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(54) Selective water distribution device for hygienic-sanitary plants.

(57) Device installable on hygienic-sanitary plants like the hygienic toilets, to permit different water volumes to be discharged depending on the type of human waste discharged on the toilet. Device including valve means (16, 17 ; 26, 27 ; 30 ; 39 ; 43 ; 552 ; 58, 59) arranged on conduits (18, 18 ; 24 ; 25 ; 37, 38) entering at different levels the reservoir (13) collecting the drainage water, which are operable selectively by manual push buttons or automatically.

Different versions of such valve means are provided, associated with the reservoir (13), with a box-like unit (42) interposed between such reservoir and the toilet, or directly with the same toilet, by providing in this case suitable sensor means (551, 554) arranged inside the same toilet and intercepting the discharged wastes, in order to select the drainage adjusted to the respective type of discharged waste.

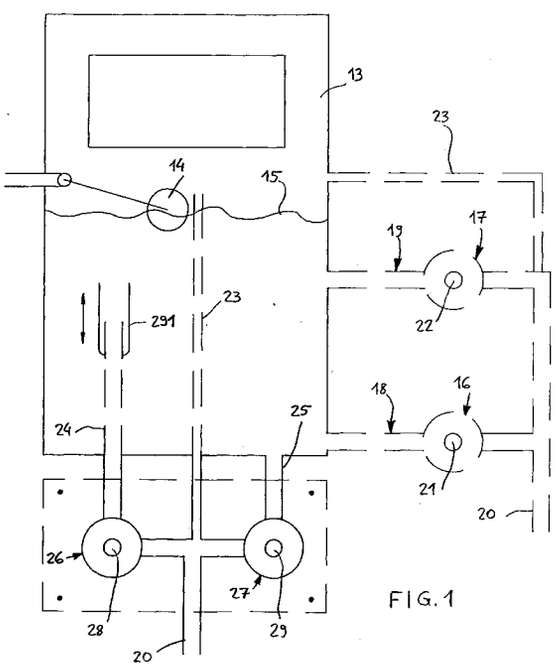

FIG.1

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The invention relates to a selective water distribution device for hygienic-sanitary plants like the toilets with water reservoirs, adapted to permit the water distribution to such plants to be metered depending on the actual need of the same water for cleaning said plants.

As it is known, the present hygienic-sanitary plants like the toilets with water reservoirs are provided with toilets connected by means of ducts to underground sewer systems, for the drainage of the human excrement, as well as reservoirs of adequate capacity disposed at a position above the respective toilets and operating by water falling, which water is contained within such reservoirs and is introduced therein through proper water mains, at pre-established and invariable amounts, so as such amounts be able to insure always an effective drainage of all the excrement materials of the persons. These reservoirs are provided with suitable automatic regulating mechanisms for admitting water into the same reservoirs, generally having floating means, associated with sealing valve mechanisms, which are operated by means of manual operating push buttons and adapted to permit all the water amount contained within each reservoir to be drained in the toilet below it whenever cleaning of the excrement materials from this latter is required. In this way, it is evident that the water amount for cleaning is always the same for each type of waste materials to be drained, is it a matter of both the urines and solid excrement which normally are respectively emitted several times or once a day only, while for these functions on the contrary it would be needed limited water amounts, in the first case, and higher ones in the second case. Consequently, the present hygienic-sanitary plants do not allow to use on an optimum manner the water amounts being stored on the associated reservoirs of such plants, rather they involve water consumptions higher than those actually required, and thus need also higher electric energy consumptions for power supply of the aqueduct pumping plants for the distribution of a greater water amount through the hydraulic plants connected to said reservoirs.

Therefore, it would be desirable, and is the object of the present invention, to provide a selective water distribution device for hygienic - sanitary plants of the above mentioned kind, and in particular for hygienic toilets having respective reservoirs for containing water for cleaning the same toilets, adapted to eliminate the drawbacks and limits of the present plants, thereby permitting a metered distribution of the same water depending on the type and amounts of the human waste materials to be drained through such toilets. This selective water distribution device is obtained with the constructive characteristics substantially described with particular reference to the accompanying claims of the present patent.

The invention will be understood better from the following description, given solely by way of not-limiting example and with reference to the attached drawings, wherein :

- Fig. 1 shows a schematic front view of the present selective water distribution device, incorporated in a reservoir for hygienic - sanitary plants and made in accordance to a first embodiment thereof ;
- Fig. 2 shows a schematic front view of the present selective water distribution device, made in accordance to a second embodiment thereof ;
- Figs. 3, 4 and 5 show an item of the device of Fig. 2, displaced on three different operative positions ;
- Fig. 6 shows a schematic front view of the present selective water distribution device, made in accordance to a third embodiment thereof ;
- Figs. 7 and 8 show a schematic front view of the present selective water distribution device, made in accordance to a fourth embodiment thereof, and displaced on two different operative positions ;
- Fig. 9 shows a schematic front view of a constructive variant of the device of both Figs. 7 and 8 ;
- Fig. 9A shows an enlarged item or the variant of Fig. 9 ;
- Figs. 10, 11 show a side view of a further item of the variant of Fig. 9, made on two different manners ;
- Fig. 12 shows a schematic front view of the present selective water distribution device, made in accordance to a fifth embodiment ;
- Fig. 13 shows a schematic front view of the present selective water distribution device, made in accordance to a sixth embodiment ;
- Figs. 14 and 15 show a schematic plan view of an item of the device of Fig. 13, on two different versions ;
- Figs. 16, 17 and 18 show the item of Figs. 14 and 15 displaced on three different operative positions.

The above Figures schematically illustrate a water reservoir 13, connected by adequate pipings (not shown) of a water supply plant and communicating on its lower side with a hygienic - sanitary plant disposed below it and provided for the drainage of the human wastes, like for example one hygienic toilet (also not shown), which is connected through suitable pipings with at least an underground sewer system, sinkholes or similar systems for waste collection and discharge. This reservoir 13 is made with such a storage capacity of a maximum water amount that to insure as usual an effective drainage of the solid human wastes like excrements, and is also provided with a suitable automatic water regulating mechanism inside the same reservoir, comprising advantageously a floating element 14 of per se known type, which is set for permitting the water to be introduced into the reservoir up

to a pre-established maximum filling level, marked with the reference numeral 15, and associated with at least a valve member (not shown in the Fig. 1), acting on the water plant piping in a manner to keep it open up to the water filling level on the reservoir 13 is lower to the pre-established maximum one, thereby permitting additional water to be introduced therein, and to shut it off when such filling level is attained, thereby shutting down the water inlet into the same reservoir.

Moreover, the reservoir 13 is provided with sealing valve mechanisms which, as usual, provide for water discharge in the toilet below it, for cleaning thereof. In this case, however, unlike the mechanisms previously used which were substantially made of a single manually operable valve member interacting with the corresponding lower reservoir drain hole, in such a way to keep it shut off and on, by acting on a proper manual operated push button, thereby allowing water drainage, the present sealing valve mechanism is substantially formed by at least two sealing valve members 16 and 17 of per se known kind, affecting respectively a first and a second horizontal conduit 18 and 19, connected at their first end to the reservoir 13 at two different water levels and at their second end being joined together and to the drainage conduit 20 directed downward and communicating with the hygienic toilet disposed below it (all these items are drawn dashed). In particular, such valve members 16 and 17 are operated by respective manual operating push buttons 21 and 22, which permit their automatic delayed action return to the starting closing position, so as the temporary displacement on the opened position of each valve member does allow the water to be drained through the conduit associated therewith. In the present case, the horizontal conduits 18 and 19 are connected to the reservoir 13 respectively on the bottom level thereof and the water level comprised between such bottom level and the above described maximum filling level, so that the opening of either the valve members 16 or 17 causes the water to pass in the drainage conduit 20, respectively through either the conduit 18, with consequent drainage of the whole water contained within the reservoir 13, up to its bottom level in which such conduit 18 is connected, or the conduit 19 with consequent drainage solely of the water head comprised between its maximum filling level and the level where such conduit 19 is connected thereto.

In practice, the water amounts being discharged in the two specified cases are selected with such volume as to provide an effective drainage from the toilet of the solid wastes like excrements, in the first case, and the liquid wastes like urines etc.. in the second case, which evidently require a water amount smaller than the previous one.

With the same criterion cited, there may be also provided possible additional conduits together with those 18 and 19 already referred to, associated to relative manually operable valve members, in case it would be provided possible additional discharge water levels and therefore corresponding different water amounts to be discharged from time to time in the toilet, for different needs, thus without departing from the protection field of the present invention.

Of course, it is right to provide as usual, together with the drainage conduits 18 and 19 and possible additional conduits, also at least an overflow conduit 23 connected at one end thereof to the reservoir 13 at a level higher than the maximum water filling level on the same reservoir, and at the other end thereof to the common drainage conduit 20, in order to be able to discharge safely any water amount exceeding the maximum filling level in case of breakdowns on the water inlet regulating mechanism 14 or breakdowns or faulty operations of the system of different kind.

Besides, in accordance to the present invention the valve members 16 and 17 may be operated also automatically instead manually, i.e. by providing at least an associated solenoid valve (not indicated on the Figure) or electromechanical, pneumatic, hydraulic and the like member, which is controlled automatically by a main control member (not shown) associated to the reservoir, with such timed make as to permit the selected water level to be discharged depending on the drainage needs of the wastes from the toilet, and then to prevent the additional water which will be admitted on the reservoir 13 for performing a subsequent discharge cycle with the same described operative criteria from being discharged therefrom. Finally, as evident from the Fig. 1, the conduits 18 and 19 and any additional conduit (not shown) may be connected to the reservoir 13 also in manners different than those described, i.e. by arranging them on a vertical position so that their free ends enter the same reservoir at different heights thereof, in order to perform always the same above specified functions, as apparent from the conduits 24 and 25 affected by respective valve members 26 and 27, controlled by corresponding manually operated push buttons 28 and 29. Moreover, each one of conduits 18, 19 and 24, 25 and the possible additional conduits may be height adjusted so as to change the water discharge level, by using for this object the same conduits without the need to provide further conduits. By way of example only, each one of such conduits as for example the conduit 24 may be provided with a movable part 291, slidable vertically on the associated conduit and movable at different regulating heights, so as to change the filling level and therefore the water discharge level on the reservoir 13. By considering now the Fig. 2, it is shown the present selective water distribution device included inside a reservoir 13 and made in a second possible embodiment.

As evident from this Figure, also in this case the reservoir 13 is connected to a common drainage conduit 20 through at least two horizontal conduits 18 and

19 (drawn dashed), situated at two different levels for permitting to discharge two different water amounts therefrom, in the present case respectively of the whole water contained within the reservoir 13 and the water volume corresponding to the water head provided between the maximum filling level and the level where the conduit 19 is connected thereto.

However, in this case a single valve member 30 is provided, instead of two members as formerly, and such single valve member is positioned on the joining zone of the horizontal conduits 18 and 19 to the common drainage conduit 20, and is so arranged as to be able to put such drainage conduit selectively into communication with either one or none of the two conduits 18 and 19. To this purpose, the valve member 30 which is shaped as a manually operated selector valve member, as evident particularly from the Figs. 3, 4 and 5, on the present example is substantially constituted by a rotating annular disc 31 provided with two sealing valve members 32 and 33, offset from each other of a fixed angular distance equal to that provided between the one and the other one of the different conduits 18, 19, which in the present example is of a right angle, but which of course may be also different and variable. In turn, the common drainage conduit 20 is connected to the rotating disc 31 at such position as not to be affected by any of the two sealing valve members 32 and 33 of the same disc, whatever operative position this latter is rotated. Furthermore, the reservoir 13 is always provided with an overflow conduit 23 positioned and foreseen as previously described and communicating directly with the common drainage conduit 20. In particular, on Fig. 3 it is noted that the rotating disc 31 is moved on the operative rest position, where the sealing valve members 32 and 33 are coinciding respectively with the conduits 18 and 19, by turning off the outflow port thereof.

Then, at this operative position both the conduits 18 and 19 are turned off by the valve members 32 and 33 of the rotating disc 31 and thereby any water discharge on the toilet below it being prevented. On the Fig. 4 it is noted that the rotating disc 31 is moved to the first operative position, with a counterclockwise manual rotation of 90° thereof, wherein the sealing valve member 33 turns off the outflow port of the conduit 18, while the other valve member 32 is inactive in that it does not turn off any of the two remaining conduits 19 and 20 of the system.

Then, at this operative position the conduit 19 is put into communication with the common drainage conduit 20, with consequent discharge on the toilet below it of a limited water amount, equal to the volume defined between the maximum filling level of the reservoir 13 and the level where the conduit 19 is connected to the same reservoir.

On the Fig. 5 it is noted that the rotating disc 31 is moved to the second operative position, by rotating it manually for 90° in a counterclockwise direction from the preceding rest position illustrated on Fig. 3, wherein the sealing valve member 32 turns off the outflow port of the conduit 19, while the other valve member 33 does not turn off any of the two remaining conduits 18 and 20 of the system.

Then, at this operative position the conduit 18 is put into communication with the common drainage conduit 20, with consequent discharge on the toilet of the whole water amount contained within the reservoir 13, thanks to the conduit 18 connected to the bottom of the same reservoir.

Likewise, when for different operative needs it is desired to provide further possible conduits combined with those already provided, for discharging other water amounts, it is enough to connect such conduits, at suitable angular distances thereamong, to the rotating disc 31, by shaping also this latter with a determinate number of valve members, such that to put always the common drainage conduit 20 selectively into communication with each needed conduit.

It is to point out that the rotating disc 31 is provided with adequate devices (not shown) like i.e. springs and the like, adapted to bring back the same disc always on its starting rest position, whenever operative position it is moved, with a pre-established delay time and such as to permit always the water amount respectively selected to be fully discharged from the reservoir to the toilet. Moreover, also in this case the valve members 32 and 33 may be operated automatically instead manually, by providing for each conduit i.e. at least a respective one-way solenoid valve or a single multi-ways solenoid valve having separated control means, acting as valve members, or electromechanical, pneumatic, hydraulic etc.. members of similar type, which can be controlled by a main control member (not shown) associated with the reservoir, so as to insure always a timed closing thereof, such that to permit the selected water level to be discharged, depending on the drainage needs of the wastes from the toilet, and thereafter to prevent the additional water which will be admitted on the reservoir 13 for performing a subsequent discharge cycle with the same described operative criteria to be discharged therefrom.

Finally, also in this case the conduits 18 and 19 and the possible additional conduits (not shown) may be connected to the reservoir 13 at positions different than those described, by arranging i.e. such conduits on a vertical direction in a manner that their free ends enter the same reservoir at different heights thereof, in order to obtain always the same above specified functions, as it is evident from the conduits 37 and 38 affected by the rotating disc 31.

As previously, also in this case each one of the conduits 18, 19 and 37, 38 and the possible additional conduits may be height adjusted with the same criteria, by providing to this aim for example together with the respective conduits a movable part like the part

371, slidable vertically (in this case, with respect to the conduit 37) in order to be able to be moved at different adjustment heights, so as to change the filling level and therefore the water discharge level on the reservoir 13. Referring now to the Fig. 6, shown therein is a third possible embodiment of the present selective water distribution device, wherein it is noted that the water reservoir 13 is provided with the customary overflow conduit 23, introduced vertically inside said reservoir and communicating directly with the common drainage conduit 20 arranged below it, as well as a valve member affecting such drainage conduit and formed by at least a solenoid valve 39 or similar member, controlled by a reservoir main control member (not shown) and operable at the opened position thereof, where it is kept at such position for different and variable time periods depending on the water amount to be discharged, which is selected by operating suitable push buttons of the reservoir associated to the different water filling levels and therefore to the different water amounts to be discharged, which push buttons on the present example are constituted by the push buttons 40 and 41 for selecting respectively the available maximum water amount and a smaller amount thereof. Then, at the end of each selected time period of opening the solenoid valve 39, this turns off again automatically by preventing additional water from leaving the reservoir 13 and permitting additional water to be introduced therein up to the maximum filling level thereof.

A fourth embodiment of the selective water distribution device according to the invention is described on the Figs. 7 and 8, wherein it is noted that such device is housed within a box-like unit 42 interposed removably between both the common drainage conduit 20 arriving from the water reservoir situated above it (not shown on the Figure), or directly from water supply tubings, and the inlet side of the hygienic toilet (not shown too). To this purpose, the device is formed as previously by at least a valve member 43 affecting the outflow port of the drainage conduit 20, in the present example formed by a gate sliding rectilinearly being controlled by a solenoid valve 44 or the like, from a rest position in which such gate fully turns off the drainage conduit 20, at the position indicated on Fig. 7, to a pre-selected operative position depending on the discharge needs, by operating suitable selector push buttons (in the present case, formed by the push buttons 46 and 47 housed within the box-like unit 42), in which such slidable gate 43 releases in a different manner the outflow port of the drainage conduit 20, for a time period enough to permit the respectively pre-established water amount (see Fig. 8) to be fully discharged, and then to cause said slidable gate 43 to be fully shut off at the end of such time period, so as to prevent additional water to leave it and to permit the reservoir to be filled again. Besides, also on this case an overflow conduit 23 is provided, arriving from the reservoir and passing through the drainage conduit 20, which overflow conduit isn't affected by the slidable gate 43 and is able to put such reservoir directly into communication with the toilet for the same previously described objects. On the Fig. 9 it is shown a constructive variant of the device of Figs. 7 and 8, wherein it is noted that inside the box-like unit 42 it is housed, in addition to the gate 43, a partition wall 48 acting as support and extended rectilinearly and parallelly to the same gate, at a position upstream it in the water flow direction (arrow B), which wall is provided with a plurality of through holes 49 traversed by the water and a short sleeve 50 providing another hole 51 (see enlarged item thereof on Fig. 9A), at one end thereof the overflow conduit 23 is forced inserted and whose other end is slightly projected to permit the gate 43 to rest tightly thereon, when it is at its rest position where it fully shuts off the outflow port of the drainage conduit 20, except the overflow conduit 23, from which position such gate may be moved by the solenoid valve 44 to the opened position thereof with the same operative criteria previously described. In particular, Figs. 10 and 11 show two different possible versions of the partition wall 48, which in the first case is shaped with several s upporting ribs 52 convergent to each other along the sleeve 50, thereby providing a set of openings of triangular shape 53 for the water flowing therethrough, which openings are fully occluded by the gate being moved to the rest closing position thereof (which position is drawn dashed), and which in the second case is shaped with a set of circular holes 54 and 55 having different diameter and arranged approached to each other, for the water flowing therethrough, which are also fully occluded by the gate being moved to the rest closing position thereof. Furthermore, the box-like unit 42 together with the associated component parts housed therein may be housed directly also inside the toilet, at a suitable position thereof, instead of being interposed between said toilet and said reservoir, permitting to perform always the same above described functions. On the Fig. 12 it is shown a fifth possible embodiment of the present device, in which it is noted that it is substantially formed by at least a photoelectric sensor 551 or sensor of other type adapted to detect the presence of wastes within the toilet, which is adequately positioned inside the toilet and is operatively connected to the previously described valve members, associated to the different levels of water to be discharged on the same toilet, or it may be connected to at least a solenoid valve 552 or similar valve member provided to control the water discharged and entering the toilet.

Moreover, such sensor 551 is associated with a light reflecting element like i.e. a mirror 553, disposed at the level of the toilet bottom side, on the collecting zone of the discharged human wastes, and is calibrated in such a manner as to transmit a luminous light

signal and to receive it reflected by such reflecting element 553.

Besides, this sensor is calibrated in such a manner as to recognize the type of discharged waste, either solid or liquid one, by means of two different threshold levels of the signal reflected by the reflecting element 553, and passing through the discharged human wastes and collected on the toilet bottom side zone, respectively a first threshold level in presence of solid wastes, wherein the reflected signal is received with too weak level or quite it is received at all by such sensor in the case in which too opaque solid wastes are provided, and a second level wherein the reflected signal is received with a level higher than the previous one, by passing through less opaque liquid wastes.

In this way, depending on the level of the received reflected signal the sensor 551 provides to control the valve members so as to adjust the volume of the discharged water, thereby adapting it to the type of wastes to be discharged, namely that in presence of the first level of such signal it controls the discharge of the greatest water amount contained within the reservoir, and that in presence of the second level of such signal it controls the discharge of a water amount smaller than the preceding one.

Moreover, on the Figure it is evident an additional sensor 554 of the type referred to, positioned in a different manner inside the toilet and emitting a luminous light signal which isn't reflected in that a reflecting element isn't provided, which signal on the contrary is intercepted in a different manner by the wastes being collected on the bottom side zone of said toilet, depending on the type e quantities thereof, thereby providing likewise to control the different volumes of water to be discharged with the same above specified criteria. In the case in which the valve members are constituted by the above described solenoid valve 552, either the sensor 551 or 554 then provides to delay in a variable manner the make of the same solenoid valve, in presence of either said first or second level of the received signal, or of the different types of wastes, thereby providing for discharging different water amounts for the same specified functions. Of course, the regulating system of the discharged water volume may be obtained also with sensors or devices of type different than those described solely by way of example, which are interacting with the valve members controlling the water amount to be discharged depending on the wastes discharged on the toilet, thus without departing from the protection field of the present invention.

Finally, Fig. 13 now shows a sixth possible embodiment of the present device, wherein it is noted that a drainage hole 57 is provided on the bottom side wall 56 of the reservoir 13, which hole is connected to the drainage conduit 20 leading to the toilet situated below it (not shown), inside which at least two valve members 58 and 59 separated from each other are provided, constituted by a respective horizontally slidable gate operable from a closed to an opened position thereof by actuating an associated manual push button (not shown), and which can be turned off automatically again by means of a suitable delaying system, after pre-established time periods, such that to allow all the water provided for each selected discharge cycle to be discharged therefrom.

At the level of one of the gates, i.e. the gate 59, it is provided a vertical conduit 60 extended upward for a determinate height from the bottom side wall 56 of the same reservoir, at a level lower than the maximum filling level of water inside the reservoir, and provided with a movable part 61 movable at different heights of such conduit, in order to change in this way the height of this latter and therefore the water discharge level through the same conduit.

In this manner, by operating either the gate 58 or 59 it is caused the discharge of two different water volumes from the reservoir 13, respectively a greatest volume when the gate 58 is operated, which gate being situated on the bottom side wall 56 of said reservoir permits all the water contained therein to be discharged therefrom, and a reduced volume when the gate 59 is operated, which gate therefore permits the water to be discharged therefrom, only up to the level defined by the height of the conduit 60.

In particular, these water volumes are selected in such a way as to allow the solid wastes like the excrements as well as the liquid ones like the urines to be respectively drained effectively from the underlying hygienic toilet.

Figs. 14 and 15 show now a plan view of two different versions of a constructive item of one of the slidable gates, for example the gate 59. In particular, from Fig. 14 it is noted that each one of such gates in addition to a rectilinear rigid rod 62, operable with the associated manual push button for providing the displacement to its two operative positions, is also provided with a suitable delaying mechanism associated to such rectilinear rod to delay the return of the same rod to the rest position thereof for the above mentioned reasons.

In the present case, this delaying mechanism is advantageously constituted by a compression spring 63 connected to the end of the rod 62 situated near the manual push button (not shown), and stressing the same rod in such a way as to keep it normally at its rest position, as well as a pawl 64 provided with a rectilinear portion 65 and a bent portion 66 joined together, wherein the free end of the rectilinear portion 65 of such pawl is pivoted rotating on a stud 67, provided at the level of the opposite end of said rod and is urged by a compression spring 68 to move to a rest position, shown on Fig. 14. In turn, the opposite end of the rod 62 is provided with a projected pin 69 cooperating with the outer profile of both the rectilinear

and bent parts 65 and 66 of the pawl 64 during the displacement of said rectilinear rod from the one to the other one of its operative positions. In particular, when the rod is moved to its opening position shown on the Figure in the direction indicated by the arrow C, against the action of the compression spring 63 of the same rod, the pin 69 being sliding in succession along the outer profile of both the bent and rectilinear portions 66 and 65 of the pawl 64, causes the same pawl to be slightly moved upward up to arrive to the reversal position of its stroke, when the rod is moved to the position of maximum opening thereof, wherein a temporary balance of the opposite forces of both the springs 63 and 68 of said rod and said pawl takes place, thereafter the action of spring 63 tends gradually to overcome that one of the other spring 68, thereby providing a progressive rotation downward of such pawl 64 and consequently a sliding on an opposite direction of the pin 69 along the outer profile of both said rectilinear and bent parts 65 and 66, up to the rod returns back again to its rest position wherein the pawl is returned back by its own spring to its rest position too. From the Fig. 15 it is noted another possible embodiment of the delaying mechanism referred to, which is substantially identical to that one of Fig. 14 and is different therefrom only in that in this case the rod 62 is provided with a movable portion 70, articulated to a pin 71 of the associated gate and co-operating with the rotating pawl 64 in the same manner and for the same above mentioned purposes. Of course, the described delaying mechanism may be made also in different ways, to perform always the same function, for example it may be unprovided of the pawl and the associated spring and provided with at least a pneumatic bellows, an electric, hydraulic, pneumatic etc.. operated piston associated with the end of the rod 62 situated near the manual push button, acting on the same rod in a manner to return it back to the rest position thereof, within the pre-established delay time, thus without departing from the p rotection field of the present invention.

Likewise, according to the invention it is also possible to eliminate the delaying mechanism, by providing to this aim to control automatically the slidable gates 58 and 59 (or other suitable valve members of per se known type) by means of a solenoid valve o similar element (not shown), which can be set by a selection push button, which when is energized causes the solenoid valve to be moved to the opened position and subsequently to be closed again with a pre-established delay time, controlled by a suitable control device (not shown) associated with the reservoir 13.

Finally, as usual, the reservoir 13 is provided with an overflow conduit 23 inserted vertically through the drainage hole 57 and communicating with the drainage conduit 20 situated below it, for the same functions set forth previously. By examining now the remaining Figs. 16, 17 and 18, shown therein are the three different operative positions in which the slidable gates 58 and 59 may be moved, respectively a first rest position (Fig. 16) where both the gates occlude the drainage hole 57 and therefore no water discharge takes place, a second position (Fig. 17) where a second gate (in this case the gate 59) is moved to the opening position thereof, while a first gate (in this case the gate 58) remains to the closed rest position thereof, so that only a smaller water volume is discharged therefrom, and a third position (Fig. 18) where the second gate 59 remains to the closed rest position thereof, while the first gate 58 is moved to the opening position thereof, so that the greatest water volume available within the reservoir is discharged therefrom. In this way, the present device permits to obtain a selective distribution of the water for cleaning hygienic-sanitary toilets at different amounts thereof, adapted to the actual need of discharging the wastes from said toilets, with consequent optimum performances and consumption savings of both water and electric energy needed for providing pumping and circulation of such water in the hydraulic plants and the possibility to design undersized sewer systems for the drainage of such wastes and the water.

Claims

1. Selective water distribution device for hygienic-sanitary plant, comprising at least a possible water reservoir communicating through at least a drainage conduit affected by valve means, operable at opening and closing position thereof, with an underlying hygienic toilet or the like for the drainage of human wastes, said reservoir being provided internally with water level adjustment means like a floating element or the like of per se known type, as well as at least an overflow conduit communicating with said drainage conduit and adapted to discharge from the reservoir any water amount exceeding the maximum filling level within the same reservoir, characterized in that said valve means (16, 17; 26, 27; 30; 39; 43; 552; 58, 59) are associated with two or more different discharge levels of water from said reservoir (13), and are operable selectively manually or automatically to the opened position thereof, by returning back to the closed position thereof after pre-established time periods, such that to permit the respectively selected water discharge level to be discharged within said toilet depending on the kind and quantity of wastes to be discharged.

2. Device according to claim 1, characterized in that said valve means (16, 17; 30; 26, 27) are connected to respective conduits (18, 19; 24, 25; 37, 38), entering said reservoir (13) at different levels at the one end thereof and which are connected at

their other end in common to said drainage conduit (20).

3. Device according to claim 2, characterized in that said valve means (30) comprise a rotating annular disc (31) provided with at least two sealing valve members (32, 33), offset from each other of a fixed angular distance equal to that provided between the one and the other one of said conduits (18, 19; 37, 38), said rotating disc (31) being connected to said conduits (18, 19; 37, 38) and said drainage conduit (20) and being operable in rotation so as to put selectively either one or none of said conduits (18, 19; 37, 38) into communication with said drainage conduit (20), respectively on the conditions in which said conduits (18, 19; 37, 38) are occluded by either one or both of said sealing valve members (32, 33).

4. Device according to claim 1, characterized in that said valve means comprise at least a solenoid valve (39) or the like, connected to said drainage conduit (20) and operable to the opened position thereof with variable delayed closing times, which can be set selectively for discharging the different water discharge levels from said reservoir (13).

5. Device according to claim 1, characterized in that said valve means comprise at least a rectilinearly slidable gate (43), arranged inside a box-like unit (42) interposed removably between said drainage conduit (20) and said hygienic toilet or the water supply system, said gate (43) being positioned at the level of the outflow port of said drainage conduit (20) and being operable by control means like a solenoid valve (44) or the like, from a closing position to an opening position of said outflow port, with pre-established fixed times for the delayed closing of the same gate.

6. Device according to claim 5, characterized in that said slidable gate (43) is associated with at least a partition wall (48), inserted through said drainage conduit (20) upstream thereto in the water circulation direction, said partition wall (48) being provided with a plurality of through holes (49, 53, 54, 55) traversed by the water and a projected sleeve (50), for resting sealingly said slidable gate (43) thereon when it is moved to its closing position.

7. Device according to claim 1, characterized in that said valve means comprise at least a solenoid valve (552) or the like, arranged within said toilet and connected to sensor means (551, 554) which can be affected by the presence of wastes and adapted to operate it to the opening position thereof, with variable delayed closing times, depending on the type of wastes provided within said toilet.

8. Device according to claim 7, characterized in that said sensor means comprise a photoelectric sensor (551, 554) or other suitable detecting sensor of per se known type, adapted to emit a luminous light signal and disposed within said toilet, near the waste collecting zone of said toilet.

9. Device according to claim 8, characterized in that said photoelectric sensor (551) is associated with a corresponding light reflecting element (553), adapted to reflect the luminous light signal emitted by said photoelectric sensor (551) toward the same sensor, upon passing through said waste collecting zone, said photoelectric sensor (551) being also calibrated in such a manner as to recognize at least two threshold levels of the signal reflected by said reflecting element (553) in correspondence of different types of wastes.

10. Device according to claim 8, characterized in that said photoelectric sensor (554) is positioned in such a manner that its emitted luminous light signal is intercepted in a different manner by the wastes being collected on said collecting zone, depending on the type of the same wastes.

11. Device according to claim 1, characterized in that said valve means comprise at least a first and a second horizontally slidable gate (58, 59), arranged inside a lower drainage hole (57) of said reservoir (13) connected to said drainage conduit (20) and at least one thereof is associated to a vertical conduit (60) having a height lower than that of the maximum water filling level within said reservoir (13), said gates (58, 59) being operable from a closing to an opening position thereof and being able to be returned back to the closing position thereof within pre-established delay times by means of delaying means (62, 64) associated therewith.

12. Device according to claims 2 and 7, characterized in that said conduits (24, 25; 37, 38; 60) are provided with at least a movable part (291, 371, 61) slidable vertically with respect to the corresponding conduit, in order to change the height thereof and therefore the volume of water discharged from said reservoir (13).

13. Device according to claim 7, characterized in that said delaying means comprise a rectilinear rod (62) for operating said first an second gate (58, 59) to their two operative positions, respectively the rest and working ones, said rod (62) being

stressed by resilient means like i.e. a compression spring (63) to stay at its rest position, as well as a pawl (64) provided with a rectilinear portion (65) and a bent portion (66) joined together and urged by additional resilient means like a compression spring (68) to stay at its rest position, said rectilinear portion (65) being pivoted on a stud (67) provided at the level of the end of said rod (62) opposite to the operation end of the same rod and being provided with a projected pin (69) co-operating with the outer profile of both said rectilinear and bent portions (65, 66) of said pawl (64), said rod (62) being operable in such a way as to move said first and second gate (58, 59) in succession to their opening position and closing rest position, under the action of said resilient means (63) and against the action of said additional resilient means (68).

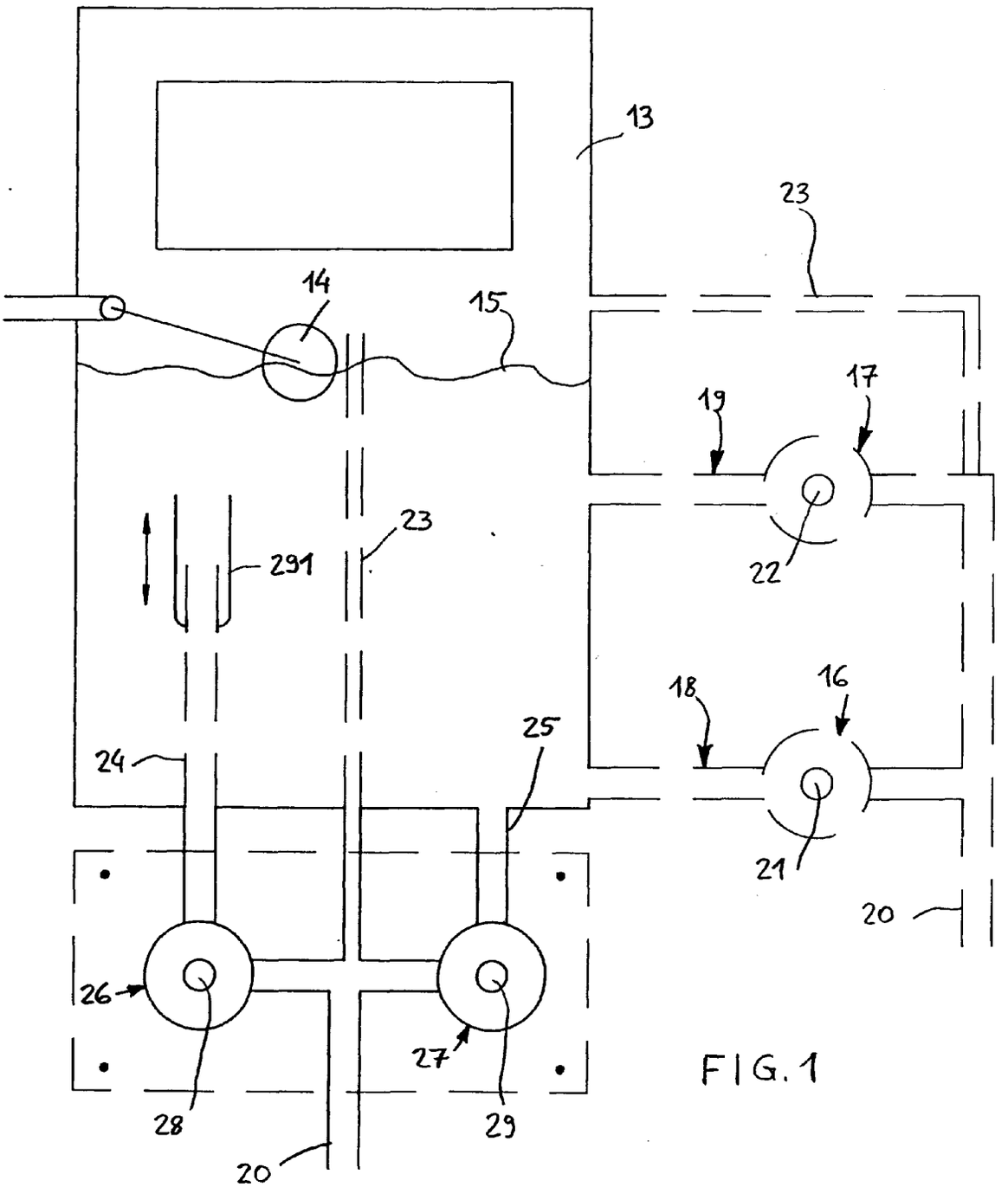

FIG. 1

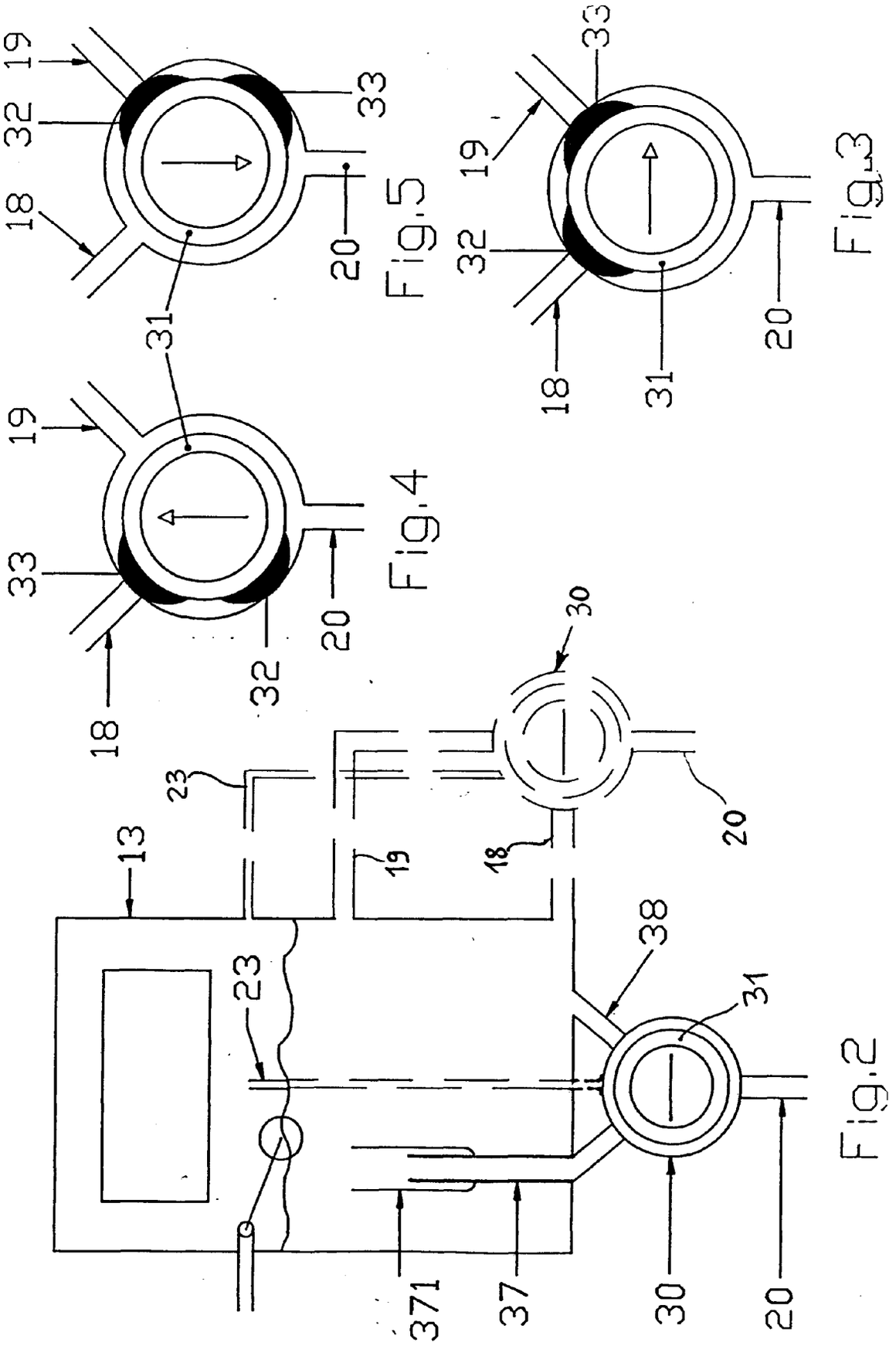
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Fig.5
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Fig.3
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Fig.2

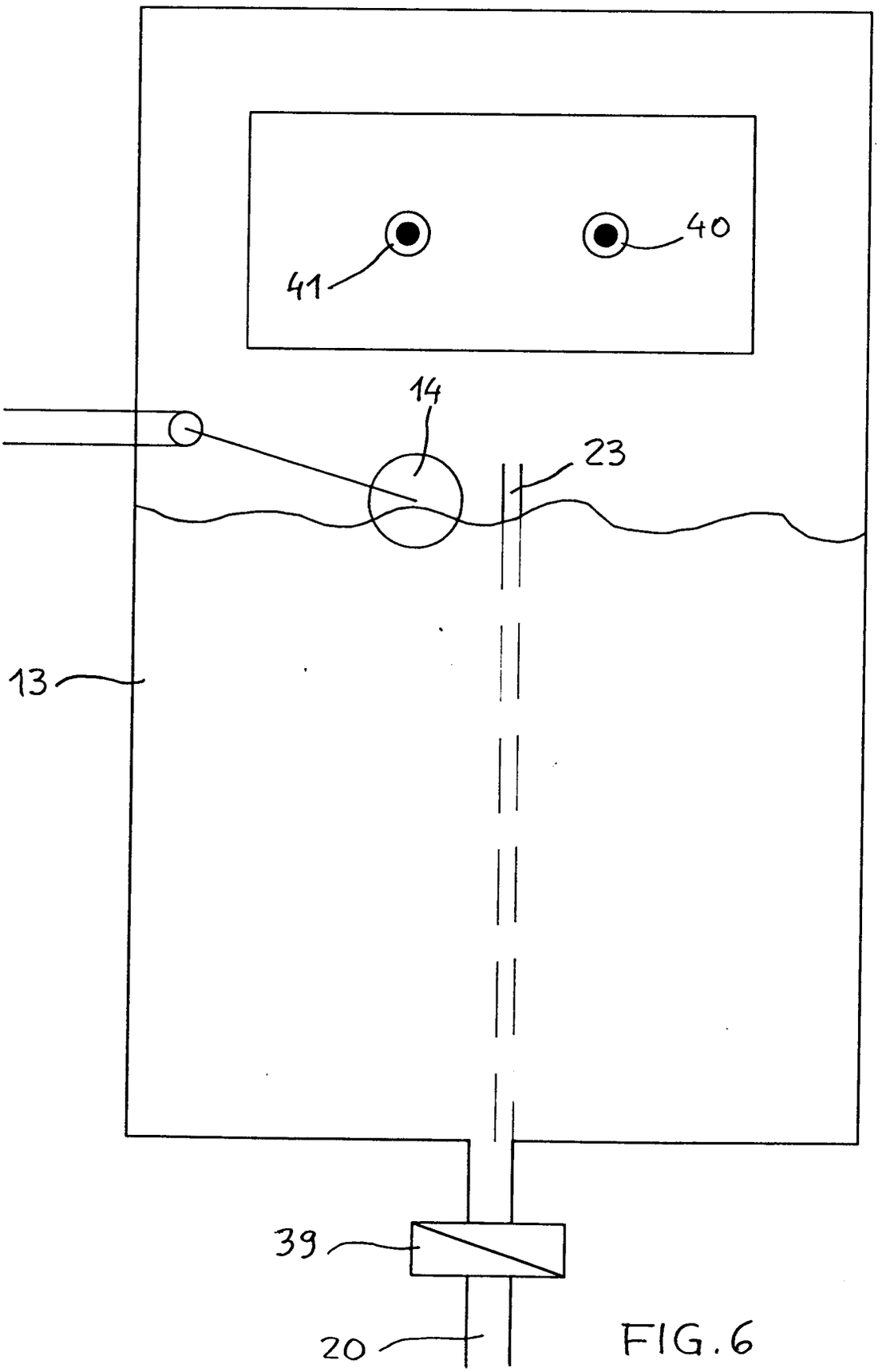


FIG.6

FIG. 7

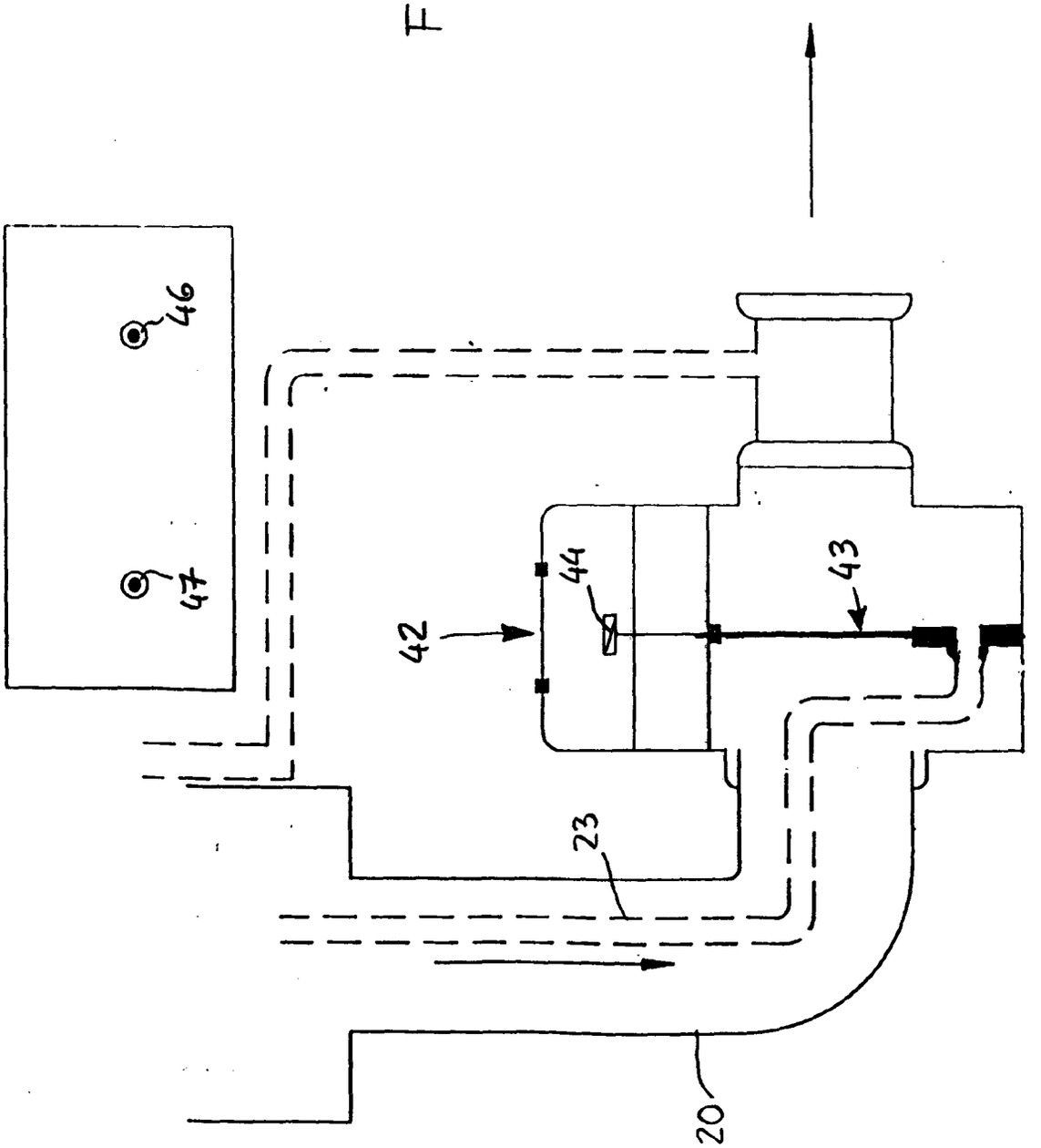


FIG.8

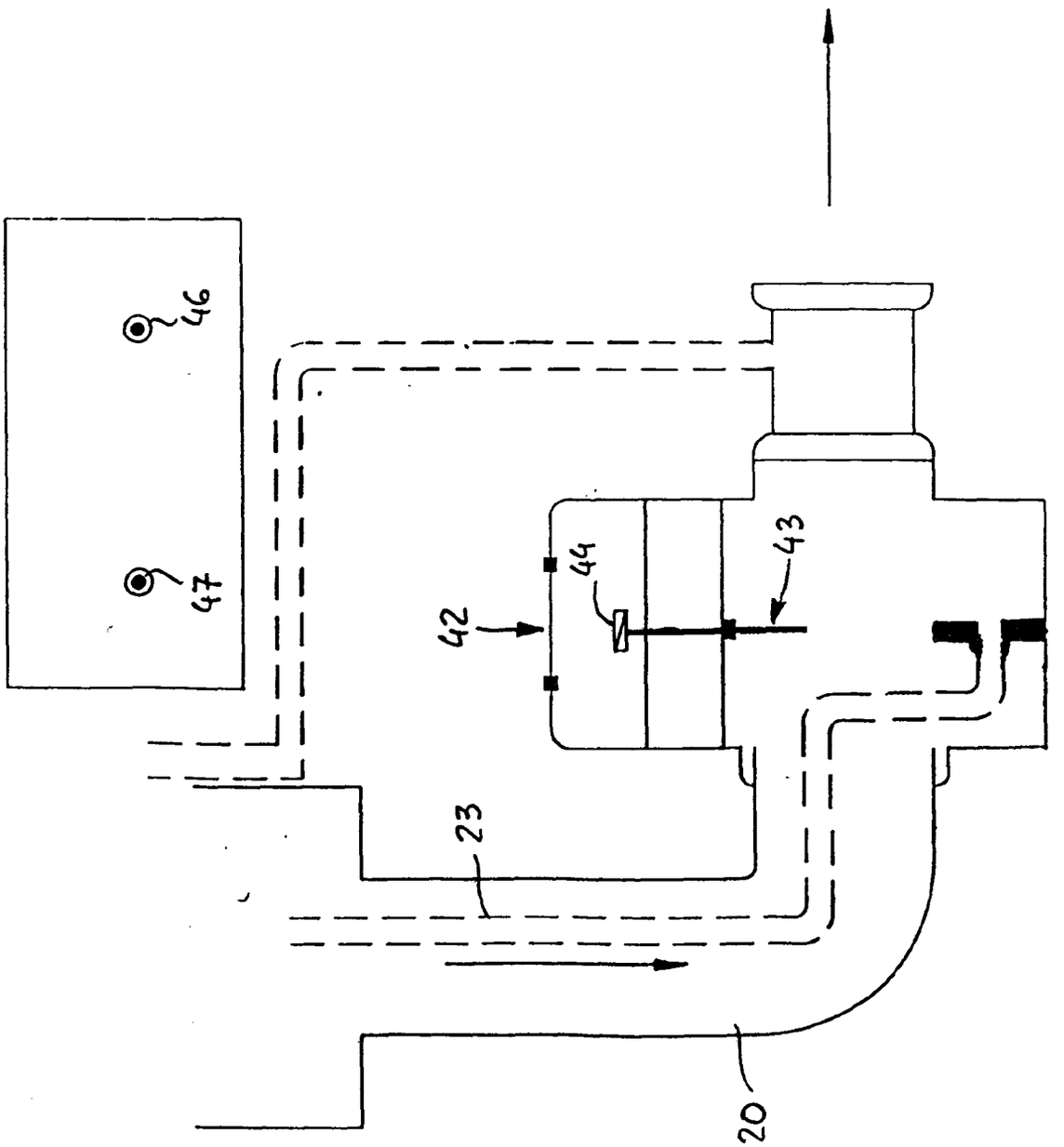


FIG. 9A

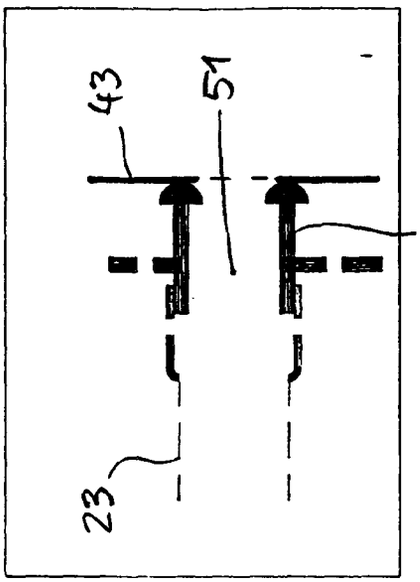
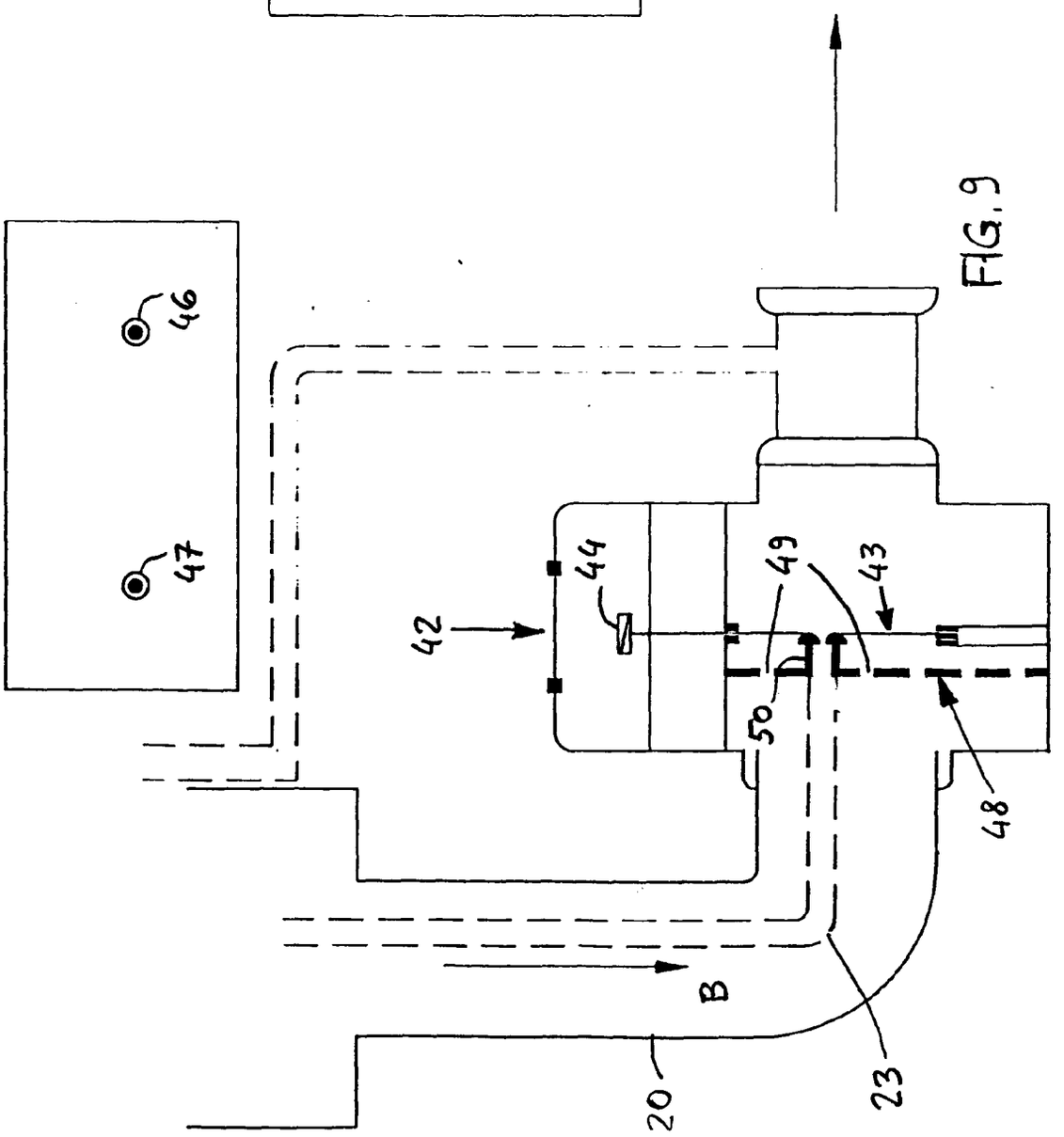


FIG. 9



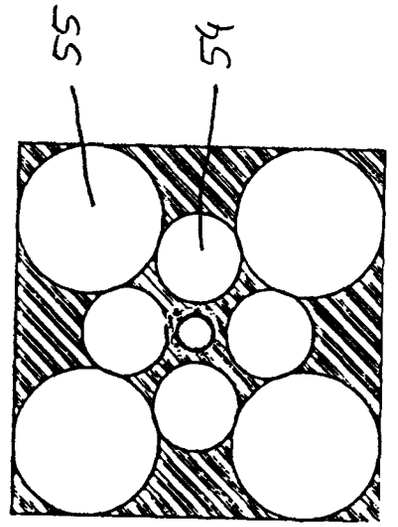


FIG.11

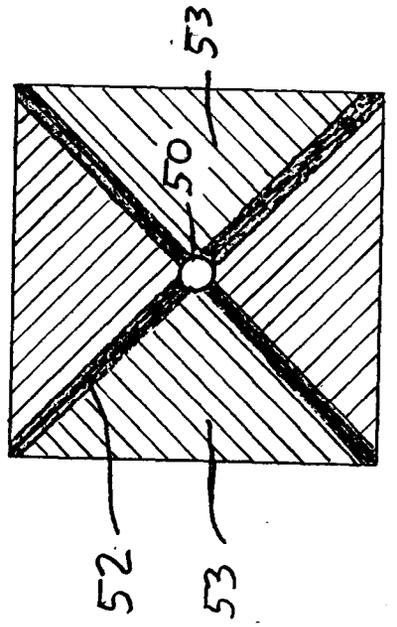
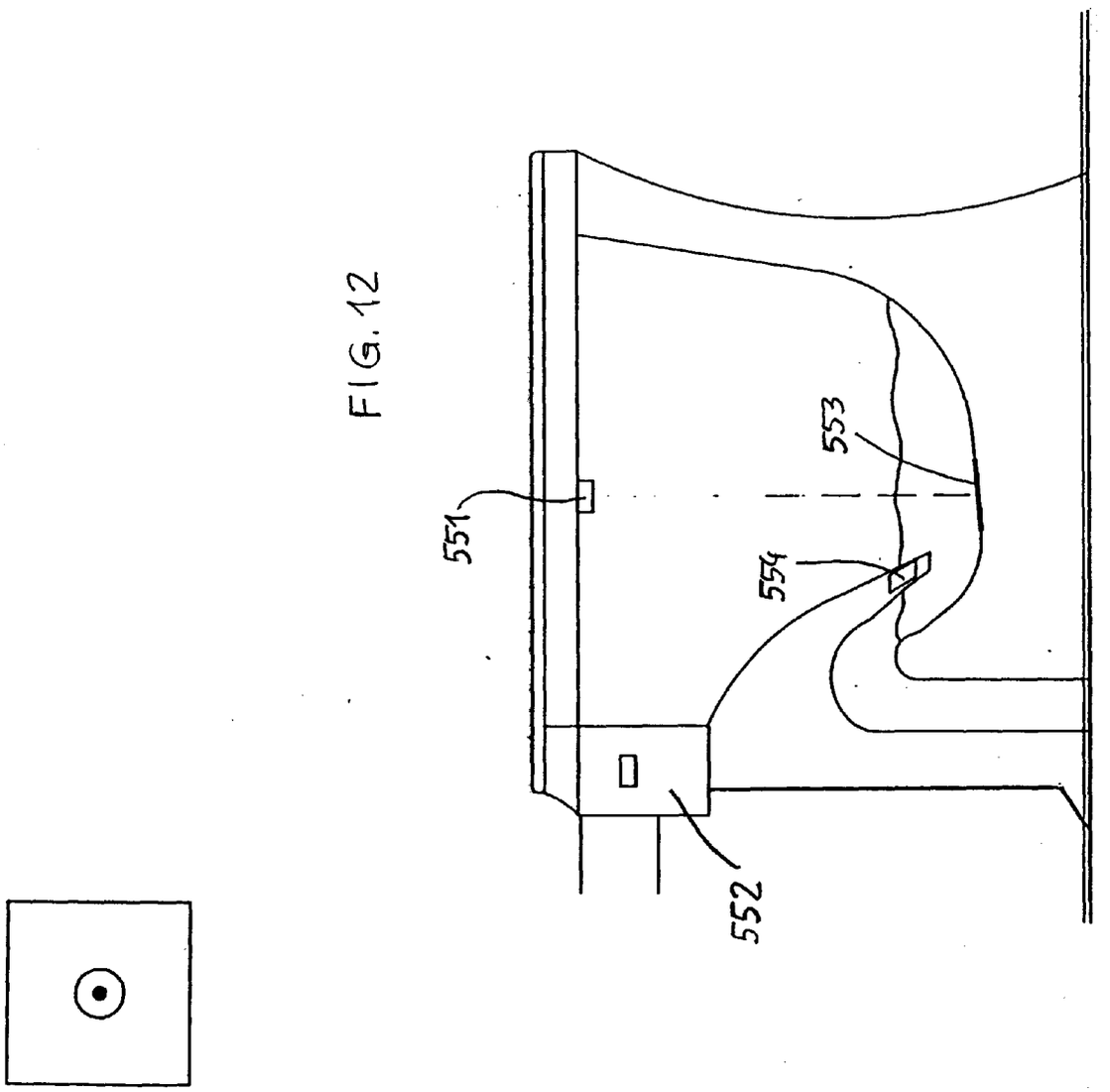


FIG.10

FIG. 12



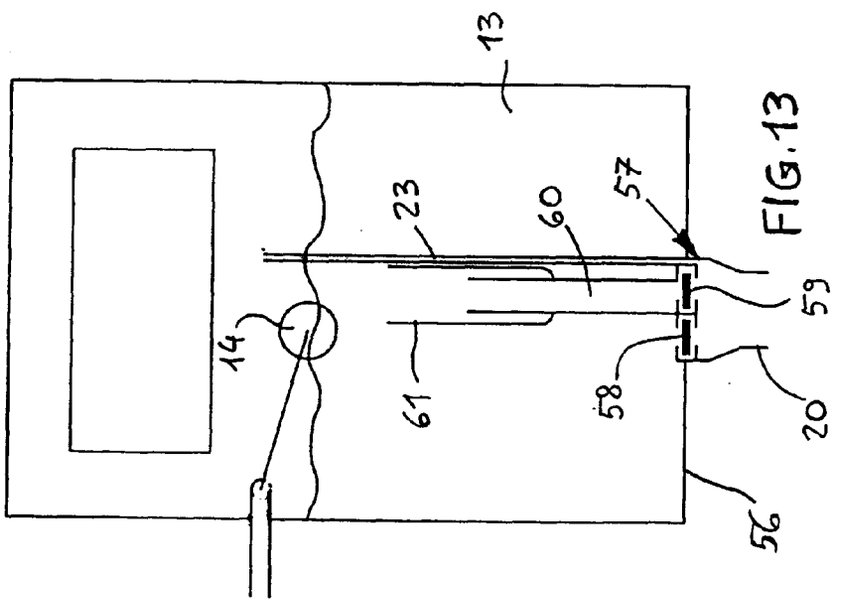


FIG.13

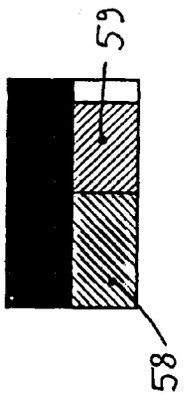


FIG.16

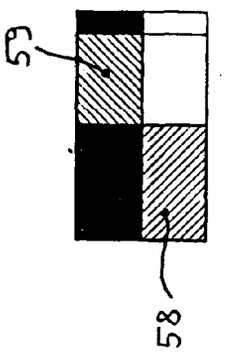


FIG.17

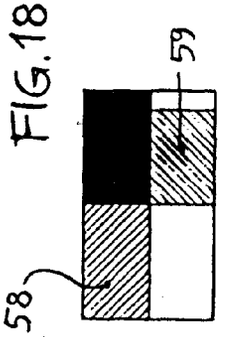


FIG.18

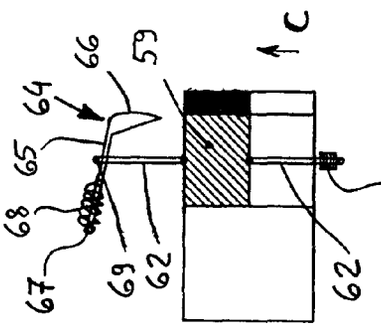


FIG.14

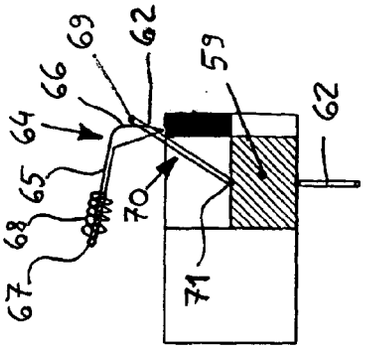


FIG.15