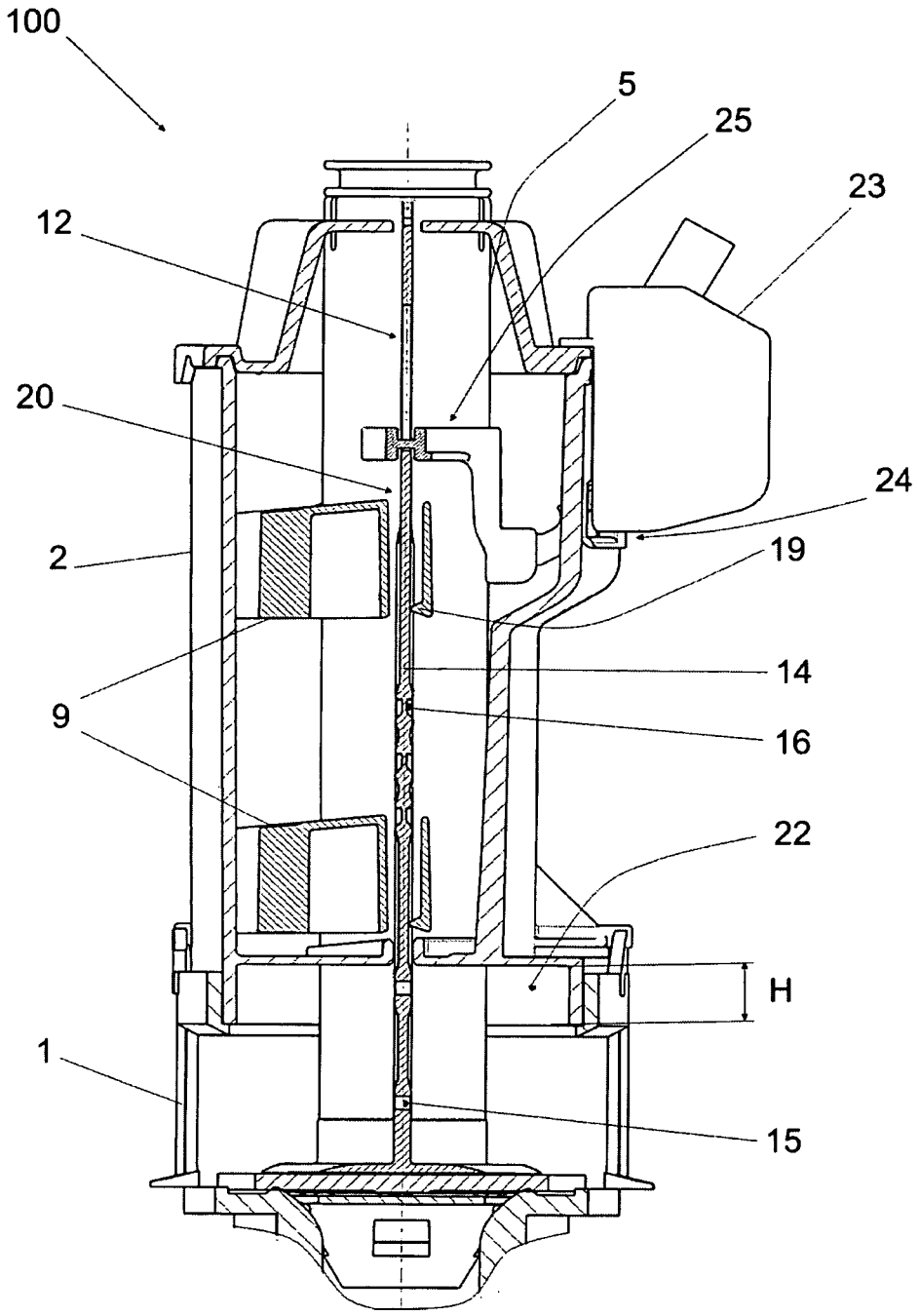

Fig. 1

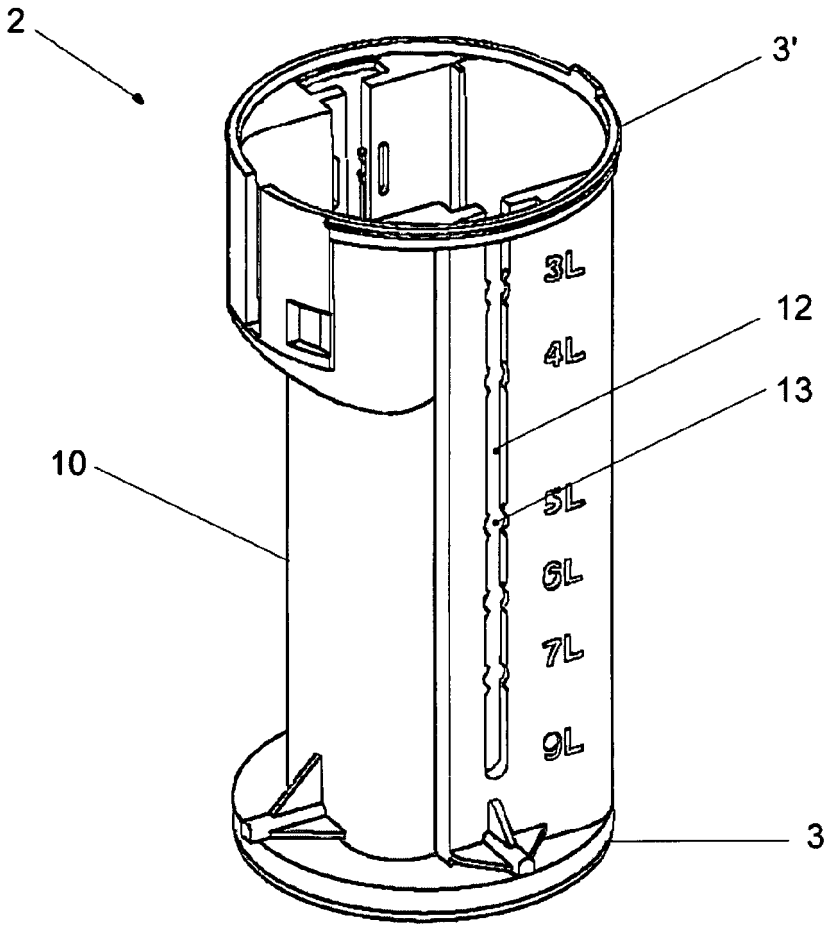

Fig. 2

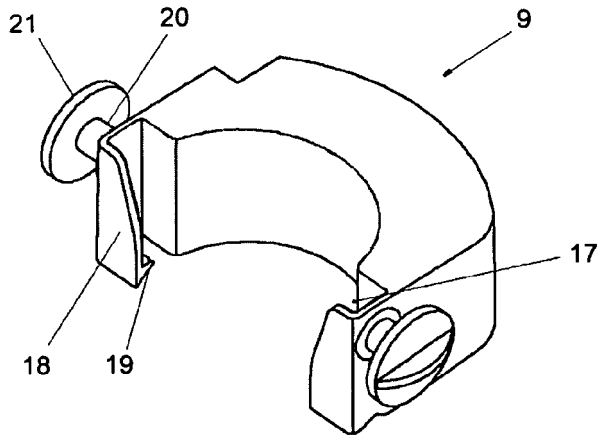

Fig. 4

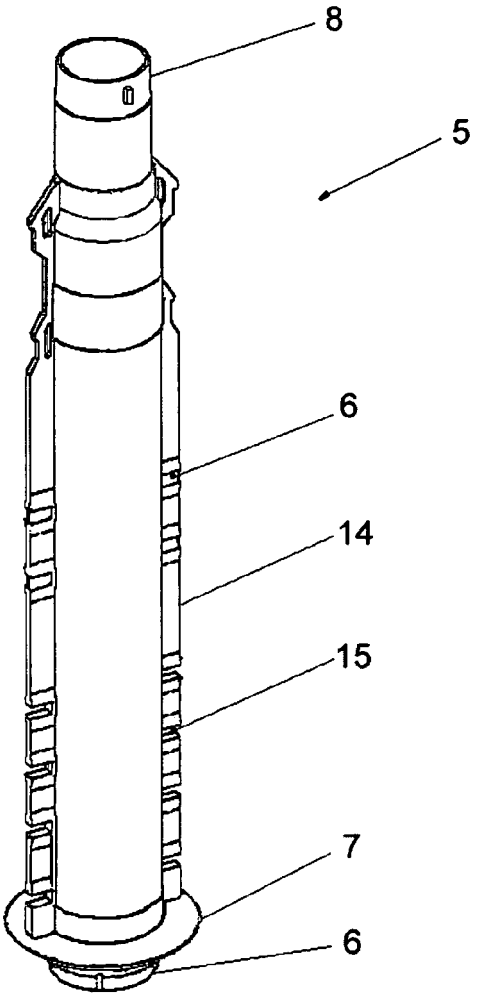

Fig. 3

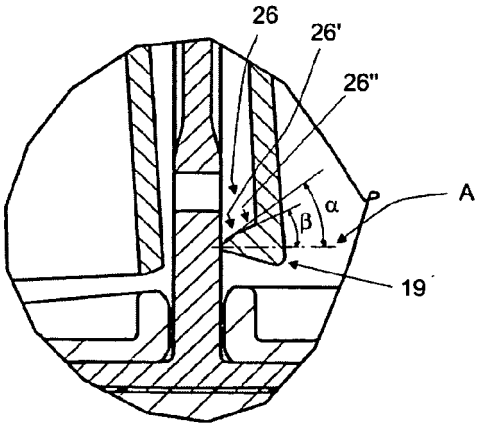

Fig. 7

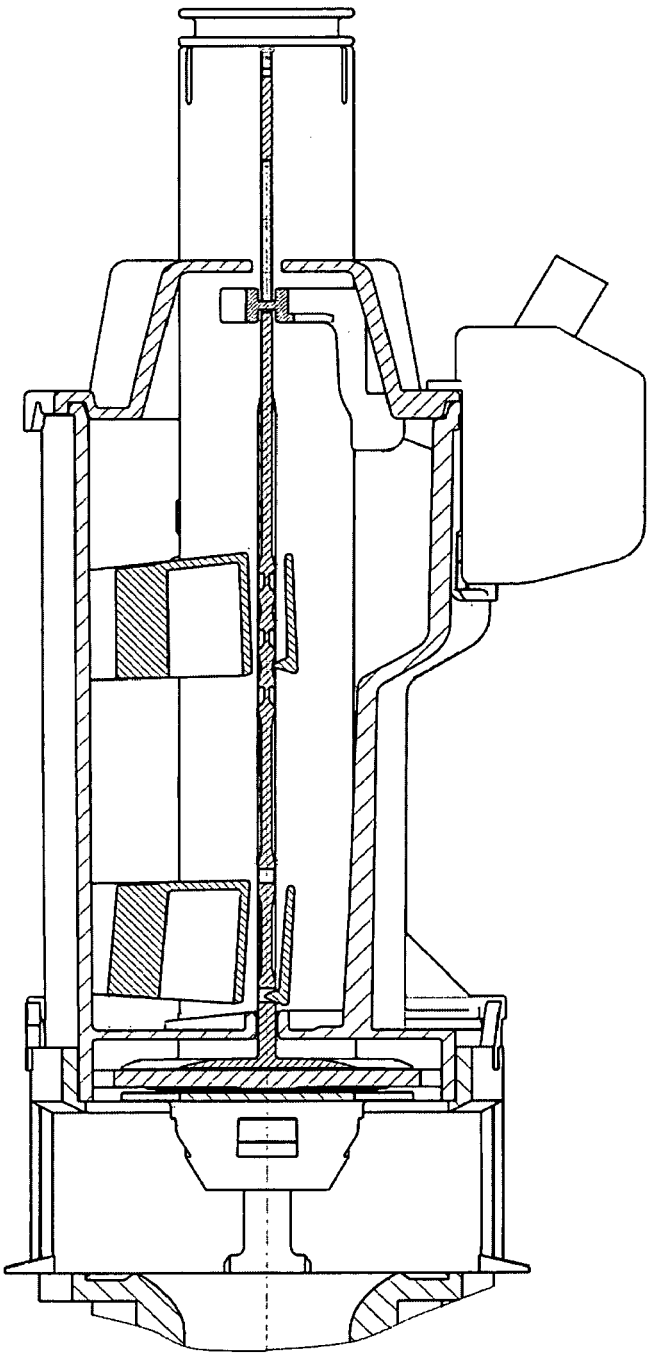

Fig. 5

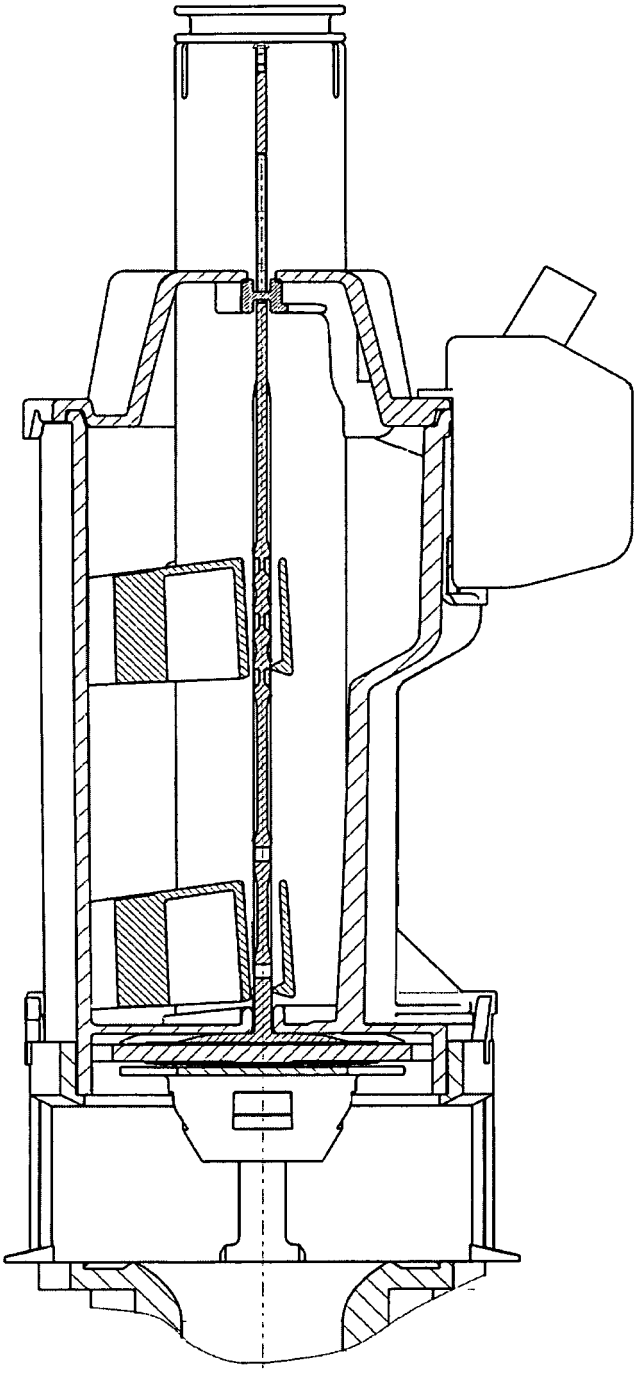

Fig. 6

REFERENCES CITED IN THE DESCRIPTION

This list of references cited by the applicant is for the reader's convenience only. It does not form part of the European patent document. Even though great care has been taken in compiling the references, errors or omissions cannot be excluded and the EPO disclaims all liability in this regard.

Patent documents cited in the description

- ES 1037249 **[0004]**
- EP 1650366 A1 **[0005]**