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 Amended claims in accordance with Rule 137(2) EPC.

(54) **SMART AUTOMATIC FLUSH TOILET CONSTRUCTION**

(57) A smart automatic flush toilet construction at least comprising an automatic flushing module (1), which can be arranged on various toilets, and can realize automatic flushing function on various toilets. The old toilet can be directly transformed into a smart automatic flush toilet through the replacement of the flushing pipe (20) of the toilet (2), and the purpose of water saving can be achieved through the control (10) of the flushing amount. In addition, the present invention can use a dual-channel shunting pipe (13) to make the toilet have the functions of automatic flushing and manual flushing, so that the user can safely go to the toilet in the event of a power outage.

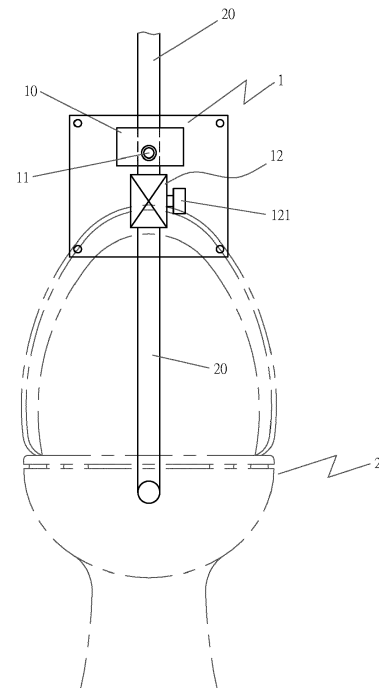


FIG 1

**EP 3 848 521 A1**

**Description****BACKGROUND OF THE INVENTION**

## 1. Field of the Invention

[0001] This invention relates to a smart automatic flush toilet construction, particularly to an innovative automatic flushing module that can be applied to various toilets to achieve automatic flushing effect of various toilets.

## 2. Description of the Prior Art

[0002] At present, the automatic flush toilets generally sold on the market are a whole set of equipment, which is mainly provided with a special automatic flushing device on a specially designed toilet, so that the toilet has the function of automatic flushing. Therefore, the consumers must purchase or replace a set of automatic flush toilet equipment to enjoy the convenience of the automatic flush toilet.

[0003] However, if the toilet is not damaged or worn out, most people are not willing to deliberately replace the entire set of toilet equipment to obtain the automatic flushing function of the toilet. Furthermore, when the automatic flush toilet can only be used on a specific toilet, it will affect the sales market of the automatic flush toilet, and the cost of replacing the entire set of automatic flush toilets will be a big economic burden for most families, so it is not economical.

[0004] In addition, all the automatic flush toilets on the market use a single sensor to determine whether flushing is required. If the position of the sensor is too high, it is difficult to accurately detect the situation of child going to the toilet. If the position of the sensor is too low, the sensor is easily interfered or blocked by the toilet cover. Moreover, when the only sensor fails (for example, the sensor is dirty or the sensor is shorted), the toilet will be uncontrolled to flush or unable to flush.

[0005] Therefore, the inventor of this invention, having much experience in designing and manufacturing valves, pipe line system and its related products, understands and researches the problem of the foregoing automatic flush toilets and hence devised this invention.

**SUMMARY OF THE INVENTION**

[0006] The objective of this invention is to offer an automatic flushing module for various toilets, the automatic flushing module can realize full-automatic flushing function for various toilets, and the construction or installation of this invention is very easy. The purpose of water saving can be achieved through the control of the flushing amount, and a dual-channel structure can also be used to make the automatic flushing module have the functions of automatic flushing and manual flushing, so that the user can safely go to the toilet in the event of a power outage, to improve the convenience of users using the

toilet in various situations.

[0007] The smart automatic flush toilet construction in the present invention includes at least an automatic flushing module, which is provided with a control system, an sensor and an electric valve, said control system is connected to said sensor and said electric valve; said electric valve is provided with a valve and a power motor, said valve is mounted on the flushing pipe of the toilet, said power motor is connected to said valve to provide the power for driving the valve, so the electric valve can control the flushing operation of the flushing pipe.

[0008] The smart automatic flush toilet construction of present invention, among which said automatic flushing module may be provided with a dual-channel shunting pipe, said dual-channel shunting pipe is mounted on the flushing pipe of the toilet. When the toilet is a toilet having a water tank, said dual-channel shunting pipe may be arranged on the flushing pipe of the water tank or arranged under the water tank. Said dual-channel shunting pipe is provided with a first pipe and a second pipe, said valve of electric valve is mounted on the first pipe, and said second pipe is provided with a manual valve which can be arranged on the second pipe or on the water tank, depending on the needs of use. In this way, said dual-channel shunting pipe can have the functions of automatic flushing and manual flushing to solve the problem that the toilet cannot be flushed in the event of a power failure or the electric valve failure.

[0009] The smart automatic flush toilet construction of present invention, among which said control system is provided with a timer, which can set an appropriate flushing time, so that said electric valve can accurately control the opening and closing time of the valve and control the amount of flushing.

[0010] The smart automatic flush toilet construction of present invention, among which said valve may be one of a ball valve, a plate valve, half-column valve or full-column valve. Said sensor may be an infrared sensor, an ultrasonic sensor, or a radar sensor. Said automatic flushing module may be provided with a plurality of sensors to detect a plurality of different directions, respectively. Said control system can use the signals returned by the multiple sensors to perform smart flushing operations and equipment function detection.

**BRIEF DESCRIPTION OF DRAWINGS**

[0011] This invention will be better understood by referring to the accompanying drawings, wherein:

FIG. 1 is a first embodiment of the present invention applied to a tankless toilet;

FIG. 2 is a second embodiment of the present invention applied to a tankless toilet;

FIG. 3 is an embodiment of the present invention applied to a tankless squatting pan;

FIG. 4 is a schematic view of the first flushing action of the ball valve in the present invention;

FIG. 5 is a schematic view of the second flushing action of the ball valve in the present invention;  
 FIG. 6 is a schematic view of the first flushing action of the plate valve in the present invention;  
 FIG. 7 is a schematic view of the second flushing action of the plate valve in the present invention;  
 FIG. 8 is a schematic view of the first flushing action of the half-column valve in the present invention;  
 FIG. 9 is a schematic view of the second flushing action of the half-column valve in the present invention;  
 FIG. 10 is a schematic view of the first flushing action of the full-column valve in the present invention;  
 FIG. 11 is a schematic view of the second flushing action of the full-column valve in the present invention;  
 FIG. 12 is an embodiment of the present invention applied to a squatting pan with a water tank;  
 FIG. 13 is a schematic diagram of the first use state of FIG. 12;  
 FIG. 14 is a schematic diagram of the second use state of FIG. 12;  
 FIG. 15 is an embodiment of the present invention applied to a toilet with a water tank;  
 FIG. 16 is a first embodiment of a dual-channel shunting pipe of a toilet with a water tank in the present invention;  
 FIG. 17 is a second embodiment of a dual-channel shunting pipe of a toilet with a water tank in the present invention;  
 FIG. 18 is a first embodiment of the double water tank structure in the present invention;  
 FIG. 19 is a second embodiment of the double water tank structure in the present invention;  
 FIG. 20 is a third embodiment of the double water tank structure in the present invention;  
 FIG. 21 is a fourth embodiment of the double water tank structure in the present invention;  
 FIG. 22 is a schematic view of a first use state in FIG. 20; and  
 FIG. 23 is a schematic view of a second use state in FIG. 20.

#### DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

**[0012]** A preferred embodiment of a smart automatic flush toilet construction in the present invention, as shown in FIG. 1 to 23, includes at least an automatic flushing module 1.

**[0013]** Said automatic flushing module 1 is arranged on the flushing pipe 20 of the toilet 2, the automatic flushing module 1 is provided with a control system 10, an sensor 11 and an electric valve 12. Said control system 10 is connected to the sensor 11 and the electric valve 12, so the control system 10 can control the electric valve 12 to flush water through the signal received from the sensor 11. Said control system 10 may be made integrally

with said sensor 11 or the electric valve 12, or may be an independent device, depending on the needs of use.

**[0014]** Said sensor 11 may be arranged at any position of the toilet 2, said sensor 11 may be an infrared sensor, an ultrasonic sensor, or a radar sensor. As shown in FIGS. 3 and 18 to 23, said sensors 11 may be plural, the plurality of sensors 11 may be respectively arranged at different positions and respectively detect a plurality of different directions. Through the detection from different directions, the problem of dead angle detection by a single sensor can be overcome, and the problem that child is not easily detected by a single sensor is solved. Said control system can use the signals returned by the multiple sensors to perform smart flushing operations and equipment function detection. Said sensors may respectively use different types of sensor to improve the accuracy of detection. Through the multiple detection technology, the problem of uncontrolled to flush can be reduced. When one sensor fails, the automatic flushing function can still be maintained.

**[0015]** As shown in Figs. 3 and 18 to 23, taking the dual sensors 11 as an example. when both sensors 11 are operating normally, said control system 10 must receive the flushing signals from the two sensors to activate the automatic flushing function, this will avoid the problem of false detection by one sensor 11. When said control system 10 detects a sensor failure, it will automatically switch to the single sensor mode and issue a maintenance warning, so the toilet can not only maintain the function of automatic flushing, but also notify the maintenance personnel to carry out maintenance as soon as possible. When one of the sensors detects that there is a child, the child mode is activated, and a low-position or low-angle sensor is used to determine whether to activate the automatic flushing function.

**[0016]** Said electric valve 12 is provided with a valve 120 and a power motor 121, said valve 120 is mounted on the flushing pipe 20 of the toilet 2, said power motor 121 is connected to said valve 120 to provide the power for driving the valve 120, so the electric valve 12 can control the flushing operation of the flushing pipe 20. Said valve 120 may be a valve structure compatible with the flushing pipe 20 of the toilet 2, such as a ball valve (as shown in FIGS. 4 and 5), a plate valve (as shown in FIGS. 6 and 7), a half-column valve (as shown in FIGS. 8 and 9), a full-column valve (as shown in FIGS. 10 and 11), and the like. Said power motor 121 is a motor structure corresponding to the operation mode of the valve, such as a rotary power motor or a telescopic power motor. Said control system 10 may be provided with a timer (not shown in FIGS.), said timer can set an appropriate flushing time, so that said electric valve 12 can accurately control the opening and closing time of the valve 120 and control the amount of flushing.

**[0017]** As shown in FIGS. 12, 16, 17, 19, 20 and 21, said automatic flushing module 1 may be provided with a dual-channel shunting pipe 13, said dual-channel shunting pipe 13 is mounted on the flushing pipe 20 of

the toilet 2, said dual-channel shunting pipe 13 is provided with a first pipe 130 and a second pipe 131, the valve 120 of the electric valve 12 is mounted on the first pipe 130, and the second pipe 131 is provided with a manual valve 14. In this way, said dual-channel shunting pipe 13 can have the functions of automatic flushing and manual flushing to solve the problem that the toilet cannot be flushed in the event of a power failure or the electric valve 12 failure.

**[0018]** As shown in FIGS. 12 to 21, when the toilet 2 is a toilet having a water tank 2A, said dual-channel shunting pipe 13 may be arranged under the water tank 2A (as shown in FIGS. 15 to 21) or on the flushing pipe 20 of the toilet 2. (as shown in FIGS. 12 and 14). Said dual-channel shunting pipe 13 is provided with a first pipe 130 and a second pipe 131, the valve 120 of the electric valve 12 is mounted on the first pipe 130, and the second pipe 131 is provided with a manual valve 14 which can be arranged on the second pipe 131 (as shown in FIGS. 12, 17, 19 and 21) or on the water tank 2A (as shown in FIGS. 16 and 20), depending on the needs of use. In this way, said dual-channel shunting pipe 13 can have the functions of automatic flushing and manual flushing to solve the problem that the toilet cannot be flushed in the event of a power failure or the electric valve 12 failure.

**[0019]** As shown in FIGS. 18 to 21, an outer casing 21 may be provided on the outer side of the water tank 2A to form a double water tank structure, so the inner water tank 2A of the double water tank structure can be used to store water and the outer casing 21 of the double water tank structure can be used to arrange with electronic equipment. In this way, the toilet with said double water tank structure can present an integrated visual beauty and avoid electronic parts and flushing pipe 20 directly exposed to the outside and affect the beauty of the toilet.

**[0020]** As shown in FIGS. 13, 14, 22 and 23, when a user on the toilet, the sensor 11 will detect the user. The control system 10 will drive the electric valve 12 to perform flushing operation according to the signal sent by the sensor 11 after the user leaves the toilet, so as to achieve the automatic flushing effect of the toilet.

**[0021]** In summary, the smart automatic flush toilet construction of this invention can arrange an automatic flushing module on various toilets with a water tank or without a water tank (including seated toilets, squatting pans, etc.), and can realize automatic flushing function on various toilets. The construction or installation of this invention is very easy, the old toilet can be directly transformed into a smart automatic flush toilet through the replacement of the flushing pipe of the toilet, and the purpose of water saving can be achieved through the control of the flushing amount. In addition, the present invention can use a dual-channel shunting pipe to make the toilet have the functions of automatic flushing and manual flushing, so that the user can safely go to the toilet in the event of a power outage, to improve the convenience of users using the toilet in various situations. Evidently this invention has tangible benefits and tallies

with progressiveness and novelty demanded by patent laws.

**[0022]** While the preferred embodiments of this invention have been described above, it will be recognized and understood that various modifications may be made therein and appended claims are intended to cover all such modifications that may fall within the spirit and scope of the invention.

## Claims

1. A smart automatic flush toilet construction at least comprising:  
an automatic flushing module, which is arranged on a flushing pipe of a toilet, said automatic flushing module is provided with a control system, an sensor and an electric valve, said control system is connected to said sensor and said electric valve; said electric valve is provided with a valve and a power motor, said valve is mounted on the flushing pipe of the toilet, said power motor is connected to said valve to provide the power for driving the valve, so the electric valve can control the flushing operation of the flushing pipe.
2. The smart automatic flush toilet construction according to claim 1, wherein said automatic flushing module is provided with a dual-channel shunting pipe, said dual-channel shunting pipe is mounted on the flushing pipe of the toilet, said dual-channel shunting pipe is provided with a first pipe and a second pipe, said valve of electric valve is mounted on the first pipe, and said second pipe is provided with a manual valve, so that said dual-channel shunting pipe can have the functions of automatic flushing and manual flushing.
3. The smart automatic flush toilet construction according to claim 1, wherein said toilet having a water tank, said automatic flushing module is provided with a dual-channel shunting pipe which is arranged under the water tank, said dual-channel shunting pipe is provided with a first pipe and a second pipe, the lower ends of said first pipe and second pipe are connected to said flushing pipe of toilet, said valve of electric valve is mounted on the first pipe; said water tank is provided with a manual valve, said second pipe is interconnected with said manual valve of water tank, the flushing operation of the flushing pipe can be manually controlled through the manual valve of the water tank, so that said dual-channel shunting pipe can have the functions of automatic flushing and manual flushing.
4. The smart automatic flush toilet construction according to claim 1, wherein said toilet having a water tank, said automatic flushing module is provided with a

dual-channel shunting pipe which is arranged under the water tank, said dual-channel shunting pipe is provided with a first pipe and a second pipe, the lower ends of said first pipe and second pipe are connected to said flushing pipe of toilet, said valve of electric valve is mounted on the first pipe; said second pipe is provided with a manual valve, the flushing operation of the flushing pipe can be manually controlled through the manual valve of the second pipe, so that said dual-channel shunting pipe can have the functions of automatic flushing and manual flushing.

5. The smart automatic flush toilet construction according to claim 1, wherein said toilet having a water tank, said automatic flushing module is provided with a dual-channel shunting pipe which is arranged on said flushing pipe of toilet, said dual-channel shunting pipe is provided with a first pipe and a second pipe, said valve of electric valve is mounted on the first pipe; said second pipe is provided with a manual valve, the flushing operation of the flushing pipe can be manually controlled through the manual valve of the second pipe, so that said dual-channel shunting pipe can have the functions of automatic flushing and manual flushing.
6. The smart automatic flush toilet construction according to claim 3, 4 and 5, wherein an outer casing is provided on the outer side of said water tank to form a double water tank structure, so the inner water tank of the double water tank structure can be used to store water and the outer casing of the double water tank structure can be used to arrange with electronic equipment; in this way, the toilet with said double water tank can present an integrated visual beauty and avoid electronic parts and flushing pipe directly exposed to the outside and affect the beauty of the toilet.
7. The smart automatic flush toilet construction according to claim 1, wherein said control system is provided with a timer, so that said electric valve can accurately control the opening and closing time of the valve and control the amount of flushing.
8. The smart automatic flush toilet construction according to claim 1, wherein said sensor may be one of an infrared sensor, an ultrasonic sensor, or a radar sensor.
9. The smart automatic flush toilet construction according to claim 1, wherein said valve may be a ball valve, a plate valve, half-column valve or full-column valve.
10. The smart automatic flush toilet construction according to claim 1, wherein said automatic flushing module is provided with a plurality of sensors to detect a plurality of different directions, respectively.

Amended claims in accordance with Rule 137(2) EPC.

1. A smart automatic flush toilet construction at least comprising:

an automatic flushing module, which is arranged on a flushing pipe of a toilet, said automatic flushing module is provided with a control system, an sensor and an electric valve, said control system is connected to said sensor and said electric valve; said electric valve is provided with a valve and a power motor, said valve is mounted on the flushing pipe of the toilet, said power motor is connected to said valve to provide the power for driving the valve, so the electric valve can control the flushing operation of the flushing pipe;

wherein said automatic flushing module is provided with a dual-channel shunting pipe, said dual-channel shunting pipe is mounted on the flushing pipe of the toilet, said dual-channel shunting pipe is provided with a first pipe and a second pipe, said valve of electric valve is mounted on the first pipe, and said second pipe is provided with a manual valve, so that said dual-channel shunting pipe can have the functions of automatic flushing and manual flushing.

2. A smart automatic flush toilet construction at least comprising:

an automatic flushing module, which is arranged on a flushing pipe of a toilet, said automatic flushing module is provided with a control system, an sensor and an electric valve, said control system is connected to said sensor and said electric valve; said electric valve is provided with a valve and a power motor, said valve is mounted on the flushing pipe of the toilet, said power motor is connected to said valve to provide the power for driving the valve, so the electric valve can control the flushing operation of the flushing pipe;

wherein said toilet having a water tank, said automatic flushing module is provided with a dual-channel shunting pipe which is arranged under the water tank, said dual-channel shunting pipe is provided with a first pipe and a second pipe, the lower ends of said first pipe and second pipe are connected to said flushing pipe of toilet, said valve of electric valve is mounted on the first pipe; said water tank is provided with a manual valve, said second pipe is interconnected with said manual valve of water tank, the flushing operation of the flushing pipe can be manually controlled through the manual valve of the water tank, so that said dual-channel shunting pipe can have the functions of automatic flushing and

manual flushing.

- 3. A smart automatic flush toilet construction at least comprising:

an automatic flushing module, which is arranged on a flushing pipe of a toilet, said automatic flushing module is provided with a control system, an sensor and an electric valve, said control system is connected to said sensor and said electric valve; said electric valve is provided with a valve and a power motor, said valve is mounted on the flushing pipe of the toilet, said power motor is connected to said valve to provide the power for driving the valve, so the electric valve can control the flushing operation of the flushing pipe;

wherein said toilet having a water tank, said automatic flushing module is provided with a dual-channel shunting pipe which is arranged under the water tank, said dual-channel shunting pipe is provided with a first pipe and a second pipe, the lower ends of said first pipe and second pipe are connected to said flushing pipe of toilet, said valve of electric valve is mounted on the first pipe; said second pipe is provided with a manual valve, the flushing operation of the flushing pipe can be manually controlled through the manual valve of the second pipe, so that said dual-channel shunting pipe can have the functions of automatic flushing and manual flushing.

- 4. A smart automatic flush toilet construction at least comprising:

an automatic flushing module, which is arranged on a flushing pipe of a toilet, said automatic flushing module is provided with a control system, an sensor and an electric valve, said control system is connected to said sensor and said electric valve; said electric valve is provided with a valve and a power motor, said valve is mounted on the flushing pipe of the toilet, said power motor is connected to said valve to provide the power for driving the valve, so the electric valve can control the flushing operation of the flushing pipe;

wherein said toilet having a water tank, said automatic flushing module is provided with a dual-channel shunting pipe which is arranged on said flushing pipe of toilet, said dual-channel shunting pipe is provided with a first pipe and a second pipe, said valve of electric valve is mounted on the first pipe; said second pipe is provided with a manual valve, the flushing operation of the flushing pipe can be manually controlled through the manual valve of the second pipe, so that said dual-channel shunting pipe can have the func-

tions of automatic flushing and manual flushing.

- 5. The smart automatic flush toilet construction according to claim 2, 3 or 4, wherein an outer casing is provided on the outer side of said water tank to form a double water tank structure, so the inner water tank of the double water tank structure can be used to store water and the outer casing of the double water tank structure can be used to arrange with electronic equipment; in this way, the toilet with said double water tank can present an integrated visual beauty and avoid electronic parts and flushing pipe directly exposed to the outside and affect the beauty of the toilet.
- 6. The smart automatic flush toilet construction according to claim 1, 2, 3 or 4, wherein said control system is provided with a timer, so that said electric valve can accurately control the opening and closing time of the valve and control the amount of flushing.
- 7. The smart automatic flush toilet construction according to claim 1, 2, 3 or 4, wherein said sensor may be one of an infrared sensor, an ultrasonic sensor, or a radar sensor.
- 8. The smart automatic flush toilet construction according to claim 1, 2, 3 or 4, wherein said valve may be a ball valve, a plate valve, half-column valve or full-column valve.
- 9. The smart automatic flush toilet construction according to claim 1, 2, 3 or 4, wherein said automatic flushing module is provided with a plurality of sensors to detect a plurality of different directions, respectively.

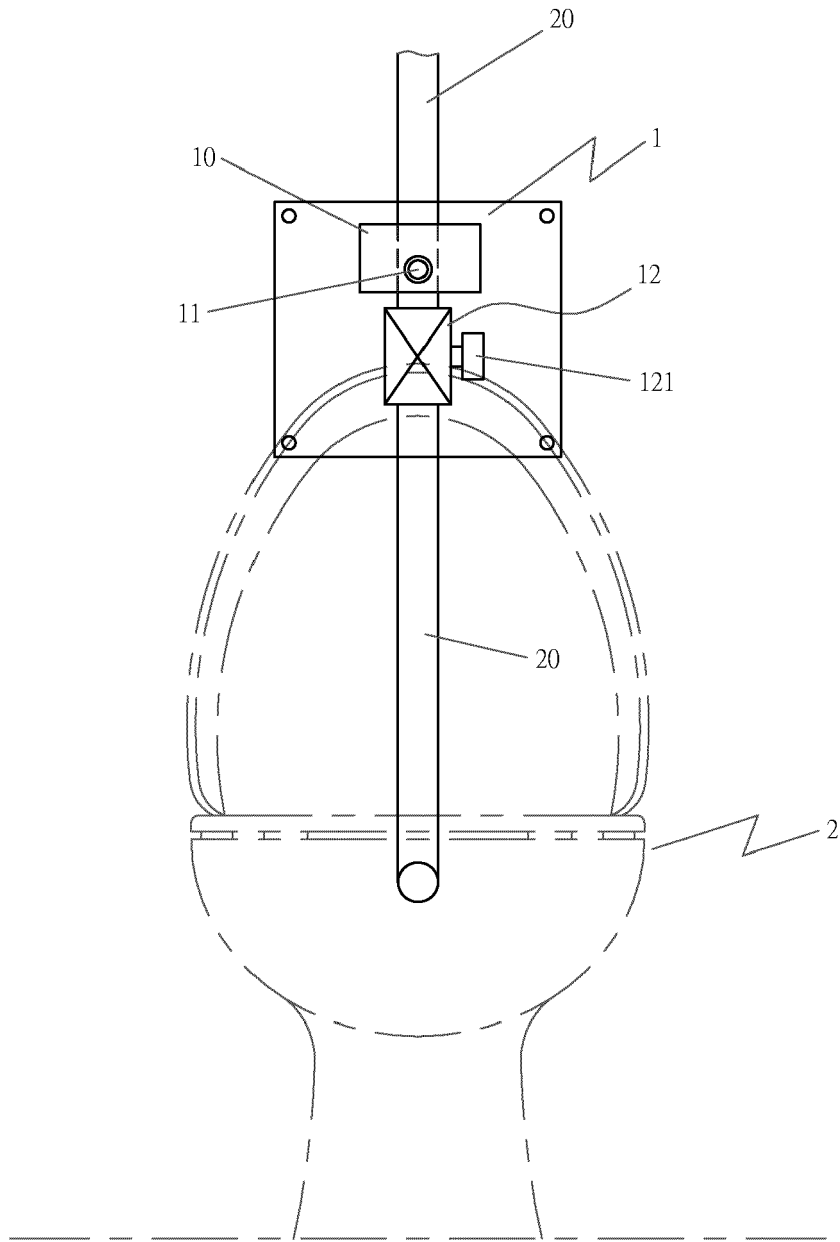


FIG 1

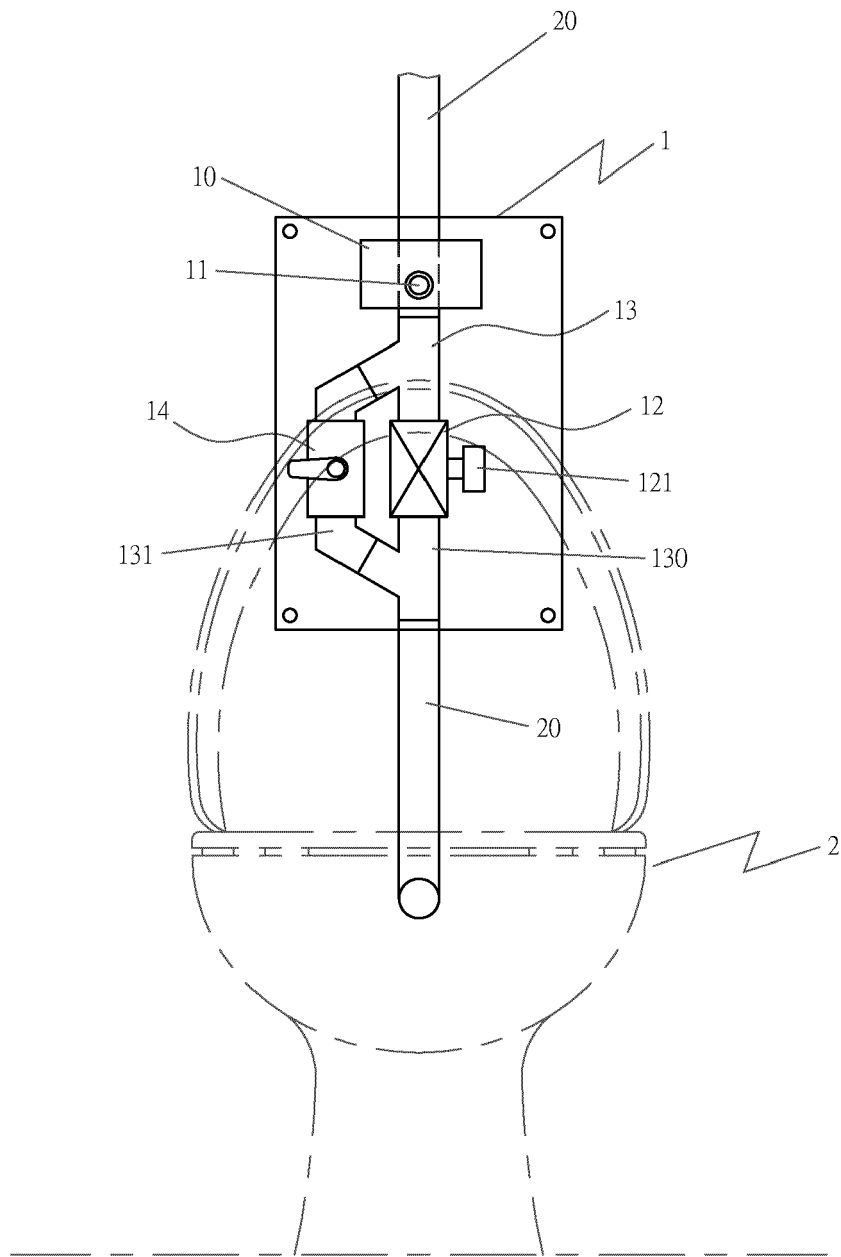


FIG 2



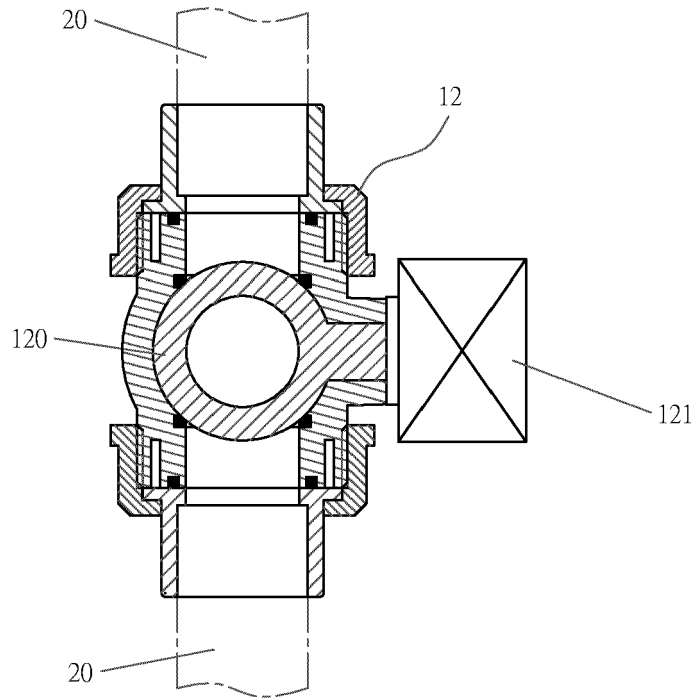


FIG 4

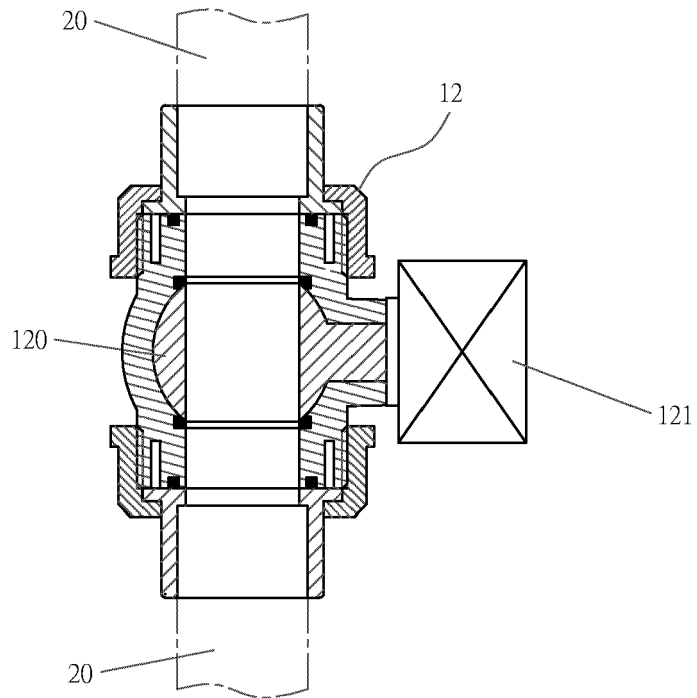


FIG 5

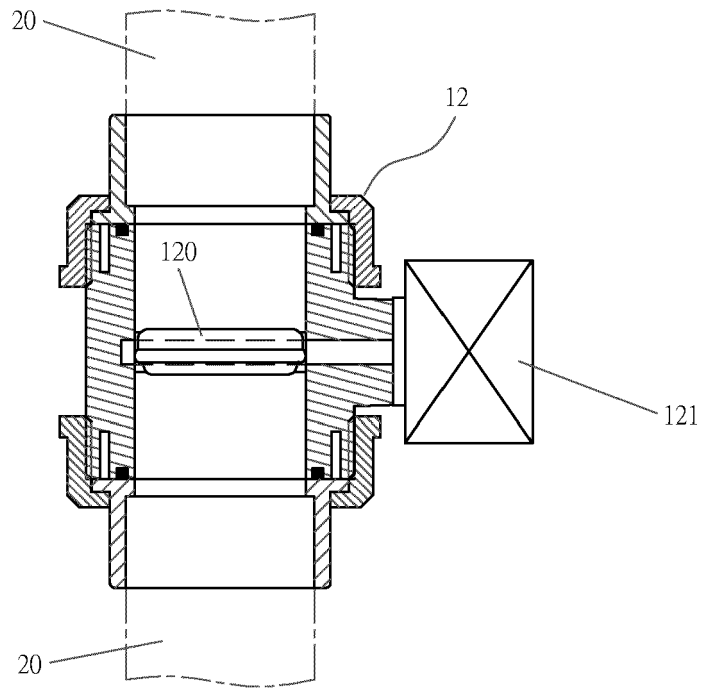


FIG 6

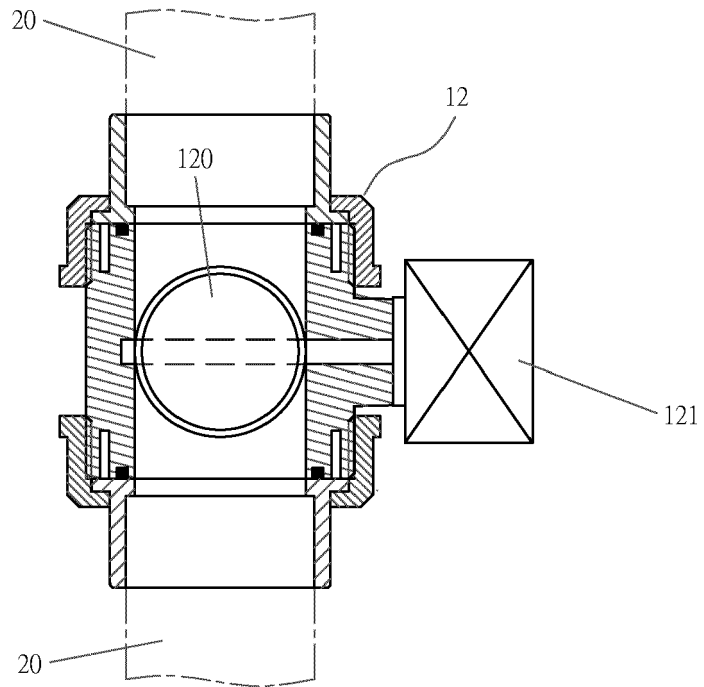


FIG 7

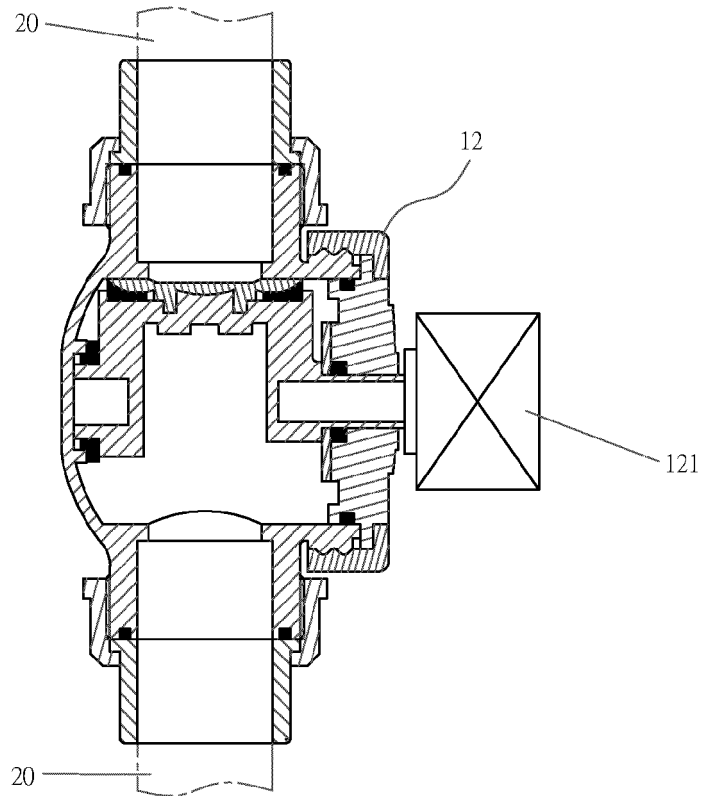


FIG 8

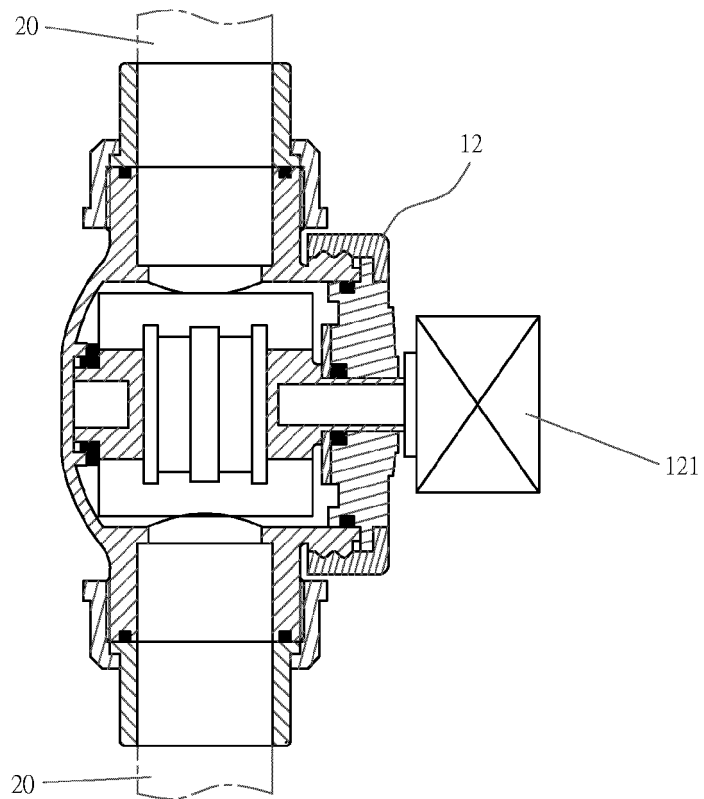


FIG 9

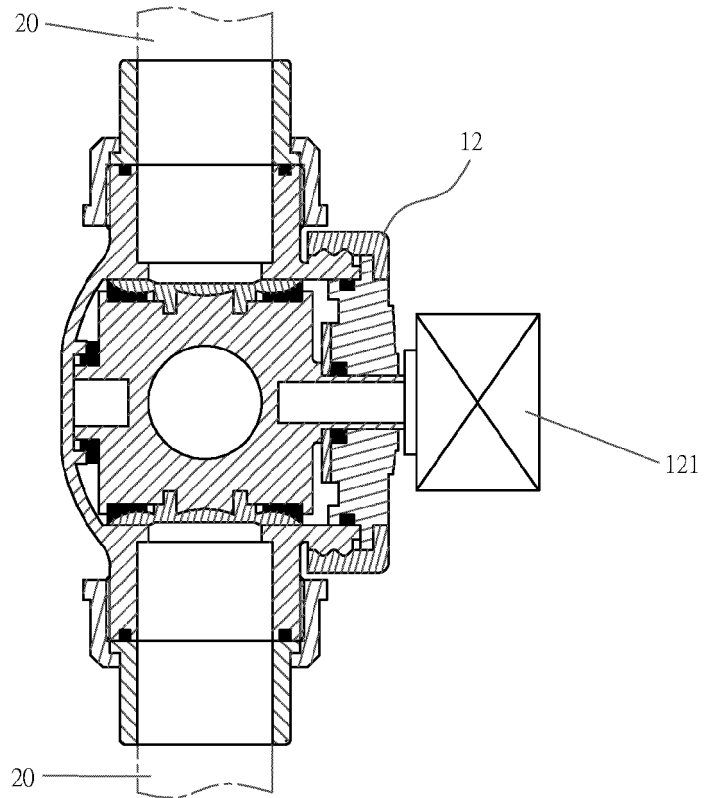


FIG 10

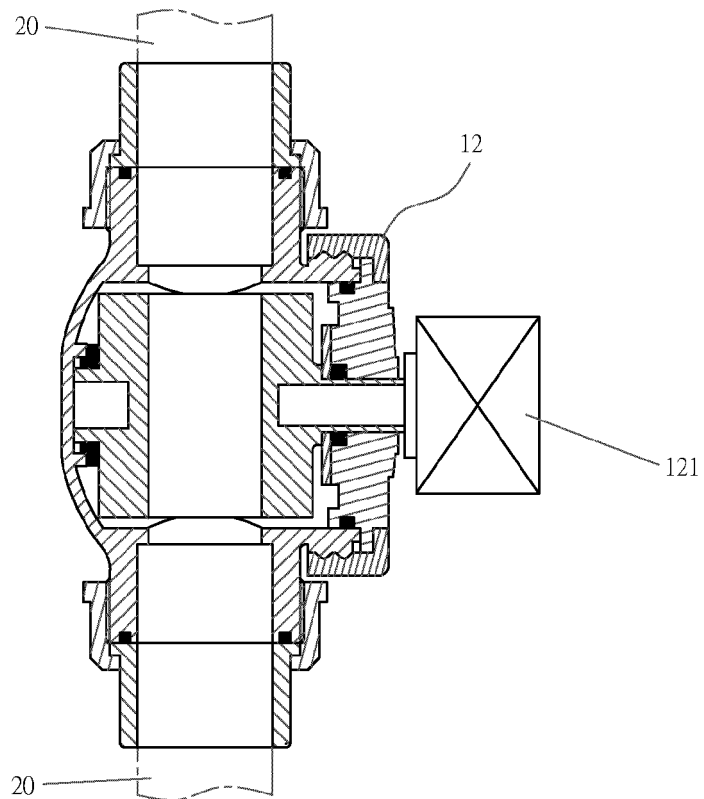


FIG 11

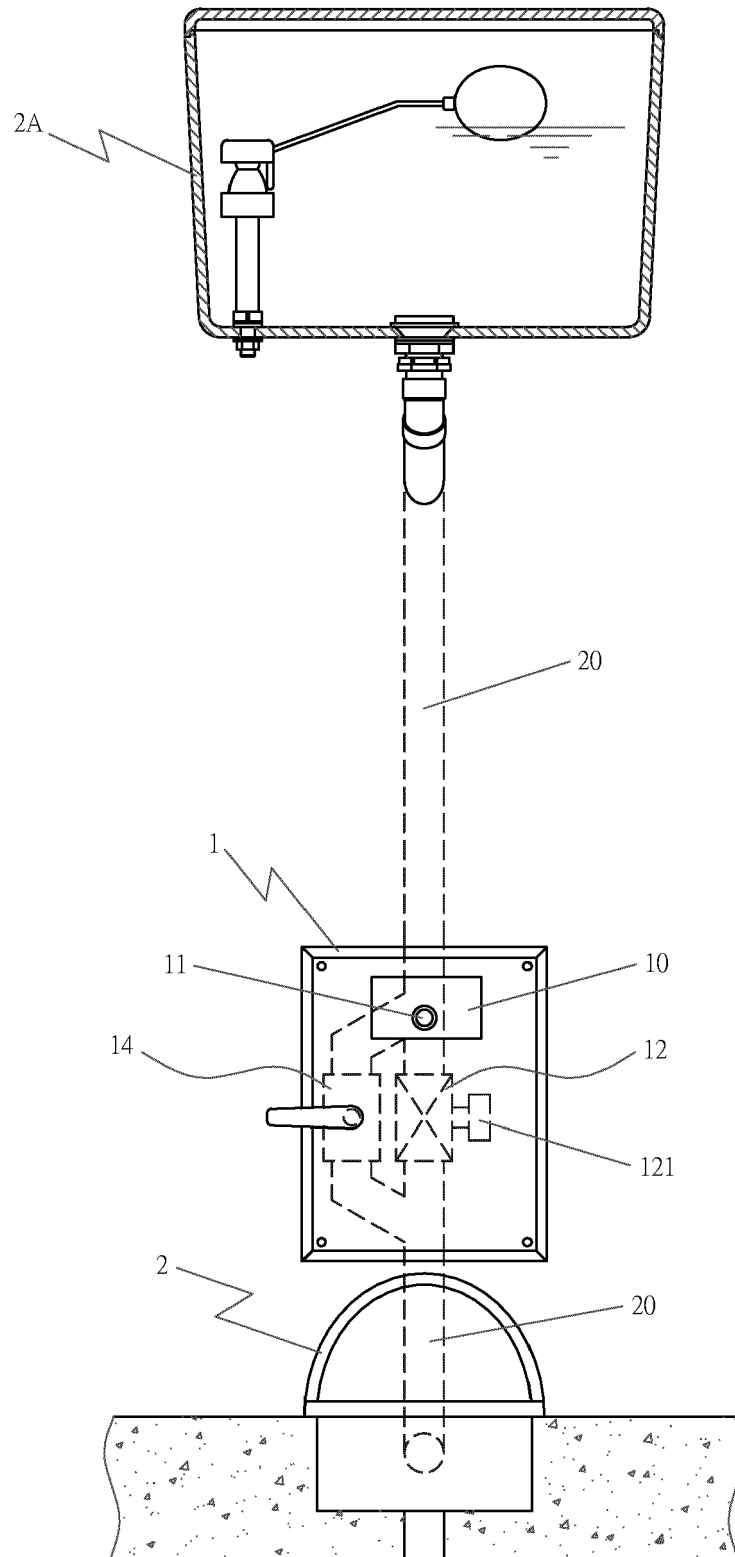


FIG 12

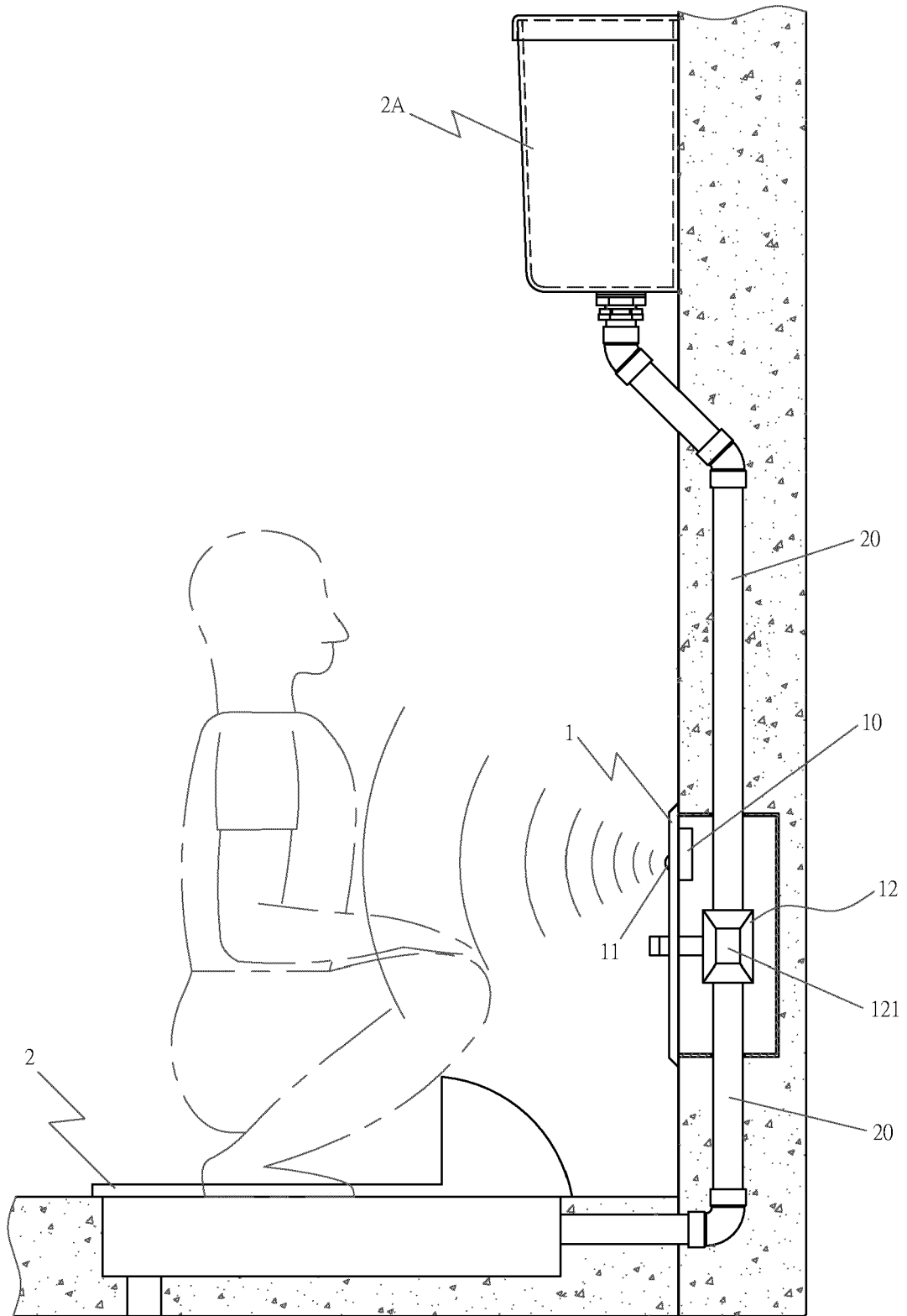


FIG 13

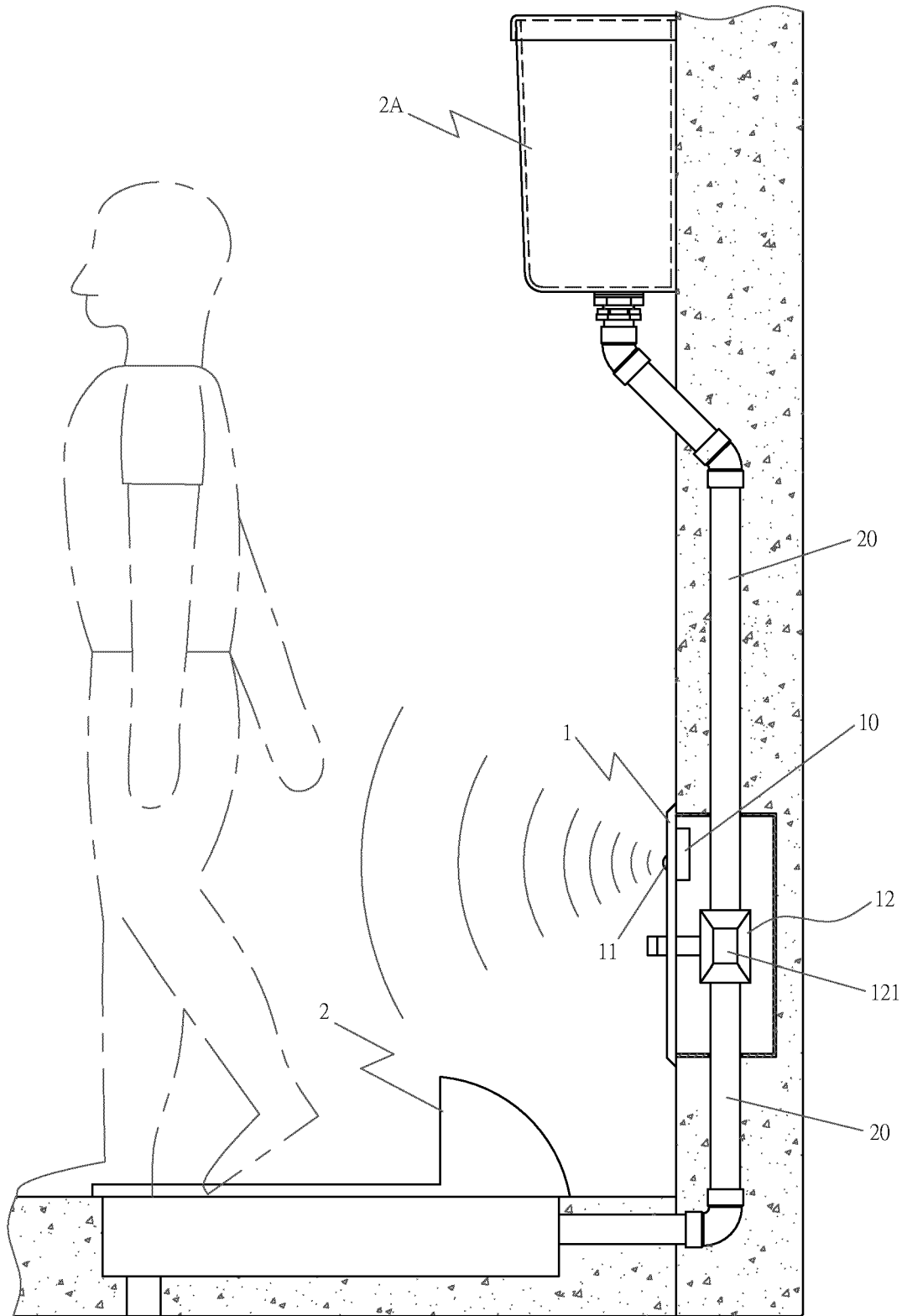


FIG 14

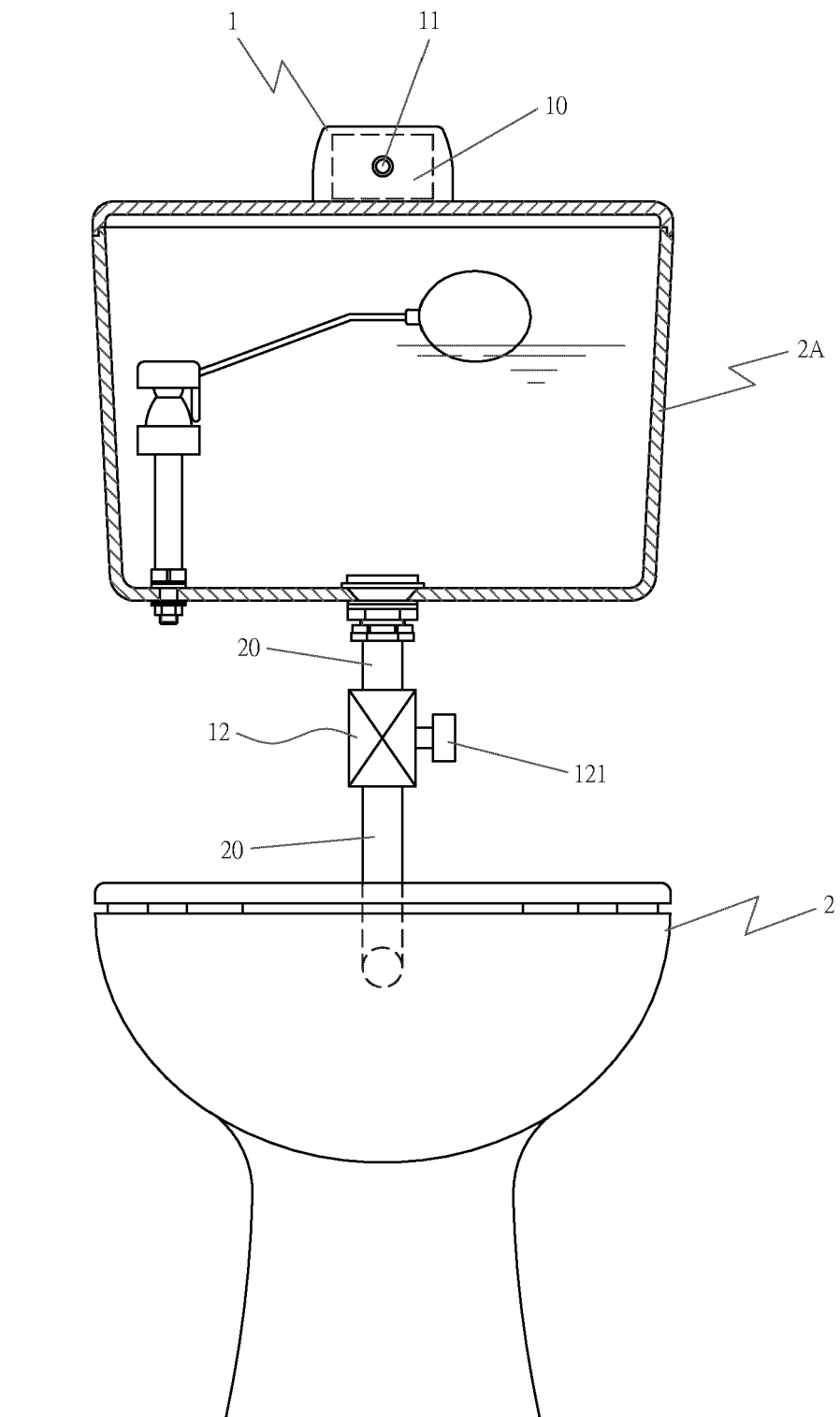


FIG 15

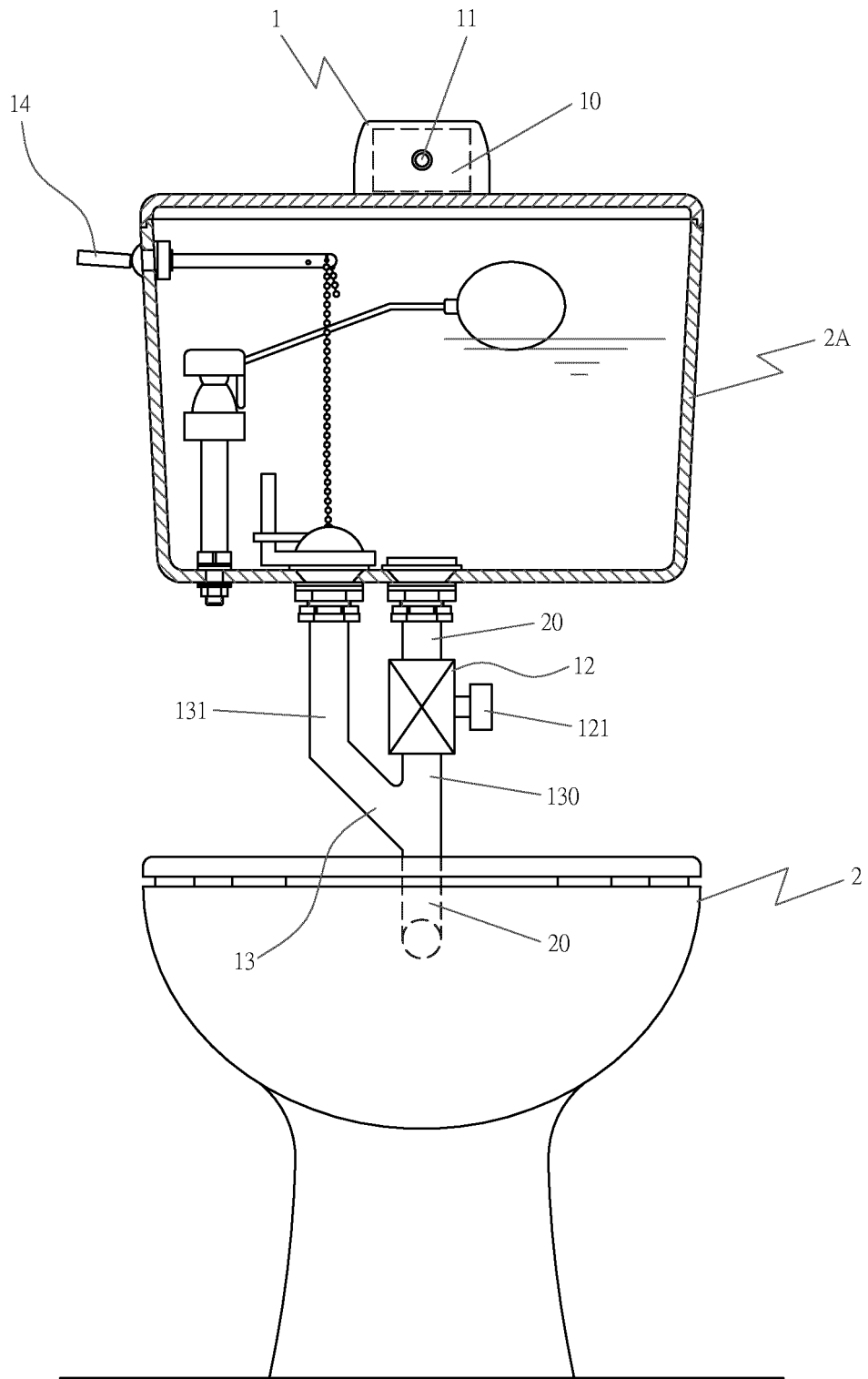


FIG 16

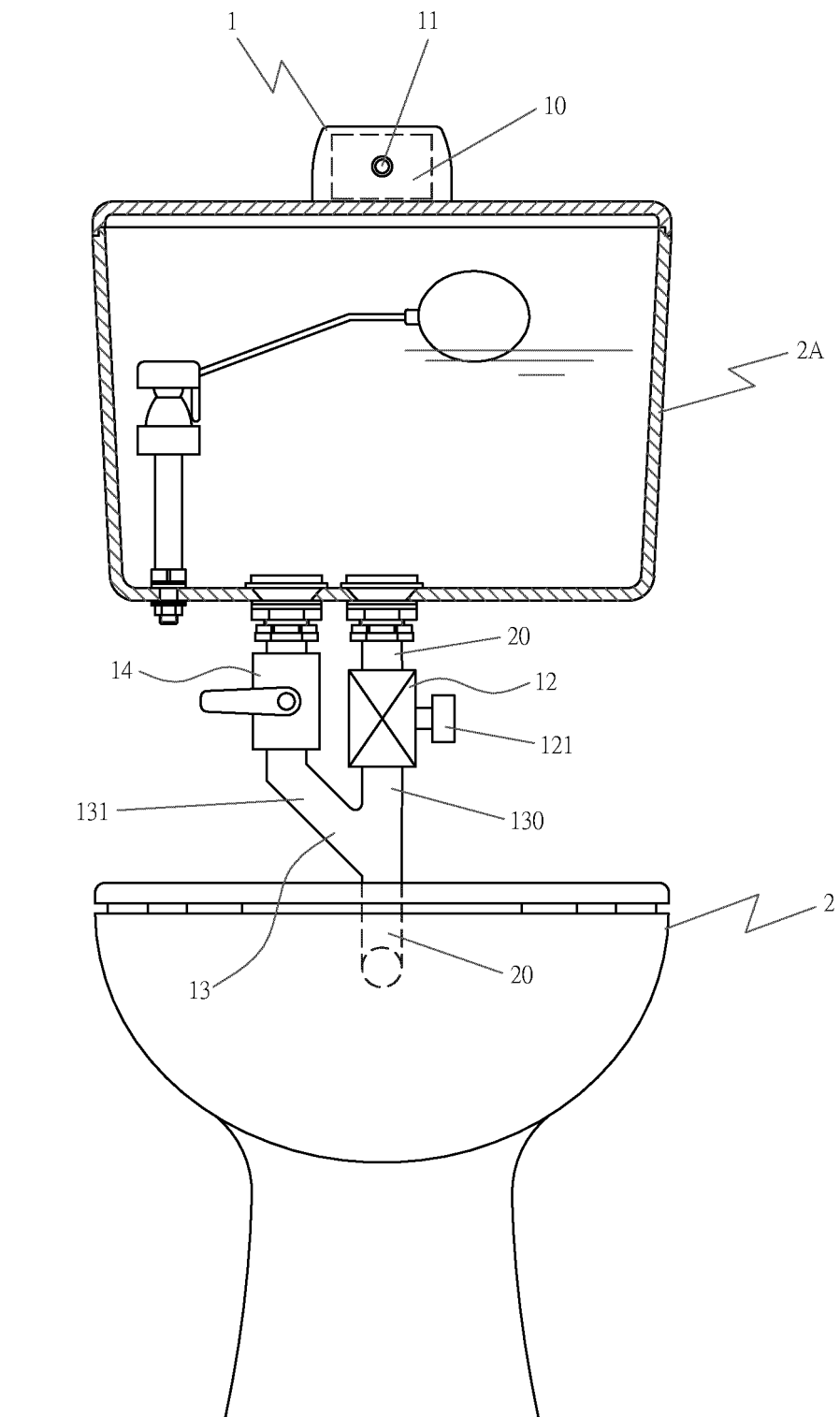


FIG 17

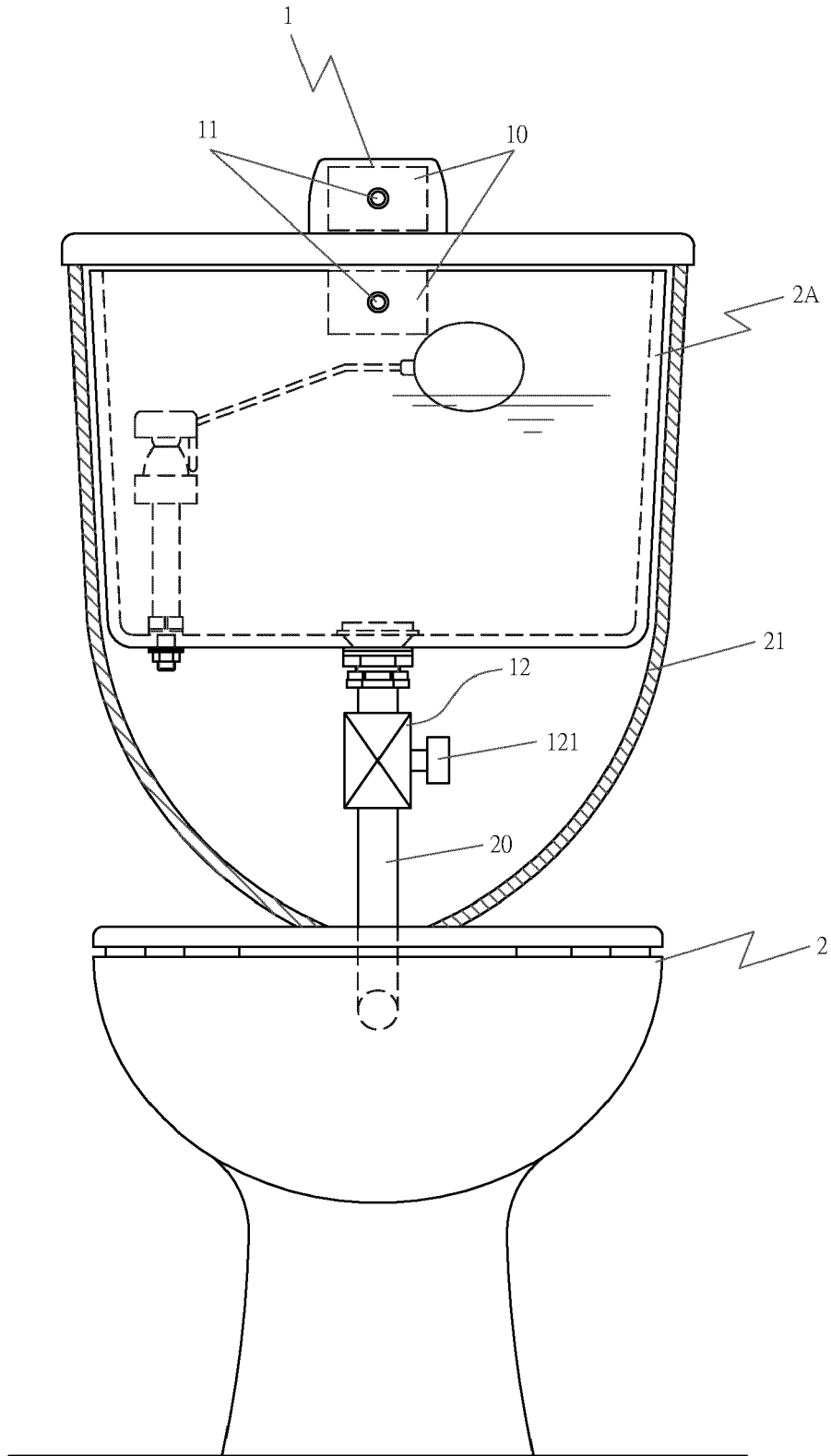


FIG 18

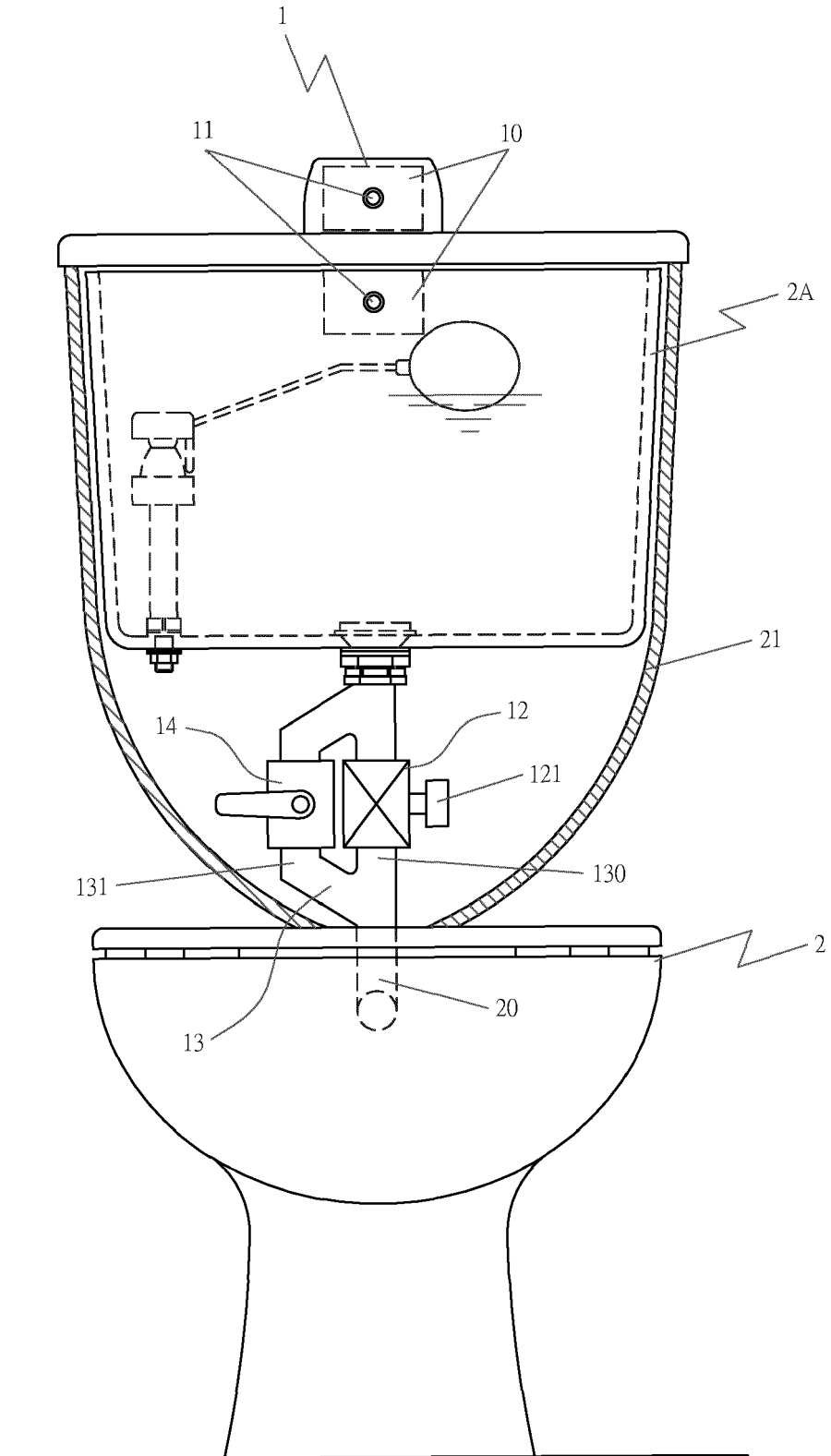


FIG 19

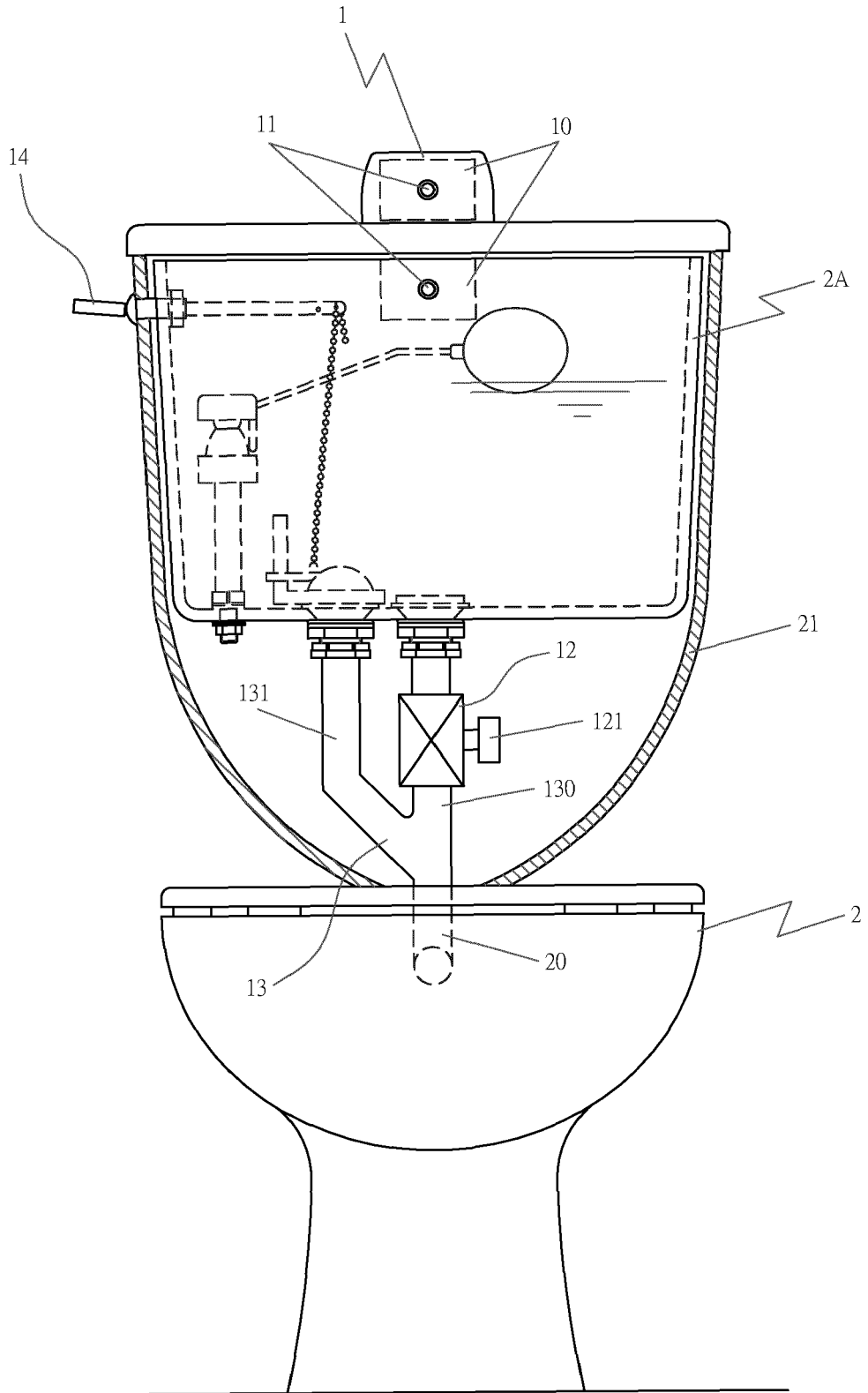


FIG 20

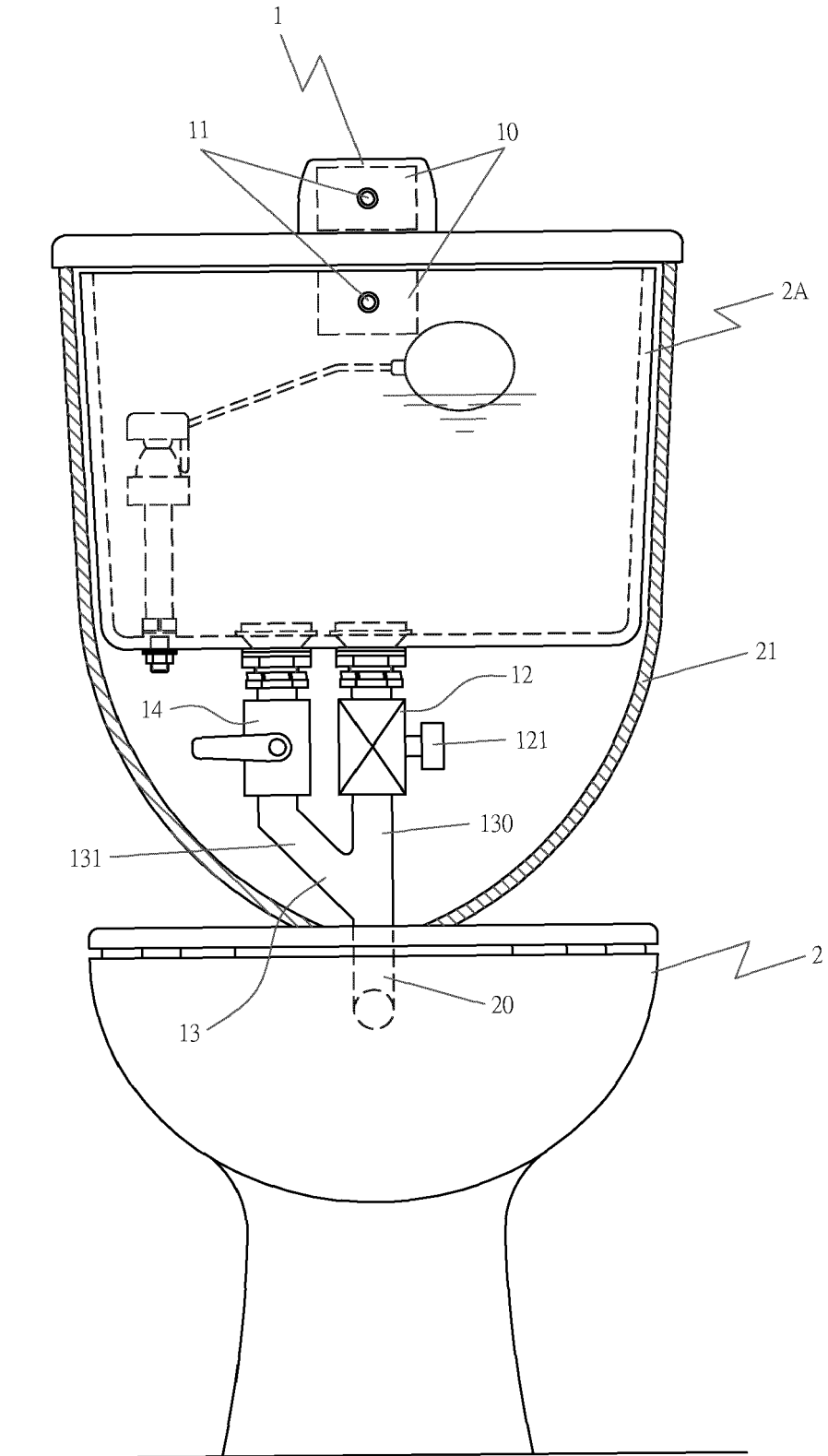


FIG 21

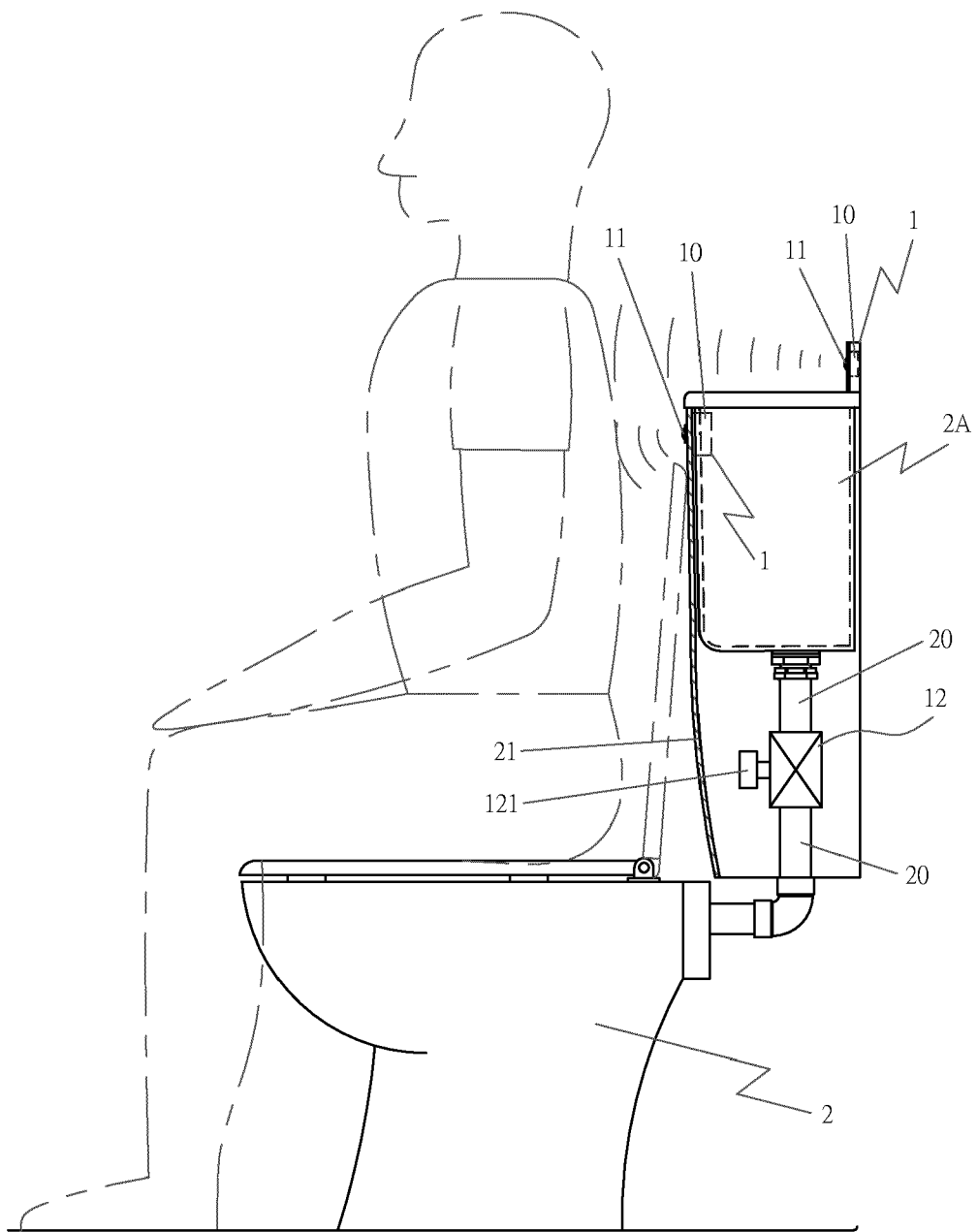


FIG 22





EUROPEAN SEARCH REPORT

Application Number  
EP 20 15 1145

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| DOCUMENTS CONSIDERED TO BE RELEVANT  |   |  |   |
|--|---|--|---|
| Category   | Citation of document with indication, where appropriate, of relevant passages   | Relevant to claim                                      | CLASSIFICATION OF THE APPLICATION (IPC) |
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