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(54) **CLEANING SYSTEM FOR TOILETS**

REINIGUNGSSYSTEM FÜR TOILETTEN

SYSTÈME DE NETTOYAGE POUR TOILETTES

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(72) Inventor: **LAZZARINI, Mauro**
I-48010 Fusignano (RA) (IT)

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(74) Representative: **Roncuzzi, Davide**
Roncuzzi & Associati S.r.l.
Via Antica Zecca, 6
48121 Ravenna (IT)

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(73) Proprietor: **Venturi, Fiamma**
48010 Fusignano (RA) (IT)

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Description

[0001] The present invention relates to a system for cleaning a toilet according to the preamble of claim 1.

BACKGROUND TO THE INVENTION

[0002] For cleaning toilets it is well known the use of hydraulic devices that flush the toilet bowl with water to free it from faeces or other organic waste. These devices are conceived to supply water below an annular portion delimiting the bowl at the top and shaped to support an annular seat. Some devices are associated with the annular portion and present a plurality of holes facing towards the pan outlet; other devices comprise a water supply arranged at the back, flushing water in a direction tangent to the pan outlet, so that the water flows in the bowl with a substantially concentric spiral movement.

[0003] To remove faeces or other organic materials firmly adhering to the toilet inner surface and requiring a mechanical friction by means of adequate brush members, solutions have been developed using supply members that can be applied to the toilet cover or can be housed in a portion thereof, supplying a high-pressure cleaning liquid. In more detail, there are well known supplying members that can be oriented so as to precisely and selectively direct the flow of cleaning liquid.

[0004] An example of a supply device according to the prior art is described in the patent application No. WO2008/099365, disclosing a plurality of embodiments of a supply member carried in a rotating or tilting way by a cover suitable to close the respective toilet in a substantially water-tight manner during cleaning operations. However, the document WO'365 only specifies that it is possible to change the direction of the cleaning flow, but does not describe in detail an actuating unit allowing to precisely and correctly direct the supply member, and therefore the flow of cleaning liquid.

[0005] The patent application WO2010/134008 discloses one more example of a device supplying a high-pressure cleaning liquid; this document describes a cleaning device provided with a supply member shaped like a rod provided with a flexible end carrying a respective supply nozzle. This supply member is carried by the tilting cover of the toilet and is designed to rotate by 360° relative to a substantially vertical axis so that the flow of cleaning liquid can peripherally sweep the toilet inner surface. Differently from WO'365, WO'008 specifies that the rotation of the supply member is provided by means of a common electric motor connected to the same supply member through a gear drive. It should be noted that the solution according to WO'008 has some limits and, in particular, the fact that the supply member cannot be sufficiently moved/oriented to allow that the flow of cleaning liquid sweeps the whole inner surface of the toilet, especially the pan outlet.

[0006] Further examples of cleaning systems for toilet bowls are known from each of US 2003/074731, KR 2010

0045754 and FR 2 864 974.

[0007] In view of what described above, the problem of selectively sweep the inner surface of a toilet by means of a flow of high-pressure cleaning liquid is therefore currently solved in an unsatisfactory manner, and represents an interesting challenge for the applicant, aiming at producing a system for cleaning sanitary fixtures allowing to limit and possibly to overcome the drawbacks of the prior art.

[0008] In view of the situation described above it would be desirable to have available a system for cleaning sanitary fixtures that, in addition to allow limiting and possibly overcoming the drawbacks of the prior art, defines a new standard in the design of toilets for private and/or public use.

SUMMARY OF THE PRESENT INVENTION

[0009] The present invention relates to a system for cleaning a toilet and to a toilet kit comprising said system and a toilet bowl.

[0010] One object of the present invention is to provide a system for cleaning a toilet that allows to solve the above mentioned drawbacks, and that is suitable to satisfy a plurality of requirements that to date have still not been addressed, and therefore suitable to represent a new and original source of economic interest, capable of modifying the current market of sanitary fixtures.

[0011] According to the present invention a cleaning system is provided, whose main features will be described in claims 1-8.

[0012] A further object of the present invention is to provide a toilet kit comprising said system and a toilet bowl, whose main features will be described in claim 9.

BRIEF DESCRIPTION OF DRAWINGS

[0013] Further characteristics and advantages of the system of the invention will be more apparent from the description below, set forth with reference to the attached drawings, where identical or corresponding parts of the system are identified by the same reference numbers. In particular:

- figure 1 comprises two side elevation views of a preferred embodiment of the present application, not falling with the scope of the claims, in two distinct configurations;
- figure 2 is a front view of figure 1, in enlarged scale and with some parts removed for the sake of clarity, with some details extracted to make the description thereof easier;
- figure 3 illustrates figure 1 by means of two block diagrams with some parts removed for the sake of clarity;
- figure 4 shows a variant of a detail of figure 1; and
- figure 5 is a variant of figure 4.
- figure 6 is a schematic perspective view of a sanitary

- fixture according to the present invention in a first configuration;
- figure 7 shows a detail from figure 6, in enlarged scale and partially cut away;
 - figure 8 shows the detail of figure 7 from a different point of view;
 - figure 9 shows a detail from figure 7, in enlarged scale and with some parts removed for the sake of clarity;
 - figure 10 shows a second preferred embodiment of figure 7; and
 - figure 11 shows three variants of a detail of figure 9.

[0014] The set of claims reflects the embodiments disclosed in Figures 6-10.

DETAILED DESCRIPTION OF THE PRESENT INVENTION

[0015] In figure 1, number 1 indicates, in its entirety, a cleaning system 1 for cleaning a toilet 3; the system, comprises a toilet bowl 4 provided with a pan outlet 5 for draining sewage, in particular faeces and urine, that leave different traces on the inner walls of the bowl 4 upstream of the pan outlet 5. The bowl 4 is delimited at the top by an cantilevered annular portion 7 that peripherally delimits a space 8 and has sufficient width to support an annular seat 9, usually geometrically shaped similarly to the annular portion 7. The system 1 comprises a hydraulic device 10 provided with a first tank 12 for water coming from the water supply network in a manner known and therefore not shown. This tank 12 may be indifferently embedded in the wall of the bathroom (as shown in figure 1) or may comprise a cistern 120 on the outside of the wall delimiting the toilet 3 at the back or at the side, as shown in figure 4. In both cases, a control plate 50 is associated to the tank 12 for controlling the supply of water - through gravity - for draining sewage through the pan outlet 5. This plate 50 is usually applied to the wall behind the toilet 3 or onto the lid 122 of the cistern 120 of the outer tank 12. In both cases the plate 50 is provided with at least one flush push button 52.

[0016] The hydraulic device 10 comprises a supply member 100 that is shaped to close the bowl 4 at the top, is provided with at least one nozzle 102 connected to the first watertight tank 12 to supply water inside the bowl 4. It should be noted that this supply member 100 is hinged to the bowl 4 and/or to the annular seat 9 in a known manner, and can therefore tilt around an axis A with respect to the bowl 4. This supply member 100 comprises a plate 104 geometrically shaped similarly to the space 8 and sized so as to be put over it and close it. According to figure 1, the supply member 100 comprises a cover 109 that delimits peripherally the plate 104 so as to form, together with the plate 104, a watertight inner chamber 110. The hydraulic device 10 comprises an electrically powered pumping unit 108 that can be actuated by means of a control and is arranged along a supply pipe

103 that is in turn arranged between the first tank 12 and each nozzle 102 so as to supply it with pressurized water. In use, the pressurized water from the pumping unit 108 allows to clean the toilet 3 with particular intensity in the areas, such as the pan outlet 5 and more generally the space 8, that come into direct contact with the organic waste and where dirt and bacteria therefore collect and shall be eliminated very carefully. In particular, the pumping unit 108 may be contained inside the first tank 12, as shown in figures 1 and 4, or may be supported by the toilet 3 or may be arranged anywhere on the supply pipe 103 according to the specific needs.

[0017] The cover 109 can therefore tilt as it is hinged to the bowl 4 in correspondence of the axis A.

[0018] It should be specified that, for the sake of economy in the drawings, the electrical connections between the electrically powered components - both the components that have been already described and the components that will be described below - are illustrated in incomplete manner.

[0019] A simple and economical way to provide each nozzle 102 is to make at least one hole 106 into the plate 104 in a substantially centred position and in hydraulic communication with the first tank 12. As, according to what described above, the plate 104 is connected to the bowl 4 in a tilting way, each hole 106 is therefore arranged in a position selectively facing the pan outlet 5, so as to minimise the distance from this pan outlet 5 and to maximise the cleaning ability of a water flow supplied inside the bowl 4 by means of each hole 106. On the other hand, it should be specified that, as visible in the left portion of figure 2, each hole 106 may be usefully of elongated shape, with at least two edge portions parallel to each other, or of circular shape, according to function or aesthetic needs, as the series of holes 106 is completely visible when the plate 104 is raised. For these reasons again, it is possible to combine elongated and circular holes 106, or holes of any other shape, taking into account the ratio between the power that can be supplied by the pumping unit 108 and the cleaning level desired for the bowl. 4.

[0020] The chamber 110 can therefore contain at least one second supply pipe 112 branching from the pipe 103 to hydraulically connect each hole 106 to the first tank 12. Moreover, in view of the above description, the chamber 110 is shaped to contain a box 114 hydraulically connected to the first tank 12 downstream of the pumping unit 108 to supply pressurized water through each hole 106. From a constructive viewpoint, the box 114 is shaped so as to be produced moulded together with the plate 104. The hydraulic device 10 furthermore comprises a valve 111 associated with the pipe 113 upstream of the box 114 with respect to each nozzle 102/hole 106, for instance at the base of the plate 104 at the side of the hinge axis of the plate 104 with the annular seat 9. This valve 111 controls the dripping from the nozzles 102 and, under certain conditions, prevents it, so that, when the plate 104 is raised, the liquid supply is completely

stopped, avoiding dripping thereof. Upstream of this valve 111, an intermediate second tank 117 for disinfectant liquid may be selectively associated with the pipe 103, and may be used selectively or always at every wash, according to the needs.

[0021] The system 1 comprises a power device 30 electrically connected to the pumping means 108 to supply them with the electricity and. This power device 30 may comprise a removable rechargeable battery 32 that can be snap-coupled to the cover 109 in a known and therefore not shown manner; this battery can be arranged for instance, although without limitation, in correspondence of the hinge portion (figures 1b and 2). Moreover, the device 30 may be directly connected to the public supply of electricity, for instance when installed in public places, if the estimated use rate of the system 1 is particularly high (see figure 3). The pumping unit 108 may be directly controlled by means of an actuating button, so as to determine the duration of the operation interval according to the specific needs.

[0022] Thanks to the electrically powered hydraulic device 10 and the power device 30 it is possible to provide the system 1 with a control device 20 provided with a plurality of sensors, with a storage unit, known and therefore not shown, where a program for managing the system operation may be stored, as well as with a data processing unit, known and therefore not shown, connected to the sensors to optimise the operation of the system 1. Particularly, the control device 20 comprises a switch or a first sensor 24 for detecting the angular position of the plate 104 with respect to the space 8 to selectively actuate the operation of the system 1 only when the plate 104/the cover 109 are in lowered position. This switch/first sensor 24 may be advantageously arranged in correspondence of the hinge axis A of the plate 104/of the cover 109 (figure 2) and may be indifferently provided with only one part connected to the movable part, i.e. the plate 104 or the cover 109, or with only one fixed part connected to the bowl 4, or with a fixed part and a movable part respectively connected to the bowl 4 and to the plate 104 and the cover 109.

[0023] As it is shown in figure 3, the control device may further comprise: a control member 23 provided with an actuating light button (herein referred to by the same number 23) electrically connected to the pumping unit 108 to control, in use, the supply of water taken from the first tank 12 and supplied, under pressure, by means of the pumping unit 108 through the nozzles 102; a timing member 25 connected to the pumping unit 108 to control the duration of the operation thereof; a second sensor 26 associated with the first tank 12 to measure the water quantity inside it; and a signalling member 28 that is electronically connected to the pumping unit 108 to indicate the operation state thereof, and that can be arranged in a position definable at will and is indicated in figure 2 in association with the control device 20 for the sake of practicality. The control member, provided with the actuating button 23, is electronically connected, in a known man-

ner, to the control device 20 and is able, in use, to control the actuation of the pumping unit 108 once the sensor 24 has verified that the plate 104/the cover 109 is in lowered position facing the space 8 and has therefore allowed the control device 20 to actuate it. In view of the description above, the actuating button 23 may be arranged in a remote position with respect to the toilet 3. For instance, the control member 23 for controlling the pumping unit 108 may be arranged at the side of the push button 52 of the plate 50, as shown in figure 3, or on the outer side of the cover 109, as shown in figure 1b, in the cut-away views of figure 2 and in figure 3, where it is shown in broken line. Moreover, the control device 20 may comprise a graphic tool 29 of any type designed to visually represent the water fall from each nozzle 102, arranged in a position definable at will and indicated in figure 2 in association with the control device 20 for the sake of practicality. This tool 29 may effectively comprise a led band 290. The graphic tool 29 could be omitted if the actuating button 23 would be provided with a led able to change colour during the operation of the pumping unit 108, to indicate respectively the activity step of water supply through the nozzles 102 and the inactivity step of the system 1 and, more in general, to indicate the different operative steps of the system 1.

[0024] In view of the above description, the control device 20, when provided, is in electronic communication both with the pumping unit 108 and the first tank 12, as well as with the plate 104 and it is therefore able to manage the water supply and the duration and intensity thereof through each nozzle 102.

[0025] The use of the system 1 is clearly apparent from the description above and does not require further explanations.

[0026] Lastly, it is clearly apparent that variants and modifications can be done to the system 1 described herein without however departing from the protective scope of the invention. For instance, it should be specified that at least one nozzle 102 may comprise at least one hydraulic member 102 shaped to supply water in drops, as it is shown in the two detailed views from the right side of figure 2. Specifically, in the first view from the right side of figure 2 only one nozzle 102 is provided, designed to supply pressurized water in drops, while in the second view from the right side a plurality of nozzles 102 are associated with the plate 104.

[0027] It should be noted that, if the valve 111 is actuated electronically and is electronically connected to the control device 20, it is possible to control the operation thereof in combination with the pumping unit 108; by adequately programming the control device 20 this pumping unit, at the end of a washing and/or sanitation cycle, could depressurize the supply pipe 103 so as to suck at least partially the liquid already supplied to the nozzles 102. Moreover, if the second tank 117 would be connected to the supply pipe 103 by means of a by-pass provided with an electrically actuatable valve, known and therefore not shown, electronically connected to the control device 20,

it would be possible to define the operative conditions under which to allow the selective supply of the sanitation liquid contained inside the second tank 117 to be supplied to the nozzles 102 together with the water taken from the first tank 12.

[0028] Obviously, the higher the power of the pumping unit 108, the more extended downwards the area of the bowl 4 affected by the cleaning action and the sanitation action, if necessary, .i.e. the higher the power of the pumping unit 108, the longer the distance of this area of the bowl 4 from the nozzles 102. In some cases such a power may be provided to clean up to near the pan outlet 5.

[0029] Obviously, if the first tank 12 is completely exposed, and therefore, as in figure 4, arranged completely outside of the wall above the bowl 4, it would be particularly easy to equip the system 1, associating at least the pumping unit 108 or at least the rechargeable battery 32 with a lid 122 of the first tank 12; it would be also possible to provide the hydraulic device 10 with a functional group 40, schematically illustrated in figure 4, contained inside a containment box-shaped body 41 designed to be coupled laterally/exteriorly to the first tank 12, after having provided the service holes for passing the hydraulic connections and the holes for fixing in the cistern 120 of the first tank 12 using screw connections, known and therefore not shown, or any other connections functionally equivalent.

[0030] With reference to figure 4 again, this functional group 40 may comprise preferably, although without limitation, the control device 20 interfaced with both the first sensor 24 for detecting the angular position of the plate 104 and the pumping unit 108, so as to selectively actuate the operation of the system 1 only when the plate 104/the cover 109 are in lowered position. Moreover, the functional group 40 may comprise a pumping unit 1 inside its box-shaped body 41 and integrate the battery 32 coupled in a releasable manner to the same box-shaped body 41. Furthermore, the functional group 40 should comprise the timing member 25, the second sensor 26 associated with the first tank 12, the signalling member 28, the graphic tool 29. In view of the description above, the functional group 40 may be part of a kit 70 to adapt ordinary hydraulic systems provided with exposed tank and associated with already installed toilets so as to make them functionally equivalent to the system 1 described above. This kit 70 should also comprise all the necessary supply pipes for the hydraulic connections and the cables for the electrical and electronic connections between the devices listed above and a cover 109 provided with the plate 104, the anti-dripping valve 111 and the nozzles 102, provided if necessary through the holes 106 of the plate 104 or in any other manner, as described above.

[0031] It should be specified that, again in order to control the dripping from the nozzles 102, the hydraulic device 10 may have, instead of the valve 111 shown in figures 2 and 3, a vent 108F (figure 3b) arranged inside the tank 12, thus simplifying the system 1 and therefore

reducing the cost thereof.

[0032] The system 1 illustrated in figure 5 falls within the protective scope of the invention too, and comprises a functional group 40 and a pumping unit 108 designed to be directly housed inside the cistern 122 of the tank 12.

[0033] The supply member 100 may be modified as shown in figures 6-10 if it is necessary to optimise the consumption of water to be supplied in the toilet 3 and the effective cleaning of the space 8. With particular reference to figures 7 and 8, the supply member 100 comprises a cover 109 that delimits peripherally the plate 104 and that, together with the same plate 104, defines a preferably watertight inner chamber 110, provided with a housing 32F that can be accessed from the rear for the battery 32 (figure 10) so that it is possible to remove the battery 32 to recharge it. Inside this inner chamber 110 there is a supply device 10, designed to supply, when the member 100 is in closing position, high-pressure water or other cleaning liquid inside the space 8 and preferably towards the area around the pan outlet 5. Instead of the fixed nozzles 102 described above, this supply device 10 comprises a supply member 15 carried by the plate 104 in a substantially articulated manner and having a respective portion housed inside a through hole 105 provided in the plate 104. With particular reference to figure 9, illustrating a preferred embodiment thereof, the supply member 15 comprises an axially-symmetrical hollow body, preferably a sleeve, that is indicated, for the sake of practicality, with the same reference number 15 and is provided with a supply head 15' presenting at least one respective nozzle 16' provided with a respective conical flared exit (figure 11a). To enlarge the width of the flow to be supplied, the supply head 15' may be preferably provided with a slit-like nozzle 16" (figure 11b) or with a plurality of nozzles 16"', each of which may be provided, without limiting the general scope of the invention, as described above (figure 11a) or in other effective way. With reference to figure 9 again, the body 15 furthermore presents an intermediate segment 15" presenting a respective convexity of substantially spherical shape, and an end portion 15''' arranged at opposite side from the supply head 15' and presenting greater outer diameter than the intermediate segment 15" so as to integrally support an annular member 18. This annular member 18 has limited longitudinal extension and its outer diameter is greater than that of the end portion 15'''. It should be noted that, as the annular member 18 is integral with the end portion 15''', it can be therefore interpreted as an end portion of the supply member 15. Moreover, as it will be better described below, the annular member 18 is designed to couple in a known manner, for instance by means of an usual threaded connection 101, to a supply pipe 103 for the cleaning fluid that will be supplied by means of the supply member 15.

[0034] With particular reference to figure 8, the hole 105 provided in the plate 104 presents a concave side surface shaped so as to define a spherical seat to couple in a substantially form-fitting manner to the convexity of

the intermediate segment 15", so as to couple in a substantially spherical manner the supply member 15 and the plate 104 and therefore the closing member 100. In this way the supply member 15 can freely rotate around at least one first and one second axis of rotation X and Y, perpendicular to each other and substantially coplanar with the plate 104. In this way, when the closing member 100 is in closing position, the longitudinal axis L of the supply member 15, and therefore the flow of cleaning liquid supplied by means of each nozzle 16, can be freely directed inside a conical portion of the space 8 presenting the respective vertex substantially in correspondence of the geometrical centre of the hole 105. In more detail, the annular member 18 is dimensioned so as to abut against the plate 104 to be suitable, in use, to define a stop for each rotation of the supply member 15 around the first and/or the second axis of rotation X/Y.

[0035] At this point, with particular reference to figure 7, it should be noted that the chamber 110 inside the closing member 100 also houses an actuating group 60 able, in use, to direct the supply member 15 according to a direction definable substantially at will. This actuating group comprises preferably, although without limitation, two actuating units 61, each of which is provided with a respective actuator 62 of the known type, for instance an electric stepping motor connected to the annular member 18 by means of a respective mechanical drive 63. This drive 63 may comprise preferably, although without limitation, a slider-crank mechanism provided with a crank 64 coupled to the drive shaft of the actuator 62 and a connecting rod 65, whose ends are hinged respectively to the crank 64 and to a spherical abutment 66 carried rigidly by the member 18. In this way, to each movement of a connecting rod 65 along a given actuating direction will correspond a rotation of the supply member around an axis of rotation transverse to this actuating direction. At this point, with particular reference to figure 7, it should be noted that the two actuating units 61 are independent of each other and designed so as to act on the supply member 15 along two transverse actuating directions so that the actuating group 60 is able, in use, to direct substantially at will the supply member 15 by means of given rotations around the first and second axes of rotation X and Y, perpendicular and coplanar. Therefore, in view of the description above, the actuating directions of each slider-crank mechanism 63 is parallel to, and therefore substantially corresponding to, a respective first or second axis of rotation X or Y.

[0036] With reference to figure 6, to the supply device 10 for the cleaning liquid a control device 20 is associated provided with an electronic control unit 21, preferably programmable and equipped with a respective memory, known and therefore not shown, storing the data and the software necessary for managing the operations of the system. In particular, the control unit 21 is connected to each actuating unit 62 by means of electric connections, known and therefore not shown for economy of the drawings, to control the movements of the supply member 15

according to a pre-set program. For instance, the control unit 21 may be programmed to move the supply member 15 in a reciprocating way so that, in use, the flow of cleaning liquid sweeps a given portion of the surface delimiting the space 8, preferably the portion surrounding the pan outlet 5 that is the area of this surface where residues of faeces or other organic material adhere more firmly. In other words, it is possible to control each nozzle 16', 16", 16''' so that it scan accurately a given portion of the surface delimiting the space 8, by alternating small discrete stepped rotations of the supply member 15 around the first axis of rotation X with reciprocating rotations of this supply member 15 for the whole extension of its angular stroke, around the second axis of rotation Y perpendicular to the first axis of rotation X. In this regard it should be specified that the verb "to sweep" has been used and is used herein with the meaning of "scanning" a given surface through the movement of a flow of given cleaning liquid.

[0037] The control device 20 of the present invention may alternatively comprise at least one sensor 150 (figures 6 and 8), for instance, although without limitation, an infra-red sensor, arranged stably inside the space 8 or carried by the closing member 100 in a tilting manner at the side of the supply member 15 to detect, in use, the position of organic residues remaining inside the space 8 on the inner surface of the bowl 4. According to this variant again, the control unit 21 may also be programmed to detect through the sensor 150 the position of organic residues to be removed and to consequently control the movement of the supply member 15 so that the respective flow of cleaning fluid supplied by means of the supply member 15 is directed substantially towards these organic residues. In more detail, the control unit 21 may be programmed to make the flow of cleaning fluid scan a portion of the inner surface of the bowl 4 focussed on the position of the organic residues detected by means of the sensor 150.

[0038] It should be noted that the control device 20 may be indifferently arranged inside (as shown in figure 6) or outside the tank 12, electrically powered by means of a battery or an outer power supply, for instance the home power supply, without however limiting the scope of the invention.

[0039] In view of the description above it is clearly apparent that the set of the supply device 10, of the actuating device 60 and of the control device 20 may be interpreted as a cleaning system 1 that can be associated with a toilet 3 and used to supply a flow of high-pressure cleaning liquid to maximise the cleaning of the inner surface of the toilet 3. At this point it should be noted that the cleaning system 1 described above is designed to be associated with a hydraulic device 100' suitable, in use, to supply said supply device 10 with a flow of given high-pressure cleaning liquid. This hydraulic device 100' may be produced in any way, without however limiting the general scope of the present invention. For instance, the hydraulic device 100' may be provided as described

above with reference to figures 3-5 of this patent. In this case, the control device 20 described above with reference to figure 1 may be associated or coincide with the control device 20 described in greater detail with reference to figures 3-5, arranged indifferently inside or outside the tank 12, and can be therefore able, in use, also to control the duration and the intensity of the cleaning liquid supplied by means of each supply member 15 provided with each nozzle 16', 16", 16'''.

[0040] With reference to figure 10, the plate 104 may present smaller dimensions and be completely housed inside the closing member 100 that, in this variant, is made by coupling a lower cap 107 and the cover 109. In particular, in this variant the plate 104 is integrally coupled to at least the lower cap 107, which presents a respective hole 105' aligned with the hole 105 of the plate 104. In more detail, the actuating units 62 can be coupled with the plate 104 in a vice-like manner by means of respective brackets of known type, made integral to the plate 104 through respective couplings of known type, for instance, although without limitation, threaded couplings. According to this variant again, at least one supply member 15, instead of being coupled in an articulated manner to the plate 104, is carried in an orientable manner by the connection 101 of the hydraulic device 100' for supplying the cleaning liquid.

[0041] In view of the description above it is clearly apparent that the presence of an electro-mechanical actuating group 60 inside the system 1 allows to selectively direct the supply member 15 and allows therefore to direct the flow of cleaning liquid in the direction where there are the organic residues to remove them definitively to prevent the development of germs and bacteria inside the toilet 3. Therefore, in view of the above description, the control group 20 may be provided to automatize the cleaning operations to clean with particular care the area of the pan outlet 5 or any other portion of the inner surface of the bowl 4 where the organic residues tend to remain.

[0042] Furthermore, each of the embodiments described above of the cleaning system 1 of the present invention solves any technical problem highlighted above, i.e. provides a system for cleaning toilets suitable to guarantee an effective removal of faeces or organic residues adhering to the inner surface of the bowl 4 near the portion surrounding the pan outlet 5.

Claims

1. A system (1) for cleaning a toilet (3) having a respective inner space (8) for draining faeces; said system (1) comprising a hydraulic device (10) provided with a first water tank (12), at least one nozzle (102) hydraulically connected to said first tank (12) and pumping means (108) arranged between said first tank (12) and said at least one nozzle (102) to pressurize the water to be supplied; said hydraulic device (10) comprising a closing member (100) adapted to

be hinged to the bowl (4) of said toilet (3) and comprising a plate (104) provided with said at least one nozzle (102); a control device (20) provided with a data processing unit (22) electronically connected to said hydraulic device (10) to manage said pumping means (108); a power device (30) being provided to supply said pumping means (108) and said control device (20) with electrical energy; wherein said hydraulic device (10) comprises a supply member (15) with an axially-symmetrical hollow body provided with a supply head (15') presenting said at least one nozzle (102), said supply member (15) being carried by said plate (104) of said closing member (100) in an articulated manner, meaning that said supply member (15) can be rotated around at least one first and one second axis of rotation X and Y, perpendicular to each other and coplanar with said plate (104), wherein said hollow body of said supply member (15) furthermore presents an intermediate segment (15'') presenting a respective convexity of substantially spherical shape, said intermediate segment being housed in a hole (105) provided in said plate (104), wherein said hole (105) presents a concave side surface shaped so as to define a spherical seat to couple in a form-fitting manner to the convexity of said intermediate segment (15''), and **characterized in that** said hollow body of said supply member (15) further comprises an end portion (15''') arranged at opposite side from said supply head (15') and presenting greater outer diameter than said intermediate segment (15'').

2. A system according to claim 1, **characterised in that** said end portion (15''') integrally supports an annular member (18).
3. A system according to claim 2, **characterised in that** said annular member (18) is designed to couple by means of a threaded connection (101), to a supply pipe (103) for the cleaning fluid to be supplied by means of said supply member (15).
4. A system according to any one of claims 2-3, **characterised in that** said annular member (18) has limited longitudinal extension and its outer diameter is greater than that of the end portion (15'''), said annular member (18) being thus dimensioned so as to abut against said plate (104) to define a stop for each rotation of said supply member (15) around said first and/or second axis of rotation (X/Y).
5. A system according to one of claims 1 to 4, **characterised in that** said closing member (100) defines a chamber (110) which houses an electrically powered actuating group (60) able, in use, to direct said supply member (15) according to a direction definable at will.

6. A system according to claim 5 when referred back to one of claims 2-4, **characterised in that** said actuating group (60) comprises two actuating units (61), each of which is provided with a respective actuator (62) connected to the annular member (18) by means of a respective mechanical drive (63).
7. A system according to claim 6, **characterized in that** each of said actuators comprises an electric stepping motor.
8. A system according to claim 7, **characterised in that** each of said drives (63) comprises a slider-crank mechanism provided with a crank (64) coupled to the drive shaft of said actuator (62) and a connecting rod (65), whose ends are hinged respectively to the crank (64) and to a spherical abutment (66) carried rigidly by said member (18).
9. A toilet kit comprising a bowl (4) provided with a pan outlet (5) for draining faeces and a system for cleaning; **characterized in that** said system for cleaning is carried out according to one of claims 1 to 8 and **in that** said closing member (100) of said system for cleaning is hinged to said bowl (4).

Patentansprüche

1. System (1) zum Reinigen einer Toilette (3), die einen jeweiligen Innenraum (8) zum Ableiten von Stuhl aufweist; wobei das System (1) eine hydraulische Vorrichtung (10) umfasst, die mit einem ersten Wasserkasten (12), mindestens einer Düse (102), die hydraulisch an den ersten Kasten (12) angeschlossen ist, und eine Pumpvorrichtung (108) umfasst, die zwischen dem ersten Kasten (12) und der mindestens einer Düse (102) angeordnet ist, um das anzuliefernde Wasser unter Druck zu setzen; wobei die hydraulische Vorrichtung (10) Folgendes umfasst: ein Schließteil (100), das geeignet ist, an die Schüssel (4) der Toilette (3) scharniert zu werden, und eine Platte (104), die mit der mindestens einer Düse (102) ausgestattet ist; eine Reguliervorrichtung (20), die mit einer Datenverarbeitungseinheit (22) ausgestattet ist, die elektronisch mit der hydraulischen Vorrichtung (10) verbunden ist, um die Pumpvorrichtung (108) zu steuern; eine Kraftliefervorrichtung (30), die bereitgestellt ist, um die Pumpvorrichtung (108) und die Reguliervorrichtung (20) mit elektrischer Energie zu versorgen; wobei die hydraulische Vorrichtung (10) ein Anlieferteil (15) mit einem axialsymmetrischen hohlen Körper umfasst, der mit einem Anlieferkopf (15') ausgestattet ist, der mindestens die eine Düse (102) aufweist, wobei das Anlieferteil (15) durch die Platte (104) des Schließteils (100) auf artikulierte Weise getragen wird, was bedeutet, dass das Anlieferteil (15) um mindestens eine erste und

eine zweite Rotationsachse X und Y rotiert werden kann, die senkrecht zu einander und koplanar zu der Platte (104) angeordnet sind, wobei der hohle Körper des Anlieferteils (15) ferner ein Zwischensegment (15'') aufweist, das eine jeweilige Konvexität der im Wesentlichen kugelförmiger Gestalt aufweist, wobei das Zwischensegment in einem Loch (105) untergebracht ist, das in der Platte (104) bereitgestellt ist, wobei das Loch (105) eine konkavförmige Seitenfläche aufweist, die so gestaltet ist, dass sie einen kugelförmigen Sitz zum formschlüssigen Verbinden mit der Konvexität des Zwischensegments (15'') definiert, und **dadurch gekennzeichnet, dass** der hohle Körper des Anlieferteils (15) ferner einen Endabschnitt (15''') umfasst, der an der entgegengesetzten Seite vom Anlieferkopf (15') angeordnet ist, und einen größeren Außendurchmesser als das Zwischensegment (15'') aufweist.

2. System nach Anspruch 1, **dadurch gekennzeichnet, dass** der Endabschnitt (15''') integral ein ringförmiges Teil (18) stützt.
3. System nach Anspruch 2, **dadurch gekennzeichnet, dass** das ringförmige Teil (18) zum Verbinden durch eine Gewindeverbindung (101) mit einem Anlieferrohr (103) für das Reinigungsfluid konzipiert ist, das durch den Anlieferteil (15) angeliefert werden soll.
4. System nach irgendeinem der Ansprüche 2-3, **dadurch gekennzeichnet, dass** das ringförmige Teil (18) eine beschränkte Längsausdehnung aufweist und sein Außendurchmesser größer ist als derjenige des Endabschnitts (15'''), wobei das ringförmige Teil (18) so dimensioniert ist, dass es gegen die Platte (104) anstößt, um einen Stoppanschlag für jede Rotation des Anlieferteils (15) um die erste und/oder zweite Rotationsachse (X/Y) zu definieren.
5. System nach einem der Ansprüche 1 bis 4, **dadurch gekennzeichnet, dass** das Schließteil (100) eine Kammer (110) definiert, die eine elektrisch angetriebene Betätigungsgruppe (60) unterbringt, die in der Lage ist, bei der Benutzung den Anlieferteil (15) einer beliebig definierbaren Richtung entsprechend zu steuern.
6. System nach Anspruch 5 bei Bezugnahme zurück auf einen der Ansprüche 2-4, **dadurch gekennzeichnet, dass** die Betätigungsgruppe (60) zwei Betätigungseinheiten (61) umfasst, von denen jede mit einem entsprechenden Aktuator (62) ausgestattet ist, der mit dem ringförmigen Teil (18) durch einen entsprechenden mechanischen Antrieb (63) verbunden ist.
7. System nach Anspruch 6, **dadurch gekennzeichnet,**

net, dass jeder der Aktuatoren einen elektrischen Schrittmotor umfasst.

8. System nach Anspruch 7, **dadurch gekennzeichnet, dass** jeder der Antriebe (63) einen Gleitkurbelmechanismus umfasst, der mit einer Kurbel (64) ausgestattet ist, die mit der Antriebswelle des Aktuators (62) und einer Verbindungsstange (65) verbunden ist, deren Enden jeweils an die Kurbel (64) und eine kugelförmige Auflage (66) scharniert ist, die unbeweglich von dem ringförmigen Teil (18) getragen wird.
9. Toilettenausstattung umfassend eine Schüssel (4), die mit einem Beckenauslass (5) zum Ableiten von Stuhl ausgestattet ist, und ein Reinigungssystem; **dadurch gekennzeichnet, dass** das Reinigungssystem nach einem der Ansprüche 1 bis 8 ausgeführt wird und dass der Schließteil (100) des Reinigungssystems an die Schüssel (4) scharniert ist.

Revendications

1. Système (1) pour nettoyer des toilettes (3) ayant un espace interne respectif (8) pour évacuer des selles ; ledit système (1) comprenant un dispositif hydraulique (10) muni d'un premier réservoir d'eau (12), d'au moins une buse (102) reliée hydrauliquement audit premier réservoir (12) et de moyens de pompage (108) disposés entre ledit premier réservoir (12) et ladite au moins une buse (102) pour mettre sous pression l'eau devant être distribuée ; ledit dispositif hydraulique (10) comprenant un élément de fermeture (100) apte à être articulé à la cuvette (4) desdites toilettes (3) et comprenant une plaque (104) munie de ladite au moins une buse (102) ; un dispositif de commande (20) muni d'une unité de traitement de données (22) connectée électroniquement audit dispositif hydraulique (10) pour gérer lesdits moyens de pompage (108) ; un dispositif d'alimentation (30) étant prévu pour alimenter en énergie électrique lesdits moyens de pompage (108) et ledit dispositif de commande (20) ; ledit dispositif hydraulique (10) comprenant un élément de distribution (15) avec un corps creux axialement symétrique muni d'une tête de distribution (15') présentant ladite au moins une buse (102), ledit élément de distribution (15) étant porté par ladite plaque (104) dudit élément de fermeture (100) d'une manière articulée, ce qui signifie que ledit élément de distribution (15) peut être tourné autour d'au moins un premier et un second axe de rotation X et Y, perpendiculaires l'un à l'autre et coplanaires avec ladite plaque (104), ledit corps creux dudit élément de distribution (15) présentant en outre un segment intermédiaire (15'') présentant une convexité respective de forme sensiblement sphérique, ledit segment intermédiaire étant reçu dans un trou

(105) prévu dans ladite plaque (104), ledit trou (105) présentant une surface latérale concave façonnée de façon à définir un siège sphérique pour s'accoupler, d'une manière à ajustement de forme, à la convexité dudit segment intermédiaire (15''), et **caractérisé par le fait que** ledit corps creux dudit élément de distribution (15) comprend en outre une partie d'extrémité (15''') disposée sur un côté opposé à ladite tête de distribution (15') et présentant un diamètre externe plus grand que ledit segment intermédiaire (15'').

2. Système selon la revendication 1, **caractérisé par le fait que** ladite partie d'extrémité (15''') supporte intégralement un élément annulaire (18).
3. Système selon la revendication 2, **caractérisé par le fait que** ledit élément annulaire (18) est agencé pour s'accoupler, au moyen d'une liaison filetée (101), à un tuyau de distribution (103) pour que le fluide de nettoyage soit distribué au moyen dudit élément de distribution (15).
4. Système selon l'une quelconque des revendications 2-3, **caractérisé par le fait que** ledit élément annulaire (18) a une extension longitudinale limitée et son diamètre externe est plus grand que celui de la partie d'extrémité (15'''), ledit élément annulaire (18) étant ainsi dimensionné de façon à venir en butée contre ladite plaque (104) pour définir un arrêt pour chaque rotation dudit élément d'alimentation (15) autour dudit premier et/ou second axe de rotation (X/Y).
5. Système selon l'une des revendications 1 à 4, **caractérisé par le fait que** ledit élément de fermeture (100) définit une chambre (110) qui reçoit un groupe d'actionnement alimenté électriquement (60) apte, en utilisation, à diriger ledit élément de distribution (15) selon une direction pouvant être définie à volonté.
6. Système selon la revendication 5 lorsqu'elle se réfère à l'une des revendications 2-4, **caractérisé par le fait que** ledit groupe d'actionnement (60) comprend deux unités d'actionnement (61), chacune d'elles comprenant un actionneur respectif (62) relié à l'élément annulaire (18) au moyen d'un entraînement mécanique respectif (63).
7. Système selon la revendication 6, **caractérisé par le fait que** chacun desdits actionneurs comprend un moteur pas-à-pas électrique.
8. Système selon la revendication 7, **caractérisé par le fait que** chacun desdits entraînements (63) comprend un mécanisme à coulisseau-manivelle muni d'une manivelle (64) couplée à l'arbre d'entraînement dudit actionneur (62) et une bielle (65), dont

les extrémités sont articulées respectivement à la manivelle (64) et à une butée sphérique (66) portée de façon rigide par ledit élément (18).

9. Kit de toilettes comprenant une cuvette (4) munie d'une sortie d'évacuation (5) pour évacuer des selles et un système de nettoyage ; **caractérisé par le fait que** ledit système de nettoyage est mis en oeuvre selon l'une des revendications 1 à 8 et **par le fait que** ledit élément de fermeture (100) dudit système de nettoyage est articulé à ladite cuvette (4).

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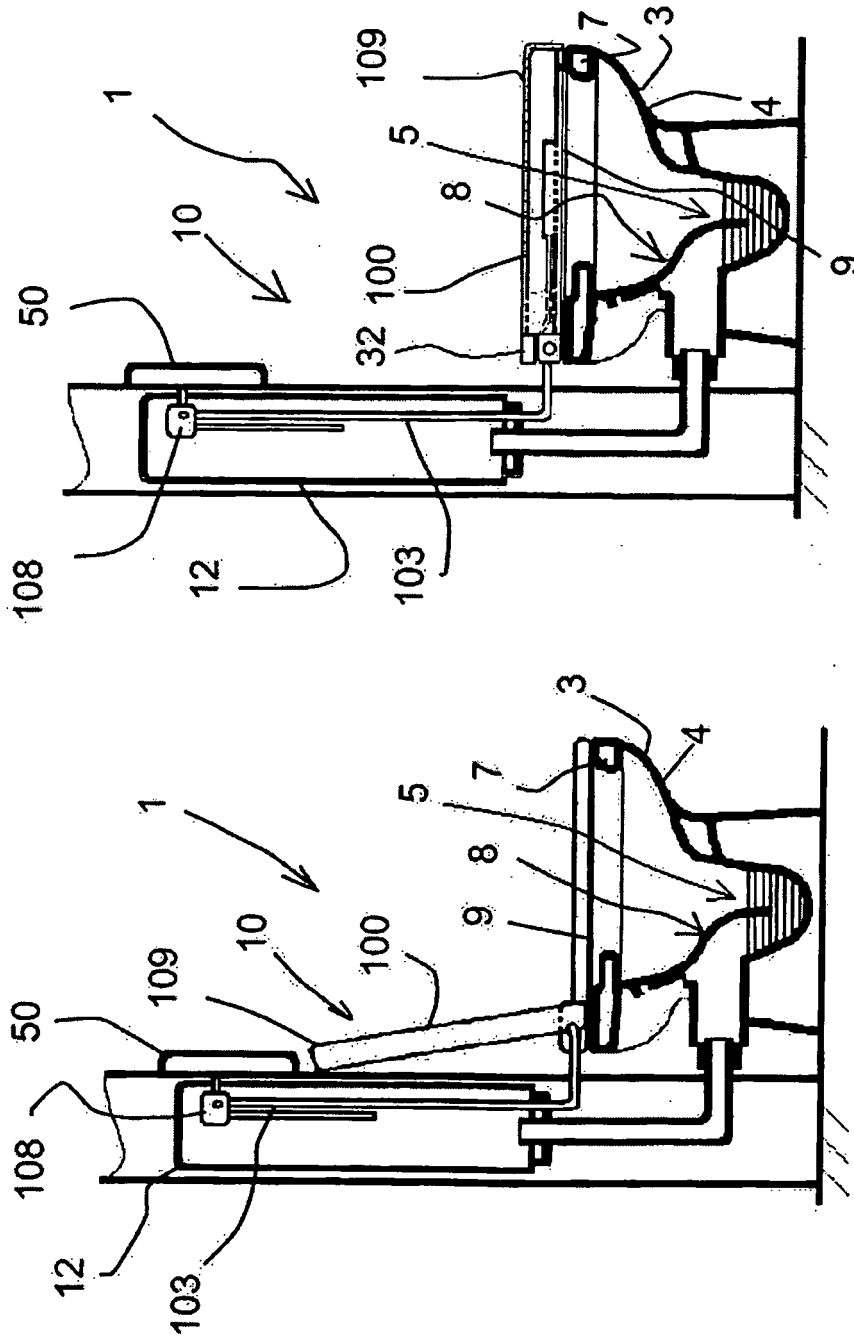


Fig. 1b)

Fig. 1a)

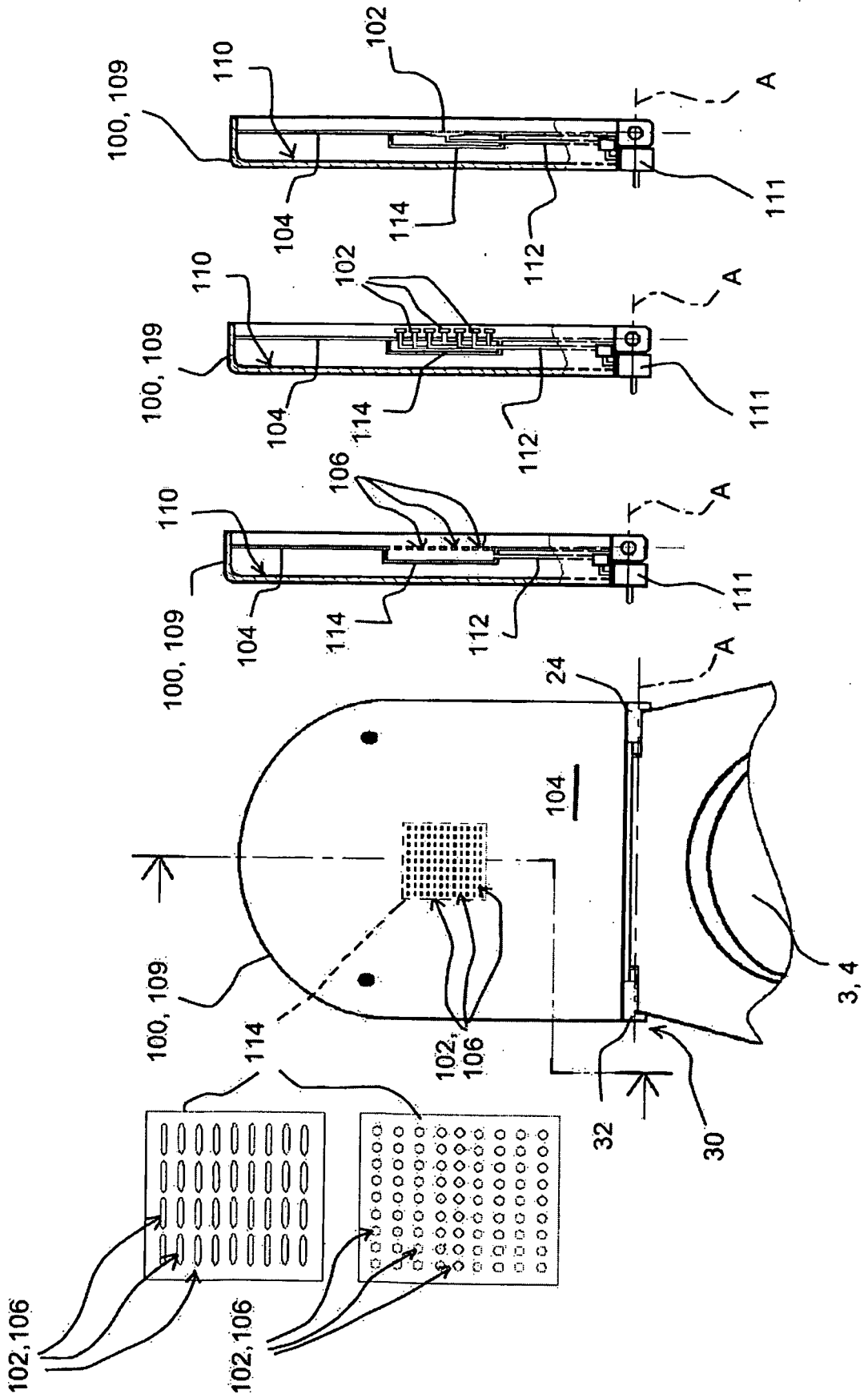


Fig. 2

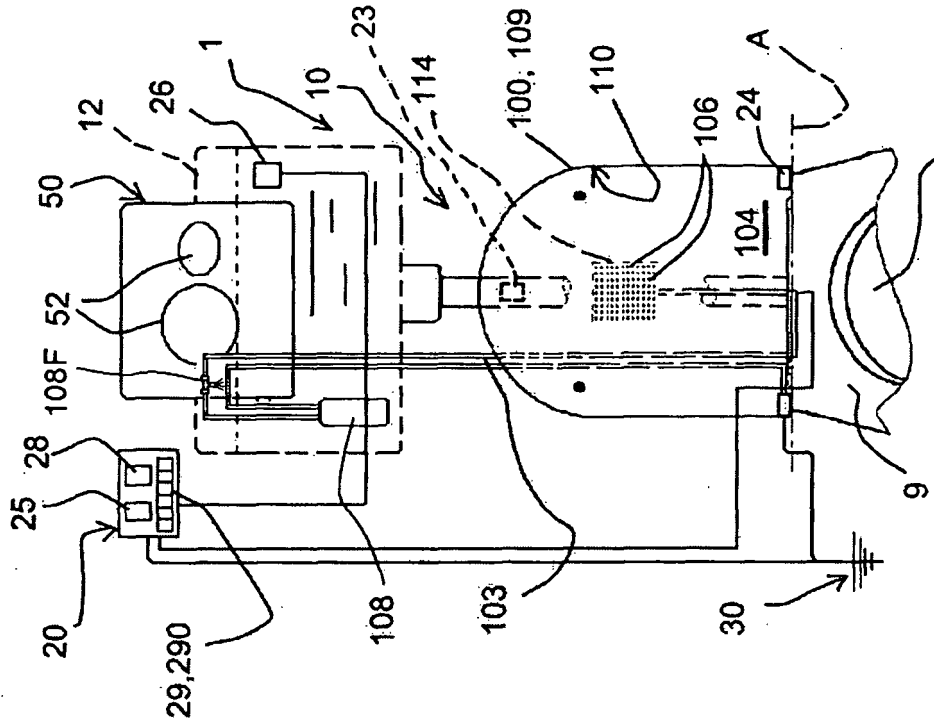


Fig. 3 b)

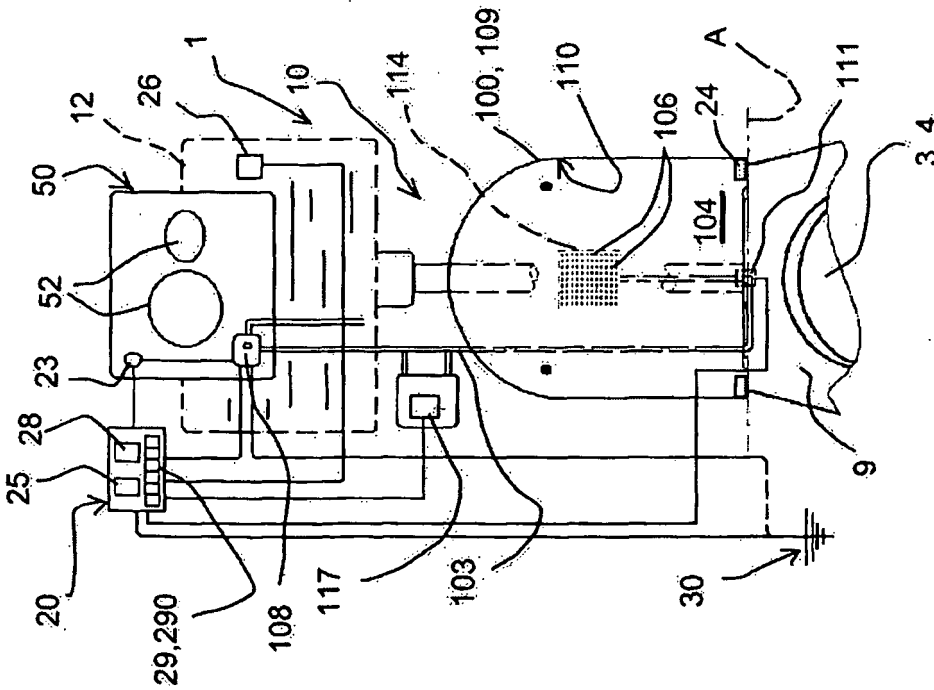


Fig. 3 a)

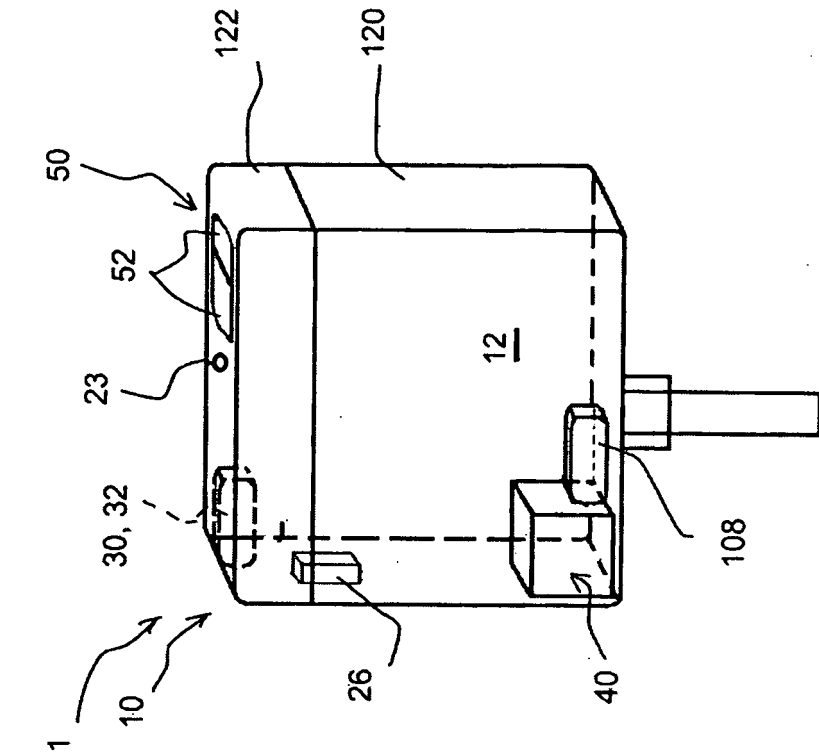


Fig. 4

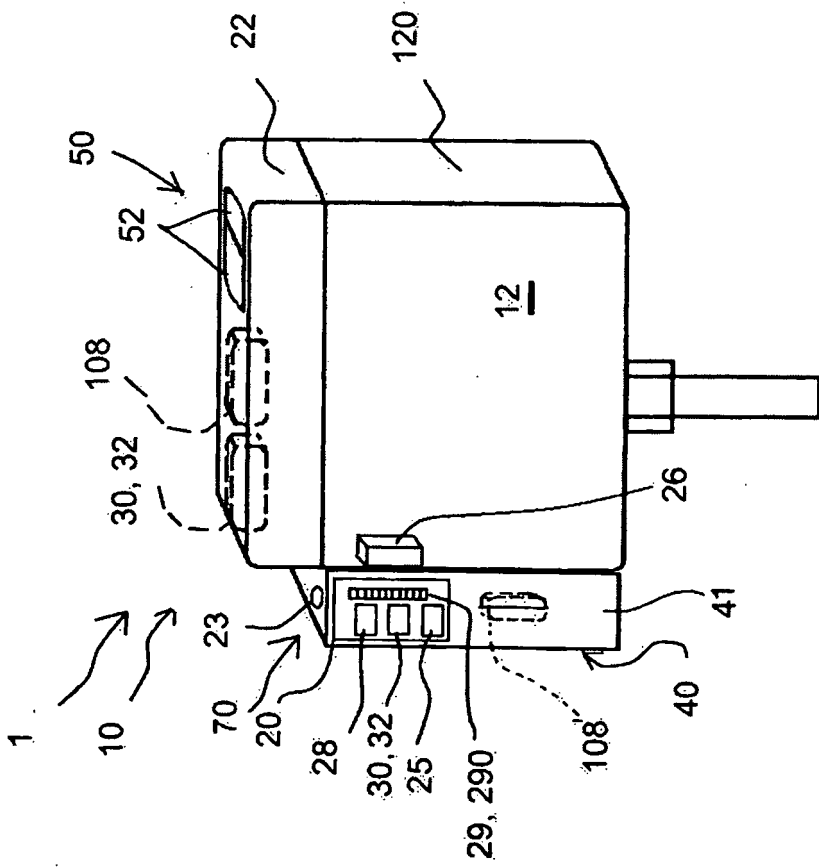


Fig. 5

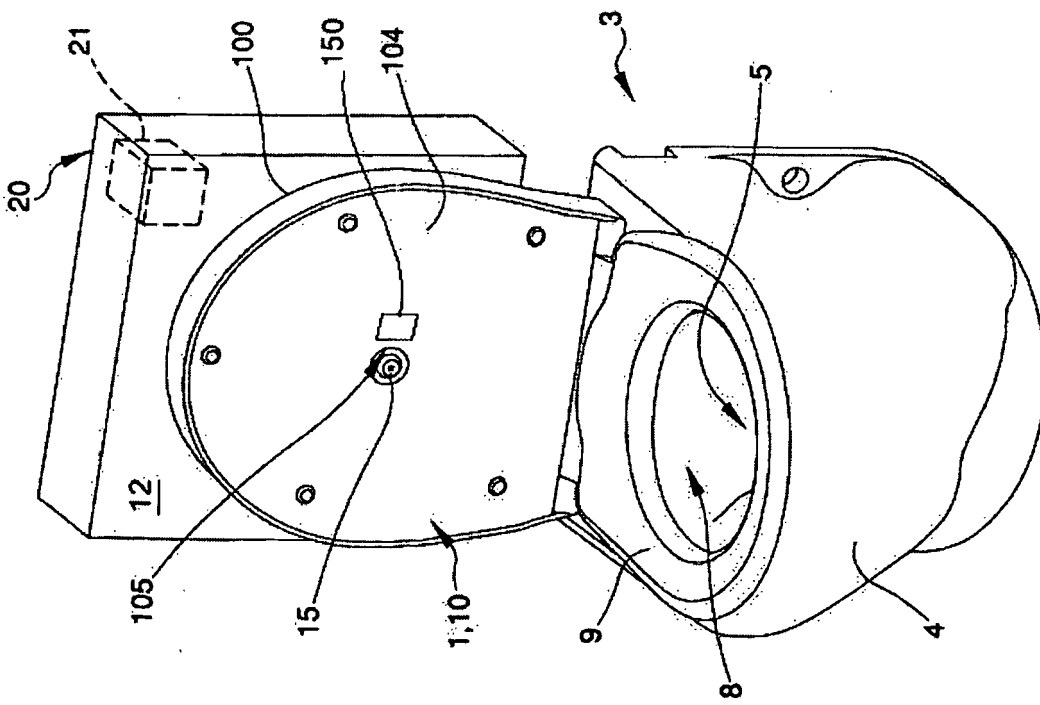
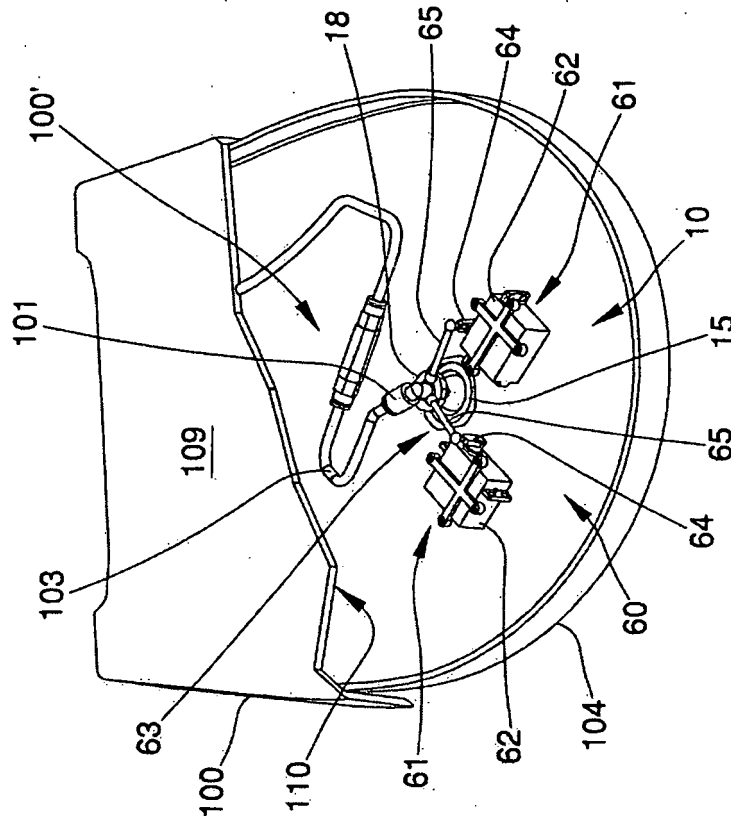


Fig. 6

Fig. 7



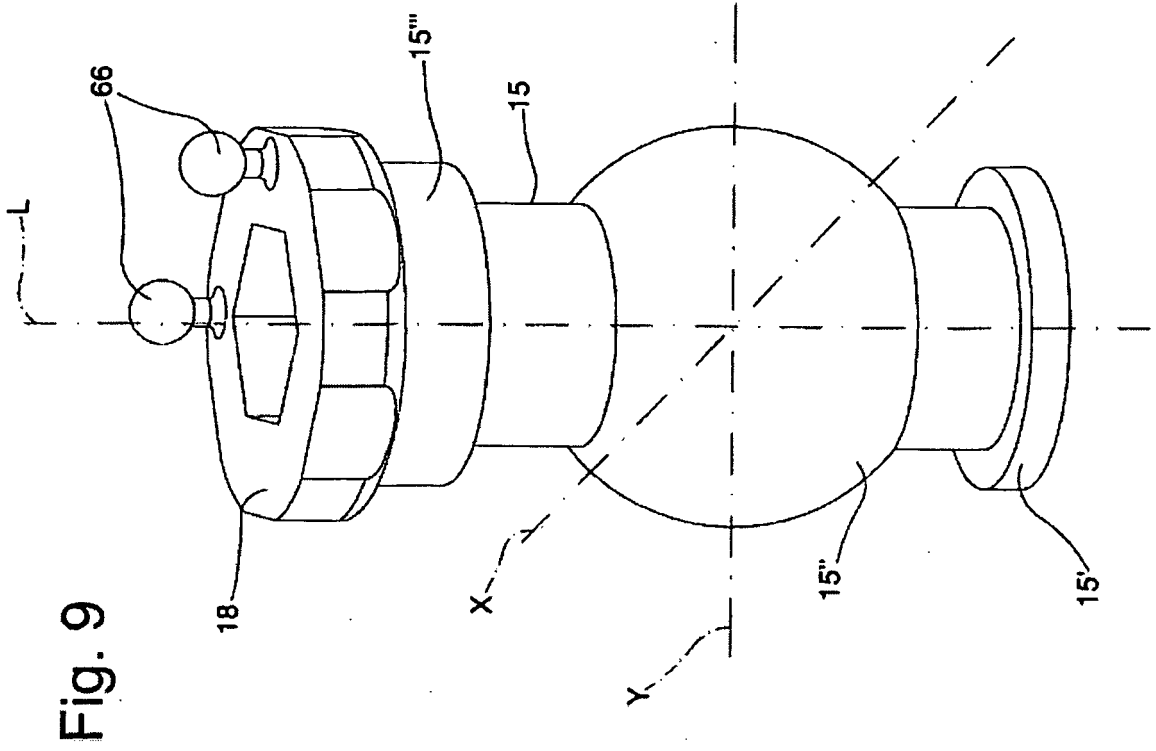


Fig. 9

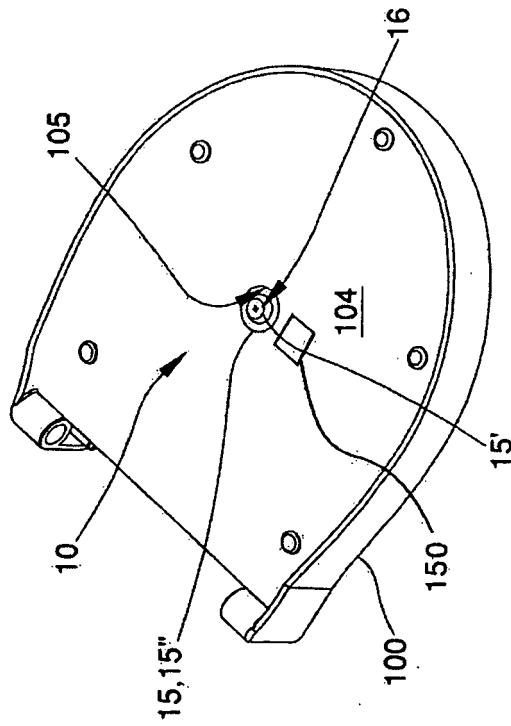


Fig. 8

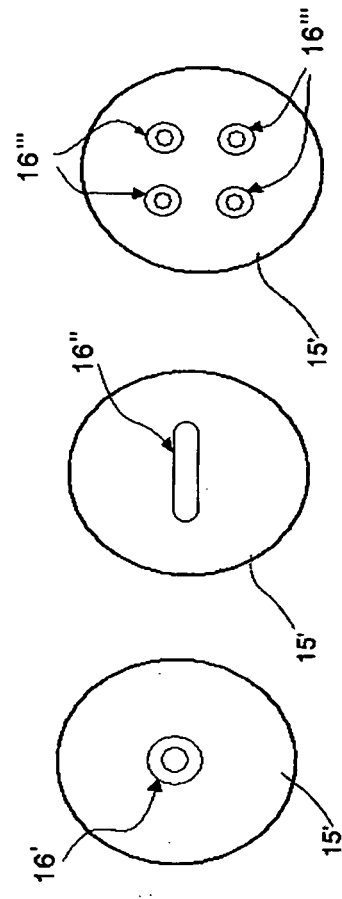
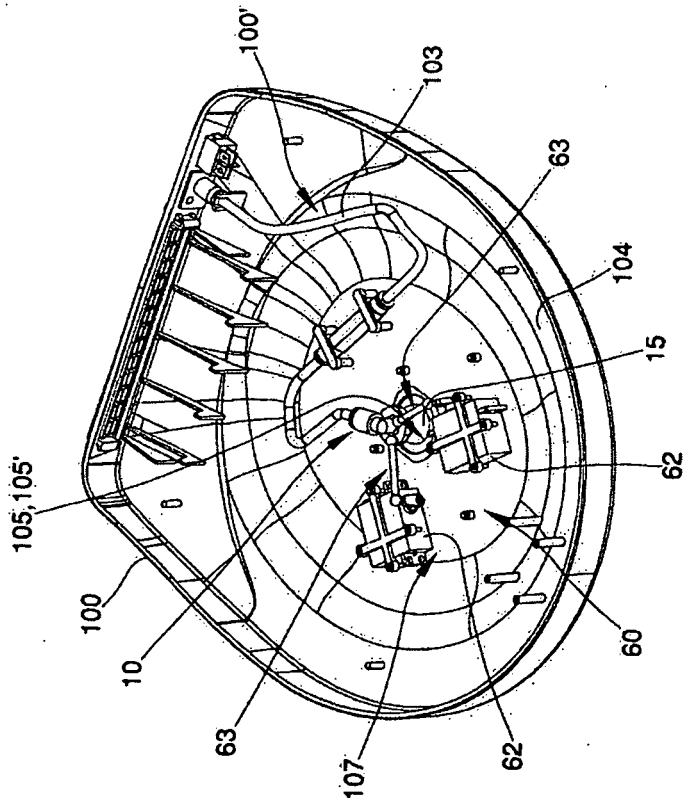


Fig. 11 a) Fig. 11 b) Fig. 11 c)

Fig. 10

REFERENCES CITED IN THE DESCRIPTION

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