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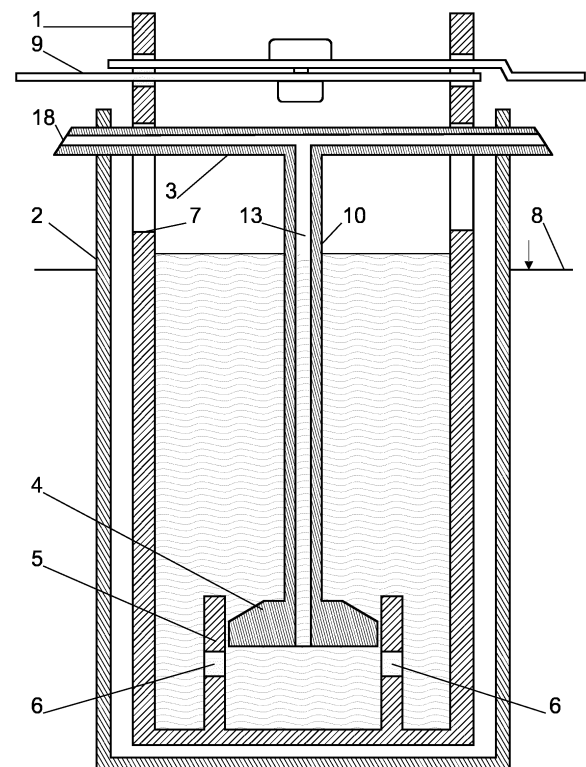
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(54) LIQUID DISPENSER IN THE FLUSHING TANK

(57) The dispenser has a vessel (1) for the liquid, a piston (4) and a cylinder (5), where the piston (4) is connected with the float body (2) floating on the water in the tank (12). The vessel (1) is solidly connected with the tank (12) and the top edge (7) of the vessel (1) is above the top water level (8) in the tank (12). The cylinder (5) is placed by the bottom of the vessel (1) and it has at least one inflow opening (6) for free flow of the liquid from the vessel (1) to the cylinder (5). The piston (4) is connected with the float body (2) by means of the piston rod (10) and the partition (3) for the purposes of pushing the piston (4) into the cylinder (5) during the descent of the float body (2) downwards and for the lifting of the piston (4) in the vessel (5) during the lifting of the float body (2), whereby the partition (3) is placed above the top edge (7) of the vessel (1) and the piston (4) or the cylinder (5) have an outpushing pipe or hose (13) for pushing out the liquid into the water in the tank.

**Fig. 4**

Description

Field of technology

[0001] The invention concerns a fluid dispenser in the flushing tank, suitable mainly for dispensing disinfection and/or deodorant liquids in the tank for flushing toilet. The invention provides efficient dispensing in the final stages of the flushing and its construction does not require sealing of the movable parts.

Prior state of the art

[0002] Dispensers placed in the flushing tank are known, such as the ones which dispense and provide chemical liquid to the water in the final stage of the flushing for the disinfection of the toilet bowl and to freshen the air in the toilet's environs. The published patent file SK289102B6 discloses an automatic dispenser inside the toilet tank for flushing, which has a pump with a suction valve, whereby the pump has a piston connected with the toilet float by means of a connecting rod and a lever.

[0003] Automatic dispenser according to this patent remedies part of the deficiencies in hitherto used methods of maintaining toilet hygiene, but the construction solution with multiple moving parts is complicated and there is a risk of damages caused by long term use. At the same time, this solution is demanding with regard to space, which decreases the available volume of the vessel with the disinfection liquid. When the reverse valve malfunctions, there is undesired mixing of the water and the dispensed liquid.

[0004] Devices for dispensing chemical substance in the flushing tank are also known, such as US4312082, CN217399835U, GB2567689A, CN112647570A, EP2434064A1. In case of device pursuant to US4312082, the sealing of the piston is used in the construction of the pump, which increases the demands for precision of the components and there is an increased resistance during the movement of the piston in the cylinder. The sealing is worn during the friction between the sealing of the piston and the wall of the cylinder, which diminishes the reliability and longevity of the device.

[0005] CN217399835U discloses a device for preparation of the disinfection liquid by means of solid disinfection pill, whereby the tank contains a mixing chamber, a piston rod and a sealing between the rod and the lid of the tank. Usage of solid disinfection pill, however, is accompanied by risk of imperfect or irregular dissolution and the sealing by risk of gradual failure in the aggressive environment.

[0006] GB2567689A discloses a device for dispensing the disinfection or deodorization liquid with the reverse valve and multiple springs which are likely to wear, which increases the risk of mechanical failure.

[0007] A solution is desired and not known, which will achieve the dispensing of the liquid to the water during the final phase of flushing, whereby the device shall be

simple, with small number of movable parts and without the need to use the sealing, since these are source of the risks during the long-term operation in the aggressive environment.

Essence of the invention

[0008] Deficiencies in the prior art are significantly remedied by the dispenser of the liquid in the flushing tank which includes a vessel for the liquid, a piston, a cylinder for sucking the liquid from the vessel and for pushing the liquid to the water in the vessel, where the piston is connected with the float body, floating on the water in the tank, the water in the tank is maintained between the top level when the tank is full and bottom level after the flushing, according to this invention, whose essence lies in the fact that the axis of the piston and the cylinder is basically perpendicular, the cylinder is part of the vessel for the liquid, the vessel is solidly connected with the tank and the top edge of the vessel is above the level of the top water level in the tank, the cylinder is placed at the bottom of the vessel and it has at least one inflow opening for the free transfer of the liquid from the vessel to the cylinder, the piston is connected, by means of the piston rod and the partition, with the float body for the pushing of the piston to the cylinder during the drop of the float body below and for the lifting of the piston in the cylinder during lifting of the float body, whereby the partition is placed above the top edge of the vessel and the piston or the cylinder have outpushing (delivery) piping for the delivery (push) of the liquid to the water in the tank, where the outpushing piping runs from below to the piston or to the cylinder upwards through the level of the top edge of the vessel.

[0009] This basic arrangement ensures that the liquid is pushed out of the cylinder during the decrease of the level in the tank, that is, at the moment of flushing. The liquid is effectively added mainly to that part of the water which remains in the toilet bowl and this saves large amount of liquid which would otherwise proceed directly to the sewage, without a chance to operate for a longer term in the toilet bowl. The invention provides an arrangement which does not require various sealings and which significantly increases reliability and durability of the device. The solid connection of the vessel for the liquid with the water tank ensures the transfer of the forces during the operation of the piston in the cylinder. The cylinder is part of the bottom of the vessel and it is created in such a way that it is plugged to the bottom of the vessel, whereby the inflow opening is by the bottom of the vessel. An arrangement is possible, too, where the vessel is an indivisible part of the tank, for example it is produced in a single piece or it is welded or it is similarly connected into a single piece.

[0010] The vessel for the liquid has a top edge defining the maximum liquid level in the vessel. The top edge is placed above the top liquid level in the tank, which reliably separates the water from the liquid in every position, that

is, during the maximum fill of the water in the tank and during the maximum liquid level in the vessel, too. The vessel for the liquid can be open from above, whereby the water from the tank does not flow into the vessel with the liquid. The vessel does not have any opening or transition towards the water below the level of the top edge and therefore it does not have to be equipped by any sealing. In order to separate the water from the liquid, the tank's wall itself suffices. Above the top edge of the vessel the vessel can be followed upwards by the connecting part and the mean for attaching the vessel in the tank. The vessel can be attached fixedly in the tank in such a way that it captures the force and moment reactions with the movement of the piston in the cylinder. The vessel with the cylinder has stable, non-moving position. The piston, the piston rod, the partition and the float body move, and they are hereinafter call "the moving group". The total weight of the piston, the piston rod, the partition and the float body must be sufficient to press the piston to the cylinder. The liquid is pushed from the cylinder precisely by the weight of the moving group, or the liquid is pushed out of the cylinder by the weight of the partition, the piston rod and the piston in the version in which the float body is not mechanically coupled with the partition during its movement downwards.

[0011] The cylinder is placed by the bottom of the tank so that the liquid is sucked to the cylinder by means of the inflow opening in the sheath of the cylinder, or so that the liquid gravitationally flows into the cylinder, respectively. The inflow opening is placed above the cylinder's bottom and it does not require a suction valve, but during the movement of the piston downwards the inflow opening is covered and basically closed by the piston. The edge of the piston forms the slider cap. The height of the placement of the inflow opening defines basic volume of the liquid which can be pushed into the outputting piping. The actually pushed volume of the liquid then depends on the length of the pushing of the piston to the cylinder's chamber after the outflow opening is closed, and on the amount of the liquid pushed through the gap between the piston and the inner surface of the cylinder. The placement of the cylinder directly into the water tank brings such an advantage that the piston in the cylinder does not have to be particularly sealed, it does not require flexible sealing, the liquid flowing around the circumference of the piston during its pushing to the cylinder remains in the water tank. The lost amount of the liquid penetrating round the circumference of the piston without sealing is basically constant with the given viscosity, temperature and speed of the movement of the piston, and it can be simply compensated by the overall outputting volume of the piston in the cylinder.

[0012] An important feature of the invention is the connection of the piston with the float body, where the piston rod follows upon the piston upwards, and in the upper part the piston rod is connected to the partition. The partition is connected downwards with the float body in such a way that during the ascent of the float body

upwards the piston rod lifts the piston in the cylinder. The partition is basically horizontally shaped and it ensures the transfer of the force mainly onto the lifting of the piston in the cylinder. The connection of the partition with the float body is outside the groundplan of the vessel, and the partition is below the top edge of the vessel. The connection of the partition with the float body can also be inside or on the edge, respectively, of the groundplan of the vessel, where a slidable connection in cases onto the outer side of the vessel is produced. Thanks to this, neither the partition nor the piston rod interferes with the sheath of the vessel with the liquid and there is no need to use sealing. The partition and the upper end of the piston rod are above the top water level in the tank and also above the liquid level in the vessel.

[0013] The float body can be with vertical movement connected with the partition solidly or in such a way that the float body lifts the partition during its movement upwards and during the decrease of the water in the tank the float body can descent independently of the group comprising partition, piston rod and the piston.

[0014] The piston or the cylinder has an outputting pipe or hose for pushing out the liquid to the water in the tank. If the outputting pipe or hose runs out of the piston, the entry opening of the outputting pipe or hose can be placed in the center of the piston. If the outputting pipe or hose runs out of the cylinder, the entry opening of the outputting pipe or hose is placed by the bottom of the cylinder, that is, in the bottom part of the cylinder or by the bottom part of the cylinder. It is important that in both variants the outputting connection runs from below, from the piston or from the cylinder, upwards through the level of the top edge of the vessel, so that the liquid does not flow freely from the cylinder to the water tank. In the same way in which the kinematic gear between the piston and the float body is led above the top edge of the vessel, the outputting pipe or hose with the liquid, too, is led above the top edge of the vessel. This solution does not require the valve in the outputting pipe or hose, and the liquid in the vessel are reliably and without the use of sealing separated from the water in the tank. The transfer of the liquid from the vessel takes place only during the pressing of the piston to the cylinder.

[0015] The basic disclosed arrangement can be realized in various versions with various construction details, whereby it ensures the pushing of the liquid in the final stage of the decrease of the water level in the tank, it has minimal number of the moving parts, and it requires no sealing.

[0016] The float body can include a substance with the specific weight less than the specific weight of the water, preferably significantly less than the specific weight of the water; for example, the float body is produced from the foam polystyrene with low absorptivity, such as the one commonly used with filling valves in the flushing tanks. In another arrangement the float body has a hollow object whose overall weight is less than the weight of the water pushed by it. The hollow object in the function of the float

body is preferably produced as a hollow object open from above, whereby the vessel is inside it. This achieves relatively high buoyancy force of the float body, whose volume can be larger than the volume of the vessel with the liquid, and at the same time it does not significantly increase the overall outer volume of the device. The common chamber of the piston, the piston rod, the partition and eventually the float body must be larger than multiple of the surfaces of the piston and the pressure of the liquid while it flows into the water in the tank. The pressure of the liquid depends on the hydrostatic pressure with regard to the height of the top edge of the vessel and on the hydrostatic pressure of the outpushing pipe or hose. In order to ensure sufficient weight of the moving group, at least on component of the moving group can be equipped by ballast weight. The ballast weight can be, for example, concrete filling of the piston rod, or metal balls in the float body.

[0017] In order to achieve good efficiency of the pumping without the use of the sealing between the piston and the cylinder, it is preferable if the height of the piston is more than the radius of the piston; preferably the height of the piston is twice the radius of the piston. An arrangement is possible, too, where the piston rod in the bottom part has identical shape and size as the piston. The increase of the course for the liquid flowing from the cylinder back to the vessel leads to higher volume efficiency of pumping.

[0018] In one aspect of the invention, the adjustable element can help to achieve the change in the actually pushed volume of the liquid. As the tests of operation proved, it suffices if one dose of the liquid which flows into the water has volume from 1 ml to 10 ml, preferably 2 ml to 5 ml, especially preferably from 2 ml to 3 ml. The actually pushed volume of the liquid depends mainly on the viscosity of the liquid at the given temperature inside the water tank. The user can adjust the volume of the dosed liquid with the adjustable element, whereby the volume can be, for example, first set to minimum and then increased gradually until the user is content with the color of the water in the bowl. The adjustable element controls the course of the movement of the piston in the cylinder until the moment of closure of the inflow opening. The adjustable element can be a screw which sets the length of the piston rod, or it can be a length setting of the connection of the float body with the partition, or it can be a stop of the bottom position of the float body.

[0019] Pursuant to the relatively small amount of the dosed liquid, it is preferable if the liquid which flows from the outpushing pipe or hose is directed directly to the water, preferable at least in place of its outflow from the tank. If the liquid flowed, for example, on the outer surface of the float body or on the inner side of the tank, it would have been late to mix into the water flowing out of the tank at the given cycle of flushing, and it would have been mixed with the new dose of the water flowing into the tank, which can only be used in the next flushing cycle. That, however, is undesired, since in that way the liquid is

diluted by the whole amount of the water in the tank, and it is not used only for the final stage of flushing. It is therefore preferable if the dispenser includes an outflow diverter which directs the liquid directly to the water, or directly to the water level, respectively. The outflow diverter can be adjustable, so that after the mounting of the dispenser to the tank the place of the outflow can be preferably adjusted.

[0020] In another aspect the invention includes an attachment mean which serves for the stable placement of the dispenser into the flushing tank. The attachment mean can be a holder with the mechanically adjustable range, which adjusts itself to the different dimensions of tanks. The holder can lean onto the top edges of the tank, for example, if the toilet bowl stands independently with the tank connected to the bowl. In another arrangement, the holder can be glued, screwed or clicked onto the inner wall of the tank. The dispenser according to this invention can be placed in the independently standing tank or in the in an inbuilt, behind-the-wall tank, when the toilet bowl is usually hanging. The vessel can be an inseparable part of the tank.

[0021] Within the tank, the dispenser can be placed in the position where the vessel is above the top edge of the water level in the tank. Such a placement is preferable for the tanks which have a sufficient free height above the top water level, for example inbuilt tanks. Below the top water level there is usually only the float body in such case. In another arrangement the vessel is placed partially or completely in the water in the tank, whereby it still holds that the top water level in the tank must be below the top edge of the vessel so that the water does not flow into the vessel with the liquid.

[0022] In order to simplify the filling of the liquid to the vessel, the dispenser can include a filling neck which is led outside the tank to the place that can be approached by the user. The filling neck preferably runs through the existing opening in the tank. The tank has usually two openings on both sides, so that during the installation the tank can be connected to water intake either on right or the left side, and the second opening not used for the water intake can be used for the filling neck. It is preferable if the vessel and/or the filling neck are equipped by the element for indication of the low liquid level so that the user can fill the liquid on time. Otherwise, the low liquid level can be observed also in such a way that the water during the flushing is no longer colored. In cases of the inbuilt tanks, the element for indication of low liquid level can be placed in the set of control buttons by which the user activates the flushing. The element for indication of low liquid level can be an electronic sensor which sends the information concerning the lack of liquid further, for example to smart home system, or to the manager of the building, and so on.

[0023] In case the filling neck is below the top edge of the vessel, the vessel can be equipped by the float valve which closes the inflow of the liquid to the vessel so that it does not overflow into the water in the tank. Float valve

may appear as an element that is in conflict with the main approach of this invention, which does not require valves or sealings, but this float valve will be used only rarely. If the liquid in the vessel suffices for hundreds of flushes, the float valve is used significantly less than other components of the dispenser which are active in each flushing cycle. The durability and reliability of the float valve is unproblematic in such case.

[0024] When using the dispenser in public spaces, office buildings or shopping malls, it is preferable if the dispenser vessel is connected with the central distribution which pumps the liquid from the reservoir to the vessel in the dispenser. This removes the necessity for manual refilling of the liquid.

[0025] We describe further the particular tested realization of the liquid dispenser. The liquid dispenser placed in the flushing tank of the toilet bowl includes the vessel which is mounted in the float body. The float body is connected with the partition onto which the piston rod follows. Inside the piston rod there is an outpushing pipe or hose with the inserted reverse valve. The arms of the partition protrude beyond the edges of the vessel, whereby the angle they form against the piston rod is less than 90 degrees. This ensures the perfect flowing of the liquid from the arms onto the water level in the flushing tank. At the bottom end of the piston rod there is a piston which by its shape and realization allows for pushing out the liquid from below the piston, through the outpushing pipe or hose running through the piston, the piston rod and the partition's arms. At ends of the both arms, or only at one arm - depending on the space ratios in the flushing tank - the liquid falls onto the water level in the flushing tank. The piston rod and the piston in this realization are T-shaped.

[0026] The essence of the invention is also in that the piston produced on the bottom end of the piston rod moves in the cylinder, without need to ensure exact tightness (sealage) between the piston and the cylinder, which removes the need to overcome friction forces between the sealing of the piston and the cylinder's wall. The liquid flowing around the piston produces a lubricating film preventing the wear and tear and mutual rubbing of the moving parts, and thereby prevents the possibility of failure due to wear and tear. The cylinder has pairs of the inflow openings at various heights formed opposite to each other in the horizontal axis. Their distance from the bottom edge of the cylinder's bottom determines the maximum pushing volume of the cylinder.

[0027] The inflow openings are covered by the screen in such a way that only the openings in one height are open at one moment, which allows to alter the pushing volume of the cylinder, which is at the bottom of the vessel. The vessel for the liquid is inserted by means of the installation flanges placed in the openings on its top side - between the flushing tank and the flushing tank's cover - or the holders are attached to the ends of the flanges by self-adhesive segment and the flanges are glued to the inner walls of the flushing tank, which ensures the variability of the installation of the dispenser into

various flushing tanks which differ in sizes and constructions, and at the same time the most suitable position for the opening for the filling neck - against the filling neck - is ensured.

5 **[0028]** In the opposite walls below the openings for the installation flanges there are vertical grooves which on their bottom edge are equipped by adjustable stop of the bottom dead-centre position. This limits the length of the course of the arm and the piston rod in the groove from the top dead-centre position in the direction downwards, whereby it holds: the stronger the concentrate of the liquid, the higher the edge of the bottom dead-centre position, and the pushed amount of liquid is lower, and this precisely sets the movement of the float body in the vertical direction. Combined with the possibility to set the volume of the cylinder, there is a possibility for exact regulation of the amount of the used liquid.

10 **[0029]** The weight of the float body is more than the hydrostatic force of the pushed liquid at the given height of the partition and the piston rod, which ensures the movement of the float body downwards during the descent of the water level in the flushing tank. In the lateral side of the vessel with the cylinder there is a filling opening into which the lateral filling neck leads to. From the top edge, it is possible to construe the mouth of the upper filling neck into the space on both sides of the installation flanges, if the construction of the cover of the flushing tank allows that.

20 **[0030]** The advantage of the liquid dispenser in the flushing tank according to this invention is that the construction simplification decreases the possibility of malfunctions during long-term use, it decreases the amount of material necessary for production, it simplifies the production process, which produces conditions for overall decreases in production costs. Setting the length of the course of the piston between the top and bottom dead-centre position, as well as placement of the inflow openings at various heights in the wall of the cylinder, and their covering by the screen, sets the dose of the liquid pursuant to its concentration, which together with the enlargement of the vessel for the liquid prolongs the refilling cycle, which increases the user's comfort. The connection of the float body with the partition and the piston rod in the upper part of the dispenser allows the placement of the cylinder and the piston to the bottom of the vessel which is at the same time the vessel for the liquid. This removes the need for ensuring complete tightness (sealage) between the piston and the cylinder wall and at the same time eliminates the need to overcome the friction forces resulting from the movement of the piston in the cylinder. The placement of the reverse valve into the outpushing pipe or hose, for example to the piston or the piston rod, or, eventually, just above the piston, removes the undesired effect of the connected vessels during which the amount of the pushed liquid decreases together with the decrease of the liquid level in the vessel. The difference between the dosed amount at various liquid levels in the vessel is relatively small even in the

realization without the reverse valve, whereby this difference decreases with the flow cross-section of the outpushing pipe or hose above the liquid level.

[0031] The advantages of the invention are the simple construction with small number of moving parts without the need to use sealings or valves. The dispenser according to this invention reliably dispenses the set amount of liquid to the water only during the flushing, which saves the liquid, reduces the ecological load and increases the effect of the liquid in the sanitary object, especially in the toilet bowl.

Description of drawings

[0032] The invention is further disclosed by means of figures 1 to 7. The depicted ratio of individual parts is for illustration purposes only, or it is altered to increase the clarity and transparency. The depicted details cannot be interpreted as limiting the scope of protection. In order to increase transparency, the other common elements and components of the tank are not depicted on the figures, such as starting float valve, outflow valve, water drop, flushing control, and so on.

Figure 1 is a schematic depiction of the dispenser in the position by the top water level in the tank, which corresponds to the static state ready for flushing.

Figure 2 schematically depicts, pursuant to figure 1, decrease of the water level at the beginning of the flushing, where the piston closes the inflow opening and the liquid starts to be pushed into the outpushing pipe or hose. Subsequently, figure 3 depicts the flow of the liquid onto the decreasing water level in the final stage of flushing.

Figure 4 schematically depicts mutual arrangement of individual parts - the liquid dispenser according to example 1 in vertical cross-section.

Figure 5 depicts in detail the placement of the installation flanges between the cover of the flushing tank and the flushing tank in the vertical cross-section.

Figure 6 depicts the filling of the filling neck in the flushing tank and its leading to the vessel with the liquid.

Figure 7 depicts the partition, the piston rod with the outpushing pipe or hose, with the reverse valve, and the piston with the amended bottom part.

Examples of realization

Example 1

[0033] In this example, according to figures 4 to 7, the liquid dispenser is placed in the independently standing tank 12 attached to the toilet bowl.

[0034] The liquid dispenser in the flushing tank 12 includes the float body 2 connected in its upper part with the arm of the partition 3 onto which the piston rod 10 is

connected. As depicted in detail on figure 7, the piston rod 10 with the outpushing pipe or hose 13 is connected to the partition 3. At the bottom end of the piston rod 10 there is a piston 4 in which the reverse valve 14 is placed, and its bottom part is shaped in such a way that it directs the liquid from below the piston 4 through the reverse valve 14 into the outpushing pipe or hose 13 and to the arm of the partition 3, which is an indivisible part of the moving group. The arms of the partition 3 protrude on both sides through the float body 2, which allows the pushed-out liquid to flow onto the water level in the flushing tank 12.

[0035] The piston 4 is placed in the cylinder 5. In the cylinder's 5 walls there are horizontal inflow openings 6 for inflow of the liquid to the space below the piston 4. The cylinder 5 is produced at the bottom of the vessel 1 for the liquid. In the top part of the vessel 1 there are, in the opposite walls above the top edge 7 of the vessel, horizontal openings into which the installation flanges are inserted and below which there are vertical grooves into which the partition 3 is inserted. Below the vertical grooves there are adjustable stops of the bottom dead-centre position which allow to set the bottom dead-centre position, then the installation flanges are depicted which by their ends are placed between the walls of the flushing tank 12 and the cover 11 of the flushing tank 12 placed from above. The installation flanges form an attachment mean 9 and they are connected with the detent screw (locking screw) which runs through the adjustment grooves produced in the installation flanges. The solid mutual connection of the two installation flanges is ensured by tightening the nut on the detent screw. The installation flanges allow to set a suitable distance pursuant to the dimensions of the respective flushing tank 12. In the lateral side of the vessel, below the bottom edge of the vertical grooves depicted on the figure 5, there is an opening for the filling neck 16 which is inserted into the opening in the wall of the flushing tank 12 which serves as an alternative opening (not marked on the figures) for installation of the lateral filling valve for water intake. When the flushing tank 12 starts to fill with water through the filling valve, the float body 2 starts to move upwards as the water level rises, and with the float body 2 the piston 4 moves in the cylinder 5, too, whereby the cylinder 5 is in the vessel 1 below the liquid level. Once the piston 4 uncovers the inflow openings 6 in the cylinder's 5 sheath, the liquid starts to flow into the cylinder 5.

[0036] By activating the flusher, the water level in the flushing tank 12 begins to decrease and by weight the float body 2 begins to move downwards and with it moves the partition 3, the piston rod 10 and the piston 4 in the cylinder 5. Once the piston 4 covers the inflow openings 6 in the cylinder 5, the liquid from the space below the piston 4 is pushed through the reverse valve 14, the outpushing pipe or hose 13 in the piston rod 10, into the arm in the partition 3. Through the ends of the partition's 3 arms protruding through the edges of the float body 2 the liquid falls onto the level of the water flowing out of the flushing tank 12 until the bottom dead-centre

position set by the adjustable stop of the dead-centre position is achieved. During the refilling of the flushing tank 12 there appears an underpressure below the piston 4 in the cylinder 5, which causes the closure of the reverse valve 14 and the liquid which has not flown through the edges of the partition's 3 arms remains in the outpushing pipe or hose 13, which removes the undesired connected vessels effect during which there is a decrease of the amount of the liquid pushed out together with the decrease of the level of the disinfection mean in the vessel 1. At the same time, the liquid is sucked from the space below the piston 4 in the cylinder 5 which produces between the piston 4 and the wall of the cylinder 5 a lubricating film which prevents the wear and tear of the both components. This also removes the need to overcome the friction forces which would have arisen by using the sealing between the piston 4 and the cylinder 5. A particular example of realization of this invention is for illustration purposes only and cannot be interpreted as limiting the scope of the protection of the invention.

[0037] The placement of the vessel 1 inside the float body 2 decreases the overall dimensions of the dispenser. The float body 2 surrounds the vessel 1, which produces large hollow volume of the float body 2. Between the float body and the outer surface of the vessel 1 there is a vertically oriented slidable connection which allows for directed movement of the float body 2. The slidable connection in this example comprises of two casings in the upper part of the vessel 1 in which the flanges proceeding upwards from the float body 2 move vertically. Using an adjustable mean 15 the length of the course of the piston 4 in the cylinder 5 can be regulated, which also regulates the amount of the liquid pushed out into the water in the tank 12.

Example 2

[0038] In this example according to schemas in the figures 1 to 3 the float body is made of foam polystyrene and it is outside the vessel 1. The vessel 1 in this realization can be placed above the top water level 8 in the flushing tank 12. The piston rod 10 has a form of the cylindrical body; the bottom part of the piston rod 10 is the piston 4.

[0039] The outpushing pipe or hose 13 runs from the piston 4, it runs upwards through the top edge 7 of the vessel 1 and it is ended by the diverter 18 of the liquid's outflow. A ballast weight 17 is placed by the piston rod 10; the ballast weight 17 is sufficient to push the liquid out of the cylinder 5 into the outpushing pipe or hose 13. Placing the vessel 1 above the top water level 8 simplifies the movement of the liquid in the vertical direction and it uses the relatively empty space in the tank 12 inbuilt to the hanging toilet bowl. At the same time, the volume of the water in the tank 12 decreases only minimally - by the volume of the float body 2. In another arrangement the outpushing pipe or hose 13 can be led from the bottom of the cylinder 5.

Example 3

[0040] In this example, no referring to any figure, the dispenser has an element to indicate the low level of the liquid in the vessel 1. The indication element can be mechanical or electronical, and it can be connected with other monitoring systems in the household.

Example 4

[0041] Multiple dispensers are connected by the hose with the central liquid reservoir from which the liquid is pumped pursuant to actual need. Such connection is preferable for public toilets, for example in the shopping malls or office buildings.

Example 5

[0042] In this example, no referring to any figure, the dispenser is part of the refilling valve, where the float body 2 is used to close the water intake to the flushing tank 12 and it is also used to lift the moving group with the piston 4. In this example the dispenser is produced and installed during the production and mounting of the flusher into the tank 12.

Industrial applicability

[0043] Industrial applicability is obvious. According to this invention it is possible to repeatedly produce and use the liquid dispenser which operates pursuant to the movement of the water level in the flushing tank.

List of symbols

[0044]

- 1 - tank
- 2 - float body
- 3 - partition
- 4 - piston
- 5 - cylinder
- 6 - inflow opening
- 7 - top edge of the vessel
- 8 - top water level
- 9 - attachment mean
- 10 - piston rod
- 11 - flushing tank cover
- 12 - flushing tank
- 13 - outpushing pipe or hose
- 14 - reverse valve
- 15 - adjustable element
- 16 - filling neck
- 17 - ballast weight
- 18 - outflow diverter

Claims

1. A liquid dispenser in a flushing tank which includes a vessel (1) for the liquid, a piston (4) and a cylinder (5) for sucking the liquid from the vessel (1) and for pushing out the liquid into a water in the tank (12), where the piston (4) is connected with a float body (2) floating on the water in the tank (12), the water in the tank (12) is maintained between a top water level (8) with the filled tank (12) and a bottom level after flushing,

is characterized by the fact, that
 an axis of the piston (4) and the cylinder (5) is basically perpendicular; the cylinder (5) is part of the vessel (1) for the liquid;
 the vessel (1) is solidly connected with the tank (12) and a top edge (7) of the vessel (1) is above the top water level (8) in the tank (12);
 the cylinder (5) is placed by a bottom of the vessel (1) and it has at least one inflow opening (6) for free flow of the liquid from the vessel (1) to the tank (5);
 the piston (4) is connected by means of a piston rod (10) and a partition (3) with the float body (2) for pushing the piston (4) into the cylinder (5) during a descent of the float body (2) downwards and for lifting of the piston (4) in the cylinder (5) during lifting of the float body (2);
 whereby the partition (3) is placed above the top edge (7) of the vessel (1) and the piston (4) or the cylinder (5) has an outpushing pipe or hose (13) for pushing out the liquid into the water in the tank (12);
 where the outpushing pipe or hose (13) runs from below into the piston (4) or into the cylinder (5) above through a level of the top edge (7) of the vessel (1).
2. The liquid dispenser in the flushing tank according to the claim 1 **is characterized by the fact**, that an effective pumping volume of the piston (4) or the cylinder (5) is up to 10 ml of the liquid, preferably between 2 to 5 ml of the liquid, especially preferably between 2 to 3 ml of the liquid.
3. The liquid dispenser in the flushing tank according to the claim 1 or 2 **is characterized by the fact**, that gravitational force from a common weight of the piston (4), the piston rod (10), the partition (3) and eventually the float body (2), too, is more than a multiple of a surface of the piston (4) and a pressure of the liquid during its outflow into the water in the tank (12).
4. The liquid dispenser in the flushing tank according to any of the claims 1 to 3 **is characterized by the fact**, that it includes a ballast weight (17) to increase the common weight of the piston (4), the piston rod (10), the partition (3) and the float body (2), whereby the ballast weight (17) is placed on the multiple piston (4) and/or on the piston rod (10) and/or on the partition (3) and/or in the float body (2).
5. The liquid dispenser in the flushing tank according to any of the claims 1 to 4 **is characterized by the fact**, that piston (4) in the cylinder (5) is without sealing, preferably a height of the piston (4) is more than twice a radius of the piston (4).
6. The liquid dispenser in the flushing tank according to any of the claims 1 to 5 **is characterized by the fact**, that the float body (2) is part of a device for a water intake into the tank (12).
7. The liquid dispenser in the flushing tank according to any of the claims 1 to 6 **is characterized by the fact**, that it includes an outflow diverter (18) connected to an output of the outpushing pipe or hose (13), preferably the outflow diverter (18) is adjustable.
8. The liquid dispenser in the flushing tank according to any of the claims 1 to 7 **is characterized by the fact**, that the outpushing pipe or hose (13) is equipped by a reverse valve (14).
9. The liquid dispenser in the flushing tank according to any of the claims 1 to 8 **is characterized by the fact**, that it includes an attachment mean (9) to attach the dispenser in the tank (12), preferably the attachment mean (9) is a holder with a mechanically adjustable range for a connection below a cover (11) of the tank (12).
10. The liquid dispenser in the flushing tank according to any of the claims 1 to 9 **is characterized by the fact**, that the vessel (1) is above the top water level (8) in the tank (12) or the vessel (1) is placed at least partially in the water in the tank (12), preferably the vessel (1) is part of the tank (12) or it forms an indivisible whole with the tank (12).
11. The liquid dispenser in the flushing tank according to any of the claims 1 to 10 **is characterized by the fact**, that it has a filling neck (16) led outside the tank (12), preferably the vessel (1) or the filling neck (16) is equipped by an element for an indication of a low liquid level.
12. The liquid dispenser in the flushing tank according to any of the claims 1 to 11 **is characterized by the fact**, that it has an adjustable element (15) to set a length of a piston's (4) course between the inflow opening (6) and a bottom dead-centre position of the piston (4).

13. The liquid dispenser in the flushing tank according to any of the claims 1 to 12 **is characterized by the fact**, that the outpushing pipe or hose (13) is part of the piston rod (10) and/or the partition (3).

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14. The liquid dispenser in the flushing tank according to any of the claims 1 to 13 **is characterized by the fact**, that the vessel (1) is connected with a central distribution of the liquid, preferably the vessel (1) has a float body valve for refilling of the liquid.

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15. The liquid dispenser in the flushing tank according to any of the claims 1 to 14 **is characterized by the fact**, that the vessel (1) is inside the float body (2), whereby a slidable connection in a horizontal direction is produced between the float body (2) and an outer surface of the vessel (1), preferably the slidable connection includes two guiding casings on opposite sides of the vessel (1).

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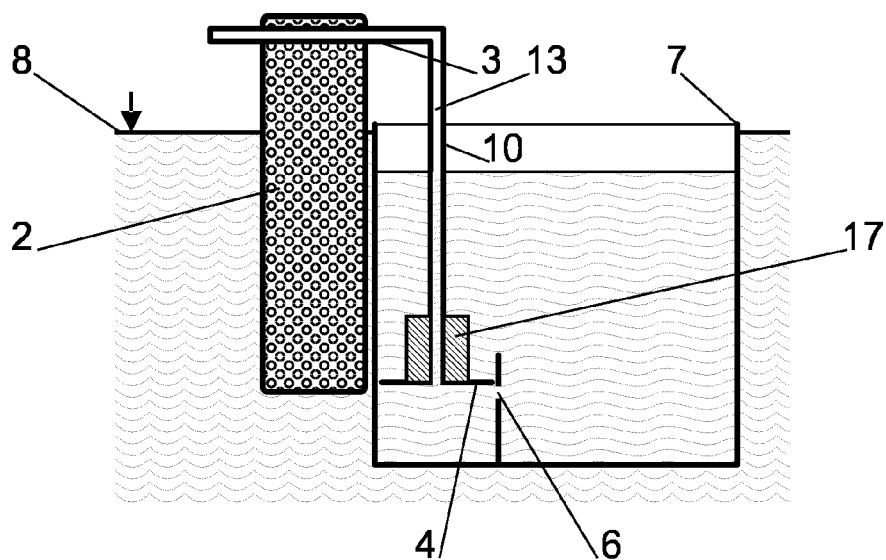


Fig. 1

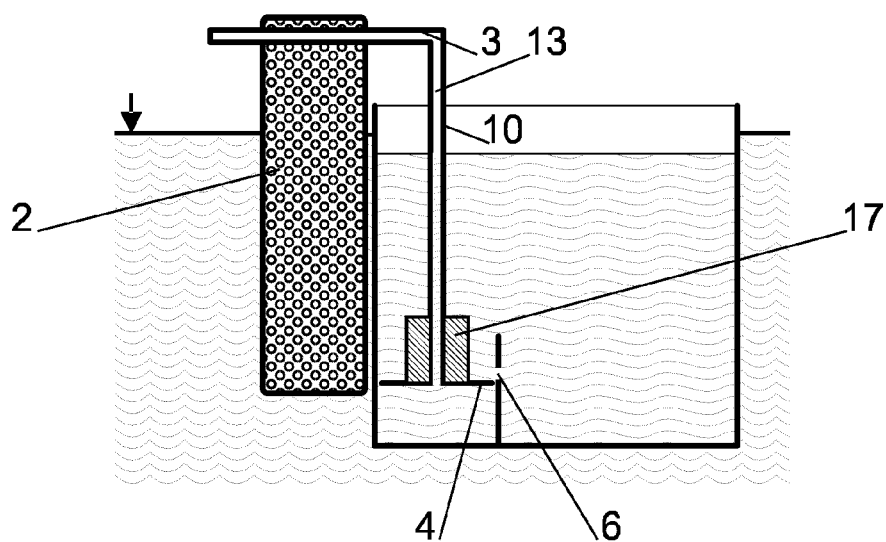


Fig. 2

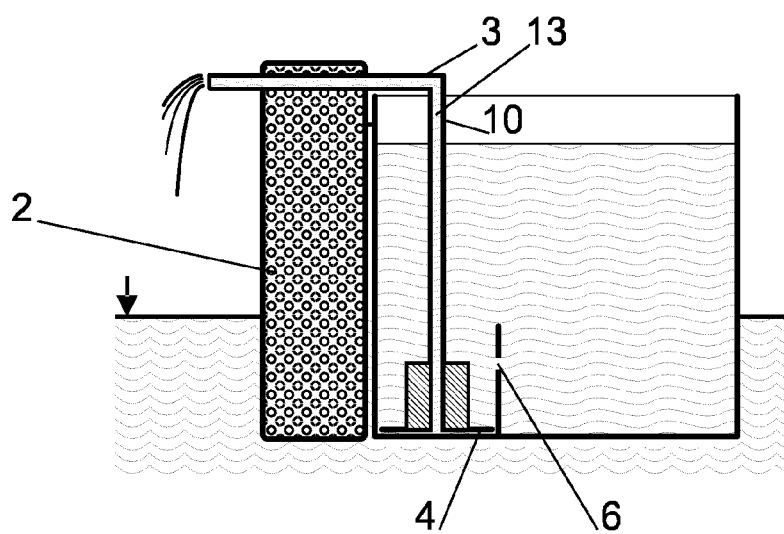


Fig. 3

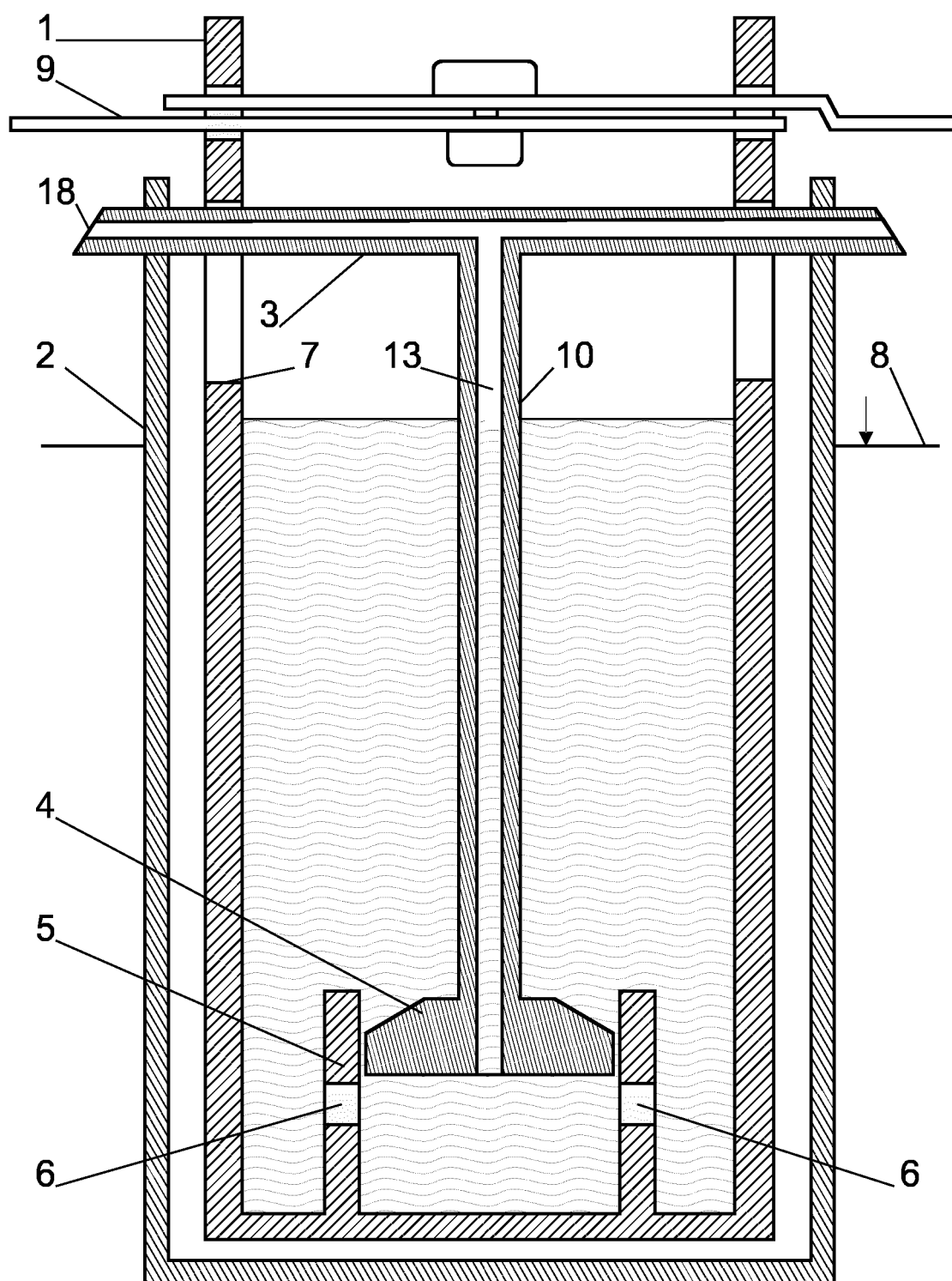


Fig. 4

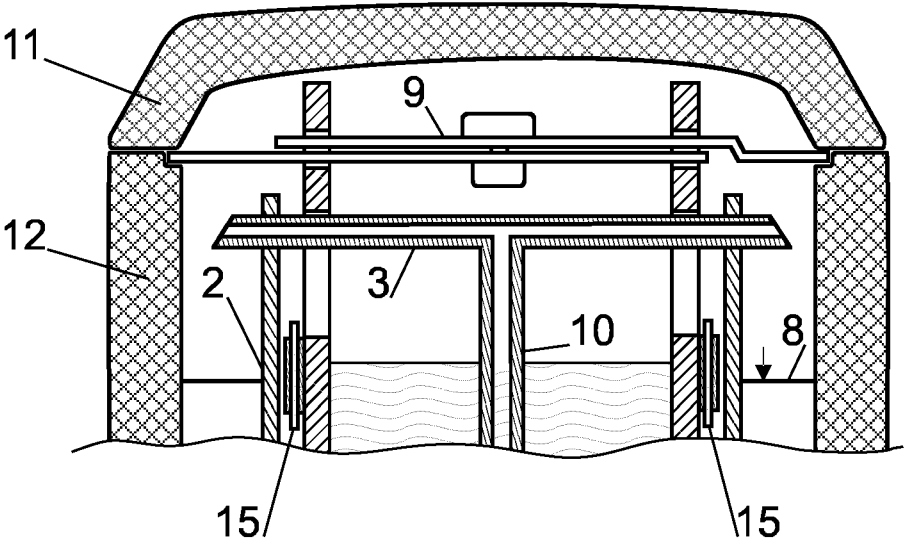


Fig. 5

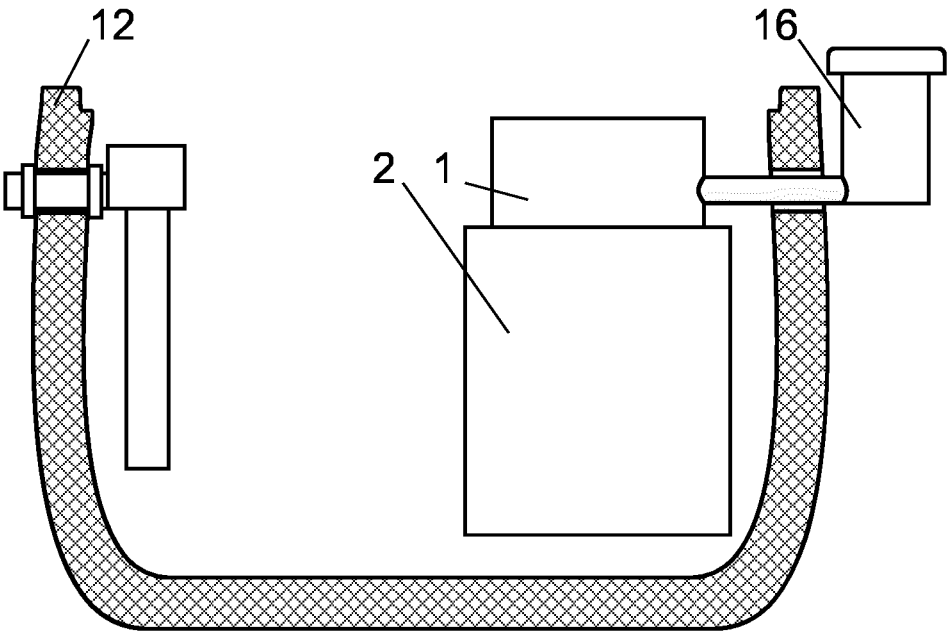


Fig. 6

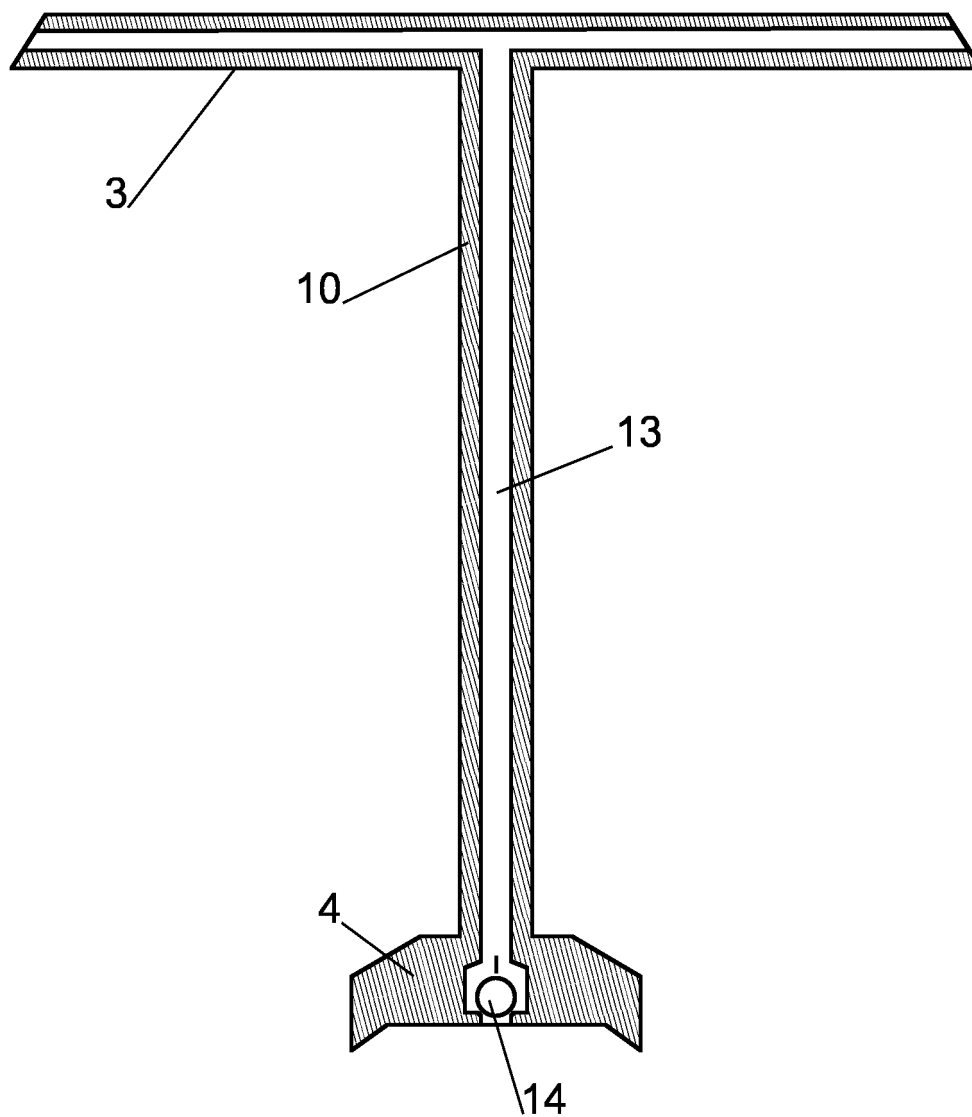


Fig. 7



EUROPEAN SEARCH REPORT

Application Number

EP 24 19 4111

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			E03D
The present search report has been drawn up for all claims			
Place of search		Date of completion of the search	Examiner
Munich		9 December 2024	Martinez Cebollada
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