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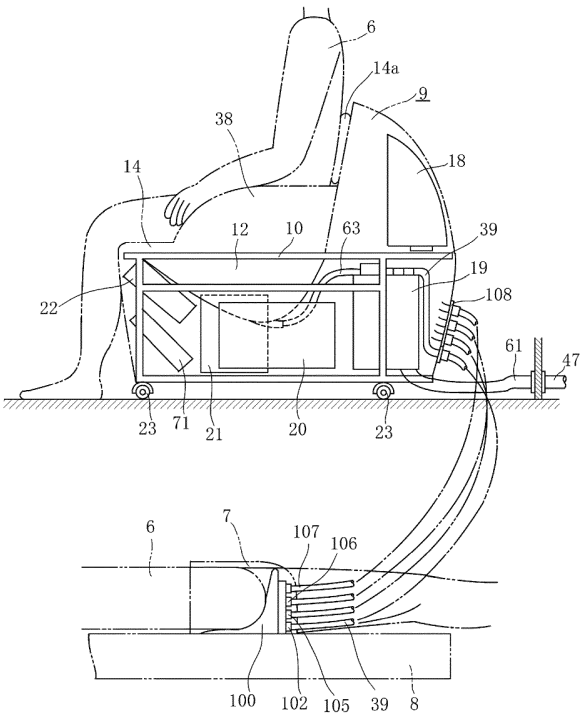
# (54) EXCREMENT TREATMENT METHOD AND DEVICE FOR SAME

(57) The present invention aims for providing an excrement treatment device capable of directly discharging sewage in a sewage tank to the outside sewers by a compressed air supplied from the excrement treatment device. The present invention includes a step of opening a suction port of a suction valve 44 of a sewage tank 19 and closing a water discharge valve 46 of the sewage tank 19; a step of sucking air in the sewage tank 19 from an air inlet/outlet 45 of the sewage tank 19 and sucking a sewage from a pipe connected to a suction port of the suction valve 44 to store the sewage; a step of closing the suction port of the suction valve 44 of the sewage tank 19 and opening the water discharge valve 46 of the sewage tank 19; and a step of injecting a compressed air into the air inlet/outlet of the sewage tank 19 to discharge the stored sewage to an outside from the water discharge valve 46.

Fig. 1

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## Description

TECHNICAL FIELD

**[0001]** The preset invention relates to an excrement treatment method and device thereof. The device can be used as a chair-type toilet when the device is moved closer to a user and an insertion toilet when the device is set to a crotch of a bedridden user.

BACKGROUND ART

**[0002]** Conventionally, various kinds of portable toilets which are capable of being used and installed as the chair-type toilet by being moved closer to the user are known.

**[0003]** Patent Document 1 discloses a portable toilet for the purpose of reducing washing water of a toilet bowl.

**[0004]** The portable toilet has a movable operation base, a toilet bowl installed on the operation base, a bucket arranged on a lower side of the toilet bowl, a toilet seat arranged on an upper side of the toilet bowl and a means for supplying bowl washing water to the toilet bowl, wherein the means for supplying bowl washing water is arranged on the rear side of the toilet bowl and has a spray nozzle for spraying water toward inside the toilet bowl, water stored in a tank is supplied to the spray nozzle via a pipe, a pump, a three-way switching valve and another pipe, and the water stored in a tank is heated to hot water via another pipe branched from the three-way switching valve and a heater and supplied to a hot water washing nozzle. After a user sits on the toilet seat and relieves nature, the buttocks are dried by the hot water washing nozzle. After that, water is sprayed from the spray nozzle to wash the toilet bowl. Since the toilet bowl is washed by spraying water from the spray nozzle, an amount of the water to be used is a little and the number of times of washing the bucket and filling water can be reduced.

**[0005]** Patent Document 2 discloses a sewage pot having an upper toilet bowl part and a lower sewage storage tank, wherein leakage of odor is prevented by surely sealing the sewage storage tank by a lid body located on a lower end part of the toilet bowl.

**[0006]** For achieving the above described purpose, the sewage pot includes an upper toilet bowl part, a lower sewage storage tank having a container shape and a lid body for sealing an opening of the lower part of the toilet bowl part. A female fitting surface having a taper shape is formed on an inner peripheral surface of the opening and a male fitting surface is formed on the lid body to be fitted with the female fitting surface. In addition, the taper angle of the male fitting surface of the lid body is larger than the taper angle of the female fitting surface of the opening.

**[0007]** In addition, Patent Document 3 discloses an excrement treatment device capable of being set to a crotch of a bedridden user and used as an insertion toilet.

**[0008]** In the excrement treatment device, the insertion toilet is laid on the crotch of the bedridden user, the insertion toilet is covered by a diaper, the excrement discharged onto the insertion toilet is sucked in a sewage tank of the excrement treatment device, and the sewage tank is separated from the excrement treatment device and transported to a toilet which is connected to a sewer-pipe to flush the sewage when the sewage tank becomes full.

PRIOR ART DOCUMENTS

[Patent Documents]

**[0009]**

[Patent Document 1] Japanese Patent Application Laid-Open No. 2002-45307
[Patent Document 2] Japanese Patent Application Laid-Open No. 2002-200005
[Patent Document 3] Japanese Patent No. 5254498

DISCLOSURE OF THE INVENTION

[Problems to be Solved by the Invention]

**[0010]** In the apparatus shown in Patent Document 1, the buttocks and the toilet bowl are cleaned by the spray nozzle after excretion. However, the excrement is stored in the bucket installed on the lower part of the toilet bowl and covered only by the lid. Thus, there is a problem that odor dispersion to outside cannot be prevented.

**[0011]** In the apparatus shown in Patent Document 2, the opening between the toilet bowl part forming the sewage pot and the lower sewage storage is closed by the lid body of the male/female fitting surfaces having a taper shape. However, there is a problem that odor dispersion cannot be prevented during the excrement.

**[0012]** In the apparatus shown in Patent Document 3, the excrement discharged onto the insertion toilet is sucked in the sewage tank of the excrement treatment device. Thus, the leakage of the odor from the insertion toilet is little. However, when the sewage tank becomes full, the sewage tank is separated from the excrement treatment device and transported to the toilet which is connected to the sewer-pipe to flush the sewage.

**[0013]** Accordingly, in all the cited documents 1, 2 and 3, when the bucket or the sewage tank is full of the excrement, the user should transfer the bucket to the toilet which is connected to the sewer-pipe and wash the bucket after the excrement is flushed to the sewers. This is hard work.

**[0014]** The first purpose of the present invention is to provide an excrement treatment device capable of pressure-feeding the excrement by a compressed air supplied from the excrement treatment device to discharge the excrement directly to the sewers when the sewage tank becomes full.

**[0015]** The second purpose of the present invention is to provide an excrement treatment device capable of being used as the chair-type toilet and also used as the insertion toilet set to the crotch.

**[0016]** The other purposes of the present invention are revealed by the description of the specification and drawings.

[Means for Solving the Problem]

**[0017]** An excrement treatment method of the present invention is characterized in comprising:

a step of opening a suction port of a suction valve 44 of a sewage tank 19 and closing a water discharge valve 46 of the sewage tank 19;
a step of sucking air in the sewage tank 19 from an air inlet/outlet 45 of the sewage tank 19 and sucking a sewage from a pipe connected to the suction port of the suction valve 44 to store the sewage;
a step of closing the suction port of the suction valve 44 of the sewage tank 19 and opening the water discharge valve 46 of the sewage tank 19; and
a step of injecting a compressed air into the air inlet/outlet of the sewage tank 19 to discharge the stored sewage to an outside from the water discharge valve 46.

**[0018]** The excrement treatment method of the present invention is characterized in that a step of crushing a solid matter in the sewage tank 19 is added before discharging the stored sewage to the outside from the water discharge valve 46.

**[0019]** An excrement treatment device of the present invention is characterized in comprising:

a sewage tank 19;
a suction valve 44 provided on the sewage tank 19, the suction valve 44 opening and closing a suction port of a sewage pipe connected to the sewage tank 19;
a water discharge valve 46 provided on the sewage tank 19, the water discharge valve 46 discharging the sewage stored in the sewage tank 19 to an outside;
an air inlet/outlet 45 provided on the sewage tank 19 for sucking air from the air inlet/outlet 45 to suck the sewage from the sewage pipe connected to the suction port of the suction valve 44 and for injecting a compressed air from the air inlet/outlet 45 to discharge the sewage stored in the sewage tank 19 to the outside; and
a suction motor 20 connected to the air inlet/outlet 45, the suction motor 20 sucking the air into the sewage tank 19 and injecting the compressed air into the sewage tank 19.

**[0020]** The excrement treatment device of the present invention is characterized in that a sewage crushing unit 43 is provided on the sewage tank 19 to crush a solid matter in the sewage tank 19.

**[0021]** The excrement treatment device of the present invention is characterized in that the suction valve 44 provided on the sewage tank 19 includes: a suction port 44a connected to a pipe 63 for flushing the sewage of a chair-type toilet 9; and a slider 123 for opening and closing the suction port 44a.

**[0022]** The excrement treatment device of the present invention is characterized in that the suction valve 44 provided on the sewage tank 19 includes: a suction port 44b connected to a pipe 39 for flashing the sewage in an insertion-type toilet 100; and a slider 123 for opening and closing the suction port 44b.

**[0023]** The excrement treatment device of the present invention is characterized in that the suction valve 44 provided on the sewage tank 19 includes: a suction port 44a connected to a pipe 63 for flashing the sewage of a chair-type toilet 9; a suction port 44b connected to a pipe 39 for flashing the sewage in an insertion-type toilet 100; and a slider 123 for selectively opening and closing the suction port 44a and the suction port 44b.

**[0024]** The excrement treatment device of the present invention is characterized in that a toilet bowl 12 of the chair-type toilet 9 has a urine sensor 56 and a feces sensor 57.

**[0025]** The excrement treatment device of the present invention is characterized in that the suction valve 44 includes: a switching motor 121 having a horizontally swingable motor shaft 121a; a slider support plate 124 provided on a tip of a switching arm 122 connected to the horizontally swingable motor shaft 121a; a slider 123 supported by the slider support plate 124 via an elastic shaft 126, the slider 123 closing both the suction port 44a and the suction port 44b, the slider 123 selectively opening and closing the suction port 44a and the suction port 44b, and a pressing roller 129 for pressing the slider 123 toward the suction port 44a and the suction port 44b via the elastic shaft 126 and a retaining plate 127.

**[0026]** The excrement treatment device of the present invention is characterized in further comprising: a booster tank 22 connected to a toilet bowl 12 of the chair-type toilet 9, the booster tank 22 storing a washing water required for one time flushing; and a suction motor 20 which supplies air pressure to the booster tank 22 to deliver the washing water stored in the booster tank 22 to a washing water jet port 17 of the toilet bowl 12.

**[0027]** The excrement treatment device of the present invention is characterized in that a washing water bag 33 having a soft property is provided inside an outer container 62 of the booster tank 22, an inlet side of the washing water bag 33 is connected to a washing water tank 18 via a water pump 27, an outlet side of the washing water bag 33 is connected to the washing water jet port 17 of the toilet bowl 12, and the outer container 62 is connected to the suction motor 20 which feeds the compressed air for compressing the washing water bag 33

to pressure-feed the washing water.

**[0028]** The excrement treatment device of the present invention is characterized in that the washing water bag 33 is separated into a plurality of independent bags and the independent bags are respectively connected to washing water jet ports 17 of the toilet bowl 12.

**[0029]** The excrement treatment device of the present invention is characterized in further comprising: a suction motor 20; and a switching valve 53 which is exposed to an air suction port and an air discharge port of the suction motor 20 to switch modes between A mode; AB mode and B mode, wherein in the A mode of the switching valve 53, the air suction port and the sewage tank 19 are connected with each other and the sewage is sucked from the chair-type toilet 9 and the insertion-type toilet 100 to the sewage tank 19, in the AB mode, an outside air is sucked from the air suction port to blow the outside air into a booster tank 22 and the insertion-type toilet 100, and in the B mode, the outside air is sucked from the air suction port and pressure-fed to the sewage tank 19 to pressure-feed the sewage to the outside.

**[0030]** The excrement treatment device of the present invention is characterized in that odor-absorbing holes 99 having a long narrow shape are formed on left and right side of a toilet bowl end 13 of the toilet bowl 12 of the chair-type toilet 9, suction boxes 119 are attached to outer sides of the odor-absorbing holes 99 so as to be exposed to the odor-absorbing holes 99, and the suction boxes 119 are connected to a deodorization filter 21 by a suction hose 120 via a deodorization fan 60.

[Effects of the Invention]

**[0031]** According to the invention of claim 1, an excrement treatment method, comprising: a step of opening a suction port of a suction valve 44 of a sewage tank 19 and closing a water discharge valve 46 of the sewage tank 19; a step of sucking air in the sewage tank 19 from an air inlet/outlet 45 of the sewage tank 19 and sucking a sewage from a pipe connected to the suction port of the suction valve 44 to store the sewage; a step of closing the suction port of the suction valve 44 of the sewage tank 19 and opening the water discharge valve 46 of the sewage tank 19; and a step of injecting a compressed air into the air inlet/outlet of the sewage tank 19 to discharge the stored sewage to an outside from the water discharge valve 46. Accordingly, the sewage can be discharged outside without directly touching the sewage tank in which the sewage is stored. In addition, since the user does not touch the sewage tank, it is excellent in a sanitary aspect.

**[0032]** According to the invention of claim 2, a step of crushing a solid matter in the sewage tank 19 is added before discharging the stored sewage to the outside from the water discharge valve 46. Accordingly, the sewage stored in the sewage tank can be surely discharged outside.

**[0033]** According to the invention of claim 3, an excrement treatment device, comprising: a sewage tank 19; a suction valve 44 provided on the sewage tank 19, the suction valve 44 opening and closing a suction port of a sewage pipe connected to the sewage tank 19; a water discharge valve 46 provided on the sewage tank 19, the water discharge valve 46 discharging the sewage stored in the sewage tank 19 to an outside; an air inlet/outlet 45 provided on the sewage tank 19 for sucking air from the air inlet/outlet 45 to suck the sewage from the sewage pipe connected to the suction port of the suction valve 44 and for injecting a compressed air from the air inlet/outlet 45 to discharge the sewage stored in the sewage tank 19 to the outside; and a suction motor 20 connected to the air inlet/outlet 45, the suction motor 20 sucking the air into the sewage tank 19 and injecting the compressed air into the sewage tank 19. Accordingly, the sewage can be treated without leaking the odor to the outside from the sewage tank and without requiring a disposal process.

**[0034]** According to the invention of claim 4, a sewage crushing unit 43 is provided on the sewage tank 19 to crush a solid matter in the sewage tank 19. Accordingly, the excrement can be surely flashed from the sewage tank to the outside.

**[0035]** According to the invention of claim 5, the suction valve 44 provided on the sewage tank 19 includes: a suction port 44a connected to a pipe 63 for flushing the sewage of a chair-type toilet 9; and a slider 123 for opening and closing the suction port 44a. Accordingly, the sewage can be automatically treated by connecting the chair-type toilet 9 to the sewage tank 19.

**[0036]** According to the invention of claim 6, the suction valve 44 provided on the sewage tank 19 includes: a suction port 44b connected to a pipe 39 for flashing the sewage in an insertion-type toilet 100; and a slider 123 for opening and closing the suction port 44b. Accordingly, the sewage can be automatically treated by connecting the insertion-type toilet 100 to the sewage tank 19.

**[0037]** According to the invention of claim 7, the suction valve 44 provided on the sewage tank 19 includes: a suction port 44a connected to a pipe 63 for flashing the sewage of a chair-type toilet 9; a suction port 44b connected to a pipe 39 for flashing the sewage in an insertion-type toilet 100; and a slider 123 for selectively opening and closing the suction port 44a and the suction port 44b. Accordingly, even a user requiring care can defecate or urinate on the chair-type toilet by assistance of a caretaker during daytime and can defecate or urinate without assistance of the caretaker during nighttime. Thus, burden of caretaking can be reduced significantly.

**[0038]** According to the invention of claim 8, a toilet bowl 12 of the chair-type toilet 9 has a urine sensor 56 and a feces sensor 57. Accordingly, the consumption of the washing water can be changed by detecting the urine or the feces. Thus, a size of the washing water tank can be reduced and the toilet bowl can be adequately treated.

**[0039]** According to the invention of claim 9, the suction valve 44 includes: a switching motor 121 having a hori-

zontally swingable motor shaft 121a; a slider support plate 124 provided on a tip of a switching arm 122 connected to the horizontally swingable motor shaft 121a; a slider 123 supported by the slider support plate 124 via an elastic shaft 126, the slider 123 closing both the suction port 44a and the suction port 44b, the slider 123 selectively opening and closing the suction port 44a and the suction port 44b, and a pressing roller 129 for pressing the slider 123 toward the suction port 44a and the suction port 44b via the elastic shaft 126 and a retaining plate 127. Accordingly, clogging between the slider 123 and the suction port with the sewage can be prevented and leakage of the odor to the outside can be reduced maximally even when the compressed air is injected into the sewage tank.

**[0040]** According to the invention of claim 10, a booster tank 22 connected to a toilet bowl 12 of the chair-type toilet 9, the booster tank 22 storing a washing water required for one time flushing, and a suction motor 20 which supplies air pressure to the booster tank 22 to deliver the washing water stored in the booster tank 22 to a washing water jet port 17 of the toilet bowl 12 are further provided. Accordingly, the excrement can be discharged by the minimum amount of water. For example, the feces can be discharged by approximately 400 to 500 cc and the urine can be discharged by approximately 200 to 300 cc of water.

**[0041]** According to the invention of claim 11, a washing water bag 33 having a soft property is provided inside an outer container 62 of the booster tank 22, an inlet side of the washing water bag 33 is connected to a washing water tank 18 via a water pump 27, an outlet side of the washing water bag 33 is connected to the washing water jet port 17 of the toilet bowl 12, and the outer container 62 is connected to the suction motor 20 which feeds the compressed air for compressing the washing water bag 33 to pressure-feed the washing water. Accordingly, the toilet bowl can be cleaned by applying the sufficient water pressure to the washing water.

**[0042]** According to the invention of claim 12, the washing water bag 33 is separated into a plurality of independent bags and the independent bags are respectively connected to washing water jet ports 17 of the toilet bowl 12. Accordingly, the toilet bowl can be cleaned by applying the desired water flow to a plurality of washing points.

**[0043]** According to the invention of claim 13, a suction motor 20; and

a switching valve 53 which is exposed to an air suction port and an air discharge port of the suction motor 20 to switch modes between A mode; AB mode and B mode, wherein in the A mode of the switching valve 53, the air suction port and the sewage tank 19 are connected with each other and the sewage is sucked from the chair-type toilet 9 and the insertion-type toilet 100 to the sewage tank 19, in the AB mode, an outside air is sucked from the air suction port to blow the outside air into a booster tank 22 and the insertion-type toilet 100, and in the B mode, the outside air is sucked from the air suction port and pressure-fed to the sewage tank 19 to pressure-feed the sewage to the outside. Accordingly, operations of sucking the sewage, discharging the odor and pressure-feeding the sewage can be efficiently performed by one suction motor and the switching valves of three modes.

**[0044]** According to the invention of claim 14, odor-absorbing holes 99 having a long narrow shape are formed on left and right side of a toilet bowl end 13 of the toilet bowl 12 of the chair-type toilet 9, suction boxes 119 are attached to outer sides of the odor-absorbing holes 99 so as to be exposed to the odor-absorbing holes 99, and the suction boxes 119 are connected to a deodorization filter 21 by a suction hose 120 via a deodorization fan 60. Accordingly, the odor in the toilet bowl 12 of toilet 9 can be surely sucked.

## BRIEF DESCRIPTION OF THE DRAWINGS

**[0045]**

Fig. 1 is an explanatory drawing showing the first embodiment of an excrement treatment device of the present invention. An upper part is an explanatory drawing showing a state of using the device as a chair-type toilet 9. A lower part is an explanatory drawing showing a state of using the device as an insertion-type toilet 100.

Fig. 2 is a block diagram showing the embodiment 1 of the excrement treatment device of the present invention.

Fig. 3A and Fig. 3B are explanatory drawings for explaining an operation for supplying washing water to a hot water toilet unit 11 shown in Fig. 2. Fig. 3A is a front view of the toilet bowl. Fig. 3B is a plan view of the toilet bowl.

Fig. 4A is a perspective view of a toilet body 10 on which a cover 10a is covered. Fig. 4B is a perspective view of the toilet body 10 where the cover 10a is opened. Fig. 4C is a perspective view of the toilet body 10 where the cover 10a is opened and a toilet seat lid 14a is opened. Fig. 4D is a perspective view of the toilet body 10 on which the cover 10a is covered viewed from the rear surface. Fig. 4E is a perspective view where suction boxes 119 for sucking odor are provided on the toilet bowl 12. Fig. 4F is a perspective view of an insertion-type toilet 100.

Figs. 5A-5C show a suction valve 44 attached to a washing water tank 19 shown in Fig. 2. Fig. 5A is a vertical cross-sectional view cut along line A-A in Fig. 5B. Fig. 5B is a bottom view of Fig. 5A. Fig. 5C is a vertical cross-sectional view cut along line B-B in Fig. 5B.

Fig. 6 is a block diagram showing the first embodiment of a control circuit in the excrement treatment device of the present invention.

Fig. 7 is a flowchart of an operation for supplying water to a toilet of the excrement treatment device of the present invention.

Fig. 8A is a flowchart of a toilet mode, Fig. 8B is a flowchart of a preliminarily washing, and Fig. 8C is a flowchart of an operation for supplying water to a booster tank 22 of the washing water.

Fig. 9 is a flowchart of a suction operation in the chair-type toilet 9 of the excrement treatment device of the present invention.

Fig. 10 is a flowchart of a pressure-feeding operation in the chair-type toilet 9 and the insertion-type toilet 100 of the excrement treatment device of the present invention.

Fig. 11 is a flowchart of an operation for sucking both feces and urine in the insertion-type toilet 100 of the excrement treatment device of the present invention.

Fig. 12A is a flowchart of an operation for sucking urine in the insertion-type toilet 100 of the excrement treatment device of the present invention. Fig. 12B is a flowchart of an operation for washing in the insertion-type toilet 100.

Fig. 13 is a flowchart of an operation for sucking feces in the insertion-type toilet 100 of the excrement treatment device of the present invention.

## MODES FOR CARRYING OUT THE INVENTION

**[0046]** An excrement treatment method of the present invention, comprising:

a step of opening a suction port of a suction valve 44 of a sewage tank 19 and closing a water discharge valve 46 of the sewage tank 19;

a step of sucking air in the sewage tank 19 from an air inlet/outlet 45 of the sewage tank 19 and sucking a sewage from a pipe connected to a suction port of the suction valve 44 to store the sewage;

a step of closing the suction port of the suction valve 44 of the sewage tank 19 and opening the water discharge valve 46 of the sewage tank 19; and

a step of injecting a compressed air into the air inlet/outlet of the sewage tank 19 to discharge the stored sewage to an outside from the water discharge valve 46.

**[0047]** In the excrement treatment method, it is preferred that a step of crushing a solid matter in the sewage tank 19 is added before discharging the stored sewage to the outside from the water discharge valve 46.

**[0048]** An excrement treatment device of the present invention, comprising:

a sewage tank 19;

a suction valve 44 provided on the sewage tank 19, the suction valve 44 opening and closing a suction port of a sewage pipe connected to the sewage tank 19;

a water discharge valve 46 provided on the sewage tank 19, the water discharge valve 46 discharging the sewage stored in the sewage tank 19 to an outside;

an air inlet/outlet 45 provided on the sewage tank 19 for sucking air from the air inlet/outlet 45 to suck the sewage from the sewage pipe connected to the suction port of the suction valve 44 and for injecting a compressed air from the air inlet/outlet 45 to discharge the sewage stored in the sewage tank 19 to the outside; and

a suction motor 20 connected to the air inlet/outlet 45, the suction motor 20 sucking the air into the sewage tank 19 and injecting the compressed air into the sewage tank 19.

**[0049]** It is preferred that a sewage crushing unit 43 is provided on the sewage tank 19 to crush a solid matter in the sewage tank 19.

**[0050]** The suction valve 44 provided on the sewage tank 19 includes: a suction port 44a connected to a pipe 63 for flashing the sewage of a chair-type toilet 9 and/or a suction port 44b connected to a pipe 39 for flashing the sewage in an insertion-type toilet 100; and a slider 123 for selectively opening and closing the suction port 44a and the suction port 44b.

**[0051]** It is preferred that a toilet bowl 12 of the chair-type toilet 9 has a urine sensor 56 and a feces sensor 57.

**[0052]** The suction valve 44 includes: a switching motor 121 having a horizontally swingable motor shaft 121a; a slider support plate 124 provided on a tip of a switching arm 122 connected to the horizontally swingable motor shaft 121a; a slider 123 supported by the slider support plate 124 via an elastic shaft 126, the slider 123 closing both the suction port 44a and the suction port 44b, the slider 123 selectively opening and closing the suction port 44a and the suction port 44b, and a pressing roller 129 for pressing the slider 123 toward the suction port 44a and the suction port 44b via the elastic shaft 126 and a retaining plate 127.

**[0053]** A booster tank 22 connected to a toilet bowl 12 of the chair-type toilet 9, the booster tank 22 storing a washing water required for one time flushing, and a suction motor 20 which supplies air pressure to the booster tank 22 to deliver the washing water stored in the booster tank 22 to a washing water jet port 17 of the toilet bowl 12 are further provided.

**[0054]** A washing water bag 33 having a soft property is provided inside an outer container 62 of the booster tank 22, an inlet side of the washing water bag 33 is connected to a washing water tank 18 via a water pump 27, an outlet side of the washing water bag 33 is connected to the washing water jet port 17 of the toilet bowl 12, and the outer container 62 is connected to the suction motor 20 which feeds the compressed air for compressing the washing water bag 33 to pressure-feed the washing water.

**[0055]** The washing water bag 33 is separated into a plurality of independent bags and the independent bags are respectively connected to washing water jet ports 17 of the toilet bowl 12.

**[0056]** A suction motor 20; and a switching valve 53 which is exposed to an air suction port and an air discharge port of the suction motor 20 to switch modes between A mode; AB mode and B mode are provided, wherein in the A mode of the switching valve 53, the air suction port and the sewage tank 19 are connected with each other and the sewage is sucked from the chair-type toilet 9 and the insertion-type toilet 100 to the sewage tank 19, in the AB mode, an outside air is sucked from the air suction port to blow the outside air into a booster tank 22 and the insertion-type toilet 100, and in the B mode, the outside air is sucked from the air suction port and pressure-fed to the sewage tank 19 to discharge the sewage to the outside.

**[0057]** Odor-absorbing holes 99 having a long narrow shape are formed on left and right side of a toilet bowl end 13 of the toilet bowl 12 of the chair-type toilet 9, suction boxes 119 are attached to outer sides of the odor-absorbing holes 99 so as to be exposed to the odor-absorbing holes 99, and the suction boxes 119 are connected to a deodorization filter 21 by a suction hose 120 via a deodorization fan 60.

[First Embodiment]

**[0058]** The first embodiment of the excrement treatment device of the present invention will be explained based on the drawings.

**[0059]** In Fig. 1 to Fig. 4F, the excrement treatment device of the present invention has a chair-type toilet 9 and an insertion-type toilet 100. Thus, the toilet body 10 can be used as the chair-type toilet 9 and also used as the insertion-type toilet 100.

**[0060]** In the following explanation, the chair-type toilet 9 is referred to as a toilet 9 and the insertion-type toilet 100 is referred to as a cup 100. In addition, the sewage means not only the sewage but also includes solid sewage.

**[0061]** As shown in Fig. 1, a washing water tank 18, a sewage tank 19, a suction motor 20, a deodorization filter 21, a toilet bowl 12 of the toilet 9, a booster tank 22, a CPU 71 and the like are housed in a reinforcing frame inside the toilet body 10. Connector 108 connected to the cup 100 and the like are provided on the rear surface. The excrement treatment device is freely movable by wheels 23.

**[0062]** As shown in Fig. 4A, a cover 10a is covered on the toilet body 10. When the cover10a is opened rearward as shown in Fig. 4B, the hot water toilet unit 11 appears. When the toilet seat lid 14a which is covered on the hot water toilet unit 11 is folded and raised, a toilet seat 14 and a toilet bowl 12 appear as shown in Fig. 4C. The folded toilet seat lid 14a functions as a backrest. Armrests 38 are provided on both sides of the toilet seat 14. The armrests 38a function as an assistance device for a user 6 to place the hand on the armrests 38a when the user 6 stands up from the toilet seat 14. If the armrests 38 obstructs the user 6 when sitting down the toilet seat 14, the armrests 38 can be housed inside the toilet body 10 as shown by broken lines.

**[0063]** As shown in Fig. 4D, the washing water tank 18 is provided on the rear surface of the toilet body 10 so that the washing water tank 18 can be pulled out of the toilet body 10. In addition, a pipe 39 for the excrement to be connected with the cup 100, an air blowing pipe 105, a water flowing pipe 106 and a connector 108 to be connected with an electric cord 107 are provided. Furthermore, a pipe 61 for discharging the sewage of the sewage tank 19 is provided.

**[0064]** As shown in Fig. 1 and Fig. 4F, the cup 100 is set to the crotch of the user 6 and protected by a diaper 7. In an excrement receptor 101 of the cup 100, a urine sensor 103 and a feces sensor 104 are provided.

**[0065]** In the toilet body 10, the toilet bowl 12 is fixedly attached. In addition to the above described washing water tank 18, the sewage tank 19, the suction motor 20, the filter 21 and the booster tank 22, pipes, various valves, control boards, electric wiring and the like are housed inside the toilet body 10. The hot water toilet unit 11 is attached to the toilet bowl end 13 which is located above the toilet bowl 12. For the hot water toilet unit 11, a commercially available hot water toilet unit having a toilet seat 14, a toilet seat lid 15 and an inside hot water nozzle is used. In addition, as shown in Fig. 4E, odor-absorbing holes 99 having a long narrow shape are formed on left and right sides of the toilet bowl end 13 of the toilet bowl 12, suction boxes 119 are attached so as to be exposed to the odor-absorbing holes 99, and the suction boxes 119 are connected to a deodorization filter 21 by a suction hose 120 via a deodorization fan 60.

**[0066]** The toilet body 10 has a whole size of, for example, approximately 750 mm in length, 550 mm in width and 800 mm in height. The shape of the toilet body 10 is designed not to cause incompatibility even if the toilet body is placed in a room.

**[0067]** In Fig. 2, Fig. 3A and Fig. 3B, the urine sensor 56 and the feces sensor 57 are provided inside the toilet bowl 12. For the urine sensor 56, a sensor of measuring an amount of the urine by detecting a quantity of infrared rays generated from the urine can be used, for example. For the feces sensor 57, a pressure sensor can be used, for example, for measuring an amount of the feces as a pressure change when the excrement is sucked from a discharge trap 16 shown in Fig. 3. In addition, the hardness of the feces can be distinguished by a motor torque of the suction motor 20 which sucks the feces into the sewage tank 19.

**[0068]** In Fig. 2, as main components of the excrement treatment device of the present invention, 1 is a toilet controller, 2 is a cup controller, 3 is a washing water controller, 4 is an excrement controller and 5 is an external controller.

**[0069]** In the washing water controller 3 shown in Fig. 2, the washing water tank 18 has a capacity of storing approximately 4 liters of washing water 25 considering the usage of approximately ten times defecation or uri-

nation per day. A sub tank 18a having a water level sensor 24 is attached near the bottom of the washing water tank 18. The washing water of approximately 1 liter is always stored in the sub tank 18a since the washing water naturally drops from the washing water tank 18. A water pump 27 is connected to the sub tank 18a having the above described capacity via a filter 26. The driving time of the water pump 27 is controlled by a timer. 31 is a relief valve.

**[0070]** In the toilet controller 1 shown in Fig. 1, the water pump 27 is connected to a connector 30 of the hot water toilet unit 11 via a check valve 28 and a water pressure sensor 29. For supplying the stable water pressure to the hot water toilet unit 11, as shown in Fig. 3A, signals of the water pressure sensor 29 are transmitted to the later described water pump control circuit 66 of the CPU 71. A comparison circuit 68 compares the signals of the water pressure sensor 29 with a target value preliminarily set in a water pressure setting circuit 67. A pulse width control signal is outputted from a PWM control circuit 69 according to the deviation values calculated above. Since the amount of the water of the water pump 27 is controlled by the above described output signal, the water pressure can be kept stable. The relief valve 31 operates in certain abnormal conditions to prevent the pressure of the water supply passage of the hot water toilet unit 11 from becoming higher. Thus, the hot water toilet unit 11 is protected.

**[0071]** In addition, the water pump 27 is connected to the washing water bag 33 of the booster tank 22 via a washing water supply valve 32b. The washing water bag 33 is made of a soft material not having elasticity. A water level sensor 34 is provided inside the washing water bag 33. The washing water bag 33 is housed in a hermetically sealed outer container 62 made of hard material. The outer container 62 is not limited to the hard material as long as the outer container 62 hardly expands when the compressed air is inserted into the outer container 62. When the washing water is filled in the washing water bag 33 and the washing water bag 33 expands, the outer container 62 does not expand and the inside air passes through a throttle valve 51 and the filter 21 and discharged to the outside air.

**[0072]** The number of the washing water bag 33 can be one. However, it is preferable to provide a plurality of washing water bags 33 as shown in Fig. 2 and Fig. 3A. For example, it is more preferable to provide two water bags 33 which are independent from each other. Specifically, the washing water of approximately 300 cc is filled in a first washing water bag 33a and the washing water of approximately 100 to 150 cc is filled in a second washing water bag 33b. The first washing water bag 33a is directly connected to the washing water jet port 17a located at the center. The second washing water bag 33b is used for supplying the washing water to the discharge trap 16 so that the discharge trap 16 stores the washing water of approximately 100 to 150 cc for the next discharge. The second washing water bag 33b is connected to the washing water jet ports 17b, 17c.

**[0073]** In addition, the water pump 27 is connected to a jet nozzle 16a which swingable as shown in Fig. 3B via a washing water supply valve 32a. The washing water is jetted in a wide range by the swing motion of the jet nozzle 16a before and after the toilet 9 is used for preventing the adhesion of feces and eliminating odor.

**[0074]** In the cup controller 2 shown in Fig. 2, the cup 100 is shown in Fig. 4F.

In this figure, the cup 100 is attached to the crotch of the user 6 by using the diaper 7 on which a hole is formed at a position of an excretory organ as shown in Fig. 1 to prevent the leakage of odor and feces to the outside. The urine sensor102, the feces sensor 104 and a washing water jet nozzle are provided on the excrement receptor 101 of the cup 100. The pipe 39 which is be communicated with an excrement suction port 102 of the excrement receptor 101, the water flowing pipe 106 of the washing water, the air blowing pipe 105 of the hot air, and the electric cord 107 of the electric signal are connected to the rear surface of the cup 100. As shown in Fig. 4D, the pipe 39, the water flowing pipe 106, the air blowing pipe 105 and the electric cord 107 are connected to the rear surface of the toilet body 10 by the connector 108.

**[0075]** The air blowing pipe 105 is connected via the connector 108 to a temperature adjustment sensor 113 which has an excessive temperature rise monitoring sensor inside the toilet body 10 and an air temperature sensor. The water flowing pipe 106 is connected to the water pump 27 via the connector 108 through a safety tank 112 having a temperature sensor and an excessive temperature rise sensor inside the toilet body 10, a water drain pump 111 for discharging the washing water in the pipe line to the cup 100, a washing valve 110 for controlling the feeding of the washing water, and a heat insulation tank 109 having a thermal fuse, a temperature sensor and a water full sensor. The electric cord 107 is connected to the CPU 71 housed in the toilet body 10 via the connector 108.

**[0076]** In the excrement controller 4 shown in Fig. 2, a suction valve 44 for switching between a toilet suction port 44a and a cup suction port 44b, an air inlet/outlet 45, and a sewage motor 43a to function as a sewage crushing unit 43 are provided on a top plate part of the sewage tank 19. A full sensor 41 and an empty sensor 40 of sewage 42 are provided inside the sewage tank 19. A water discharge valve 46 is provided on a bottom plate part of the sewage tank 19.

**[0077]** A rotary blade 43c is provided on a lower end part of a rotation axis 43b of the sewage motor 43a to crush the solid matter such as feces and toilet paper gathered at a crushing basket 43d.

**[0078]** The crushed sewage 42 passes through the check valve 28 and the pipe 61 and leads to a discharge pipe 47 of an external discharge unit 5 connected by the connector 108.

**[0079]** The suction valve 44 switches the positions of

the ports in the following three ways: opening the toilet suction port 44a and closing the cup suction port 44b; closing the toilet suction port 44a and opening the cup suction port 44b; and closing simultaneously the toilet suction port 44a and the cup suction port 44b.

**[0080]** Specific configuration of the suction valve 44 will be explained based on Fig. 5A, Fig. 5B and Fig. 5C.

**[0081]** The toilet suction port 44a and the cup suction port 44b are bored side by side on the top plate part of the sewage tank 19. The pipe 63 of the toilet side is connected to the toilet suction port 44a and the pipe 39 of the cup side is connected to the cup suction port 44b. A switching motor 121 is attached to the upper surface of the top plate part. The motor shaft 121a of the switching motor 121 is hung down to inside the sewage tank 19. The suction valve 44 is attached to the lower surface of the top plate part via a mounting plate 130. The details of the suction valve 44 are as follows.

**[0082]** At the tip end part of the switching arm 122 fixed to the lower end part of the motor shaft 121a, the slider support plate 124 orthogonally arranged to the switching arm 122 is supported by two pins 125 so that the switching arm 122 and the slider support plate 124 are movable in the axial direction while keeping the cross shape with respect to each other. Two elastic shafts 126 made of rubber or the like are provided on both ends of the slider support plate 124. The slider 123 is provided on the elastic shafts 126 to switch the opening/closing of the toilet suction port 44a and the cup suction port 44b. For pressing the slider 123 to the toilet suction port 44a and the cup suction port 44b to be in contact with each other, a retaining plate 127 is fixed to the slider support plate 124 by inserting screws 128 into the switching arm 122. In addition, two pressing rollers 129 are provided to face the swinging position of the retaining plate 127. By adopting the above described configuration, the slider 123 is pressed to the toilet suction port 44a and the cup suction port 44b by sucking the air or injecting the compressed air into the sewage tank 19 to prevent gaps from occurring.

**[0083]** In the state of the solid line shown in Fig. 5B, the slider 123 has an ellipse shape capable of closing both the toilet suction port 44a and the cup suction port 44b simultaneously. When the retaining plate 127 is pressed by two pressing rollers 129, the elastic shafts 126 are pressed via the slider support plate 124 and the slider 123 is pressed to both the toilet suction port 44a and the cup suction port 44b to close them simultaneously. When the motor shaft 121a of the switching motor 121 is rotated to the left or right direction by 60 degrees as shown in the chain line of Fig. 5B, one of the toilet suction port 44a and the cup suction port 44b is opened and the other is closed.

**[0084]** In the excrement controller 4 shown in Fig. 2, the pipe 63 for discharging the excrement of the discharge trap 16 of the toilet bowl 12 is connected to the toilet suction port 44a of the sewage tank 19, and the pipe 39 for discharging the excrement of the cup 100 is connected to the cup suction port 44b. In addition, an air inlet/outlet 45 of the sewage tank 19 is connected to an input (suction) side of the valve A and an output (outside air compression) side of the valve B of the three way switching valve 53 provided on the suction motor 20 via a mist filter 52. An output (discharge) side of the valve A and an output (outside air compression) side of the valve AB of the switching valve 53 are connected to the booster tank 22 by a pipe 64 at the toilet 9 side and connected to the blowing pipe 105 via a temperature monitor sensor 113 at the cup 100 side. Furthermore, the pipe 64 is connected to the filter 21 via the throttle valve 51.

**[0085]** The switching of the valves A, AB and B of the three way switching valve 53 is actuated by a motor valve 49.

**[0086]** Fig. 6 shows the connection relation between the CPU 71 and sensors, switches and other components as an entire control circuit. An operation panel 72 is connected to the CPU 71. As for switches, a power switch 73a, an excrement suction switch 73b, a sewage pressure-feed switch 73c and a toilet/cup changeover switch 73d are provided on the operation panel 72. As for indicator lamps, a power indicator lamp 74a, an operation indicator lamp 74b, a washing water shortage lamp 74c and a sewage full lamp 74d are provided.

**[0087]** In the CPU 71 shown in Fig. 6, 75 is an input terminal from the urine sensor 103 and the feces sensor 104 of the cup 100, 76 is an input terminal for inputting an instruction of washing and sucking the cup 100, 79 is an output terminal to the suction motor 20, 80 is an input terminal of the water level sensor 34 of the booster tank 22, 81 is an input/output terminal of the operation panel, 82 is an input/output terminal of the washing water level sensor, 83 is an input terminal of the water pressure sensor, 84 is an output terminal of the water pump, 85 is an output terminal of the washing water supply valve 32b connected to the booster tank 22, 86 is an output terminal to a deodorization fan 60, 87 is an input terminal of a seating sensor 58, 88 is an input terminal of the feces sensor 57, 89 is an input terminal of the urine sensor 56, 90 is an output terminal to the sewage crushing unit 43, 91 is an output terminal to the motor valve 49, 92 is an output terminal to the suction valve 44, 93 is an output terminal to the discharge valve 46, 94 is an input terminal of a sewage full sensor 41, 95 is an input terminal of a sewage empty sensor 40, 96 is an input terminal of a toilet bowl full sensor 16a, 98 is an output terminal to a control valve 32a of a jet nozzle 16b, 114 is an input terminal of the heat insulation tank 109, 115 is an output terminal of the washing valve 110 for washing the cup, and 116 is an output terminal to the water drain pump 111.

**[0088]** Operations of the excrement treatment device having the above described configuration will be explained.

1. Operation for supplying water to hot water toilet unit 11

Fig. 7

**[0089]**

- After confirming that the connector 30 is connected to the hot water toilet unit 11, the power switch 73a is turned on.
- When the toilet bowl full sensor 16a is No, the washing water sensor 24 is No, the water pressure sensor 29 is Yes and the timer time up is No, the water pump 27 operates and the washing water timer starts.
- After the timer counts 20-30 seconds, if the toilet bowl full sensor 16a is Yes, the washing water sensor 24 is Yes, the water pressure sensor 29 is No and the timer time up is Yes, the water pump 27 stops and the washing water timer stops.

2. Operation of toilet 9

**[0090]** In the following explanation of the operation of the toilet 9, when the connector 108 of the cup 100 is removed, the flow of the air and water is shut off at the part of the connector 108.

Fig. 8A

**[0091]**

- When the power 73a is turned on, the water shortage indicator 74c is turned off, the alarm occurrence is No, the opening of the toilet seat lid 14a is Yes and the seating sensor 58 is Yes, the preliminarily washing shown in Fig. 8B starts.

Fig. 8B

**[0092]**

- When the preliminarily washing starts, the washing water valve 32a is opened and the water pump 27 operates. After three seconds passed after the timer started, the water pump 27 is stopped and the washing water valve 32a is closed. Since the preliminarily washing is performed, the toilet bowl 12 is wet to prevent the adhesion of the excrement to the toilet bowl 12.
- After the preliminarily washing and the excretion is finished, the detection of the urine sensor 56 is Yes, the flag=1? of the urine sensor 56 is judged to No, the flag=1 of the urine sensor 56 is set and the supply of the washing water to the booster tank 22 shown in Fig. 8C starts.
- After the preliminarily washing, the excretion is finished, the detection of the urine sensor 56 is No and the detection of the feces sensor 57 is Yes, the flag=1? of the feces sensor 57 is judged to No, the flag=1 of feces sensor 57 is set and the supply of the washing water to the booster tank 22 shown in Fig. 8C starts.
- In Fig. 8C, for supplying the washing water to the booster tank 22, the washing water valve 32b is opened and the water pump 27 is operated. When ten seconds passed after the timer started, the water pump 27 is stopped and the washing water valve 32b is closed.
- After the excretion, when the seating sensor 58 is No, the suction operation shown in Fig. 9 starts.
- Then, the pressure-feed operation shown in Fig. 10 starts. Although the pressure-feed operation starts every time when the excretion is sucked in the toilet 9 in principle, it is also possible to start the pressure-feed operation after several times of excretion.
- After the pressure-feed operation, the flag=0 is set to the feces sensor 57 and the flag=0 is set to the urine sensor 56 to return to the initial state.

3. Suction operation of toilet 9

Fig. 9

**[0093]**

- The suction switch 73b is turned on to start the suction operation.
- The slider 123 of the suction valve 44 is rotated by 60 degrees to open the toilet suction port 44a, close the cup suction port 44b and close a water discharge valve 46.
- The switching valve 53 is set to AB and the suction motor 20 is driven for two seconds. As a result, an outside air 50 is sucked and the washing water stored in the washing water bag 33 in the booster tank 22 is discharged to the toilet bowl 12 at once.
- The switching valve 53 is set to A and the suction motor 20 is driven for two seconds. As a result, the air stored in the sewage tank 19 is sucked from the air inlet/outlet 45 and the sucked air is transferred to the booster tank 22 via the mist filter 52.
- The suction motor 20 is driven for 15 seconds in a state that the toilet suction port 44a is opened and the cup suction port 44b is closed by the slider 123 of the suction valve 44. As a result, the sewage including feces and toilet paper stored in the toilet bowl 12 is sucked in the sewage tank 19 via the pipe 63.
- After sucking the sewage, the washing water valve 32a is opened and the water pump 27 is driven for three seconds to clean the toilet bowl 12 again.
- After the toilet bowl 12 is cleaned again, the water pump 27 is stopped, the washing water valve 32a is closed, the slider 123 of the suction valve 44 is returned to the original position to close both the toilet suction port 44a and the cup suction port 44b. Thus, the suction of the toilet 9 is finished.

4. Pressure-feed operation (both for the sewage sucked from the toilet 9 and the sewage sucked from the later described cup 100)

Fig. 10

**[0094]**

- Both the toilet suction port 44a and the cup suction port 44b are closed by the slider 123 of the suction valve 44, the water discharge valve 46 is closed, the switching valve 53 is set to B, and the crushing motor 43a is rotated for five seconds to crush the sewage stored in the sewage tank 19.
- The water discharge valve 46 is opened, the suction motor 20 is driven, the outside air 50 is pressure-fed from the air inlet/outlet 45 to the sewage tank 19. Thus, the sewage stored in the sewage tank 19 is transferred from the pipe 61 to the discharge pipe 47 via the check valve 28.
- When the output of the empty outputted from the empty sensor 40 of the sewage tank 19 becomes Yes, the suction motor 20 is driven five more seconds and then stopped. Then, the water discharge valve 46 is closed to finish the pressure-feed operation.

5. Operation of cup 100

**[0095]** In the following explanation of the operation of the cup 100, when the connector 108 of the cup 100 is connected, the flow of the air and the flow of the water communicate with each other at the part of the connector 108.

Fig. 11

**[0096]**

- When the power 73a is turned on, the water shortage indicator is turned off and the alarm occurrence is No, the device is brought into a standby state for the cup operation.
- When the urine sensor 103 for the cup is Yes, the later described small suction operation of the cup shown in Fig. 12A starts and +1 is added in a counter.
- When the urine sensor 103 for the cup is No and the cup feces sensor 104 is Yes, the later described large suction operation of the cup starts and +2 is added in a counter.
- When the small suction exceeds 4 in the counter (sewage of the small mode is stored four times) or the large suction exceeds 2 (sewage of the large mode is stored two times), the above described pressure-feed operation shown in Fig. 10 starts and the counter is reset to 0.

6. Small suction operation of cup 100

Fig. 12A

**[0097]**

- After checking that the switching valve 53 is set to A, the suction motor 20 is driven.
- The cup washing operation shown in Fig. 12B is started, the washing valve 111 is opened, the water pump 27 is driven, the washing water is transferred for two seconds to wash, and then the water pump 27 is stopped. At that time, the temperature of the washing water heated by the heat insulation tank 109 is checked by the safety tank 112.
- After two seconds passed in the timer, the setting values of the duration time of the washing operation of the water pump 27 as 2 seconds, the number of times of washing as 3 times, and the interval of the washing as 18 seconds are set on each register as a parameter of the small suction mode.
- The cup washing operation shown in Fig. 12B is started again to clean the cup 100.
- +1 is added in a hot water pump washing counter. If the cup feces sensor 104 is not detected, the cup washing operation is repeated until the washing counter reaches 3.
- If the cup feces sensor 104 is detected, the setting values of the duration time of the washing operation of the water pump 27 as 4 seconds, the number of times of washing as 5 times, and the interval of the washing as 16 seconds are set on each register as a parameter of the large suction mode. When the feces sensor 104 is detected during the washing in the small suction mode, the mode is shifted to the large suction mode without being shifted to the small suction mode.
- When the washing counter reaches the set number of times of washing, the water drain pump 111 is driven for five seconds to discharge the rest water and air in the pipes of the toilet 9 and the cup 100 to the cup 100 after five seconds passed in the timer to avoid the influence of the residual pressure of the water in the pipes.
- When five seconds has passed after the water drain operation, the suction motor 20 is stopped and the operation is finished.

7. Large suction operation of cup 100

Fig. 13

**[0098]** After checking that the switching valve 53 is set to A, the suction motor 20 is driven.

- The above described cup washing operation shown in Fig. 12B is started, the washing valve 111 is opened, the water pump 27 is driven, the washing

water is transferred for two seconds to wash, and then the water pump 27 is stopped. At that time, the temperature of the washing water heated by the heat insulation tank 109 is checked by the safety tank 112.

- After two seconds passed in the timer, the setting values of the duration time of the washing operation of the water pump 27 as 4 seconds, the number of times of washing as 5 times, and the interval of the washing as 16 seconds are set on each register as a parameter of the large suction mode.
- The cup washing operation shown in Fig. 12B is started again to clean the cup 100.
- +1 is added in the hot water pump washing counter. If the cup feces sensor 104 is not detected, the cup washing operation is repeated until the washing counter reaches 5.
- When the washing counter reaches the set number of times of washing, the water drain pump 111 is driven for five seconds to discharge the rest water and air in the pipes of the toilet 9 and the cup 100 to the cup 100 after five seconds passed in the timer to avoid the influence of the residual pressure of the water in the pipes.
- When five seconds has passed after the water drain operation, the suction motor 20 is stopped and the operation is finished.

8. Pressure-feed operation

**[0099]**

- The pressure-feed operation of the sewage sucked from the cup 100 to the sewage tank 19 is same as the pressure-feed operation of the sewage sucked from the toilet 9 shown in Fig. 10. Although the sewage sucked from the toilet 9 is pressure-fed each time when the suction is performed, the sewage sucked from the cup 100 is pressure-fed after storing a plurality times of suctions. However, the above described number of times is arbitrarily determined.

**[0100]** In the above described embodiment, the switching valve 53 is connected to the suction motor 20 so as to be switchable in three-ways, the sewage is sucked from the chair-type toilet 9 and the insertion-type toilet 100 in A mode, the outside air is blew into the booster tank 22 and the insertion-type toilet 100 in AB mode, and the function of pressure-feeding from the sewage tank 19 to the discharge pipe 47 located outside.

**[0101]** However, the present invention is not limited to the above described configuration. The above described functions can be achieved by independent suction motors. Alternatively, any two of the above described functions and the other functions can be achieved by independent suction motors.

[Description of the Reference Numerals]

**[0102]** 1: toilet controller, 2: cup controller, 3washing water controller, 4: excrement controller, 5: external discharge unit, 6: user, 7: diaper, 8: bed, 9: chair-type toilet (toilet), 10: toilet body, 11: hot water toilet unit, 12: toilet bowl, 13: toilet bowl end, 14: toilet seat, 15: toilet seat lid, 16: discharge trap, 17: washing water jet port, 18: washing water tank, 18a: sub tank, 19: sewage tank, 20: suction motor, 21: filter, 22: booster tank, 23: wheels, 24: washing water level sensor, 25: washing water, 26: filter, 27: water pump, 28: check valve, 29: water pressure sensor, 30: connector, 31: relief valve, 32: washing water supply valve, 33: washing water bag, 34: water level sensor, 35: air pressure inlet, 36: washing water inlet, 37: washing water outlet, 38: armrest, 39: pipe, 40: sewage empty sensor, 41: sewage full sensor, 42: sewage, 43: sewage crushing unit, 44: suction valve, 45: air inlet/outlet, 46: discharge valve, 47: discharge pipe, 48: remote control switch, 49: motor valve, 50: outside air, 51: throttle valve, 52: filter, 53: switching valve, 54: changeover switch, 56: urine sensor, 57: feces sensor, 58: seating sensor, 60: deodorization fan, 61: pipe, 62: outer container, 63: pipe, 64: pipe, 65: check valve, 66: water pump control circuit, 67: water pressure setting circuit, 68: comparison circuit, 69: PWM control circuit, 71: CPU, 72: operation panel, 73a: power switch, 73b: excrement suction switch, 73c: sewage pressure-feed switch, 73d: toilet/cup changeover switch, 74a: power indicator lamp, 74b: operation indicator lamp, 74c: washing water shortage lamp, 74d: sewage full lamp, 79: suction motor output terminal, 80: water level sensor input terminal, 81: operation panel input/output terminal, 82: washing water level sensor input/output terminal, 83: water pressure sensor input terminal, 84: water pump output terminal, 85: washing water supply valve output terminal, 86: deodorization fan output terminal, 87: seating sensor input terminal, 88: feces sensor input terminal, 89: urine sensor input terminal, 90: sewage crushing unit output terminal, 91: motor valve output terminal, 92: suction valve output terminal, 93: discharge valve output terminal, 94: sewage full sensor input terminal, 95: sewage empty sensor input terminal, 96: water full sensor input terminal, 97: empty sensor input terminal, 98: output terminal to control valve 32a for jet nozzle, 99: odor-absorbing holes, 100: insertion toilet 100 (cup), 101: excrement receptor, 102: excrement suction port, 103: urine sensor, 104: feces sensor, 105: air blowing pipe, 106: water flowing pipe, 107: electric cord, 108: connector, 109: heat insulation tank, 110: washing valve, 111: water drain pump, 112: safety tank, 113: temperature monitor sensor, 114: heat insulation tank input terminal, 115: washing valve output terminal, 116: water drain pump output terminal, 117: safety tank sensor input terminal, 118: temperature monitor sensor input terminal, 119: suction boxes, 120: suction hose, 121: switching motor, 122: switching arm, 123: slider, 124: slider support plate, 125: pins, 126: elastic shaft (rubber), 127: retaining plate, 128: screw, 129: pressing

roller, 130: switching valve mounting plate

## Claims

1. An excrement treatment method, comprising:

   a step of opening a suction port of a suction valve 44 of a sewage tank 19 and closing a water discharge valve 46 of the sewage tank 19;
   a step of sucking air in the sewage tank 19 from an air inlet/outlet 45 of the sewage tank 19 and sucking a sewage from a pipe connected to the suction port of the suction valve 44 to store the sewage;
   a step of closing the suction port of the suction valve 44 of the sewage tank 19 and opening the water discharge valve 46 of the sewage tank 19; and
   a step of injecting a compressed air into the air inlet/outlet 45 of the sewage tank 19 to discharge the stored sewage to an outside from the water discharge valve 46.

2. The excrement treatment method according to claim 1, wherein
   a step of crushing a solid matter in the sewage tank 19 is added before discharging the stored sewage to the outside from the water discharge valve 46.

3. An excrement treatment device, comprising:

   a sewage tank 19;
   a suction valve 44 provided on the sewage tank 19, the suction valve 44 opening and closing a suction port of a sewage pipe connected to the sewage tank 19;
   a water discharge valve 46 provided on the sewage tank 19, the water discharge valve 46 discharging the sewage stored in the sewage tank 19 to an outside;
   an air inlet/outlet 45 provided on the sewage tank 19 for sucking air from the air inlet/outlet 45 to suck the sewage from the sewage pipe connected to the suction port of the suction valve 44 and for injecting a compressed air from the air inlet/outlet 45 to discharge the sewage stored in the sewage tank 19 to the outside; and
   a suction motor 20 connected to the air inlet/outlet 45, the suction motor 20 sucking the air into the sewage tank 19 and injecting the compressed air into the sewage tank 19.

4. The excrement treatment device according to claim 3, wherein
   a sewage crushing unit 43 is provided on the sewage tank 19 to crush a solid matter in the sewage tank 19.

5. The excrement treatment device according to claim 3 or 4, wherein
   the suction valve 44 provided on the sewage tank 19 includes:

   a suction port 44a connected to a pipe 63 for flushing the sewage of a chair-type toilet 9; and
   a slider 123 for opening and closing the suction port 44a.

6. The excrement treatment device according to claim 3 or 4, wherein
   the suction valve 44 provided on the sewage tank 19 includes:

   a suction port 44b connected to a pipe 39 for flashing the sewage in an insertion-type toilet 100; and
   a slider 123 for opening and closing the suction port 44b.

7. The excrement treatment device according to claim 3 or 4, wherein
   the suction valve 44 provided on the sewage tank 19 includes:

   a suction port 44a connected to a pipe 63 for flashing the sewage of a chair-type toilet 9;
   a suction port 44b connected to a pipe 39 for flashing the sewage in an insertion-type toilet 100; and
   a slider 123 for selectively opening and closing the suction port 44a and the suction port 44b.

8. The excrement treatment device according to claim 5, wherein
   a toilet bowl 12 of the chair-type toilet 9 has a urine sensor 56 and a feces sensor 57.

9. The excrement treatment device according to any one of claims 5 to 7, wherein the suction valve 44 includes:

   a switching motor 121 having a horizontally swingable motor shaft 121a;
   a slider support plate 124 provided on a tip of a switching arm 122 connected to the horizontally swingable motor shaft 121a;
   the slider 123 supported by the slider support plate 124 via an elastic shaft 126, the slider 123 closing both the suction port 44a and the suction port 44b, the slider 123 selectively opening and closing the suction port 44a and the suction port 44b; and
   a pressing roller 129 for pressing the slider 123 toward the suction port 44a and the suction port 44b via the elastic shaft 126 and a retaining plate 127.

**10.** The excrement treatment device according to claim 5, further comprising:

a booster tank 22 connected to a toilet bowl 12 of the chair-type toilet 9, the booster tank 22 storing a washing water required for one time flushing, wherein
the suction motor 20 supplies air pressure to the booster tank 22 to deliver the washing water stored in the booster tank 22 to a washing water jet port 17 of the toilet bowl 12.

**11.** The excrement treatment device according to claim 10, wherein
a washing water bag 33 having a soft property is provided inside an outer container 62 of the booster tank 22, an inlet side of the washing water bag 33 is connected to a washing water tank 18 via a water pump 27, an outlet side of the washing water bag 33 is connected to the washing water jet port 17 of the toilet bowl 12, and the outer container 62 is connected to the suction motor 20 which feeds the compressed air for compressing the washing water bag 33 to pressure-feed the washing water.

**12.** The excrement treatment device according to claim 11, wherein
the washing water bag 33 is separated into a plurality of independent bags and the independent bags are respectively connected to washing water jet ports 17 of the toilet bowl 12.

**13.** The excrement treatment device according to claim 7, further comprising:

a suction motor 20; and
a switching valve 53 which is exposed to an air suction port and an air discharge port of the suction motor 20 to switch modes between A mode; AB mode and B mode, wherein
in the A mode of the switching valve 53, the air suction port and the sewage tank 19 are connected with each other and the sewage is sucked from the chair-type toilet 9 and the insertion-type toilet 100 to the sewage tank 19,
in the AB mode, an outside air is sucked from the air suction port to blow the outside air into a booster tank 22 and the insertion-type toilet 100, and
in the B mode, the outside air is sucked from the air suction port and pressure-fed to the sewage tank 19 to discharge the sewage to the outside.

**14.** The excrement treatment device according to claim 5, wherein

odor-absorbing holes 99 having a long narrow shape are formed on left and right side of a toilet bowl end 13 of the toilet bowl 12 of the chair-type toilet 9,
suction boxes 119 are attached to outer sides of the odor-absorbing holes 99 so as to be exposed to the odor-absorbing holes 99, and
the suction boxes 119 are connected to a deodorization filter 21 by a suction hose 120 via a deodorization fan 60.

Fig. 1

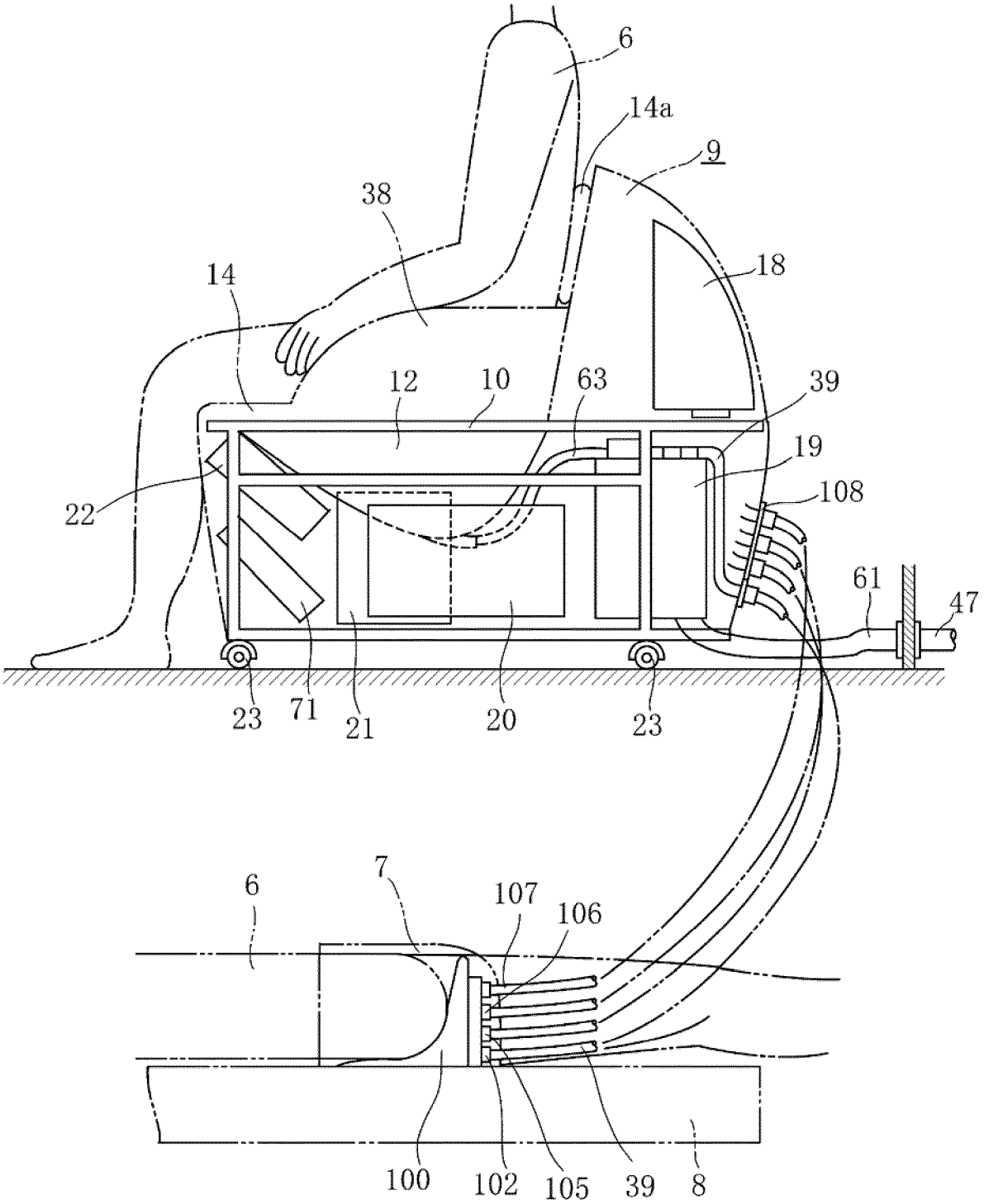

6
14a
9
38
18
14
12
10
63
39
19
108
22
61
47
23
71
21
20
23
6
7
107
106
100
102
105
39
8

Fig. 2

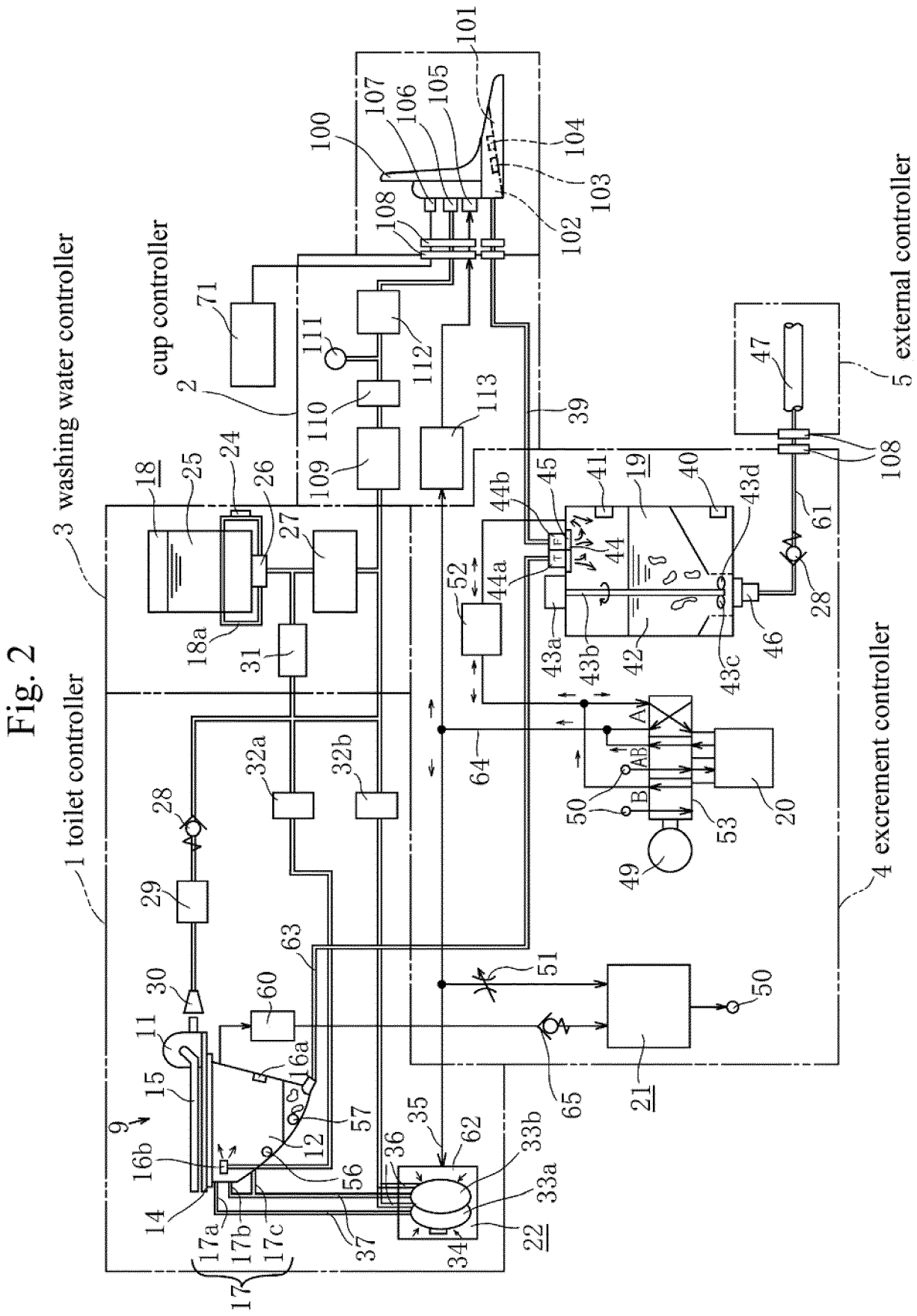

1 toilet controller
2 cup controller
3 washing water controller
4 excrement controller
5 external controller

Fig. 3A

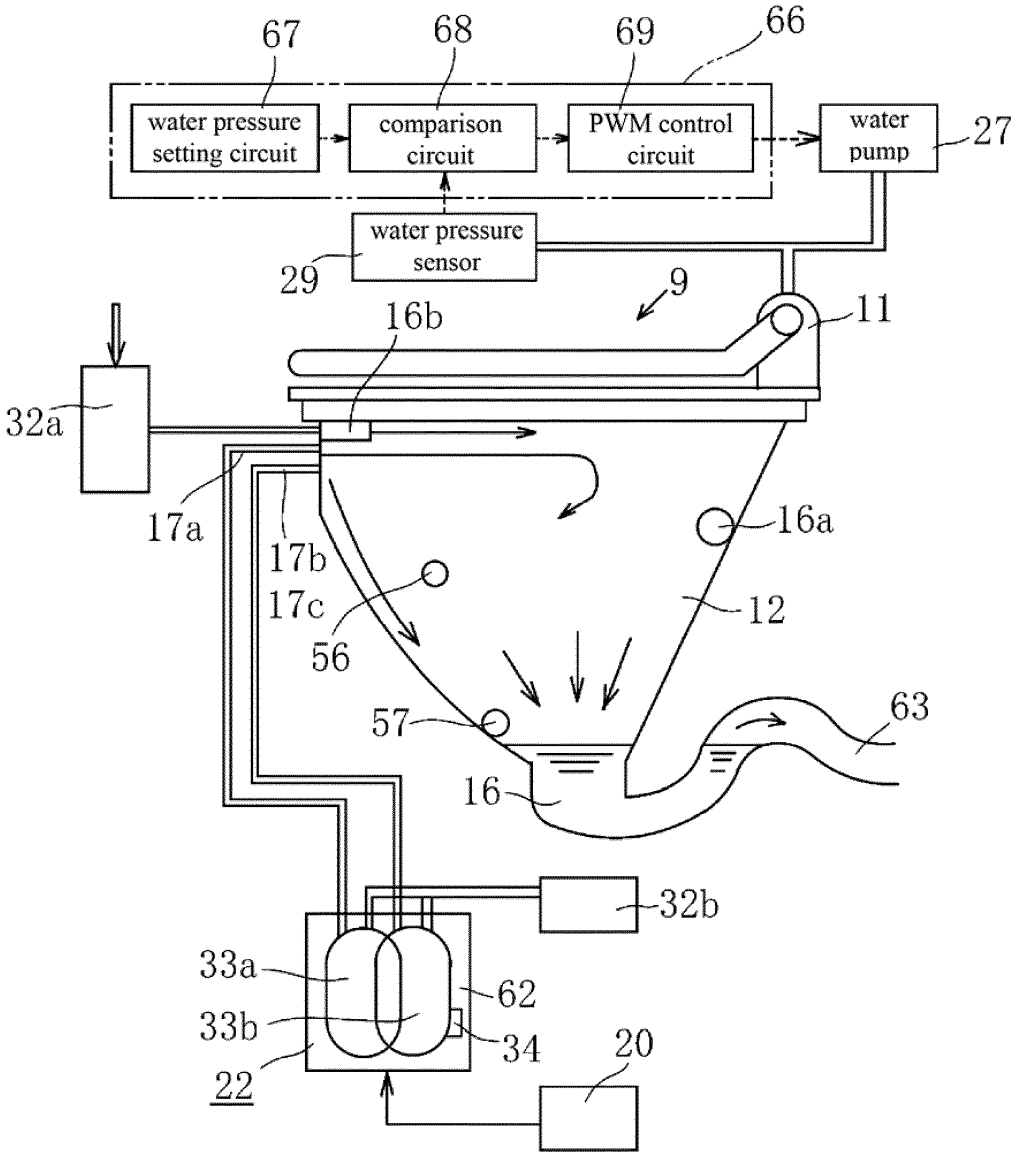

67
68
69
66
water pressure setting circuit
comparison circuit
PWM control circuit
water pump
27
water pressure sensor
29
9
11
16b
32a
17a
17b
17c
56
16a
12
57
63
16
32b
33a
62
33b
34
20
22

Fig. 3B

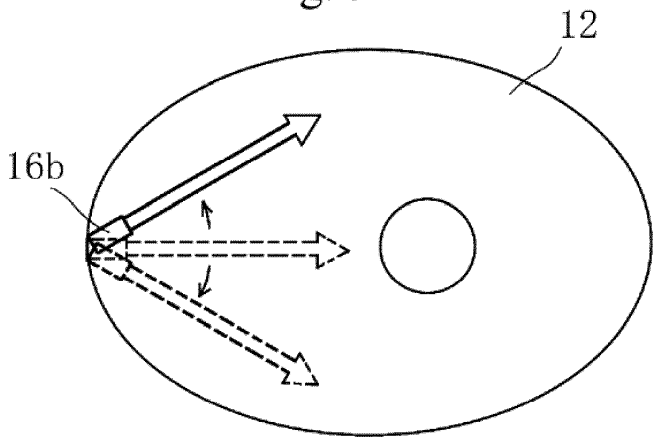

12
16b

Fig. 4A

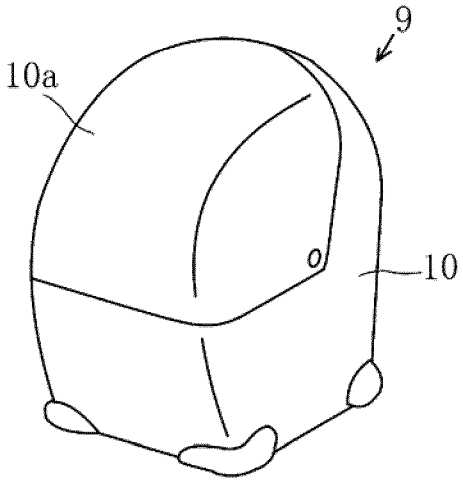



Fig. 4C

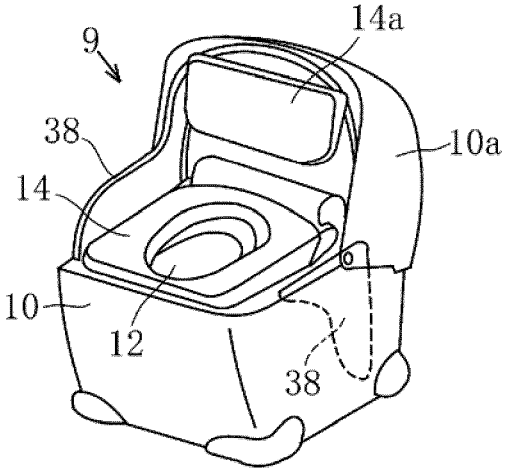



Fig. 4B

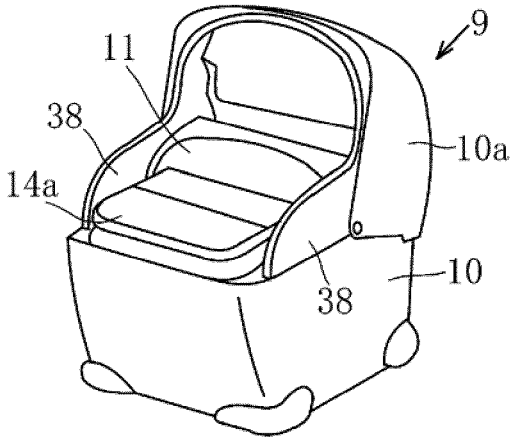



Fig. 4D

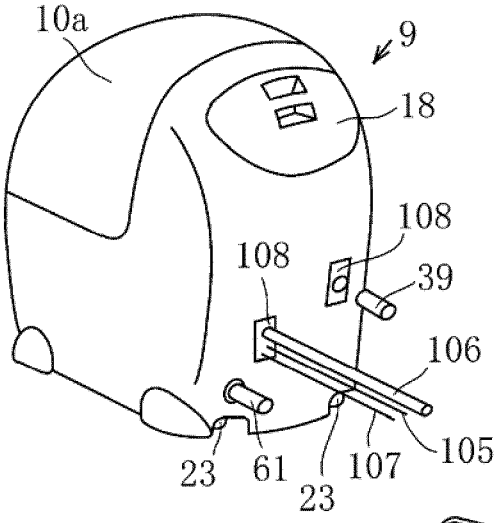



Fig. 4E

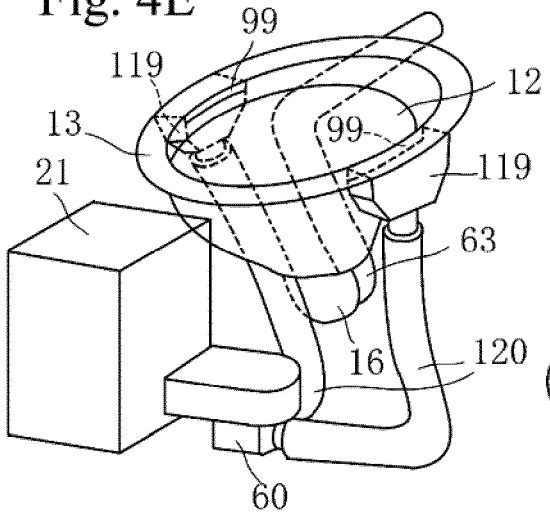



Fig. 4F

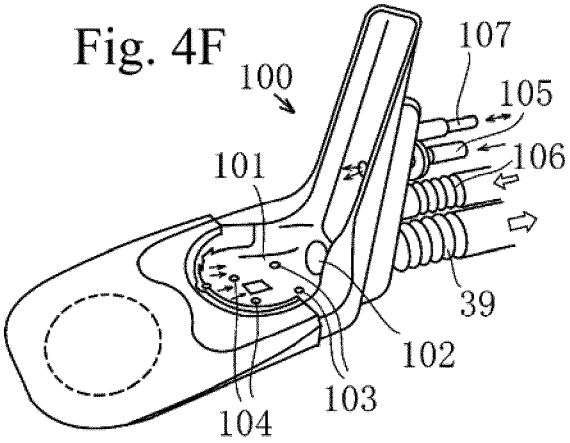


Fig. 5A

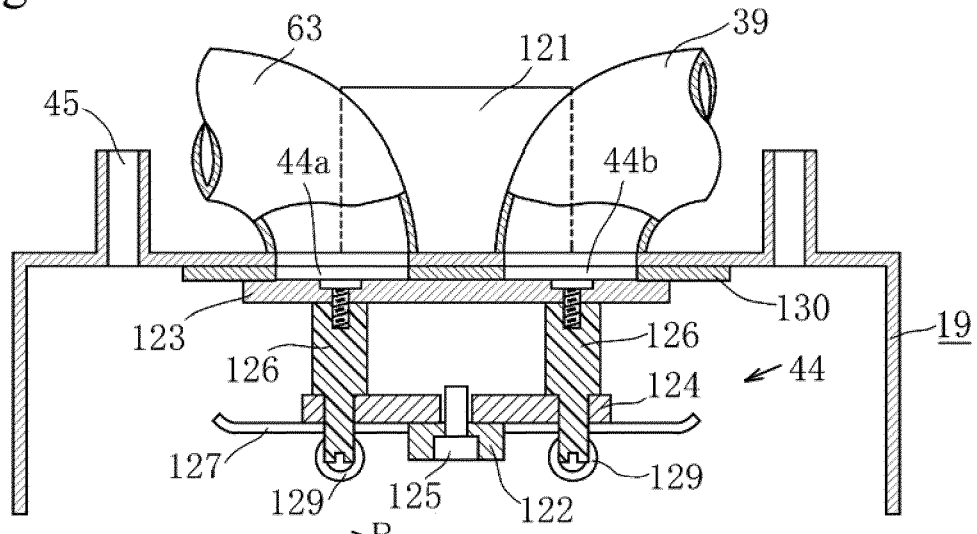



Fig. 5B

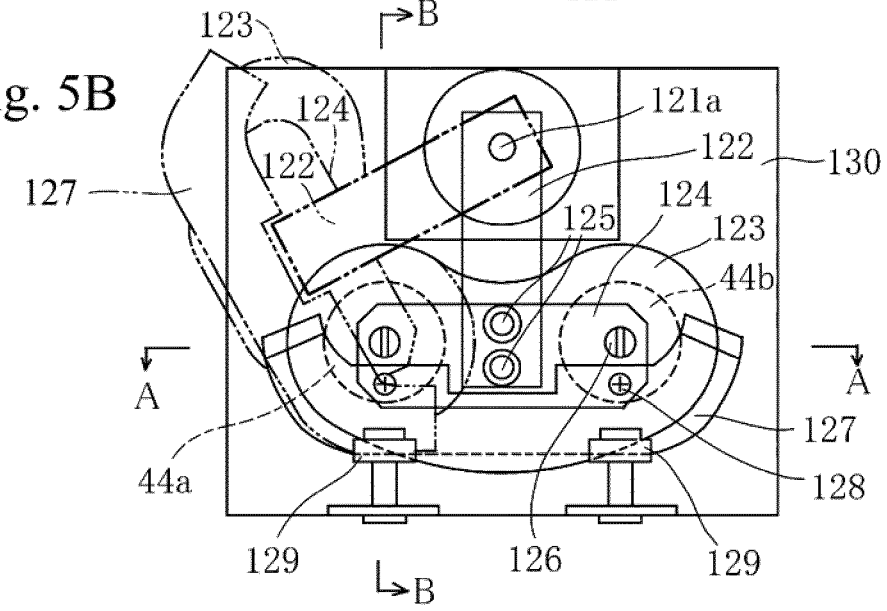



Fig. 5C

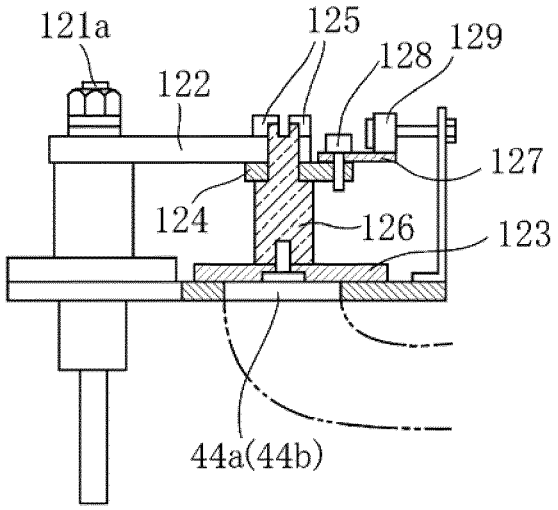


Fig. 6

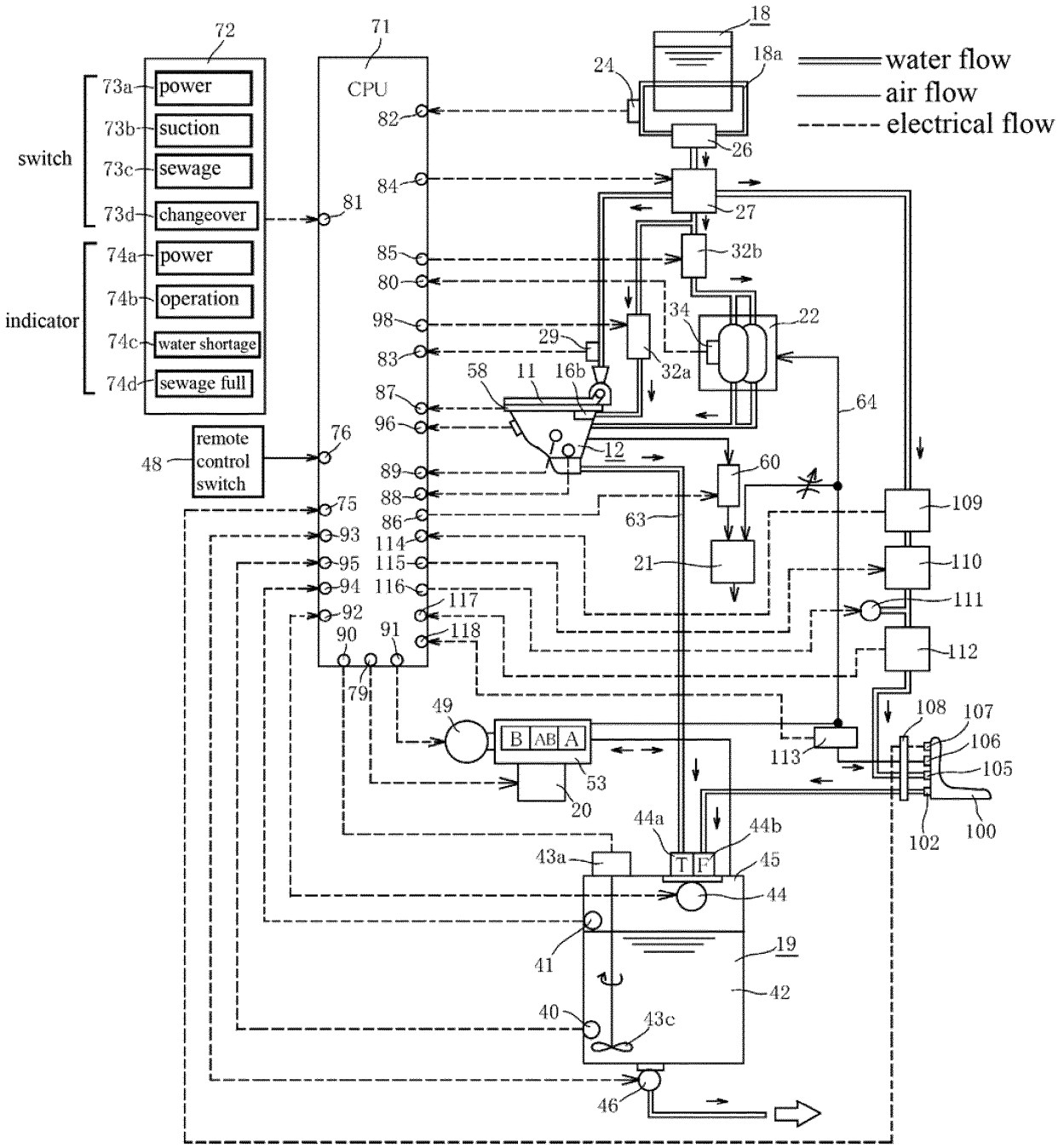
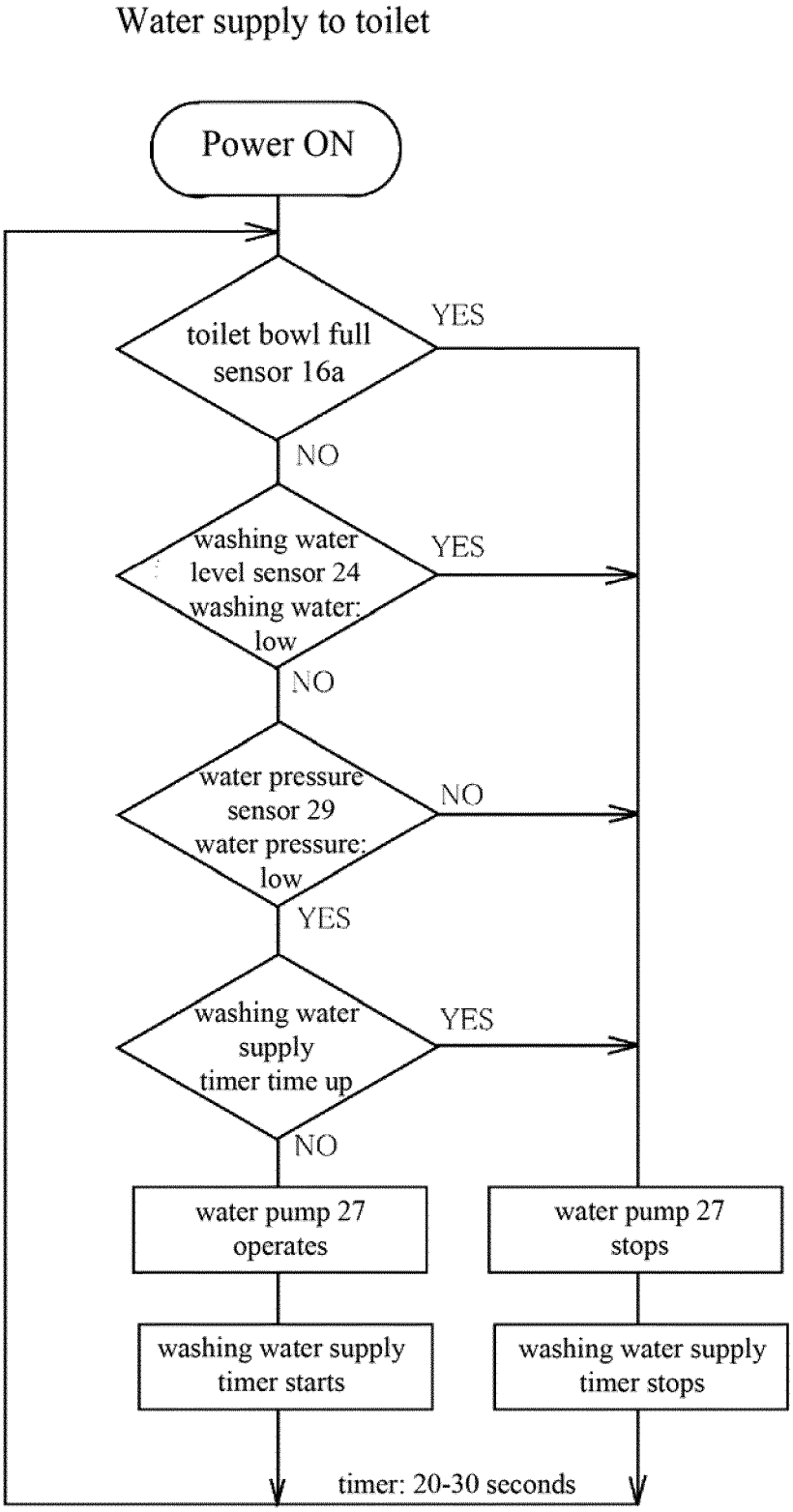

water flow
air flow
electrical flow
switch
indicator
power
suction
sewage
changeover
power
operation
water shortage
sewage full
remote control switch
CPU
72
71
73a
73b
73c
73d
74a
74b
74c
74d
48
76
81
82
84
85
80
98
83
87
96
89
88
86
114
115
116
117
118
75
93
95
94
92
90
91
79
18
18a
24
26
27
32b
34
22
29
32a
58
11
16b
12
64
60
63
21
109
110
111
112
49
B
AB
A
53
20
113
108
107
106
105
102
100
44a
44b
T
F
45
43a
44
41
19
42
40
43c
46

Fig. 7


Water supply to toilet
Power ON
toilet bowl full sensor 16a
YES
NO
washing water level sensor 24 washing water: low
YES
NO
water pressure sensor 29 water pressure: low
NO
YES
washing water supply timer time up
YES
NO
water pump 27 operates
water pump 27 stops
washing water supply timer starts
washing water supply timer stops
timer: 20-30 seconds

# Fig. 8A

Toilet mode operation

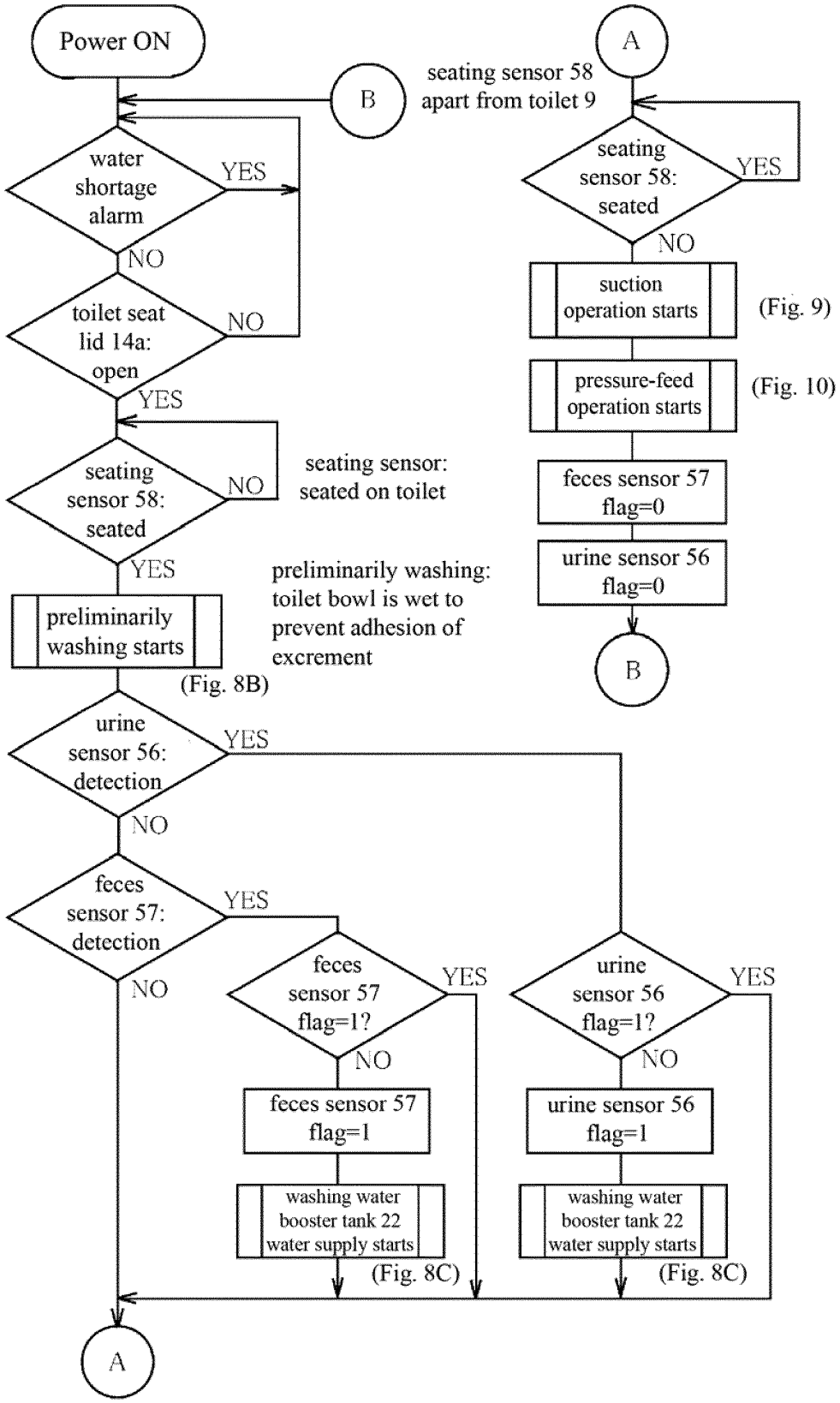


Fig. 8B

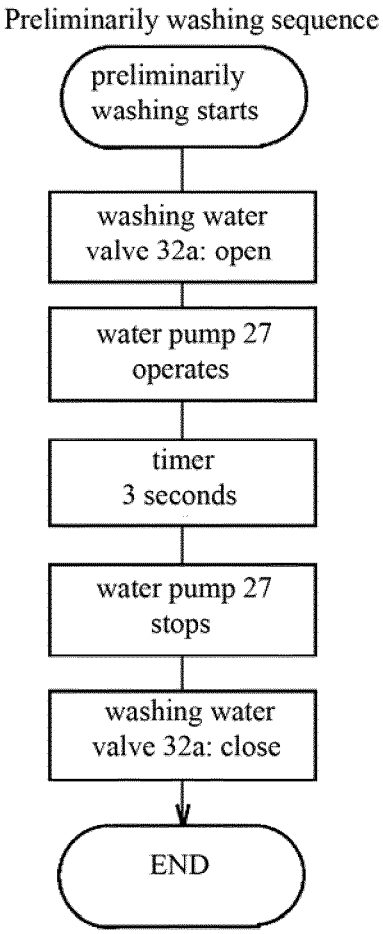

Preliminarily washing sequence
preliminarily washing starts
washing water valve 32a: open
water pump 27 operates
timer 3 seconds
water pump 27 stops
washing water valve 32a: close
END

Fig. 8C

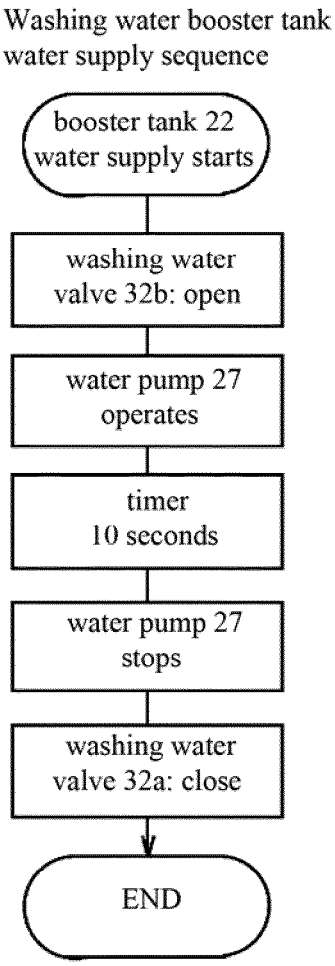

Washing water booster tank water supply sequence
booster tank 22 water supply starts
washing water valve 32b: open
water pump 27 operates
timer 10 seconds
water pump 27 stops
washing water valve 32a: close
END

Fig. 9

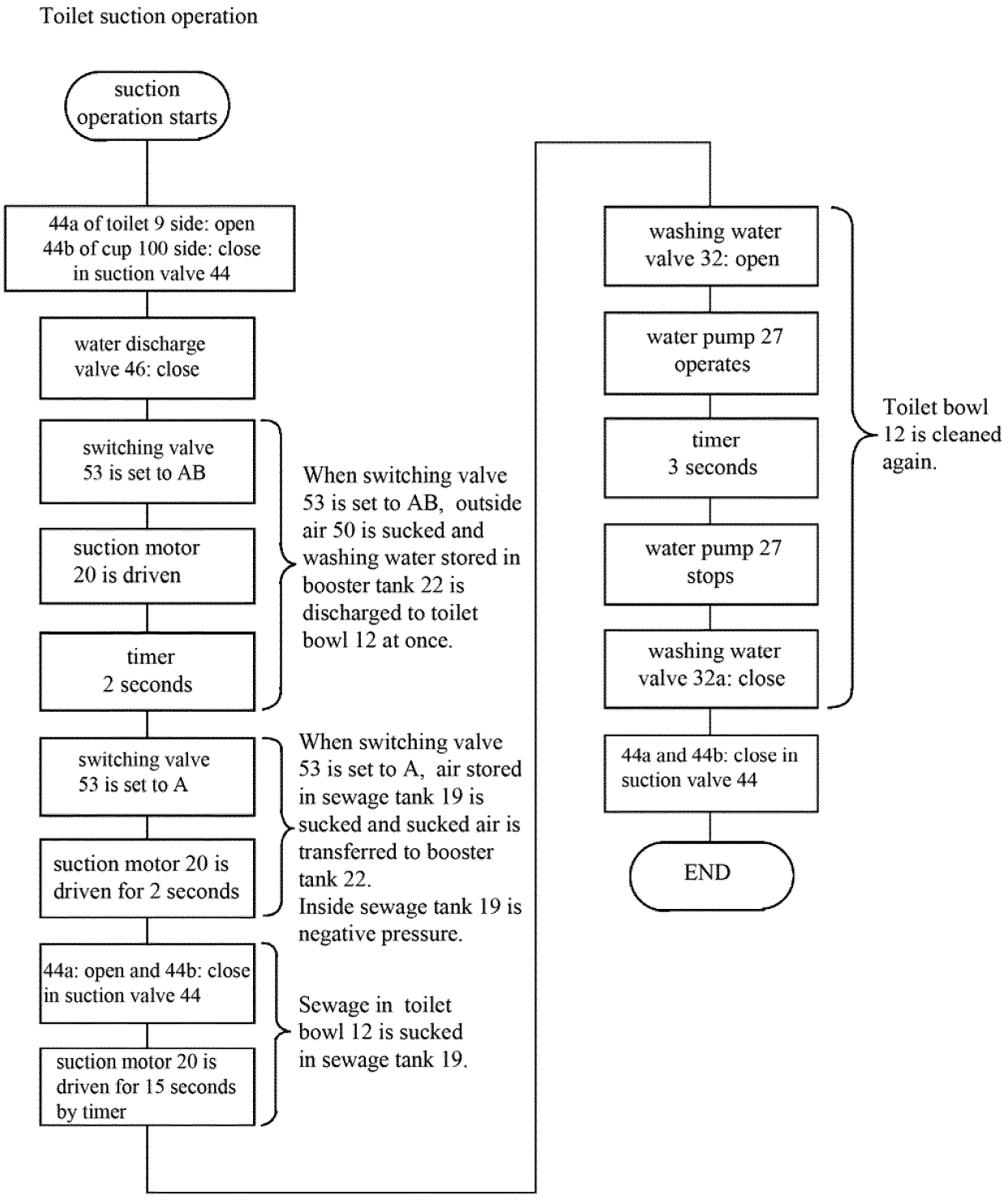

Toilet suction operation
suction operation starts
44a of toilet 9 side: open
44b of cup 100 side: close
in suction valve 44
water discharge valve 46: close
switching valve 53 is set to AB
suction motor 20 is driven
timer 2 seconds
When switching valve 53 is set to AB, outside air 50 is sucked and washing water stored in booster tank 22 is discharged to toilet bowl 12 at once.
switching valve 53 is set to A
suction motor 20 is driven for 2 seconds
When switching valve 53 is set to A, air stored in sewage tank 19 is sucked and sucked air is transferred to booster tank 22.
Inside sewage tank 19 is negative pressure.
44a: open and 44b: close in suction valve 44
suction motor 20 is driven for 15 seconds by timer
Sewage in toilet bowl 12 is sucked in sewage tank 19.
washing water valve 32: open
water pump 27 operates
timer 3 seconds
water pump 27 stops
washing water valve 32a: close
Toilet bowl 12 is cleaned again.
44a and 44b: close in suction valve 44
END

Fig. 10

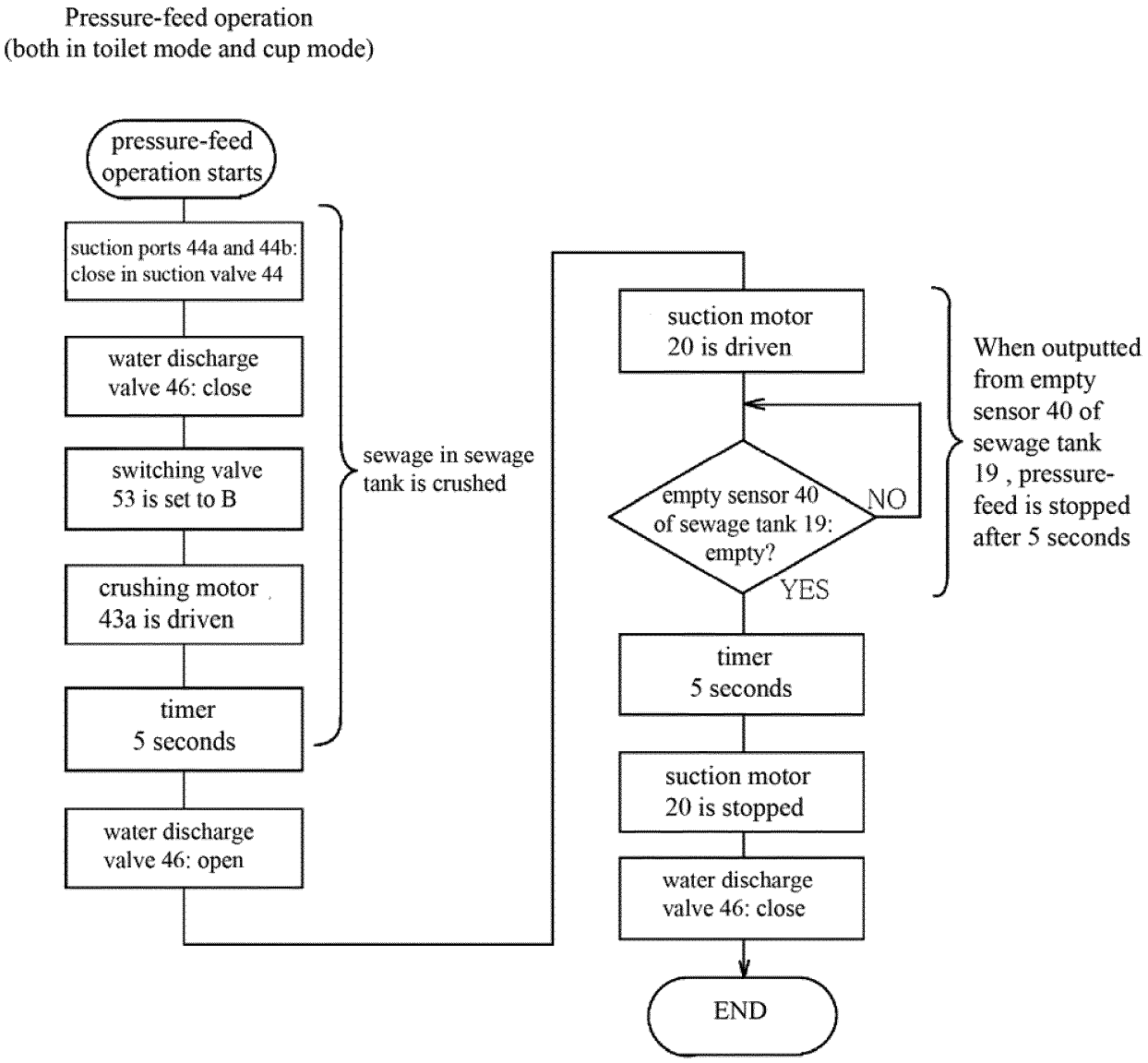

Pressure-feed operation
(both in toilet mode and cup mode)
pressure-feed operation starts
suction ports 44a and 44b: close in suction valve 44
water discharge valve 46: close
switching valve 53 is set to B
crushing motor 43a is driven
timer 5 seconds
water discharge valve 46: open
sewage in sewage tank is crushed
suction motor 20 is driven
empty sensor 40 of sewage tank 19: empty?
NO
YES
timer 5 seconds
suction motor 20 is stopped
water discharge valve 46: close
END
When outputted from empty sensor 40 of sewage tank 19 , pressure-feed is stopped after 5 seconds

Fig. 11

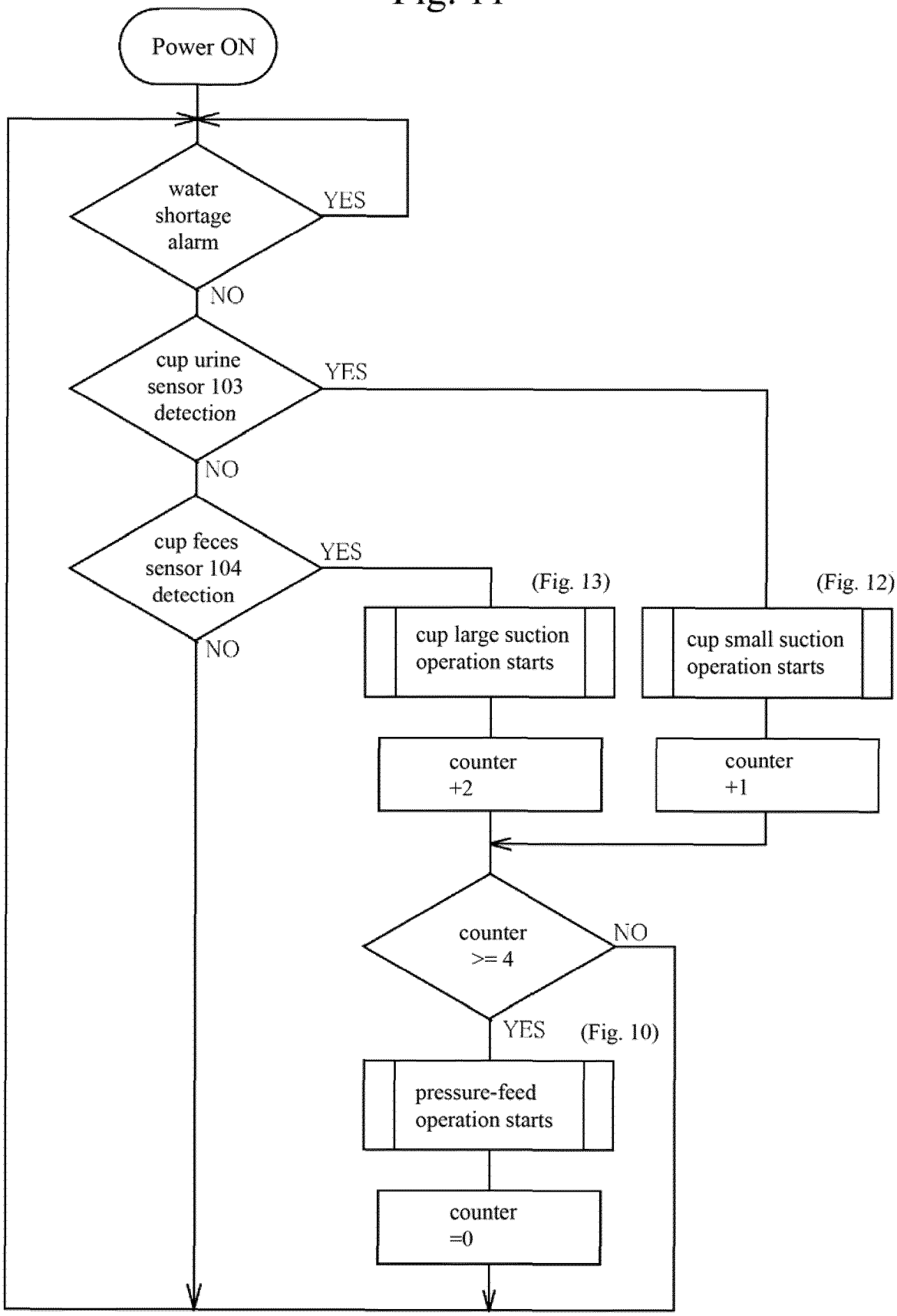

Power ON
water shortage alarm
YES
NO
cup urine sensor 103 detection
YES
NO
cup feces sensor 104 detection
YES
NO
(Fig. 13)
(Fig. 12)
cup large suction operation starts
cup small suction operation starts
counter +2
counter +1
counter >= 4
NO
YES
(Fig. 10)
pressure-feed operation starts
counter =0

Fig. 12A

Cup small suction operation

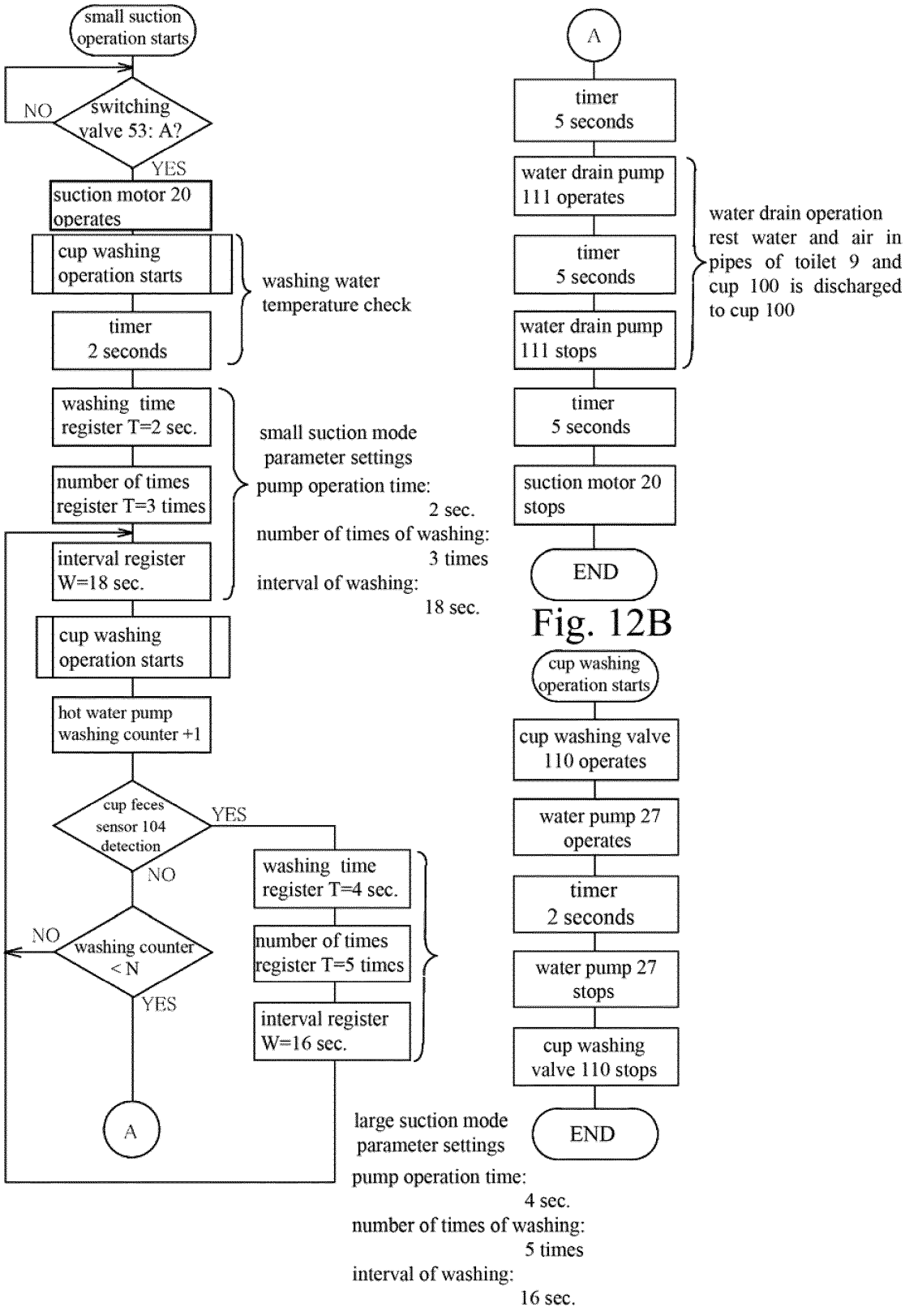
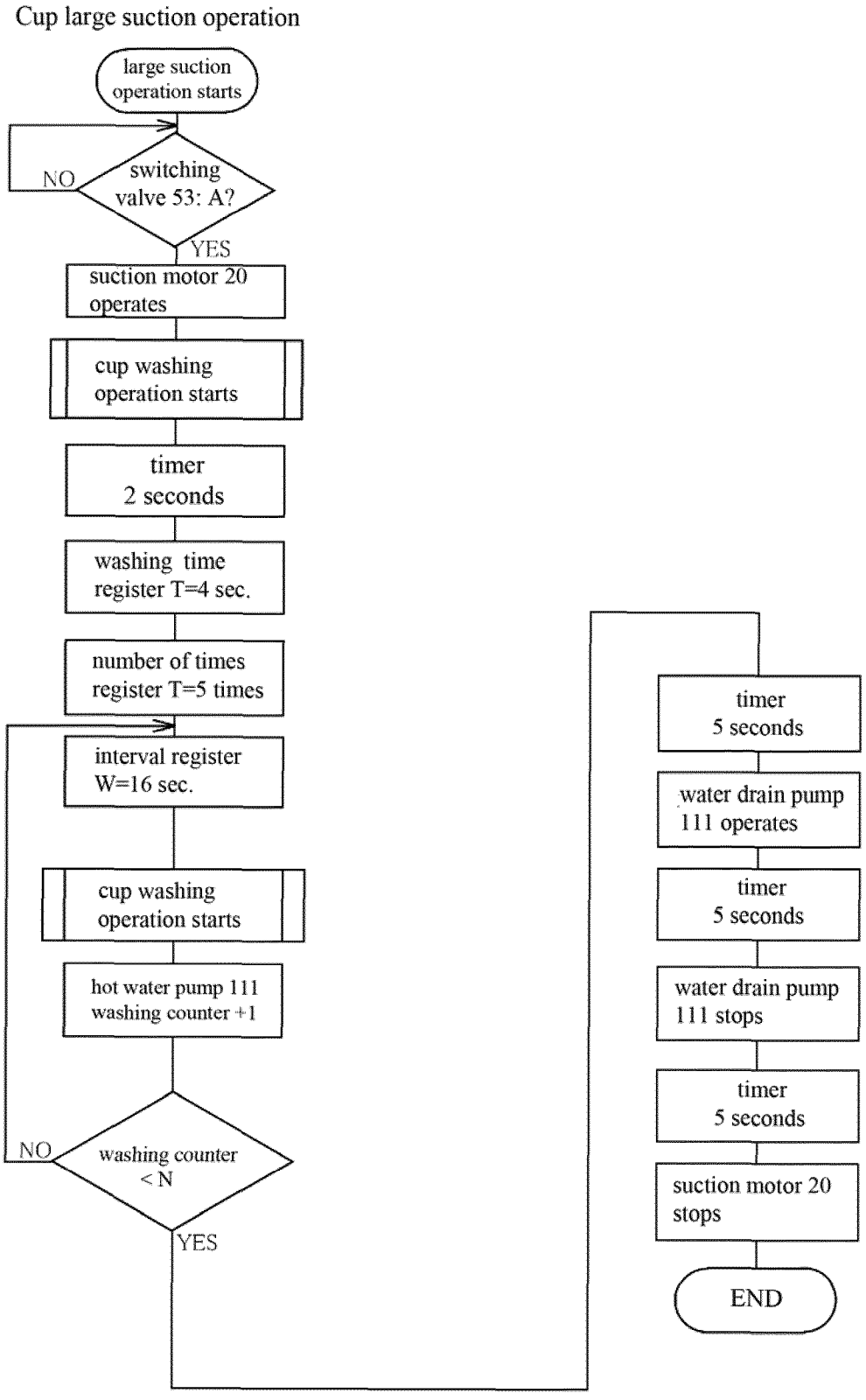



Fig. 12B

Fig. 13


Cup large suction operation
large suction operation starts
switching valve 53: A?
NO
YES
suction motor 20 operates
cup washing operation starts
timer 2 seconds
washing time register T=4 sec.
number of times register T=5 times
interval register W=16 sec.
cup washing operation starts
hot water pump 111 washing counter +1
washing counter < N
NO
YES
timer 5 seconds
water drain pump 111 operates
timer 5 seconds
water drain pump 111 stops
timer 5 seconds
suction motor 20 stops
END

**INTERNATIONAL SEARCH REPORT**

International application No.
PCT/JP2018/001876

A. CLASSIFICATION OF SUBJECT MATTER
Int.Cl. A47K11/04(2006.01)i, E03D11/00(2006.01)i

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
Int.Cl. A47K11/00, A47K11/04-11/08, A47K11/12, E03D11/00-11/18, E03D5/00-5/12, A61F5/451, A61G9/00

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

| | |
|---|---|
| Published examined utility model applications of Japan | 1922-1996 |
| Published unexamined utility model applications of Japan | 1971-2018 |
| Registered utility model specifications of Japan | 1996-2018 |
| Published registered utility model applications of Japan | 1994-2018 |

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

| Category* | Citation of document, with indication, where appropriate, of the relevant passages | Relevant to claim No. |
|---|---|---|
| A | JP 2016-54771 A (ARON KASEI KK) 21 April 2016, paragraphs [0023], [0048], [0063]-[0078], fig. 1 (Family: none) | 1-14 |
| A | JP 2012-36681 A (MAX CO., LTD.) 23 February 2012, paragraphs [0046]-[0049], fig. 1 (Family: none) | 1-14 |
| A | JP 2009-243053 A (TOTO LTD.) 22 October 2009, paragraph [0022] (Family: none) | 1-14 |

☒ Further documents are listed in the continuation of Box C. ☐ See patent family annex.

* Special categories of cited documents:
"A" document defining the general state of the art which is not considered to be of particular relevance
"E" earlier application or patent but published on or after the international filing date
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
"O" document referring to an oral disclosure, use, exhibition or other means
"P" document published prior to the international filing date but later than the priority date claimed
"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
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"&" document member of the same patent family

| Date of the actual completion of the international search | Date of mailing of the international search report |
|---|---|
| 09.04.2018 | 24.04.2018 |

| Name and mailing address of the ISA/ | Authorized officer |
|---|---|
| Japan Patent Office<br>3-4-3, Kasumigaseki, Chiyoda-ku,<br>Tokyo 100-8915, Japan | Telephone No. |

Form PCT/ISA/210 (second sheet) (January 2015)

**INTERNATIONAL SEARCH REPORT**

International application No.
PCT/JP2018/001876

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

| Category* | Citation of document, with indication, where appropriate, of the relevant passages | Relevant to claim No. |
|---|---|---|
| A | JP 2016-137205 A (AD-ROLLS CO., LTD.) 04 August 2016, paragraphs [0018], [0022], [0023], fig. 2 (Family: none) | 1-14 |
| A | Microfilm of the specification and drawings annexed to the request of Japanese Utility Model Application No. 143995/1978 (Laid-open No. 59786/1980) (MATSUSHITA ELECTRIC INDUSTRIAL CO., LTD.) 23 April 1980, page 1, line 12 to page 2, line 8, fig. 1 (Family: none) | 1-14 |

Form PCT/ISA/210 (continuation of second sheet) (January 2015)

## REFERENCES CITED IN THE DESCRIPTION

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### Patent documents cited in the description


- JP 2002045307 A **[0009]**
- JP 2002200005 A **[0009]**
- JP 5254498 B **[0009]**