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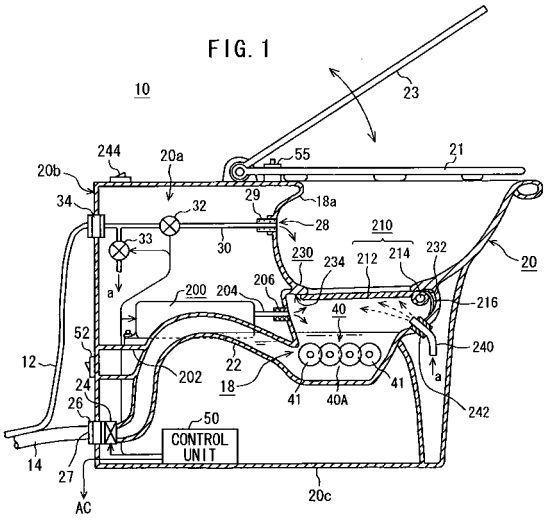
(54) **TOILET DEVICE**

(57) A breaking means (40) is installed in a stagnant portion (18) of the body of the toilet device (20). The breaking means (40) has a breaking mechanism unit (40A). The breaking mechanism unit (40A) is a cutter mechanism and has cutter members (41). Each of the cutter members (41) has multiple cutter blades along its rotation axis direction. Cutter blades of adjacent cutter members mesh with each other with a small clearance kept. Because by the action of this cutter member, excrement and others including tissue paper, etc. can be cut out finely and broken, the excrement and others (solids) are made into liquid mixture in this breaking process. Because of liquid mixture, drain takes place easily so that clogging of a drain pipe can be prevented even if hardly soluble matters such as tissue paper are used.

FIG. 1



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Description

TECHNICAL FIELD

[0001] The present invention relates to a toilet device that can be applied to fixed type Western-style toilet, portable Western-style toilet and the like. It relates, specifically, to a toilet device that can cut out and break not only excrement but also hardly soluble tissue paper, etc. to discharge them to any sewer pipe or the like by installing breaking means for breaking excrement and the like in a stagnant portion of the body of the toilet device and at the same time, adopting a cutter mechanism that can cut out and break them as this breaking means.

BACKGROUND ART

[0002] The present Western style toilet has a stagnant portion to store trap water at the bottom part of the body of the toilet device, and any excrement is evacuated into trapped trap water and at the same time, excrement and water-soluble toilet paper (hereinafter called excrement and others) are drained together with the trap water to the sewer-pipe side (for example, see Japanese Patent Application Publication No. 2004-308404).

[0003] With respect to paper used for Western-style toilets, attention is often drawn to use toilet paper (water-soluble paper) provided, as much as possible. This is because the use of water-soluble toilet paper is recommended as toilet paper in order to prevent clogging at the body of the toilet device or clogging at the sewer pipe. Recently, in addition to this kind of toilet paper, any paper could be used even for Western-style toilets, so long as it is water-soluble. For example, water-soluble tissue paper, etc. which can be used in Western-style toilets has been put on market.

[0004] On the other hand, in addition to a fixed type Western-style toilet, a portable type simplified Western-style toilet has been also known (for example, see Japanese Patent Application Publication No. 2000-325258). This portable type simplified Western-style toilet has been developed for elderly persons who need care or physically disabled persons who find it difficult to go to an existing toilet (Western-style toilet, etc.) in his or her house.

[0005] This portable type simplified Western-style toilet is configured into a chair type one so that it can be easily provided in their private room and they can sit on the chair type toilet by which he or she can defecate. The simplified Western-style toilet has a configuration substantially similar to that of the fixed type Western-style toilet. Consequently, for the portable Western-style toilet, a body of the toilet device which has a stagnant portion to store trap water is also used, and after the use, the excrement and others are drained together with trap water.

[0006] Even in this kind of simplified Western-style toilet, a kind of usable paper is water-soluble paper such as toilet paper so that the excrement and others can not clog the body of the toilet device or the sewer pipe. In addition, in order to facilitate draining, some toilets have breaking means inside the body of the toilet device (for example, see Japanese Patent Application Publication No. 2001-275885).

[0007] And now, because in Western-style toilets in which rinse water is used, the excrement and others are drained together with trap water without breaking them to the outside of the body of the toilet device, as described above, any attention for use such that any paper other than toilet paper provided should be not used is drawn and any evocation thereof is performed, but there are cases in which paper other than that provided is used.

[0008] For example, there is tissue paper. Disposing of tissue paper into a body of the toilet device with the tissue paper being in a condensed state such as being crumpled into a ball, etc. is likely to give rise to any accidents such that the body of the toilet device or the sewer pipe (the exhaust pipe) is clogged.

[0009] Even water-soluble tissue paper is likely to cause similar accidents if it is used in a large quantity. In addition, in toilet facilities which are used by large numbers of the general public, such as lavatories, etc. in public places, improvement plans for a disposal method of used sanitary items are called for. As one example of these improvement plans, water-soluble sanitary items, which can be disposed into existing toilet facilities after they have been used, are sold, but when they are used together with toilet paper, etc., it takes time for water (rinsing water such as trap water, etc.) to penetrate into them even though they are water-soluble, so that their solidity can be not broken and they are not always drained securely. This problem is the same in the case of the simplified Western-style toilets.

[0010] In Patent Literature 3, a configuration to provide a simplified Western-style toilet device with breaking means has been disclosed, so that it is assumed that this configuration could be adopted for the above-mentioned fixed type Western-style toilet. However, this breaking means uses rotary vanes with them being brought down sideways, and since only the rotary vanes are used for breaking, the breaking means does not provide sufficient capabilities to break not only excrement but also kinds of water-soluble paper such as toilet paper, etc. Accordingly, when regular tissue paper and the like are used together, any treating case far exceeding its breaking capacity may occur. Consequently, there is a high possibility such that they may be drained in a solid state including the excrement, and therefore, it is not sufficient to improve clogging of the body of the toilet device and clogging of sewer pipe, too.

[0011] Not only in the fixed system but also in the simplified Western-style toilet device, it is assumed that merely employing the breaking means like the Patent Literature 3 would raise similar problems of the fixed type Western-style toilets.

DISCLOSE OF THE INVENTION

[0012] This invention solves such the conventional problems and relates to a toilet device comprising a body of the toilet device having a stagnant portion at the bottom thereof, and a breaking means with being immersed into trap water trapped in the stagnant portion, wherein the breaking means includes a breaking mechanism unit that has a cutter blade, and its driving means, and by driving the breaking mechanism unit, excrement and others which have fallen into the stagnant portion is cut out and broken.

[0013] By installing the breaking means for performing any break-processing of the excrement and others such as stool, etc. in a stagnant portion of the body of the toilet device and at the same time, adopting a cutter mechanism (breaking mechanism unit) that can cut out and break them as the breaking means, it is possible to cut out and break not only excrement but also hardly soluble tissue paper as to be suited for discharging them to a sewer pipe even when the hardly soluble tissue paper and the like are used.

[0014] This invention is applicable to portable type simplified Western-style toilets with the indoor use premised, in addition to the fixed type Western-style toilets.

[0015] The breaking means has cutter functions, and is constituted of a breaking mechanism unit (cutter mechanism unit) and its drive means. The breaking mechanism unit falls broadly into two categories. One is the case in which the breaking mechanism unit is composed of multiple contrarotating cutter members, and the other is the case in which the breaking mechanism unit is composed of fixed guide members and cutter members (rotating members) which are mounted thereto.

[0016] The breaking mechanism unit is composed of four cutter members disposed to be placed side by side in such a manner that they can mesh with each other. Each of the cutter members is composed by installing multiple disk-shaped cutter blades in the longitudinal direction (rotation axis direction) thereof with a predetermined interval kept, and cutter blades of adjacent cutter members are disposed to mesh with each other on sides of the side surfaces thereof.

[0017] The degree of meshing is optional. When a substantially straight type cutter member is used as the cutter members, the cutter blade sizes are substantially same, and therefore, they mesh with each other in the same mesh depth throughout the longitudinal direction thereof. In the case of a combination of a substantially straight type and a substantially bobbin type of the cutter members, meshing of cutter blades gradually varies towards the longitudinal direction, and in such event, at the center part of the cutter member, the shallowest meshing takes place. In this combination, a cutter member with a substantially bobbin shape meshes with other cutter member, so that a recessed portion can be formed at the nearly center part of the meshed portion of cutter members, which is deeper than that when cutter members of a straight shape mesh with each other, and at the same time, the tooth tip profile of each of the cutter members, which forms a substantially bobbin shape, is curved as a whole from both end sides towards the center part. Consequently, the excrement and others are easy to be collected to this recessed portion and the excrement and others can be effectively cut out and broken.

[0018] The cut system of the breaking mechanism unit includes a straight cut, a cross-cut, and a spiral cut. It is optionally chosen which type of the cutter blade is used, but the cross-cut system will be illustrated. By using the cutter blade of this system, it is possible to cut out and break the excrement and others effectively even when comparatively difficult-to-break hardly soluble matters such as tissue paper, etc. are included in addition to any stool as the excrement and others. Consequently, accidents of clogging of the body of the toilet device or the sewer pipe, etc. can be beforehand prevented.

[0019] The body of the toilet device may be provided with, above the stagnant portion into which body waste is excreted, a reducing size portion (annular flange portion) which has smaller diameter than the opening of the body of the toilet device, a lid for open and closure to block this reducing size portion, and pressure-feed means to pressure-feed the excrement and others. In such event, the lid for open and closure preferably has such a structure that when the body waste and the like fall on the lid for open and closure, the head end part of the lid for open and closure is separated from the edge part of the reducing size portion by the weight of the body waste and the like, and the body waste automatically falls into the stagnant portion by its own weight. By the pressure-feed means, the excrement and others can be pressure-fed to a drain pipe linked to the sewer pipe of the existing toilet. The lid for open and closure is convenient when it is applied particularly to any simplified Western-style toilets because drifting of foul odor of the excrement can be eliminated.

BRIEF DESCRIPTION OF THE DRAWINGS

[0020]

Fig. 1 is a cross-sectional view of an embodiment of the toilet device according to this invention for showing an important portion thereof when it is applied to a simplified Western style toilet;

FIG. 2 is a plan view thereof for showing the important portion;

FIG. 3 is a cross-sectional view of Fig. 2;

FIG. 4 is a perspective view of an embodiment of a cutter member which constitutes a breaking mechanism unit for showing an important portion thereof;

FIG. 5 is a gear arrangement diagram for showing an embodiment of driving means;

FIG. 6 is a cross-sectional view of the simplified Western-style toilet shown in Fig. 1 for showing the use condition thereof;

FIG. 7 is a conceptual diagram that shows an example when water-supply/drain hose of the simplified Western-style toilet is coupled to an existing Western-style toilet;
FIG. 8 is a cross-sectional view thereof for showing its important portion;
FIG. 9 is a diagram for showing a configuration of the water-supplying hose;
FIG. 10 is a diagram for showing a configuration of the drain hose;
FIG. 11 is a cross-sectional view of an embodiment of a check valve for showing an important portion thereof;
FIG. 12 is a system diagram that shows one example of the control system used for a simplified Western-style toilet;
FIG. 13A is a waveform chart used for explaining the operation;
FIG. 13B is a waveform chart used for explaining the operation;
FIG. 13C is a waveform chart used for explaining the operation;
FIG. 13D is a waveform chart used for explaining the operation;
FIG. 13E is a waveform chart used for explaining the operation;
FIG. 14A is a waveform chart used for explaining the draining operation;
FIG. 14B is a waveform chart used for explaining the draining operation;
FIG. 14C is a waveform chart used for explaining the draining operation;
FIG. 15 is a cross-sectional view of an existing Western-style toilet for showing an example when the drain hose is coupled to the existing Western style toilet;
FIG. 16 is a conceptual diagram that shows a linkage example of the existing Western-style toilet and a portable type simplified Western-style toilet;
FIG. 17 is a configuration diagram of another embodiment of the breaking mechanism unit for showing an important portion thereof;
FIG. 18A is a configuration diagram of still another example of the breaking mechanism unit for showing an important portion thereof and its schematically perspective view thereof;
FIG. 18B is a configuration diagram of still another example of the breaking mechanism unit for showing an important portion thereof and its schematically perspective view thereof;
FIG. 19 is a cross-sectional view of another embodiment of a portable type simplified Western-style toilet according to this invention for showing an important portion thereof;
FIG. 20 is a cross-sectional view of still another embodiment of a portable type simplified Western-style toilet according to this invention for showing an important portion thereof;
FIG. 21 is a front view of another embodiment of the breaking mechanism unit;
FIG. 22 is a partly omitted plan view of an important portion thereof;
FIG. 23 is a cross-sectional view of an embodiment of a fixed type Western-style toilet to which the present invention is applied for showing an important portion thereof;
FIG. 24 is an important portion block diagram for showing an example of the control system;
FIG. 25A is a timing chart diagram for showing the control timing example;
FIG. 25B is a timing chart diagram for showing the control timing example;
FIG. 25C is a timing chart diagram for showing the control timing example;
FIG. 25D is a timing chart diagram for showing the control timing example;
FIG. 25E is a timing chart diagram for showing the control timing example;
FIG. 25F is a timing chart diagram for showing the control timing example; and
FIG. 26 is a cross-sectional view of a fixed type Western-style toilet for showing another example of an open/close mechanism.

DETAILED DESCRIPTION OF THE INVENTION

[0021] The following will describe preferred embodiments of a toilet device according to the present invention in detail with reference to drawings. The following embodiments relate to cases in which the present invention is applied to a simplified Western-style toilet on the assumption that this toilet device according to the invention is used in any private rooms. Even in the case of usage in the private rooms, as is the case of a fixed-type Western-style toilet, it is preferably a Western-style toilet having a so-called warm-water washing toilet seat with a bidet function equipped. However, in the following description, any explanation in the equipment of this warm-water washing toilet seat will be omitted.

(Embodiment 1)

[0022] Fig. 16 shows an example to which the present invention is applied. This example indicates a case in which an existing toilet (fixed type Western-style toilet) 3 is provided facing a corridor 2 of a house 1. In the existing toilet 3, a toilet bowl 4 and a rinse water tank 5 are provided. Along the corridor 2, a room 6 is located as a bed room in this embodiment, and inside the room 6, for example, a bed 7 is placed.

[0023] To a simplified Western-style toilet 10, water-supplying means and draining means are provided, and the water-supplying means is coupled to the waterworks and the draining means is coupled to a sewer pipe (sewage system). In general, to couple the water-supplying means (water-supply hose 12) and draining means (drain

hose 14), the water-supply pipe and drain pipe (sewer pipe) of existing toilet device 4 are used, respectively.

[0024] FIG. 1 is a cross sectional view of an embodiment of a portable toilet device 10 according to the invention for showing an important portion thereof. The simplified Western-style toilet 10 has a body 20 of the toilet device. The body 20 of the toilet device has a profiled configuration of a funnel almost like that of a normal flush toilet (of western style), but has a whole configuration of box. Because any interior decorations are recently required, the body 20 of the toilet device may be not only formed as a box but also formed as, for example, chair-type one equipped with armrests.

[0025] In order to save the weight of the body 20 of the toilet device, in this embodiment, plastic molded body is used as the body 20 of the toilet device, but any other materials such as ceramics may be used to be molded. A toilet seat 21 is mounted on the body 20 of the toilet device at a side of its upper opening and a cover 23 is provided for closing the seat 21 and the upper opening.

[0026] A stagnant portion 18 of trap water, the excrement and others is formed at a bottom of the body 20 of the toilet device. A S-bent trap unit (drain portion) 22 having a profiled configuration turned down at ends thereof, which is communicated with the stagnant portion 18, is provided and a drain hose 14 is connected to a drain opening 27 provided at its end. Thus, a connection portion 26 relative to the drain opening 27 is formed on a rear surface portion 20b of the body 20 of the toilet device and an electromagnetic valve 24 acting as on-off valve is mounted near the connection portion 26 inside the body 20 of the toilet device. It is conceivable that the profiled configuration of the S-bent trap unit 22, which is turned down at ends thereof, communicated with the stagnant portion 18 includes configurations of P type, U type, bowl type and the like in addition to the shown configuration. All of these configurations cause similar effects.

[0027] The electromagnetic valve 24 is controlled so that it opens only when the trap water (including the excrement) in the stagnant portion 18 is drained out of the toilet device and it closes when the toilet is not used. This is because the water is prevented from leaking.

[0028] In the vicinity of the top of the body 20 of the toilet device, on the wall surface 18a, a water-supplying port 28 for the rinse water is provided on a side of the S-bent trap unit 22. Between the coupling part 34 provided on a rear 20b of the main body and this water-supplying port 28, a coupling pipe 30 is disposed. For the coupling pipe 30, a branch pipe is used, and to one coupling pipe 30 that goes to the water-supplying port 28, an electromagnetic valve 32 is mounted to control rinse water. This is because the water supply from the water supply hose 12 coupled to the coupling part 34 may be controlled by this electromagnetic valve 32.

[0029] To another coupling pipe 30 branched, a rinsing hose (rinse pipe) 240 is coupled via an electromagnetic valve 33, too. The head end part of the rinsing hose 240 is provided in such a manner that it protrudes above the water surface of trap water in the stagnant portion 18. By water injection (in actuality, a jet) from this rinsing hose 240, the stagnant portion 18 and a rear surface of a lid body 212 are rinsed, which will be described later.

[0030] It is to be noted that, between the water-supplying port 28 and the wall surface 18a, a rubber pipe 29 for water-leak prevention is inserted, and at the stagnant portion 18 through which the rinsing hose 240 penetrates, a pipe 242 for water-leak prevention is also inserted, thereby preventing water from being leaked to the outside.

[0031] In a portion where trap water is stored at the stagnant portion 18, breaking means 40 of the excrement and others is provided. The breaking means 40 cuts out and breaks the excrement, toilet paper, etc. (hereinafter referred to as "excrement and others") which are collected inside the stagnant portion 18, and reduces their solids so that they become smaller as far as they possibly can do, to make them into liquid mixture, if possible, and thus, the broken excrement and others pass a space between the breaking means 40 and the bottom wall of the stagnant portion 18, are mixed with trap water, and are drained. To cut out and break not only the excrement but also others (toilet paper, tissue paper including water soluble one, sanitary items, etc.), which are fallen into the stagnant portion 18, into appropriate sizes, a cutter mechanism (breaking mechanism unit) is adopted for the breaking means 40.

[0032] Consequently, this breaking means 40 is constituted of a breaking mechanism unit 40A and its drive means 40B (see Fig. 3). The breaking mechanism unit 40A is composed of multiple cutter members 41 (41A, 41B, ...) as shown in Fig. 2. As shown in Fig. 3 and Fig. 4, the cutter member 41 is configured so that a plurality of cutter blades 43 (43A, 43B, 43C, ...) is arranged with predetermined intervals ΔL maintained with respect to the axial direction (longitudinal direction) of a rotary shaft 42.

[0033] The cutter blade 43 forms a disk shape as shown in Fig. 4 and has multiple blades 47 (47a, 47b, ...) each forming wedge shapes with them keeping their predetermined intervals along the circumferential direction. For the head end part of blades 47a, 47b, ..., steel is used for this embodiment, but the whole thereof may be made of stainless steel.

[0034] To each of the cutter blades 43, multiple through holes 48 are provided with predetermined intervals maintained along the circumferential direction on the inner side of the blades 47. Because by these through holes 48, broken liquid mixture including trap water is allowed to be circulated between both right and left sides of the cutter blades 43, the excrement and others can be smoothly drained.

[0035] Thus, the cutter members 41 configured with multiple cutter blades 43 are arranged in rows and placed side by side as shown in Fig. 2. The number of rows is determined by the size of the internal space in the stagnant portion 18 and the outside diameter of each of the

cutter blades 43 is determined by the depth of the stagnant portion 18, etc. In the embodiment of Fig. 2, the breaking mechanism unit 40A is configured by placing four rows of cutter members 41 side by side.

[0036] In a case where the cutter members 41 are arranged in rows, the cutter blades 43, 43 of adjacent cutter members 41, 41 are arranged in a staggered manner so as to meshed with (to rub on) each other with a small clearance on their side surfaces in order to achieve easy cut-out even though ductile material is used. If the small clearance is provided to the extent such that cutter blades rub on each other, it is preferable to provide a clearance of about 0.05 mm. The meshing-depth of cutter blades 43 which alternately mesh with each other is optional but in order to realize efficient cut-outand breaking, they are arranged to mesh with each other with an appropriate depth. For example, they are arranged in such a manner that the meshing-depth becomes 1/3 to 1/2 of the length of the blade 47(in a radial direction).

[0037] Rotary shafts 42 provided to the multiple cutter members 41A through 41D are guided out to the outside via bearing units 42a, 42b provided in the side wall of the stagnant portion 18 as shown in Fig. 3. The bearing units 42a, 42b should have any measures to prevent water from being leaked therefrom.

[0038] To the rotary shaft 42 on a side of the bearing unit 42b, a drive means 40B as shown in Fig. 3 is provided. The drive means 40B is composed of a rotation transmission means 44 provided to this rotary shaft 42 and a driving motor 46. The driving motor 46 is fixed to a bottom plate 20c of the body 20 of the toilet device and the rotary force of the motor shaft 46a is transmitted to the multiple cutter members 41 via the rotation transmission means 44. The rotation transmission means 44 is arranged in such a manner that gears 44A through 44D provided to relevant rotary shafts of the cutter members 41A through 41D are engaged with each other as shown in Fig. 5 and at the same time, a gear 44E related to the driving motor 46 is engaged with, particularly, an intermediate gear, the gear 44B in this example.

[0039] Configuring the rotation transmission means 44 in this way allows other gears 44A through 44D to rotate along the arrows, respectively, when the gear 44E rotates clockwise as shown by the arrow. That is, the cutter member 41A and 41B function as a pair of cutter mechanism and contrarotate in a direction to crunch (in a direction to break in) things. Similarly, other cutter members 41C and 41D function as a pair of cutter mechanism and contrarotate in a direction to crunch things.

[0040] In addition, the cutter blades 43 are allowed to mesh with each other with a small clearance provided and the multiple blades 47 are provided to each of the cutter blades 43 of the cutter member 41, so that the breaking mechanism unit 40A functions as a crosscut mechanism unit. When the cutter member 41 is driven to rotate, the excrement and others are cut out and broken while being jammed into inner portion between the cutter blades 43, thereby enabling the excrement and others to be extremely finely cut out and finely broken. As a result thereof, tissue paper, etc. tossed into the stagnant portion 18 can be finely cut out (cross-cut), of course, to say nothing of the toilet paper tossed thereinto.

[0041] In addition to this, since the breaking means 40, in particular, the breaking mechanism unit 40A, is immersed into trap water, the breaking mechanism unit 40A is driven in water. As a result thereof, the trap water is infiltrated into the excrement and others, and the excrement and others are broken with trap water being infiltrated thereinto, so that it becomes much easier to break the excrement and others. Even sanitary items and the like, if they are water-soluble, can be relatively easily cut out when they are cut out by using any actions by this infiltrating water.

[0042] As shown in Fig. 1, on the inside (upper side) of the bottom plate 20c, a control unit 50 including a CPU, etc. is disposed. Each driving of the electromagnetic valve 24 for drain, the electromagnetic valves 32 and 33 for water-supply, the motor 46, etc. as described above is controlled at a predetermined timing merely for a predetermined period of time by the control unit 50. A power switch 52 for the control unit 50 is provided on the rear 20b of the body of the toilet device and on the top part of the body of the toilet device and under the toilet seat lid 23, an open/close switch 55 (which will described later) is provided.

[0043] In the simplified Western-style toilet 10 shown in Fig. 1, the following mechanisms are further adopted. As shown in Fig. 1, at a predetermined position that is located on the stagnant portion 18 in the body 20 of the toilet device and under the water-supply port 28, a comminuted substance pressure-feeding means 200 is provided to feed specified compressed air to the stagnant portion 18. To a side that is above the stagnant portion 18 and that is slightly above the mounting position of the pressure-feeding means 200, a reducing size portion 230 is provided. On the bottom surface of the reducing size portion 230, a lid open/close mechanism 210 is provided in order to block this reducing size portion 230 and hermetically seal the stagnant portion 18.

[0044] The pressure-feeding means 200 may be configured by an air compressor, and a feeding pipe 204 for this air compressor 200 is guided to a side of the stagnant portion 18 via a mounting means 206. The mounting means 206 is provided on the place above a water surface of trap water in the stagnant portion 18. The air compressor 200 is fixed on a mounting plate 202 provided in the rear space 20a of the body 20 of the toilet device.

[0045] Even in any mechanism in which compressed air is taken from the outside of the body of the simplified Western-style toilet without the body 20 of the toilet device is equipped with the air compressor 200, the similar effects can be expected.

[0046] The reducing size portion 230 is configured as an annular flange unit, and is protruded by a predetermined length towards an inner of the stagnant portion 18. The feeding pipe 204 described above is located be-

tween the trap water of the stagnant portion 18 and the reducing size portion 230.

[0047] As it can be clear from Figure 1, the reducing size portion 230 is provided so that its entirety is tilted slightly toward a side of the S-bent trap unit 22. On the bottom side of the reducing size portion 230, the lid open/close mechanism 210 is provided that blocks this reducing size portion 230. As the lid open/close mechanism 210, a swing type and a slide type can be considered. Fig. 1 shows a swing-type example.

[0048] In this embodiment, because the lid open/close mechanism is a swing type, the mechanism 210 for opening/closing the lid has a lid body 212, and one end of this lid body 212, the right end part in the illustrated embodiment, is made into a swing shaft part 214, and this swing shaft part 214 is rotatably pivoted with respect to the body 20 of the toilet device so that the swing shaft part 214 is located on the bottom part 232 of the reducing size portion 230. This pivot portion is water-tightly pivoted with respect to the body 20 of the toilet device.

[0049] The lid body 212 is urged to obtain a state in which the circumferential surface thereof comes into contact with the bottom edge part 234 of the reducing size portion 230. The lid body 212 has a shape that fits in the bottom edge part 234 and at the same time, a sprig 216 for urging is wound around between the swing shaft part 214 and a wall surface of the bottom part 232 so that the lid body 212 generally comes into contact with this bottom edge part 234 and hermetically seals the stagnant portion 18. Consequently, the breaking means 40 is shielded by the lid body 212, and any feeling of being in danger due to disposition of the breaking means 40 thus positioned can be suppressed.

[0050] Now, since the reducing size portion 230 is provided as to be slightly tilted towards the side of the S-bent trap unit 22, as described above, the lid body 212 itself constituting the lid open/close mechanism 210 is also mounted as to be tilted to the side of the S-bent trap unit 22. As shown in Fig. 6, by mounting the lid body 212 as to be tilted, the excrement and others (illustrated by a broken line), which have fallen onto the top of the lid body 212, can be completely dropped down into the stagnant portion 18.

[0051] The rinsing hose 240 described above is fixed so that its head end can be positioned inside the stagnant portion 18 with it having an angle at which the rinsing water is injected to both of the rear side of the lid body 212 and a part of the circumferential surface of the stagnant portion 18. In this embodiment, as shown in Fig. 1, it is mounted in a liquid-tight manner and fixed to a position near and under the swing shaft part 214 of the lid body 212.

[0052] To the body 20 of the toilet device thus configured, the water-supply hose 12 and drain hose 14 are coupled, which are guided to the existing toilet 3.

[0053] FIG. 7 shows an outline of the existing toilet 3. FIG. 7 illustrates an existing toilet device 4 that is equipped with a warm-water washing toilet seat 80. In this embodiment, a diverging pipe 84 is connected to a water pipe (water supply pipe) 82 and a first diverging port 86 is provided to the diverging pipe 84 at a side of the water pipe 82, and is connected with a hose 87 for the warm-water washing toilet seat. A second diverging port 88 is provided thereto nearer the end thereof than the first diverging port, and is connected with a hose 89 for the rinse water.

[0054] In this embodiment, the diverging pipe 84 having such the diverging configuration is used; a check valve 90 is arranged between the first and second diverging ports 86, 88; and a connection portion 92 for connecting the water-supplying hose 12 is provided at a tail end of the diverging pipe 84. The connection portion 60A provided at a tip end of the water-supplying hose 12 is connected to this connection portion 92. The check valve 90 is roughly illustrated in the drawing so that its function can be understood.

[0055] Thus, arranging the new diverging pipe 84 and attaching the water-supplying hose 12 thereto enables the rinse water to be supplied to the simplified Western-style toilet 10. It is because if an error such that water from the hose 89 and the water-supplying hose 12 flows backward should happen, the water to be supplied to a side of the warm-water washing toilet seat is prevented from being mixed with the water flown backward, to arrange the check valve 90 between the first and second diverging ports 86, 88.

[0056] A tank 96 filled with a sterilizing solution is further inserted to a connection portion for the sterilizing solution at the tail end portion of the diverging pipe 84. Using the sterilizing solution enables any sanitary conditions in not only the existing toilet 3 but also the simplified Western-style toilet 10 to be improved. The drain hose 14 may be also washed at the same time. It is to be noted that the tank 96 has not always to be provided but may be suitably provided at need.

[0057] Thus, applying any water-supply system of the existing toilet allows the simplified Western-style toilet 10 to be utilized merely by a simple increase in facilities relative to the diverging pipe 84.

[0058] The drain hose 14 may be arranged as to drain the waste water and the like directly to the drain pipe, for example, the drain pipe in the existing toilet 3 but, in a simple case, the drain hose 14 extends to the toilet device 4 and the waste water and the like pour directly into the toilet device 4. Alternatively, a drain outlet for drain is provided in the toilet device 4 and the drain hose 14 is connected to it so that the waste water and the like can pour into the toilet device 4 therethrough.

[0059] An embodiment shown in FIG. 8 is an embodiment in which it is connected to a connection portion 114 provided in the toilet device 4. In this moment, this is accomplished by reforming a body 108 of the toilet device. As shown in Fig. 8, to the body 108 of the toilet device, a drain pipe 110 is included, but a drain guide port 112 is located in the body 108 of the toilet device and above the stagnant portion and to the connection

part 114 provided on its rear side, the connection portion 62B of the drain hose 14 is coupled.

[0060] In the event that the existing toilet device 4 is thus improved, if there is any level difference between the simplified Western-style toilet 10 and this existing toilet device4 and the toilet device 4 is located at a higher position, there is a fear that the fluid mixture may be accumulated within the drain hose 14. Consequently, pressure of the above-mentioned air compressor 200 is adjusted in such a manner that the liquid mixture can be completely discharged from the drain hose 14.

[0061] Although it is not illustrated, it is able to configure in such a manner that a blocking lid that blocks the top of the stagnant portion including the drain guide port 112 is provided and is closed in relation to drain processing of the simplified Western-style toilet 10. In such event, it is preferable to adopt motorized operation for closing this blocking lid.

[0062] When the water-supply and the drain is thus performed by utilizing the existing toilet 3, water-supplying hose and drain hose shown in FIG. 9 and follows are used. FIG. 9 shows an example of the water-supplying hose 12 and FIG. 10 shows an example of the drain hose 14. When an end 12a of the water-supplying hose 12 is an end that is connected to a side of a water supply pipe and the other end 12b thereof is an end that is connected to the simplified Western-style toilet 10, the end 12a and the other end 12b are respectively provided with connection portions 60A, 60B, each of which has a check valve.

[0063] Similarly, of the drain hose 14, an end 14a and the other end 14b are respectively provided with connection portions 62A, 62B, each of which has a check valve. In this moment, the end 14a is an end that is connected to a side of the simplified Western-style toilet 10, but the other end 14b is an end that is connected to a side of the drain pipe or the like.

[0064] Since the water-supplying hose 12 is used for rinse water supplied to the body 20 of the toilet device, a vinyl hose having a small diameter or the like may be used. On the other hands, since the drain hose 14 enables any liquid mixture formed by breaking the excrement and the like to be flown therein, a vinyl hose or the like having a diameter equal to or a slightly larger diameter than that of the water-supplying hose 12 may be used. This is because liquid mixture with the rinse water, not solidified excrement, is treated. FIG. 10 shows a case where the vinyl hose 14 having a larger diameter than that of the water-supplying hose 12 is used.

[0065] If diameters of the water-supplying hose 12 and the drain hose 14 are so selected as to be become the diameters described above, rudimentary mistake in connection manipulation such that the water-supplying hose 12 is used as a drain hose or the drain hose 14 is accidentally connected as a water-supplying hose may be certainly prevented because of difference in their diameters. Of course, not only in a case where hoses having different diameters are used but also in a case where hoses having same diameter are used, as shown in FIGS. 9 and 10, any marked names such as "Water-supplying Hose" and "Drain Hose" are stamped on a surface of each of the hoses, so that any accidental connection may be certainly prevented. Anti-standardization for shapes or forms of metal connection fittings in the connection portions enables any accidental connection to be prevented. The water-supplying hose 12 and the drain hose 14 are colored with different colors so that such the difference in colors enables any accidental connection to be also prevented.

[0066] The connection portions 60 (62), each of which has a check valve, form a hollow valve operation room 64 with a rectangular profile inside a body 63, as shown in FIG. 11, and a ball member 65 acting as valve action and a push spring 66 urging against it are provided in the room, thereby enabling the valve to be opened by an action of water pressure in a direction of an arrow "a". This prevents backflows from both of the sides of the simplified Western-style toilet and the water supply pipe.

[0067] On the other hands, when the other connection portions 60B (62B) of the connection portions 60 (62) are connected to a side of the simplified Western-style toilet and a side of drain pipe of the existing toilet device, their internal valves are opened to become any communicate condition in a case where the connection portions 60 (62) are connected if projection members, not shown, each retreating the ball member 65 of the check valve against the push spring 66, are respectively provided in the side of the simplified Western-style toilet and the side of the drain pipe, or when they are not connected, their internal valves are closed to prevent liquid in each of the hoses from being leaked to outside.

[0068] Therefore, even if the connection portion 60A is detached while the connection portion 60A of the water-supplying hose 12 is connected to the water supply pipe and the connection portion 60B thereof is connected to the side of the body 20 of the toilet device, any liquid in the hose is not leaked; and even if the other connection portion 60B is detached, any liquid in the hose is not leaked. Similarly, even if the used drain hose 14 is detached, any waste liquid in the hose is not leaked to outside.

[0069] Fig. 12 shows a control example in the control unit 50 provided to the simplified Western-style toilet 10. To the above-mentioned body 20 of the toilet device, the power switch 52 and the open/close switch 55 are provided, and their ON/OFF signals are supplied to the control unit 50.

[0070] The power switch 52 is turned ON when the simplified Western-style toilet 10 is provided. To the contrary, the open/close switch 55 is a switch to be turned ON or OFF in relation to opening or closing operation of the toilet seat lid 23 to close the upper portion of the toilet seat 21. Consequently, as shown in Fig. 1, in this embodiment, the open/close switch 55 (open/close detection sensor switch, etc.) is mounted to the undersurface of the toilet seat lid 23 in such a manner that it faces the toilet seat lid 23. In the embodiment of Fig. 1, a drain

switch 244 is further provided on the upper surface of a rear side of the body 20 of the toilet device.

[0071] Each driving condition of the electromagnetic valve 24 for drain, the electromagnetic valve 32 for water-supply, the electromagnetic valve 33 for washing, the driving motor 46 for breaking, and the air compressor 200, which have been described above, is controlled by the control signals from the control unit 50 composed by CPU.

[0072] FIGS. 13A through 13E respectively show an example of control timings. It is supposed that in a case of the simplified Western-style toilet 10, the lid body 212 that is a lid for open and closure is closed when the toilet is not used.

[0073] The simplified Western-style toilet 10 is used after the toilet seat lid 23 has been opened. The open manipulation of the toilet seat lid 23 is detected by the open/close detection switch 55 (FIG. 13A). Bowel movement is carried out while the toilet seat lid 23 is opened. When the excrement and others drop down onto the lid body 212, the lid body 212 is opened by their own weight and the excrement and others are dropped into the trap water in the stagnant portion 18 (see FIG. 6). When the excrement is dropped, the lid body 212 is automatically closed. This is because the lid body 212 is always urged toward a side of the reducing size portion 230.

[0074] After the bowel movement has been finished, the toilet seat lid 23 is closed (FIG. 13A). If it is determined that the lid is closed, any excrement is broken (or cut out) into fragments for a period of time Ta (FIG. 13B). It is to be noted that instead of the detection for the closure operation of the toilet seat lid 23, a start switch corresponding to the open/close switch 55 may be operated by any manual operation to start such the breaking operation. The period of time Ta for breaking operation is set to a period of time when the excrement, toilet paper, tissue paper and the like may be suitably broken into fragments. It is normally set to a period of time of 20 seconds or less, preferably about 5 through 10. This is because they are suitably cut out and broken to avoid any solids or the like remaining.

[0075] When the breaking operation has been finished, an air compressor 200 is driven to send compressed air into an interior of the stagnant portion 18 which is then pressed (FIG. 13E). A period of time Tb for pressing process is set to a period of time when internal pressure in the stagnant portion 18 is increased up to a predetermined value (for example, 2 atmospheric pressures). The predetermined value of the internal pressure means a pressure such that the liquid mixture is certainly sent by compression and drained to the existing toilet device 4 through the drain hose 14. A period of time Tb when the internal pressure in the stagnant portion 18 is increased to a predetermined value thereof is set in advance and this period of time Tb is counted.

[0076] When the period of time Tb has been elapsed, the electromagnetic valve 24 for drain is driven while the air compressor 200 is driven, namely, the compressed air is sent to the interior of the stagnant portion 18 (FIG. 13D). When the electromagnetic valve 24 for drain is driven to open the drain opening 27, the excrement and others (liquid mixture) in the stagnant portion 18 are sent together with the trap water at once by the compressed air toward a side of the drain hose 14. Since the drain hose 14 is connected with the existing toilet device 4, the excrement and others cut out and broken into fragments by the breaking means 40 is drained to a side of the existing toilet device 4.

[0077] A period of time Tc for sending-by-compression is normally set to a period of relatively longer time, for example, about 10 through 30 seconds, in order to prevent the excrement and others from being remained in the drain hose 14, though there may be a difference in a set length of the drain hose 14.

[0078] When the period of time Tc has been elapsed, the electromagnetic valve 24 for drain is turned off and driving of the air compressor stops (FIGS. 13D, 13E). This enables the drain opening 27 to be closed. The electromagnetic valve 32 for water-supply is then activated to start the water supply to the stagnant portion 18 (FIG. 13C). A period of time Td for water-supply is set to a period of water supply time when the trap water in the stagnant portion 18 reaches a predetermined amount. It is to be noted that the predetermined amount means water supplies up to an amount where a surface of the trap water exceeds a bent portion of the S-bent trap portion 22. When the water supply to the stagnant portion 18 has been completed, its standby condition therefor occurs.

[0079] It is to be noted that, in this embodiment, an electromagnetic valve 33 for washing is also driven with synchronization with the operation of the electromagnetic valve 32 for water-supply, as shown in FIG. 13C. If the electromagnetic valve 33 operates, water is supplied into the stagnant portion 18 through the rinsing hose 240; the water is concretely jet toward a rear surface of the lid body 212 and a wall surface of the stagnant portion 18. Since, by means of this jet by the rinse water, the rear surface of the lid body 212 and the wall surface of the stagnant portion 18 are rinsed, the lid body 212 and the interior of the stagnant portion 18 can be always kept clean.

[0080] Such the rinsing process may be performed before the water supply to the stagnant portion 18, namely, after the excrement and others have been sent by compression and drained, not simultaneous execution of the water supply to the stagnant portion 18 and the rinsing of the lid body 212 and the like, to send and/or drain the rinse water therefor at the same time. In this moment, the water supply to the stagnant portion 18 is then performed after the electromagnetic valve 24 has been closed.

[0081] If the portable simplified Western-style toilet 10 is moved or removed, it is preferable to drain the trap water from the stagnant portion 18. Such the drain processing is separately performed from the above-mentioned drain process. In this case, as shown in FIGS. 14A

through 14C, the drain switch 244 is turned on, and the air compressor 200 is then activated (FIGS. 14A, 14B). The start of the air compressor 200 enables the interior of the stagnant portion 18 to be pressed (FIG. 14C). After the press process over a period of time Tf has been finished, the electromagnetic valve 24 for drain is driven so that the drain opening can be opened for a predetermined period of time Tg (FIG. 13B).

[0082] This sending-by-compression enables the trap water to be drained from the stagnant portion 18. The electromagnetic valve 24 for drain is closed with a small amount of delay (ΔTf) starting from when the driving of the air compressor 200 stops. This causes any drain processing of the trap water to be completed. It is to be noted that period of time Tb and the period of time Tg may be set to the period of time Tc.

[0083] FIGS. 7 and 8 show the embodiment in which the connection part 114 is provided at the existing toilet device 4 and to which the drain hose 14 is coupled, but as the simplest embodiment, the drain hose 14 itself is allowed to pass under the bottom surface of the toilet seat 118 as shown in Fig. 15 and guided to the body 108 of the toilet device. In such event, the tip end of the drain hose 14 is expanded in width as shown in Fig. 15 to alleviate the drain pressure thereof.

(Embodiment 2)

[0084] Fig. 17 shows another combination example of cutter members 41. Fig. 2 shows an example in which substantially straight type cutter members 41 are used for all four breaking mechanisms. The substantially straight type referred to here is a generic term that designates the case in which the sizes (outside diameter) of the cutter blades 43 that constitute the cutter members 41 are composed of the same ones.

[0085] Fig. 17 shows the case in which the breaking mechanism 40A is configured by use of the substantially straight type cutter members and so-called substantially bobbin type cutter members. In this event, the substantially bobbin type is a generic term that designates the case in which the sizes (outside diameter) of the cutter blades 43 that constitutes the cutter members 41 have a larger diameter on both end sides of the cutter member 41, which varies along the longitudinal direction (rotating axis direction) from the both end sides thereof toward the center part of the cutter member 41 as to be reduced gradually.

[0086] In the embodiment of Fig. 17, the first and the third cutter members 41A and 41C are substantially straight type ones and the second and the fourth cutter members 41B and 41D are of the substantially bobbin type ones. In such case, too, the length of the fourth cutter member 41D is shorter than others in order to fit in the shape of the stagnant portion 18. In addition, needless to say, the adjacent cutter members 41 are arranged in such a manner that respective cutter blades 43 are meshed with each other.

[0087] By using the cutter members 41 with different shapes in this way, the degree of meshing of cutter blades 43 varies along the longitudinal direction thereof. In this embodiment, the meshing is shallow at the center part thereof and becomes gradually deeper as it goes toward both ends. Consequently, nearly at the center part of the portion where the cutter members 41 having a substantially bobbin type shape mesh with the straight type cutter member 41, a recessed portion deeper than that in the case of embodiment 1 in which cutter members 41 having straight type shape mesh with each other is formed, thereby enabling cutting and breaking processing to be efficiently performed.

(Embodiment 3)

[0088] Fig. 18A and Fig. 18B are examples of the breaking mechanism unit 40A which adopts another combination example of the cutter members 41. In this embodiment, as shown in Fig. 18A, substantially bobbin shape cutter members are used for all the four cutter members 41. In order to clarify the meshing condition, in Fig. 18A, odd-numbered cutter members 41B and 41D are shown by broken lines.

[0089] In this case, too, the meshing condition of the cutter member 41 is shallowest at the center, and deepest at both edges. Consequently, a recessed portion 900 (see Fig. 18B) deeper than that in the case shown in Embodiments 1 and 2 is formed nearly at the center of the portion where cutter members 41 having a substantially bobbin shape mesh with each other, and at the same time, a tooth tip contour of each of the cutter members 41 having a substantially bobbin shape forms a curved shape from both edge sides thereof to the center part thereof as a whole. Consequently, the excrement and others are easy to be collected at the recessed portion 900 so that the excrement and others can be effectively cut and broken.

(Embodiment 4)

[0090] Fig. 19 is a modified embodiment of a location of the breaking means 40. In the case of Fig. 1, the breaking means has been provided to the stagnant portion 18 and the multiple cutter members 41 are placed side by side in the transverse direction.

[0091] The embodiment of Fig. 19 shows a case in which the breaking means 40 is provided in the vicinity of an opening (coupling portion) of the S-bent trap unit 22 that is communicated to the stagnant portion 18. In this case, the breaking mean 40 is placed parallel to the vertical direction. The number of rows of the cutter members 41 which constitutes the breaking mechanism unit 40A, the shape of each of the cutter members 41 (outer diameter of the cutter blade 43), the numbers of cutter blades 43, and the like vary depending on a diameter and an area of the opening 22a.

[0092] In the present embodiment, a case in which the

breaking mechanism unit 40A is composed by using two pieces (one pair) of substantially straight type cutter members 41 will be described. The cutter member 41 has a length of less than about one half that in the case of Fig. 2. Disposing drive means 40B for the breaking mechanism unit 40A to outside of the body 20 of the toilet device is the same as in the case of Fig. 3.

[0093] Because, even if disposing the breaking mans 40 to the opening 22a of the S-bent trap unit 22 in this way, excrement and others can be cut and broken in the same manner as in the case of Fig. 1, the sewer pipe, etc. are free from clogging by the excrement and others. By the way, in this case, as the breaking means 40, the one smaller than that in the case of Fig. 1 must be used, a period of the breaking processing time Ta is set as to be longer (about twofold) than that in the case of Fig. 1. It is to be noted that this breaking processing may be conducted simultaneously with draining of the excrement and others and trap processing of the trap water.

(Embodiment 5)

[0094] Fig. 20 shows another embodiment of the breaking means 40. This embodiment is a case in which pairs of guide members 70 (70A, 70B) and cutter members 41 (41A, 41B) constitute the breaking mechanical unit 40A. It is the case in which the breaking means 40 is provided in the stagnant portion 18.

[0095] As shown in Fig. 21, too, the pair of guide members 70A, 70B are oppositely disposed with a predetermined clearance maintained in such a manner that they face each other, and a pair of cutter members 41A and 41B are rotatably disposed between them.

[0096] One guide member 70A are composed by arranging multiple guide plates 48 (48a, 48b, ...) with a predetermined clearance (pitch) maintained in the longitudinal direction thereof (i. e., a direction of a rotary shaft of the cutter member 41) as shown in Fig. 22. They are mutually fixed by fixing guide shafts 45a shown in Fig. 21.

[0097] The other guide member 70B, which is contrast to this guide member 70A, has multiple guide plates 49 (49a, 49b, ...) in the same manner and they are arranged at a predetermined pitch, and are mutually fixed by fixing guide shafts 45b. The guide plates 49 are arranged with half a pitch deviated from the guide plates 48 of one guide member 70A. In addition, the guide plates 48, 49 have their tops formed into tapers 51a, 51b in such a manner as to be directed inwards as shown in Fig. 21. For a pair of the cutter members 41A, 41B, substantially straight type cutter members are used.

[0098] The rotary shaft 42a of one cutter member 41A is, at its both edges, pivoted by the both end guide plates 48a, 48n in the one guide member 70A. Consequently, the portions which correspond to the rotary shaft 42a, of multiple guide plates existing in the both end guide plates 48a and 48b have holes each having a diameter that do not interfere with the rotation of the rotary shaft 42a in this embodiment. A part of the rotary shaft 42a may be cut away. Multiple cutter blades 43 that constitute the cutter member 41A are allowed to regulate their arrangement pitches in such a manner that they are fitted within the clearances between the guide plates 48 (48a, 48b, 48c, ..., 48n) with a small clearance provided.

[0099] In the similar manner, in the other cutter member 41B, the rotary shaft 42b is pivoted by both end guide plates 49a, 49n, which constitute the other guide member 70B, and the multiple cutter blades 43 are allowed to regulate their arrangement pitches in such a manner that they are fitted within the clearances between the guide plates 49 with a small clearance provided.

[0100] The cutter blade 43 of one cutter member 41A and the cutter blade 43 of the other cutter member 41B are arranged so that their parts overlap with each other, as shown in FIG. 21. For a shape of the blade (an edge of the blade) of the cutter blade 43, saw-teeth as shown in Fig. 21 are illustrated but the present invention is not limited thereto.

[0101] Even when the breaking mechanism unit 40a is configured in this way, a small clearance is formed between each of the guide plates 48 and each of the cutter blades 43 (also, between each of the guide plates 49 and each of the cutter blades 43) and furthermore, the cutter members 41A, 41B are arranged to partly overlap with each other so that a small clearance is formed between the side surfaces, respectively, of the overlapping cutter blades 43, 43, thereby enabling the excrement and others to be finely cut (cross-cut) so that they can be broken into liquid mixture by rotating the pair of cutter members 41A, 41B in a direction to mesh with each other.

[0102] Because in the guide plates 48, 49 facing each other, tapers 51a, 51b are formed in such a manner that things fall in towards the cutter members 41A, 41B, the excrement and others fallen into the stagnant portion 18 are easy to collect at a center part thereof. This enables the excrement and others to be effectively cut and broken.

(Embodiment 6)

[0103] The embodiments described have been cases in which the present invention is applied to any portable type simplified Western-style toilets. The following will describe a case in which the present invention is applied to any fixed type Western-style toilets.

[0104] In this case, the above-mentioned breaking means 40 is also disposed in the stagnant portion 18. Fig. 23 shows the case in which the breaking means 40 that is provided with the breaking mechanism unit 40A described in the Embodiment 1 is applied thereto.

[0105] To an upper part of the stagnant portion 180, a blocking lid 250 which blocks a part of the stagnant portion 180 is provided. A center part of the blocking lid 250 is made into a predetermined opening 250a, and other end of the blocking lid 250 has a flange unit 255 so that it can be mounted to the inner circumferential wall 108a of the body 108 of the toilet device on its both of upper

and lower sides of the end surfaces thereof.

[0106] By affixing this flange unit 255 to the inner circumferential wall 108a by use of adhesives, etc., the blocking lid 250 can be mounted (fixed) to the body 108 of the toilet device. By locating the opening 250a nearly at the center of the blocking lid 250, the excrement and others can be fallen into the stagnant portion 180 without allowing them to come into contact with the blocking lid 250.

[0107] The blocking lid 250 is removably provided to the inner circumferential wall 108a. This allows the blocking lid 250 to be removed to clean it periodically, so that it can be hygienic.

[0108] On the top of the body 108 of the toilet device, a control unit 300 containing a CPU is mounted. By this control unit 300, any controls, etc. for the breaking means 40 are executed. Fig. 24 shows one example of a control circuit system in which ON-OFF signals of the power switch 225 and the open/close switch 226 (see Fig. 24) are supplied to the control unit 300. In the control unit 300, controls of an electromagnetic solenoid 117 and an electromagnetic valve 113 in addition to a driving motor for breaking are carried out.

[0109] Fig. 26 shows a control timing example, and the blocking lid 250 is controlled to be normally closed. As the toilet seat lid 230 opens and loses, the open/close switch 226 is activated (turns ON and OFF) (Fig. 25A and Fig. 25B). While the toilet seat lid 230 is open, the evacuation is carried out, and the toilet seat lid 230 is then closed. When it is detected that the toilet seat lid 230 is closed, the blocking lid 250 is closed (Fig. 25C). When this lid closure is detected, the driving motor 46 is energized and breaking processing starts (Fig. 25D). The breaking processing referred to here is a cutting and breaking processing similar to the above cases.

[0110] When breaking processing for a period of predetermined time is finished, an electromagnetic valve 113 is opened and rinsing processing for the blocking lid 250 takes place (Fig. 25E). Upon completion of the rinsing processing, the blocking lid 250 is opened (Fig. 25C). Thereafter, the existing operation button (not illustrated) provided to the Western-style toilet is operated and the excrement and others are drained (including trap processing of trap water) (Fig. 25F).

[0111] Thus, even when the present invention is applied to the fixed type existing Western-style toilets, the excrement and others including toilet paper, tissue paper, used sanitary items, etc. as described above can be cut and broken and then, drained, and thereby clogging of the sewer pipe or the like can be completely eliminated.

(Embodiment 7)

[0112] Fig. 26 shows another embodiment of a fixed type Western-style toilet to which the present invention is applied. In the embodiment shown in Fig. 26, a swing type open/close lid mechanism 260 is adopted in place of the blocking lid 250. In this embodiment, a reducing size portion 270 is provided at an upper side of the stagnant portion 180, and to the lower surface of the reducing size portion 270, the open/close lid mechanism 260 is provided so that this reducing size portion 270 is blocked and the stagnant portion 180 is hermetically sealed.

[0113] The reducing size portion 270 is configured as an annular flange unit and protrudes towards the inner surface of the stagnant portion 180 by a predetermined length. As it is clear from Fig. 26, the reducing size portion 270 is provided so that its entirety can be slightly tilted toward a side of the drain unit 182. On a side of lower surface of the reducing size portion 270, the open/close lid mechanism 260 that can block this reducing size portion 270 is provided.

[0114] The open/close lid mechanism 260 is of a swing type and has a lid body 262 which constitutes the open/close lid mechanism 260, and one end of this lid body 262, in the example of the drawing, the right end part is made into a rotating shaft unit 264, and this rotating shaft unit 264 is swingably pivoted with respect to the body 108 of the toilet device so that the rotating shaft unit 264 is located on a lower surface part 272 of the reducing size portion 270. This pivot unit is water-tightly pivoted to the body 108 of the toilet device.

[0115] The lid body 262 is urged to bring its circumferential surface in contact with an edge part 274 of the lower surface of the reducing size portion 270. The lid body 262 is formed to have a shape that conforms to the edge part 274 and, at the same time, an urging spring 276 is wound around between the rotating shaft unit 264 and the wall surface of the underside part 272 so that the lid body normally comes into contact with the edge part 274 to seal the stagnant portion 180 hermetically.

[0116] If a fixed type Western-style toilet is configured in this way, when excrement falls onto the lid body 262, a side of the forward end of the lid body 262 opens by its own weight, and the excrement falls into the trap water of the stagnant portion 180. When the excrement falls, the lid body 262 automatically returns to its original position by any action of the spring and blocks the upper part of the stagnant portion 180.

[0117] When the rinsing operation button (flush valve operation button) 280 is operated, rinse water flows into the stagnant portion 180 via the upper surface of the lid body 262 while running around the inner circumferential surface 108a of the body 108 of the toilet device. Because the operation condition of the rinsing button 280 is controlled by the control unit 30, when this rinsing processing is carried out, the breaking means 40 is simultaneously driven, and the excrement which has fallen into the breaking means 40 and toilet paper, etc. which has flowed in together with rinse water are broken (cut and crushed). Because any sanitary items, etc. flow into the stagnant portion 180 together with rinse water, driving the breaking means 40 for a predetermined time period in relation to the rinsing processing can cut and crush them to drain them.

[0118] By the way, in Fig. 26, an embodiment in which

the lid body 262 is held substantially horizontal in the closed state is shown, but because the reducing size portion 270 is provided to be slightly tilted to the side of the drain unit 182 as described above, mounting the lid body 262 itself which constitutes the open/close lid mechanism 260 tilted to the side of the drain unit 182 enables all the excrement and others, which have fallen onto the upper surface of the lid body 262, to be completely fallen into the stagnant portion 180.

[0119] It is to be noted that a case to dispose valve unit members (electromagnetic valve, etc.), which can be remotely controlled by the control unit 300, in place of the flush valve 280 in the route of a feed-water pipe, not shown, provided between the rinse water tank 5 and the body 108 of the toilet device can be considered. In such event, as is the case of other embodiments, the driving-start time of the breaking means 40 and the rinse water supply time may vary appropriately. This enables the breaking means 40 to operate for a period of predetermined time and then rinse water to be supplied after breaking processing has been completed.

[0120] In addition, in the present embodiment, too, it is needless to say that to the breaking mechanism unit 40A, various kinds of breaking mechanisms shown in other examples can be applied. The same thing can be applied to the open/close lid mechanism 260, too. In short, when the present invention is applied to the fixed type Western-style toilets, by disposing at least one set of above-mentioned cutter members 41 to the stagnant portion 180 of the body 108 of the toilet device, breaking processing of the excrement such as stools, toilet paper, used sanitary items, etc. which accumulate in the stagnant portion 180 can be carried out. In addition, by equipping the open/close lid mechanism 260 to the upper part of the stagnant portion 180, any feeling of being in danger due to disposing of the cutter members 41 at the stagnant portion 180 and to which the user of the present Western-style toilet device is susceptible can be eased.

[0121] By the way, it is needless to describe in detail that various breaking means 40 shown in Embodiments 2 through 5 can be applied to the fixed type Western-style toilets shown in Embodiments 6 and 7.

INDUSTRIAL APPLICABILITY

[0122] The present invention can be used for existing Western-style toilets and simplified Western-style toilets as a nursing-care supporting device for nursing and personal care facilities and at-home nursing care, etc.

Claims

1. A toilet device, **characterized in that** the toilet device comprises:

   a body of the toilet device having a stagnant portion at the bottom thereof ; and

   a breaking means installed in the stagnant portion with it being immersed into trap water trapped in the stagnant portion,

   wherein the breaking means includes a breaking mechanism unit that has a cutter blade, and its driving means, and by driving the breaking mechanism unit, excrement and others which have fallen into the stagnant portion is cut out and broken.

2. The toilet device according to claim 1, **characterized in that** the breaking mechanism unit comprises multiple cutter members each containing multiple disk-shaped cutter blades that are configured side by side in a rotation axis direction thereof; and cutter blades of cutter members which are adjacent to each other mesh with each other with a small clearance being kept therebetween.

3. The toilet device according to claim 2, **characterized in that** each of the cutter members has cutter blades of gradually varying with their sizes, the cutter blades being sequentially placed side by side, and any one or both of a cutter member that has a substantially bobbin-like shape which has a large diameter on both end sides and gradually reduces the diameter thereof from the both end sides towards the center portion and a cutter member that has a substantially straight shape in which multiple cutter blades of substantially same size are sequentially placed side by side is or are used.

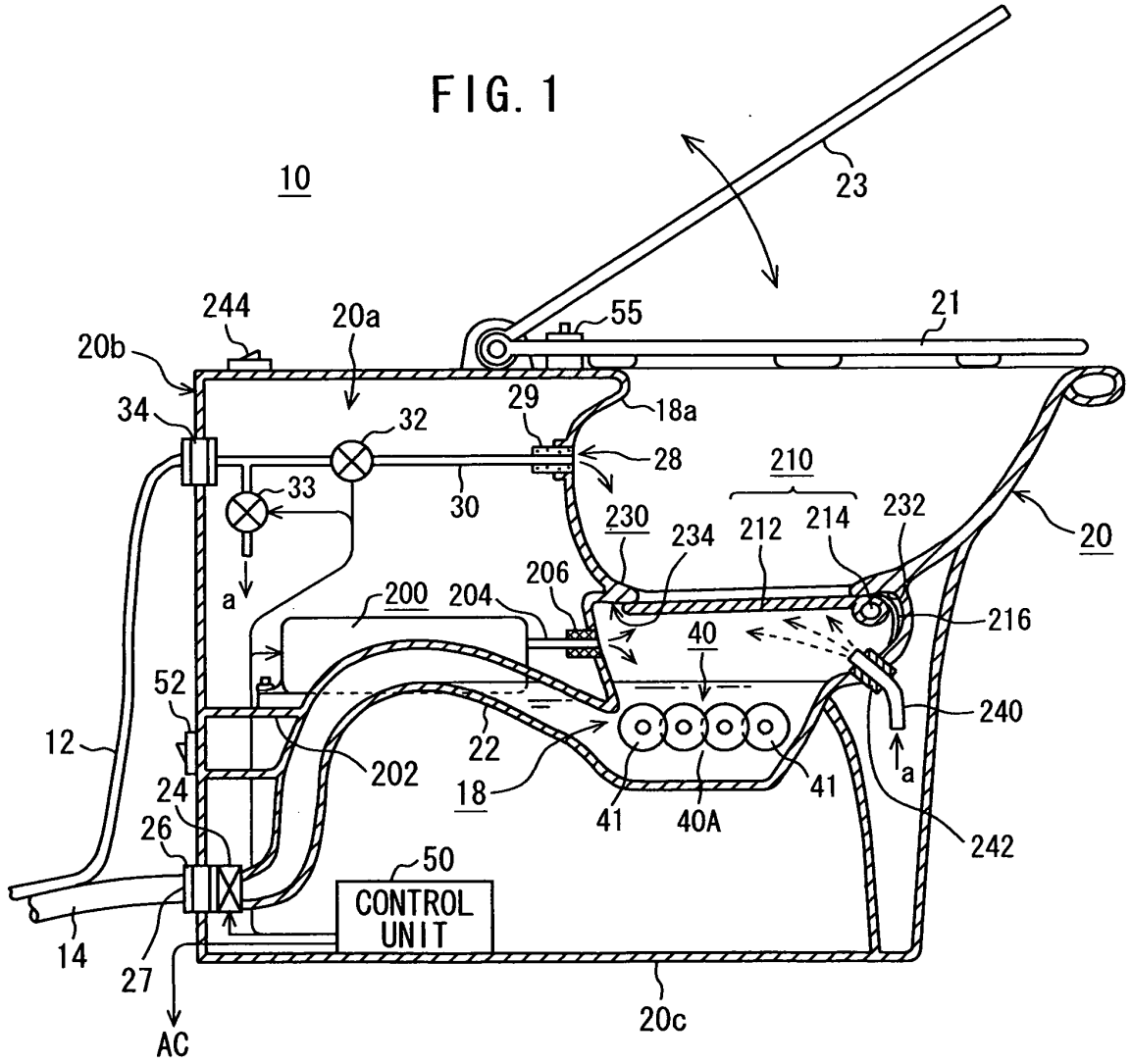
4. The toilet device according to claim 2, **characterized in that** the small clearance is preferably a clearance of an extent that allows the cutter blades of adjacent cutter members to be scraped.

5. The toilet device according to claim 1, **characterized in that** the breaking mechanism unit includes a pair of guide members and a pair of cutter members;
   the pair of guide members contain multiple guide plates disposed on the longitudinal direction thereof with a predetermined pitch; and the cutter members are provided to each of the guide members and multiple cutter blades constituting the cutter members are assembled in such a manner as to enter a place between the guide plates of facing guide members.

6. The toilet device according to claim 1, **characterized in that** the cutter blade has a structure that employs at least any one of cut systems of a straight cut, a cross cut, and a spiral cut.

7. The toilet device according to claim 1, **characterized in that** the body of the toilet device is a fixed type Western-style toilet or a portable type simplified Western-style toilet.

FIG. 1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23
244
20a
55
21
20b
34
29
18a
32
28
210
33
30
230
234
212
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232
20
a
200
204
206
216
40
52
240
12
22
202
18
41
40A
41
24
26
242
50
CONTROL UNIT
14
27
AC
20c

FIG. 2

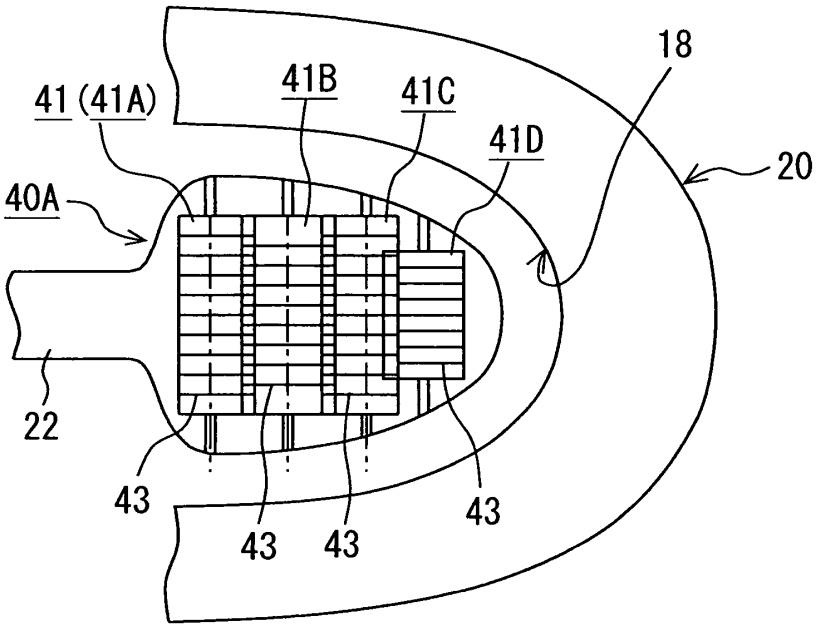

18
41 (41A)
41B
41C
41D
20
40A
22
43
43
43
43

FIG. 3

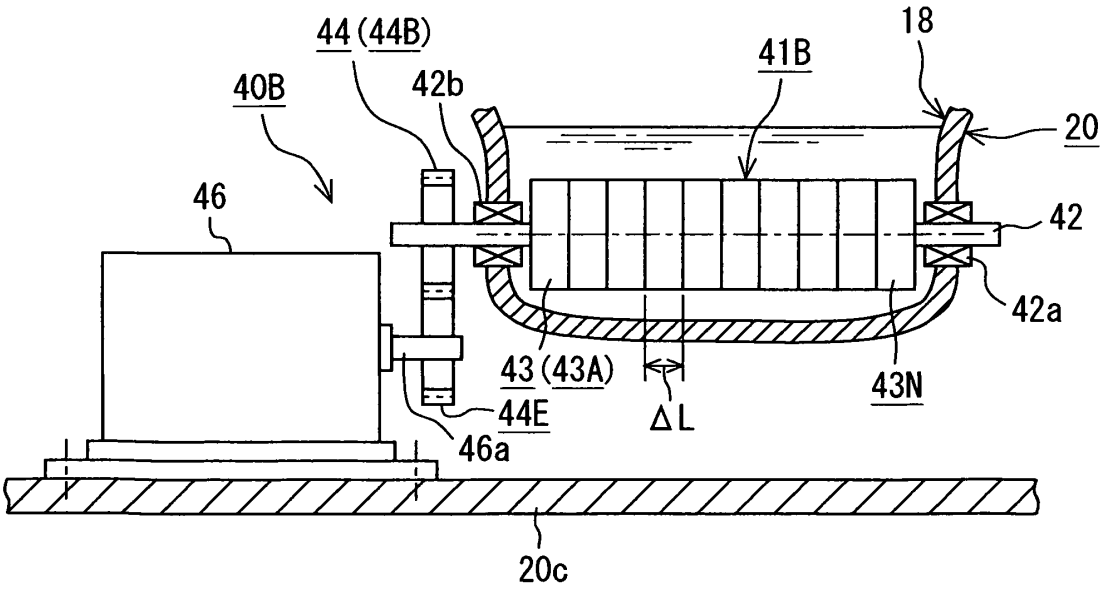

44 (44B)
18
41B
40B
42b
20
46
42
42a
43 (43A)
43N
ΔL
44E
46a
20c

FIG. 4

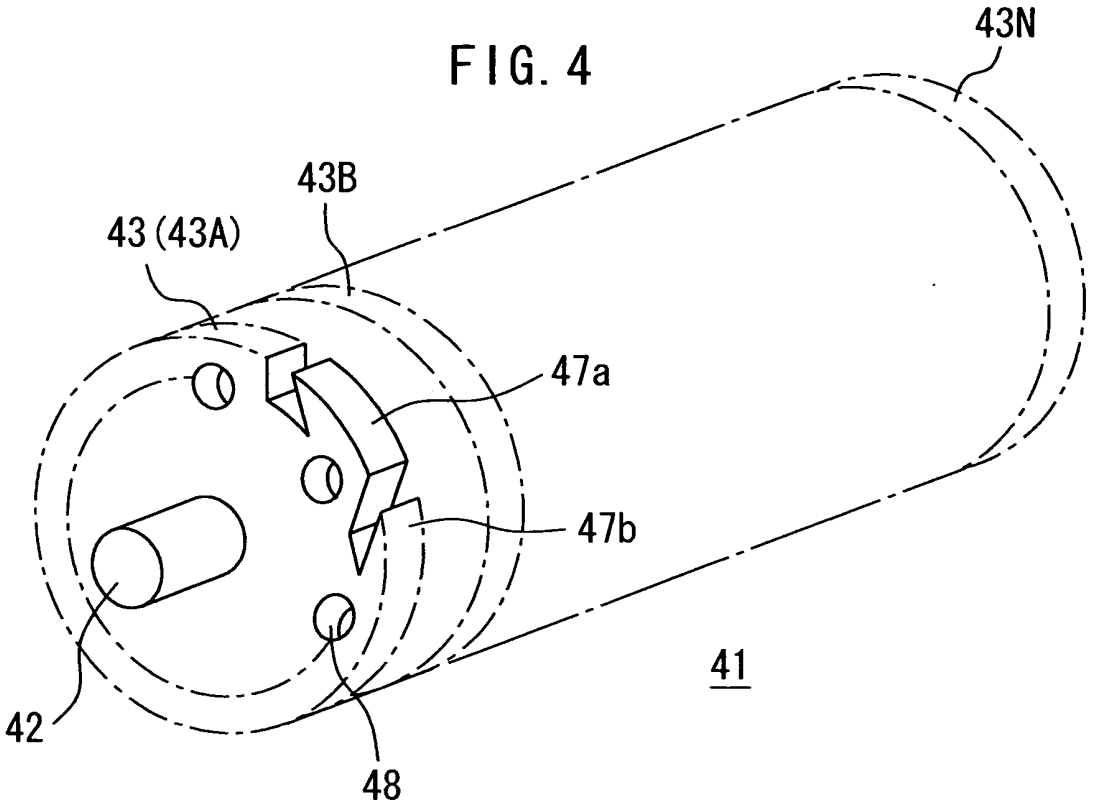

43N
43B
43 (43A)
47a
47b
41
42
48

FIG. 5

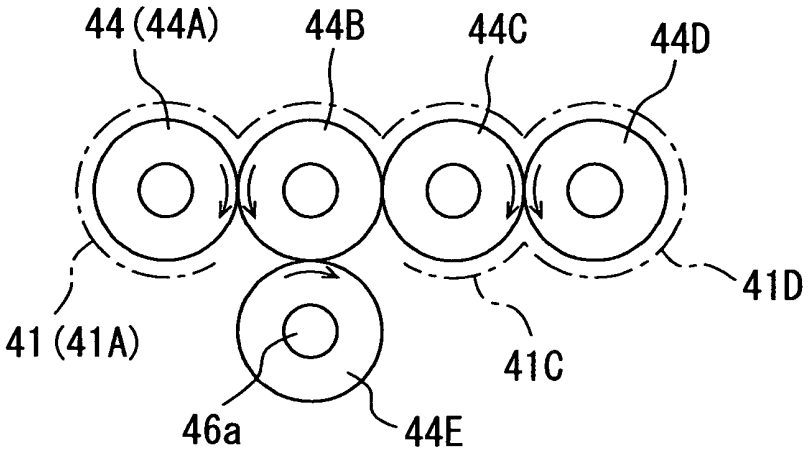
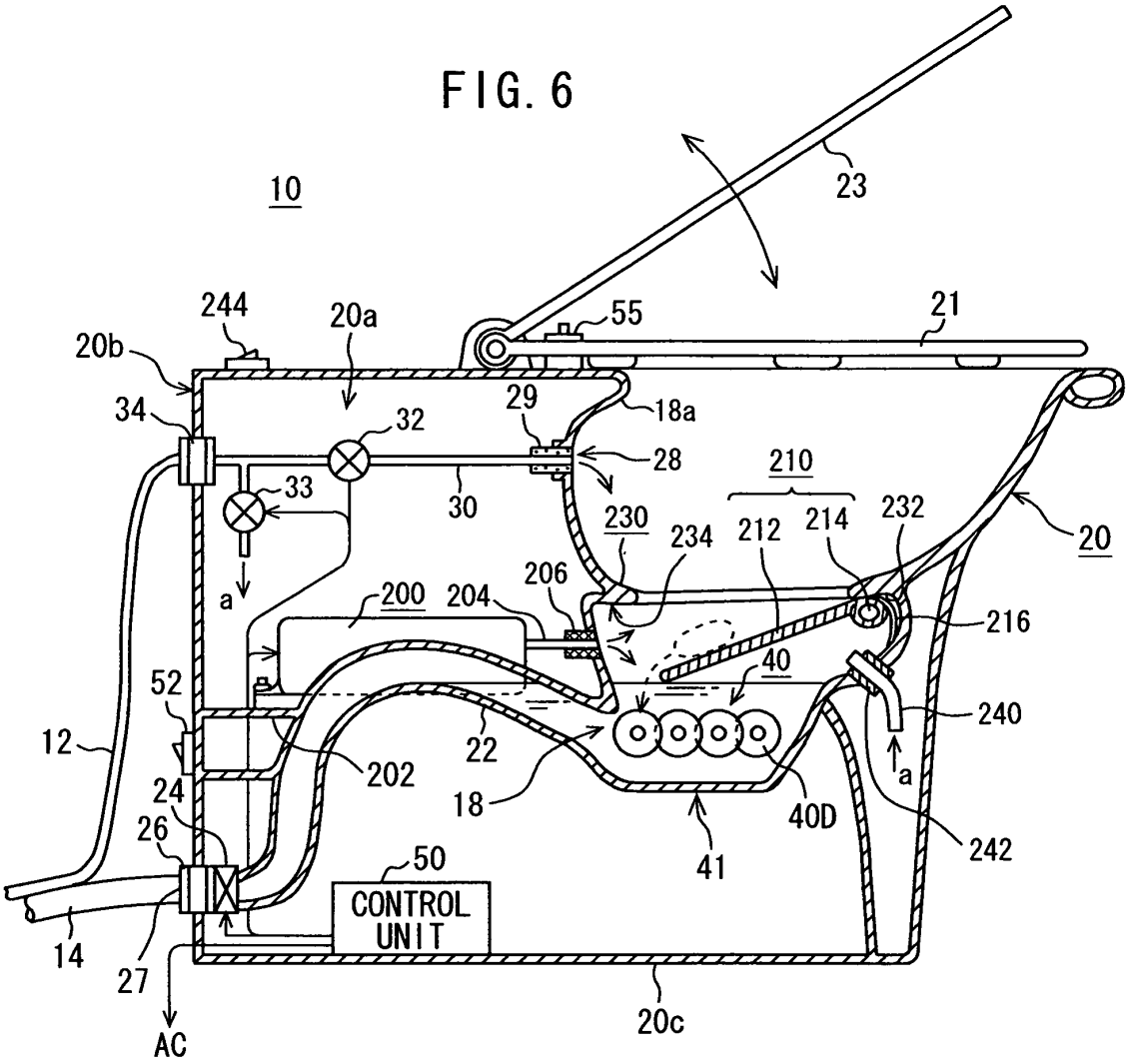

44 (44A)
44B
44C
44D
41D
41 (41A)
41C
46a
44E

FIG. 6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23
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21
20b
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18a
32
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210
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230
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212
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20
a
200
204
206
216
40
52
240
12
22
202
a
24
18
40D
242
26
50
41
CONTROL UNIT
14
27
AC
20c

FIG. 7

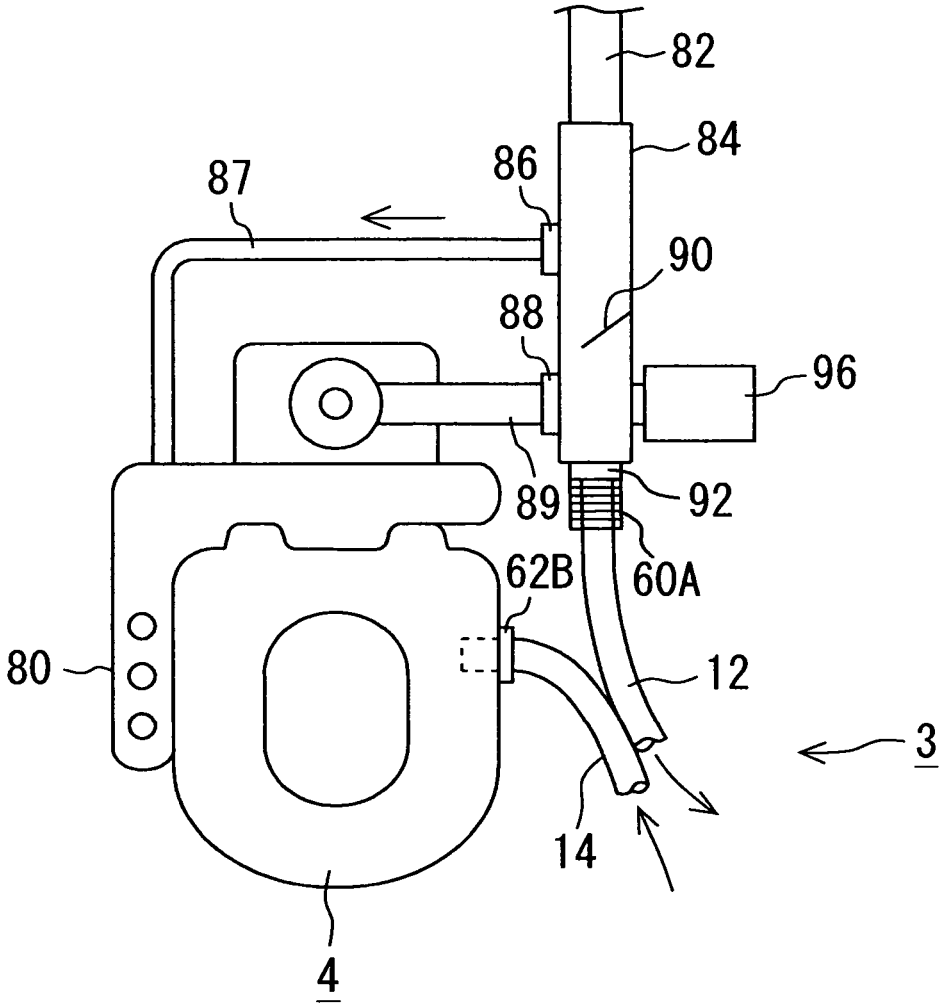


FIG. 8

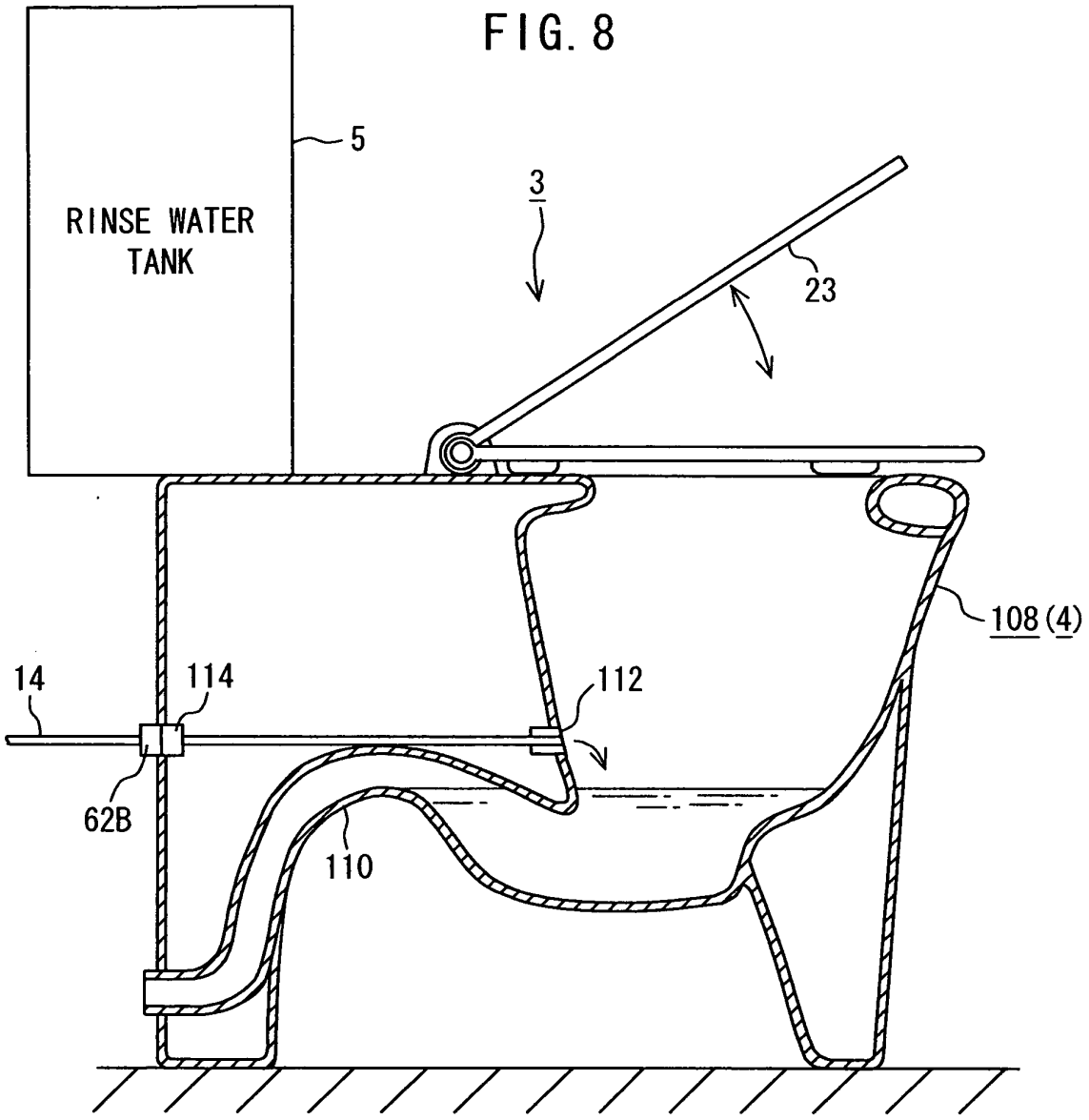


FIG. 9

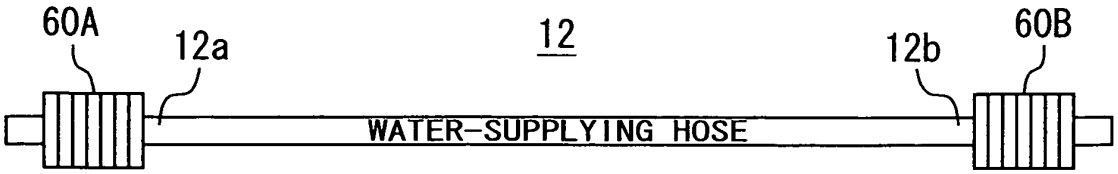


FIG. 10

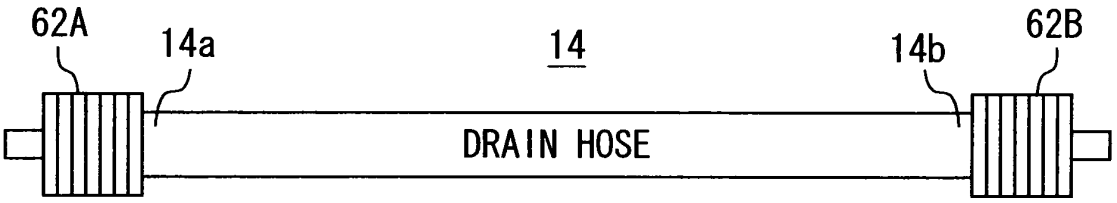


FIG. 11

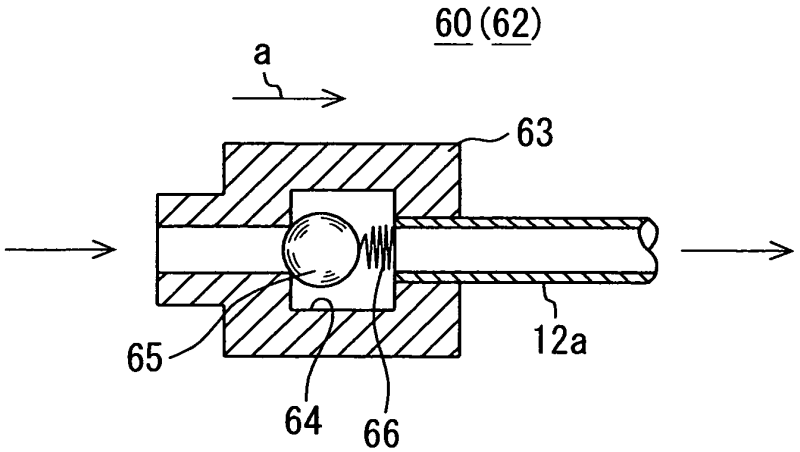
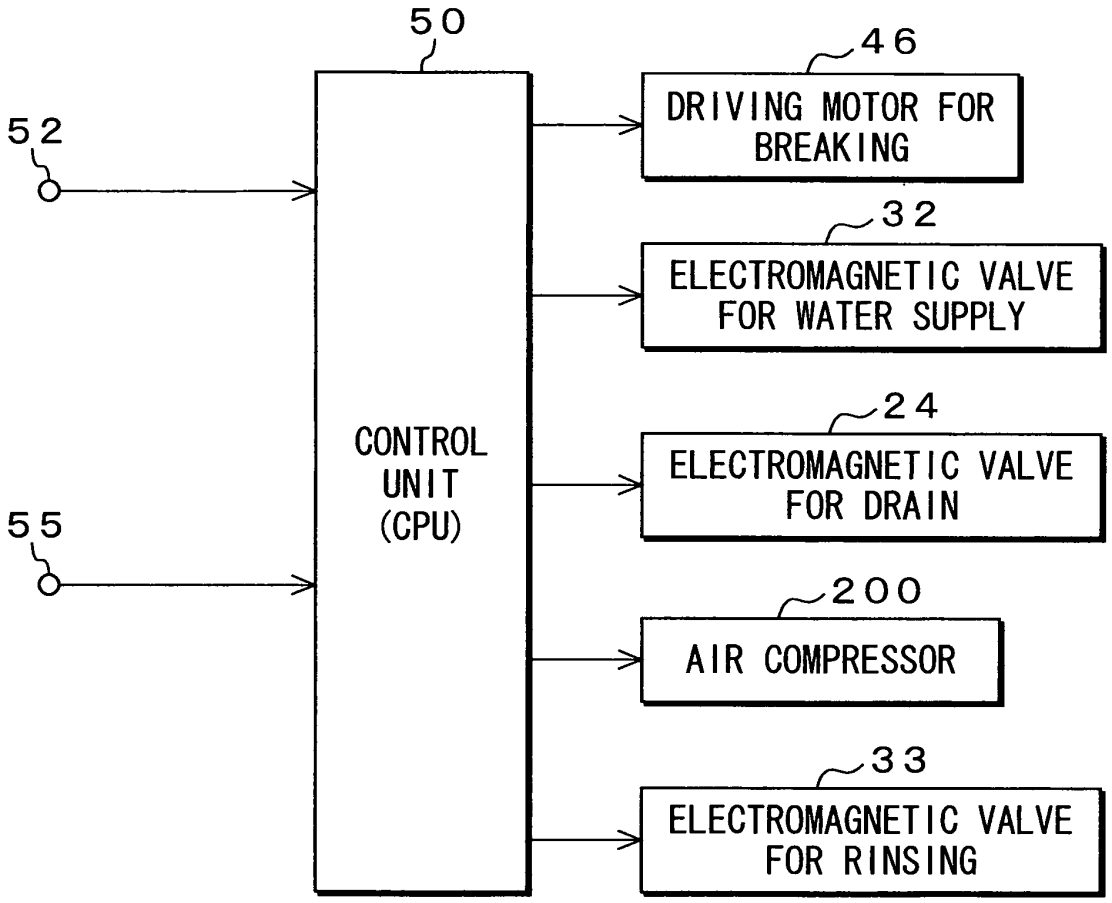


FIG. 12


50
52
55
CONTROL UNIT (CPU)
46
DRIVING MOTOR FOR BREAKING
32
ELECTROMAGNETIC VALVE FOR WATER SUPPLY
24
ELECTROMAGNETIC VALVE FOR DRAIN
200
AIR COMPRESSOR
33
ELECTROMAGNETIC VALVE FOR RINSING

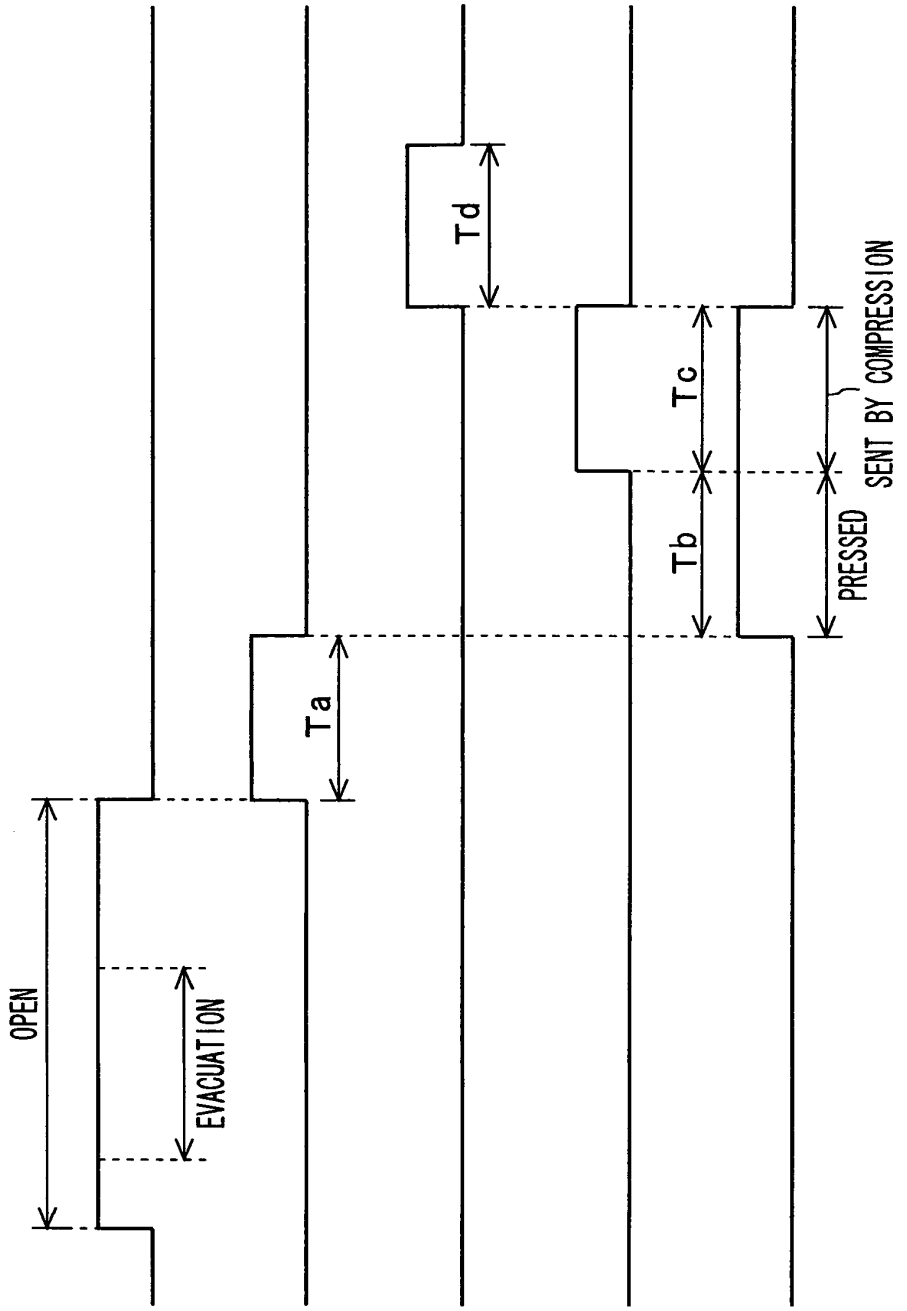


FIG. 13A
OPEN/CLOSE OF TOILET SEAT LID

FIG. 13B
BREAKING PROCESS

FIG. 13C
ELECTROMAGNETIC VALVES 32, 33 FOR WATER SUPPLY

FIG. 13D
ELECTROMAGNETIC VALVE 24 FOR DRAIN

FIG. 13E
AIR COMPRESSOR 200

FIG. 14A
DRAIN SWITCH 244(ON)

FIG. 14B
ELECTROMAGNETIC VALVE 24 FOR DRAIN

FIG. 14C
AIR COMPRESSOR 200

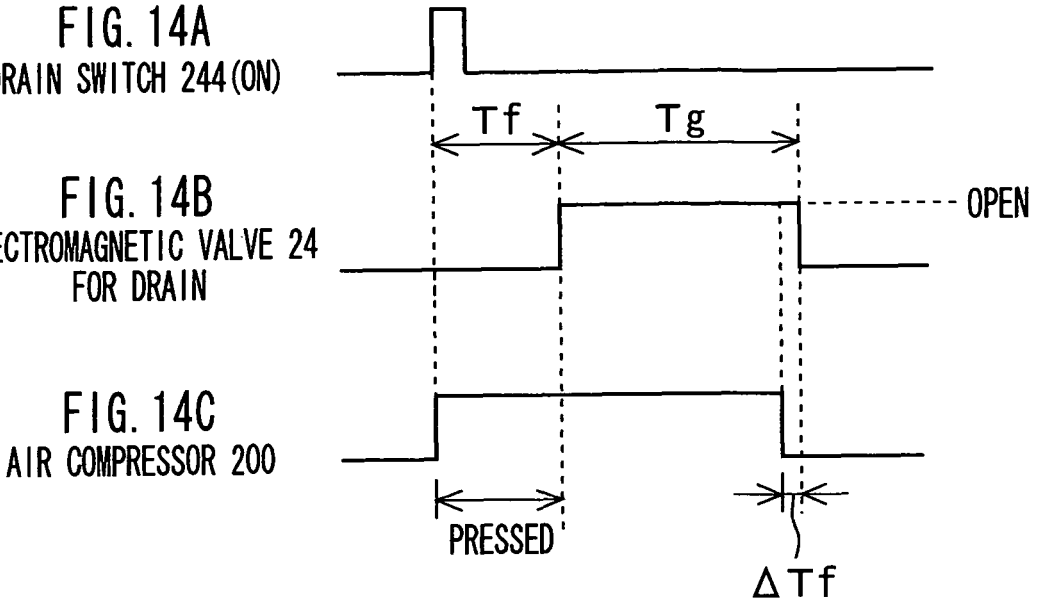


FIG. 15

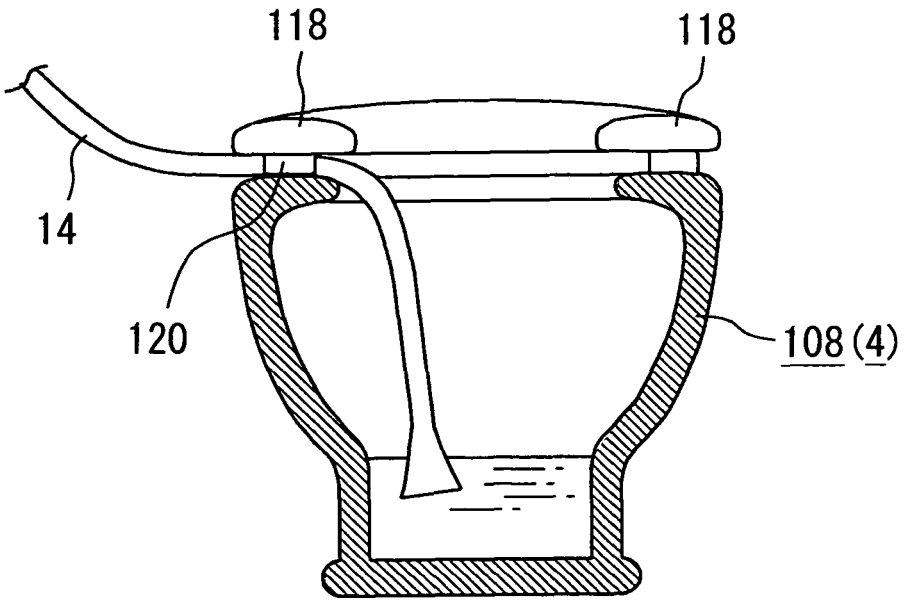


FIG. 16

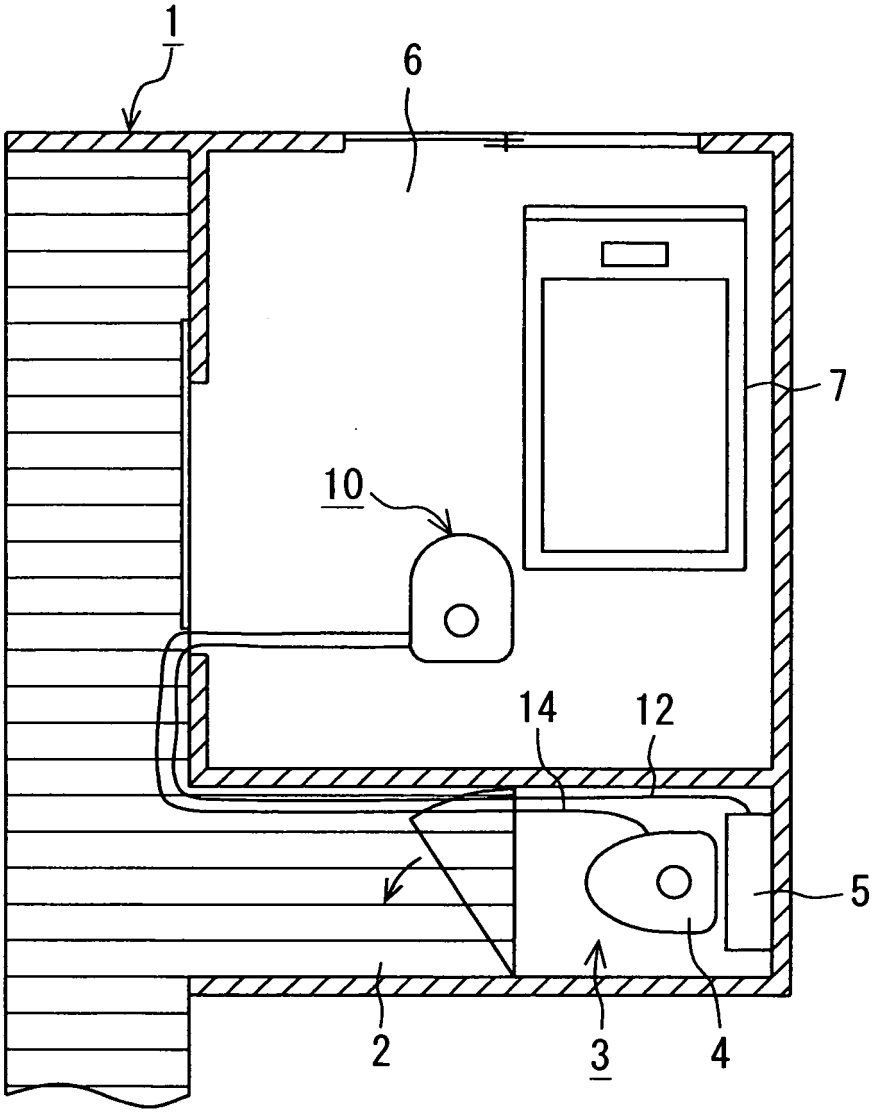


FIG. 17

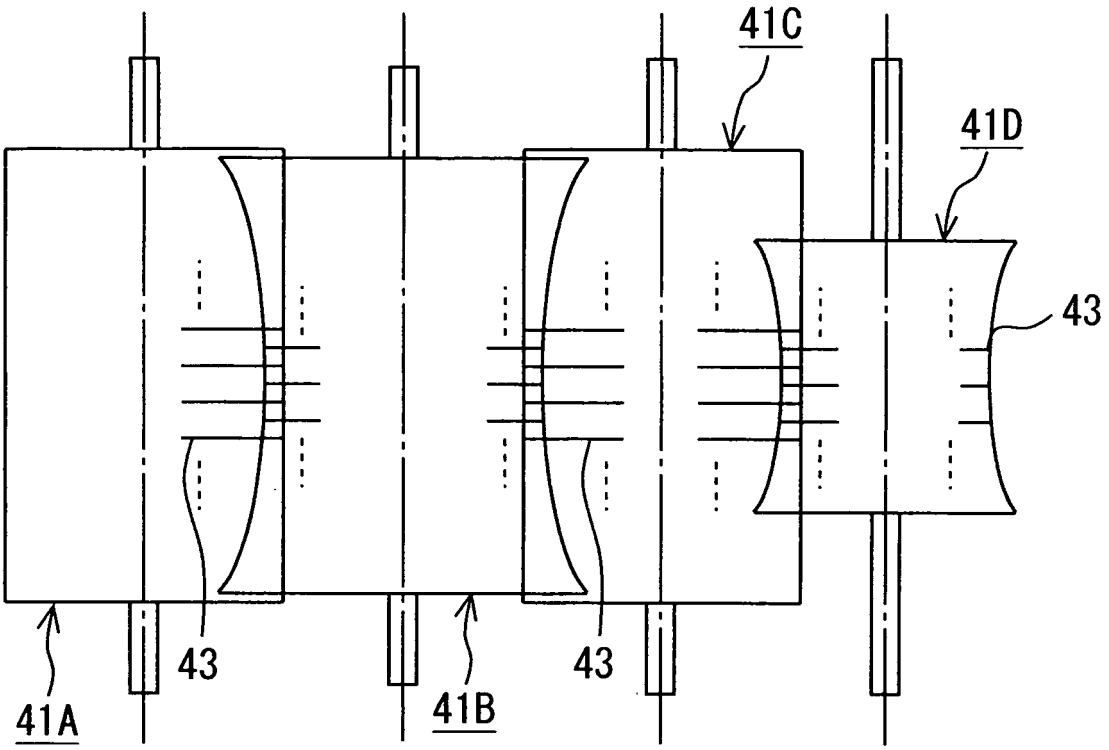


FIG. 18A

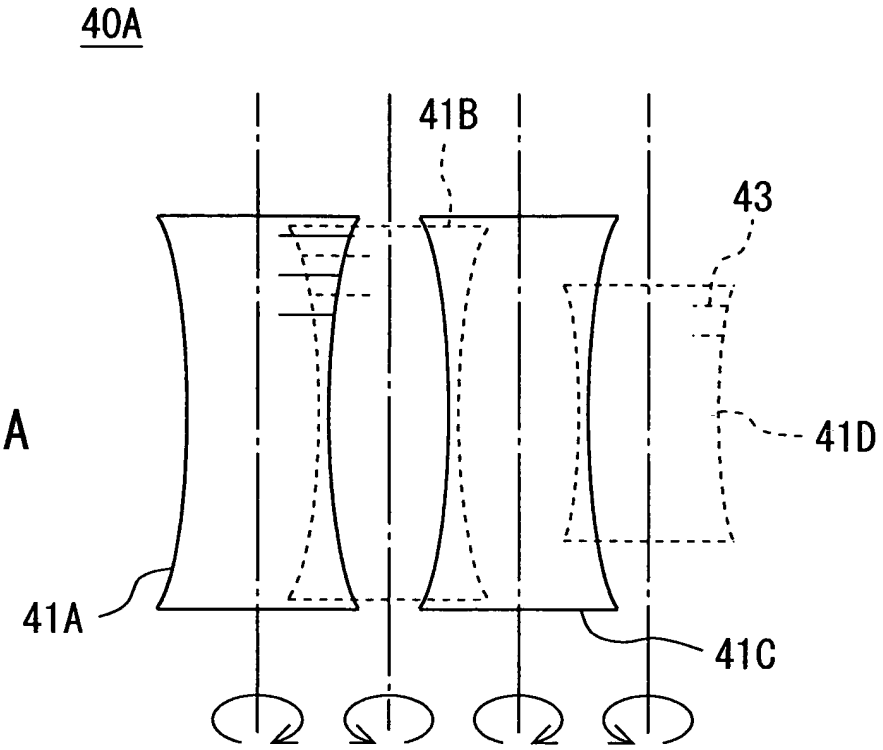


FIG. 18B

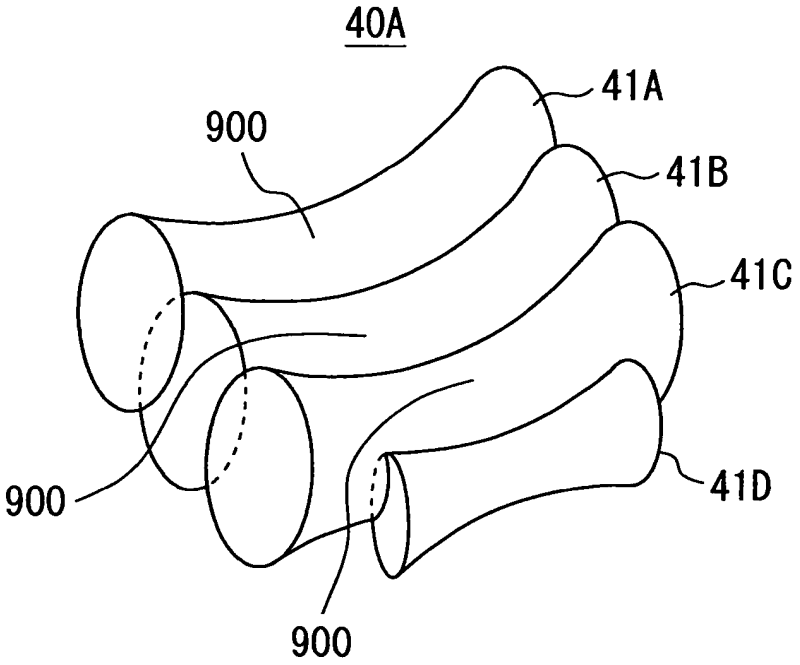
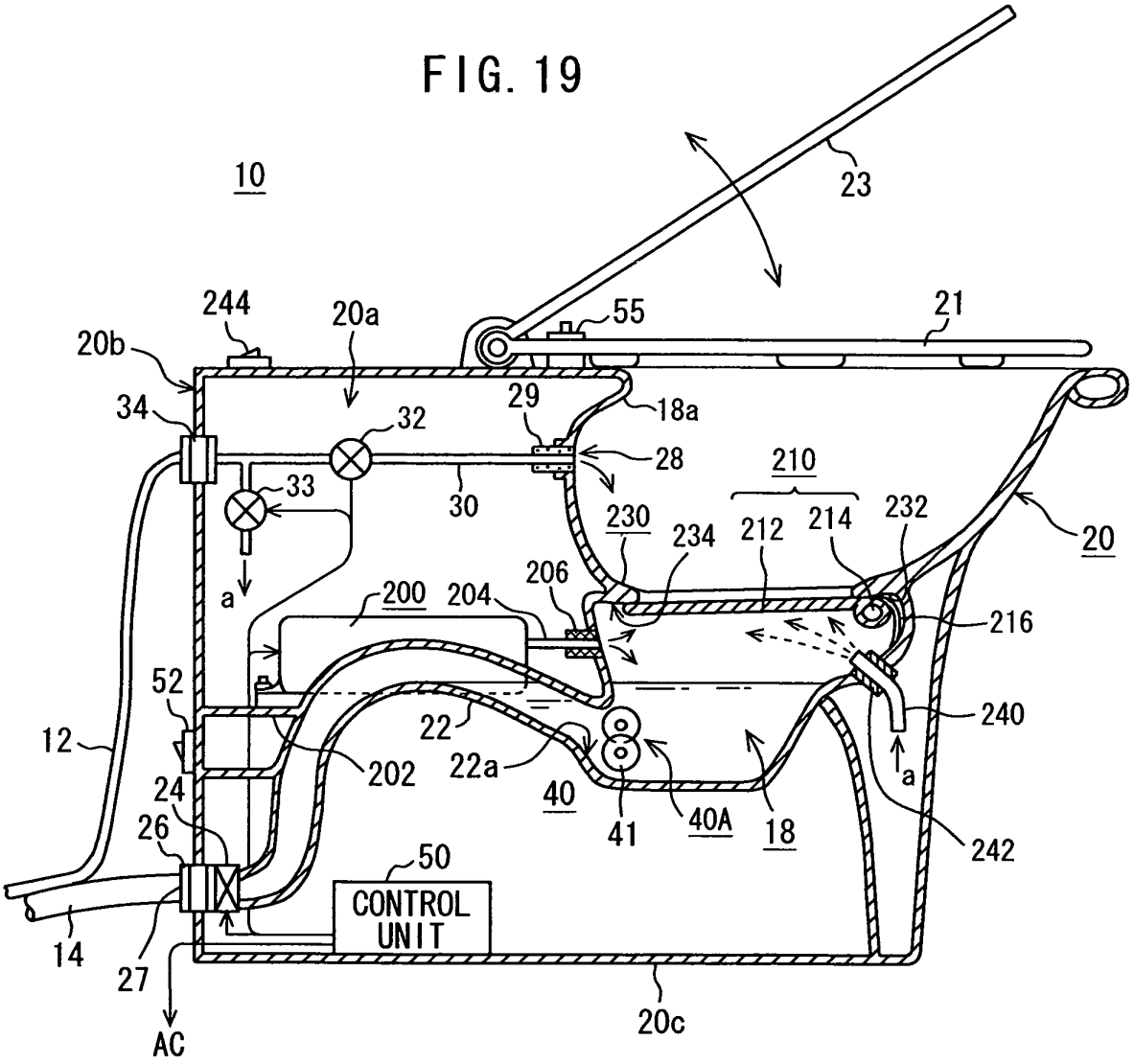


FIG. 19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a
200
204
206
216
52
22
240
12
202
22a
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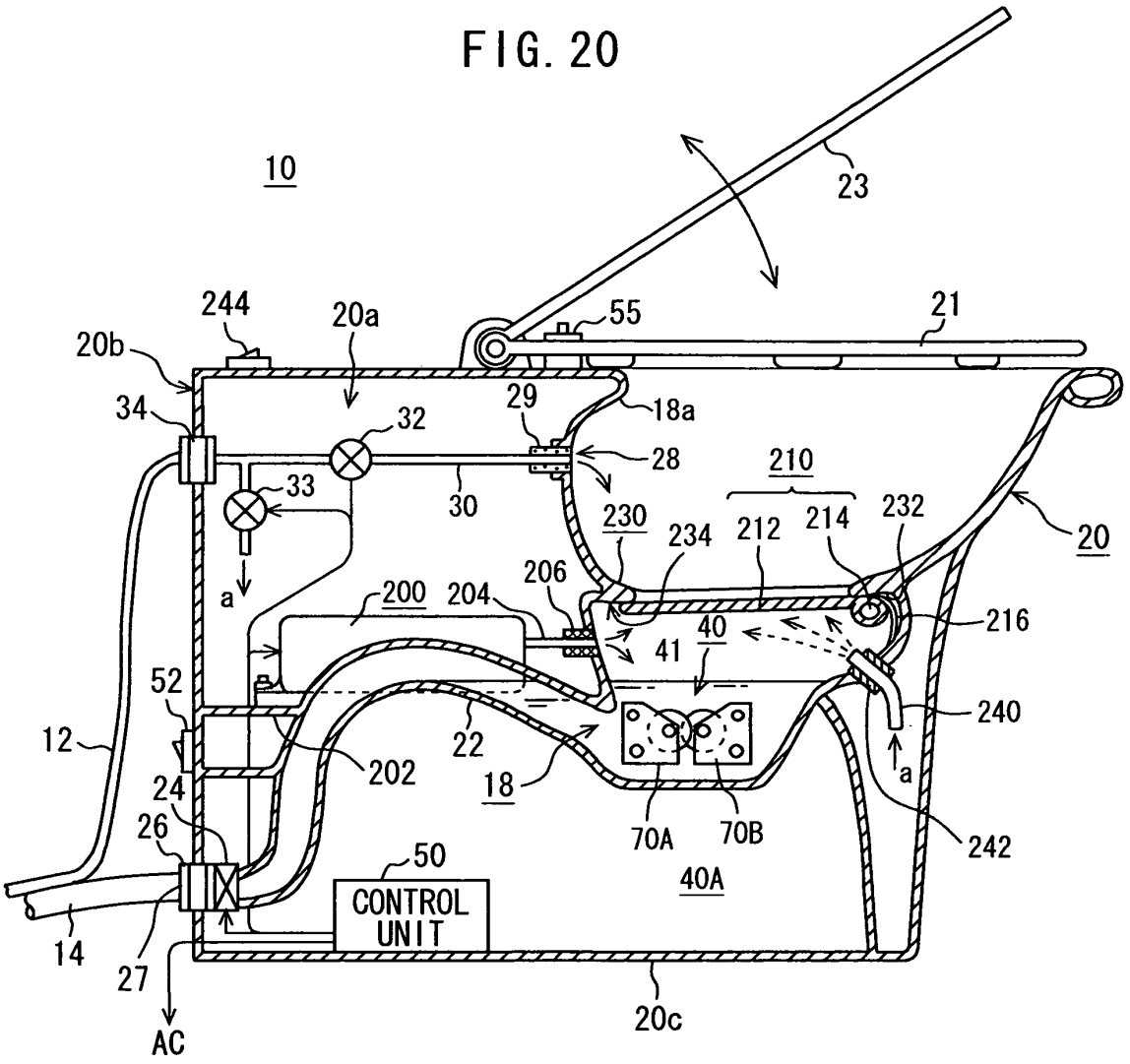
41
40A
18
24
26
50
CONTROL UNIT
242
14
27
AC
20c

FIG. 20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212
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232
20
a
200
204
206
216
40
41
52
240
12
22
202
18
24
26
70A
70B
242
50
CONTROL UNIT
40A
14
27
AC
20c

FIG. 21

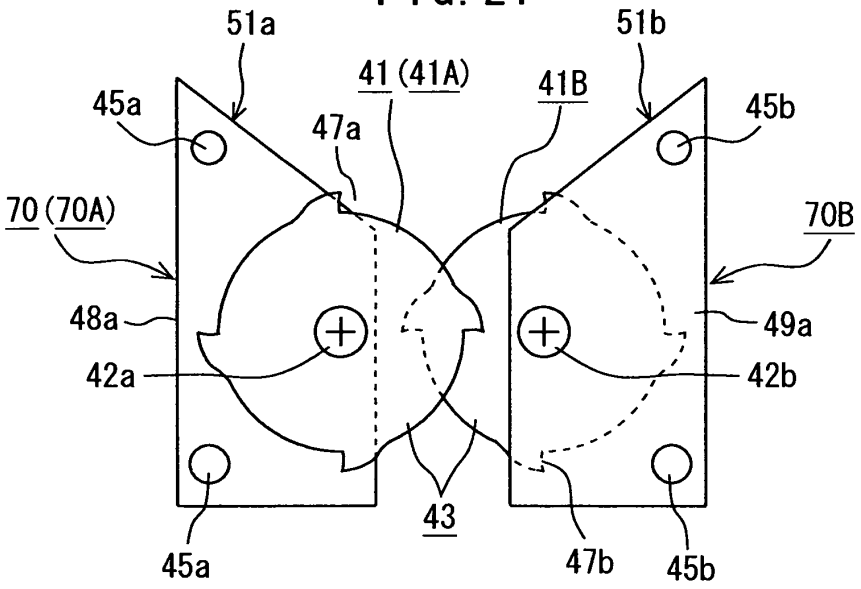

51a
51b
41 (41A)
41B
45a
47a
45b
70 (70A)
70B
48a
49a
42a
42b
43
45a
47b
45b

FIG. 22

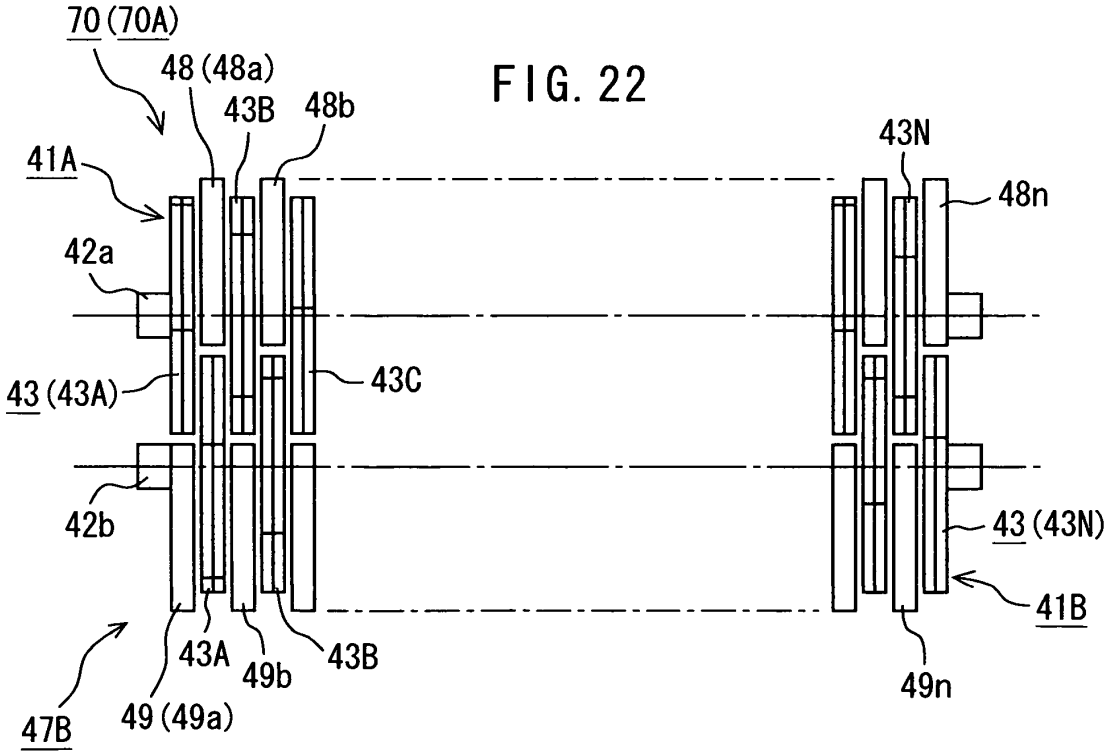

70 (70A)
48 (48a)
43B
48b
43N
41A
48n
42a
43 (43A)
43C
42b
43 (43N)
41B
43A
49b
43B
49n
47B
49 (49a)

FIG. 23

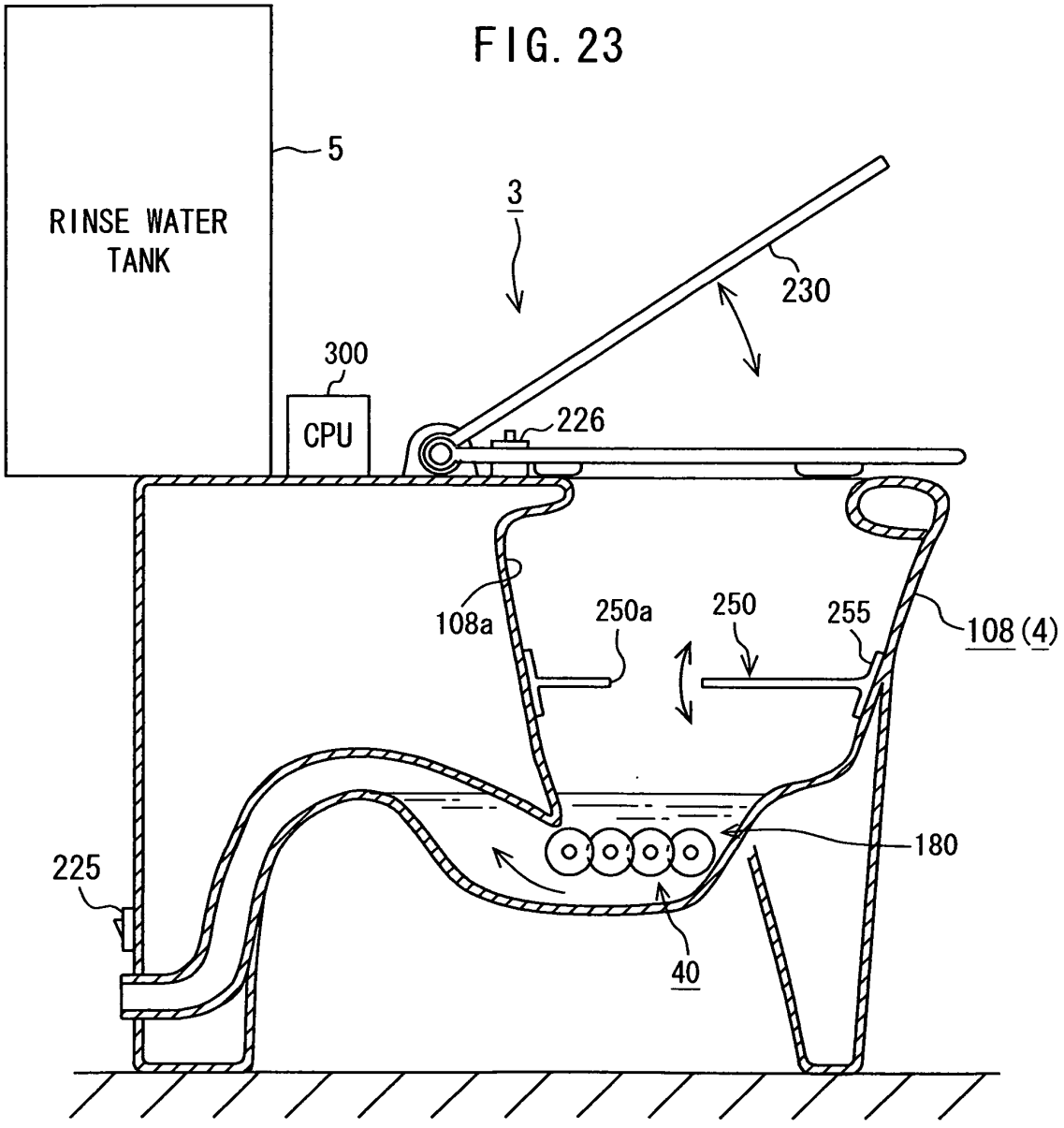
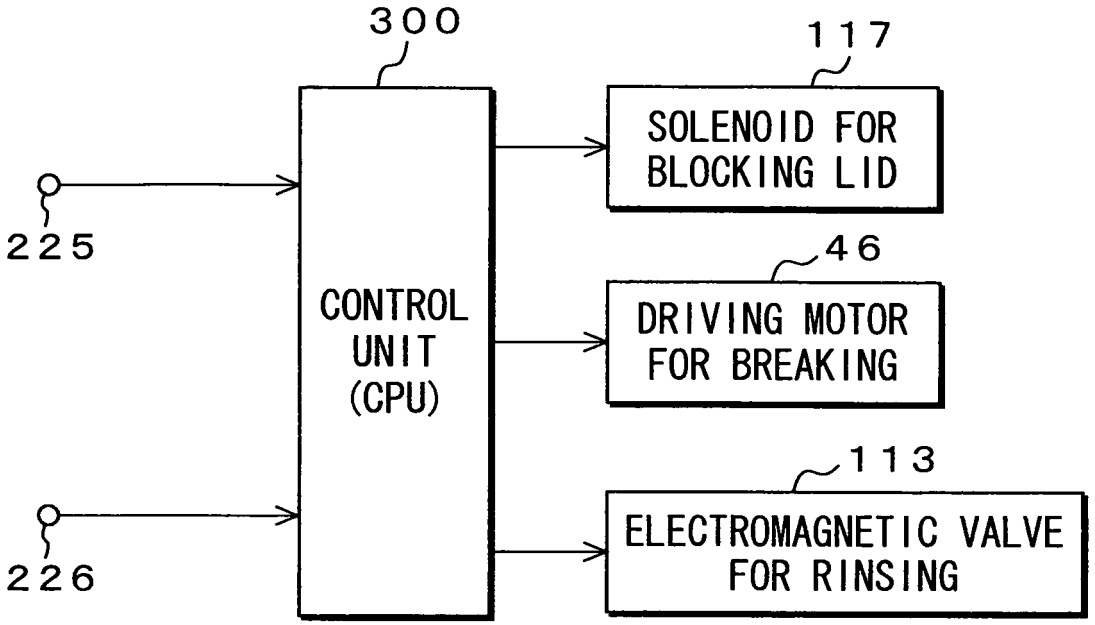

RINSE WATER TANK
5
3
230
300
CPU
226
108a
250a
250
255
108 (4)
180
225
40

FIG. 24


300
117
SOLENOID FOR BLOCKING LID
225
46
CONTROL UNIT (CPU)
DRIVING MOTOR FOR BREAKING
113
226
ELECTROMAGNETIC VALVE FOR RINSING

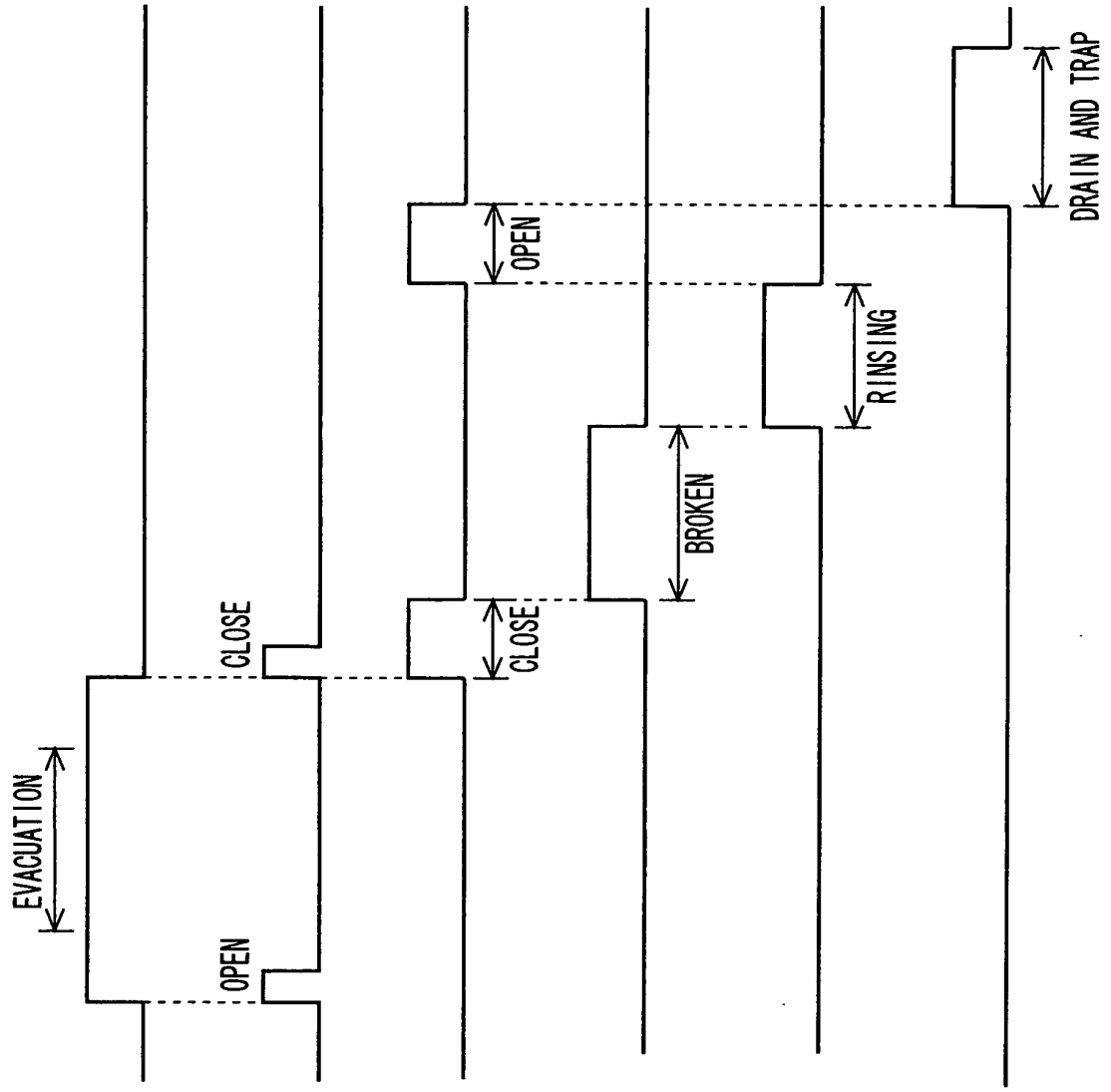


FIG. 25A
OPEN/CLOSE OF TOILET SEAT LID

FIG. 25B
SWITCH FOR OPEN/CLOSURE

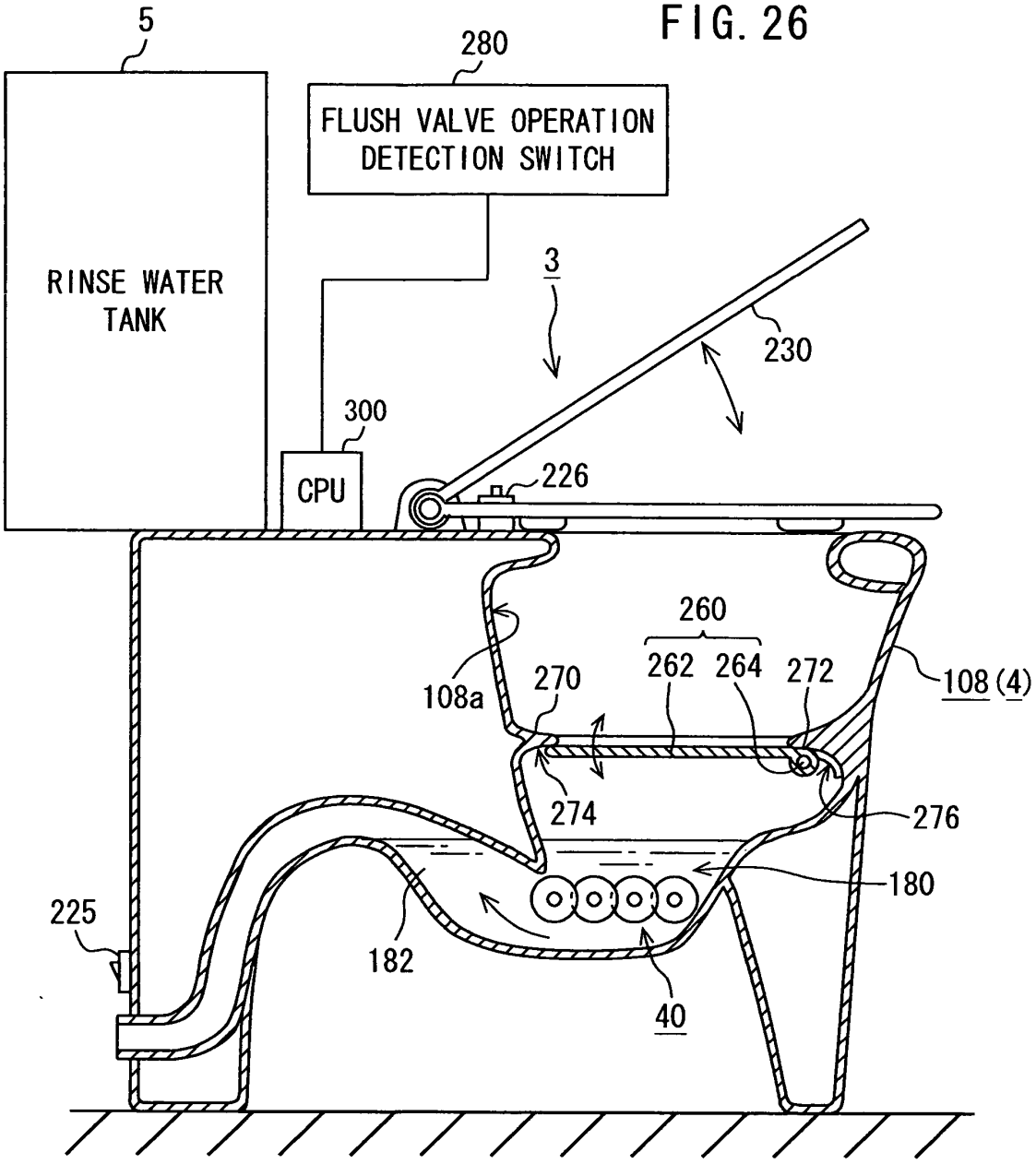
FIG. 25C
BLOCKING LID

FIG. 25D
BREAKING CUTTER

FIG. 25E
RINSING MEANS

FIG. 25F
DRAIN/TRAP PROCESSING

FIG. 26


5
280
FLUSH VALVE OPERATION DETECTION SWITCH
RINSE WATER TANK
3
230
300
CPU
226
260
262
264
272
108a
270
108 (4)
274
276
180
225
182
40

INTERNATIONAL SEARCH REPORT

International application No.
PCT/JP2006/310615

A. CLASSIFICATION OF SUBJECT MATTER
E03D11/00(2006.01), ***B02C18/00***(2006.01), ***B02C18/18***(2006.01), ***E03D9/10***(2006.01)

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)
E03D11/00(2006.01), ***B02C18/00***(2006.01), ***B02C18/18***(2006.01), ***E03D9/10***(2006.01)

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched
Jitsuyo Shinan Koho 1922-1996 Jitsuyo Shinan Toroku Koho 1996-2006
Kokai Jitsuyo Shinan Koho 1971-2006 Toroku Jitsuyo Shinan Koho 1994-2006

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.
X Y	JP 2000-8442 A (Hiroshi FUJITA), 11 January, 2000 (11.01.00), Par. Nos. [0013] to [0040]; all drawings (Family: none)	1,6,7 2-5
Y	JP 2002-1148 A (Nichisui Kako Kabushiki Kaisha), 08 January, 2002 (08.01.02), Par. Nos. [0010], [0013]; Fig. 6 & US 2002/0023977 A1 & EP 1166877 A1 & CA 2340841 A & TW 533095 B	2-4
Y	JP 7-155630 A (Nichisui Kako Kabushiki Kaisha), 20 June, 1995 (20.06.95), Par. Nos. [0010], [0012]; Fig. 1 (Family: none)	5

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

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"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
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"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
15 June, 2006 (15.06.06)	27 June, 2006 (27.06.06)
Name and mailing address of the ISA/ Japanese Patent Office Facsimile No.	Authorized officer Telephone No.

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Patent documents cited in the description

- JP 2004308404 A **[0002]**
- JP 2000325258 A **[0004]**
- JP 2001275885 A **[0006]**