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(54) Title: INTERMITTENT MODULE TO PREVENT BACK SUCTION OF WATER FROM THE BOWL OF A TOILET WITH PRESSURE FLUSH AND A TOILET WITH PRESSURE FLUSHING AND WITH AN INTERMITTENT MODULE

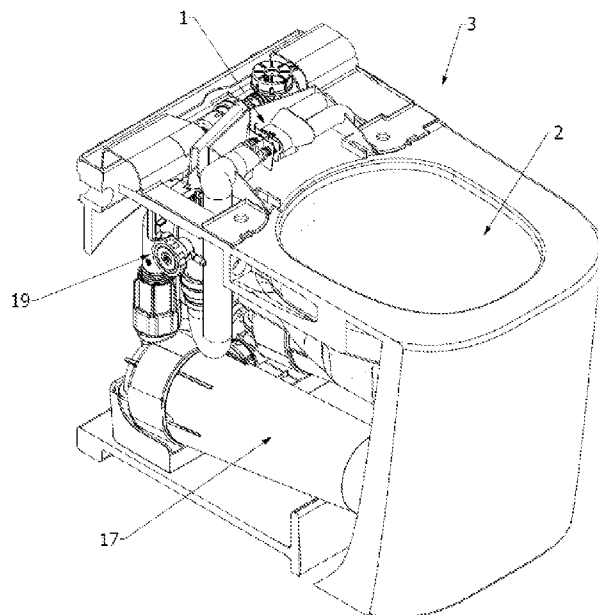


Fig. 2

(57) Abstract: The intermittent module (1) is used to prevent the suction of contaminated water from the toilet bowl (2) of a toilet (3) with a pressure flushing. The intermittent module (1) is arranged downstream of the flushing valve (19) of the toilet (3) with pressure flushing. Preferably, the intermittent module (1) is provided with a rectifier (11) of the targeted stream which helps the accelerated flushing water to more efficiently cross the safety air gap without compromising the safety function of the intermittent module (1).



Intermittent module to prevent back suction of water from the bowl of a toilet with pressure flush and a toilet with pressure flushing and with an intermittent module

Field of the Invention

The invention relates to the field of secure operation of toilets having a pressure flush to accelerate the flushing water, in order to prevent contaminated water from the toilet bowl from being sucked back into the water supply line through which the water is fed to the toilet.

Background of the Invention

According to the European standard EN 1717 in force at the date of filing of the present application, manufacturers of sanitary equipment are obliged to prevent the risk of contamination of drinking water in drinking water mains by Class 5 liquids, i.e. water from flushing toilets, caused by the back suction of toilet water into the water supply line. The objective of the regulation under the standard is to prevent penetration of pathogenic micro-organisms from toilet water into the water supply lines. The EN 1717 standard presents a range of sanitary technology, but for this application Group A Type D - relating to free-flow with injector - is relevant.

Water back suction interrupters are known to be used to prevent water back suction into water mains. An example of such a solution is the invention of CN U206809880. The principle of the interrupter is to introduce an air gap according to the standard into the stream of the supplied water. As long as the water is flowing in the correct direction, the interrupters are inactive and the air gap does not appear, but as soon as the flow of the incoming water is reversed, the air from the air gap replaces the reversed flow of water, thus preventing the water from the toilet bowl from being sucked in, as there is a loss of vacuum in the section between the interruptor and the water outlet to the toilet bowl.

Nowadays, toilets with a pressure flush are known, the principle of which is to improve the flushing of the bowl by means of acceleration of the flushing water, i.e. by means of flushing

water with added kinetic energy, or by means of flushing water with a so-called shock wave. An exemplary example is the invention of document EP B3294963, or the invention of document US2019 /330831 A1. The added energy is transferred to the water by a so-called air accumulator, in which air is compressed and whose energy is transferred to the flushing water during flushing. Air accumulators do not need an additional energy source, as they use the energy from the water pressure of the water line to compress the air.

Unfortunately, the existing interruptors of back suction, limit the transfer of energy from the water supply line to the air accumulators significantly due to their design, thus limiting the use of toilet with the pressure flushing or reducing their efficiency below the permissible limit.

It is an object of the invention to provide an intermittent module which would protect the water supply line from back suction of water from the bowl of a toilet with a pressure flush, and which would have a minimized effect on the efficiency of the toilet with pressure flushing, it is further an object of the invention to provide a toilet with a pressure flushing fitted with the intermittent module according to the invention.

The summary of the invention

This object is solved by means of an intermittent module formed according to the invention described below.

The intermittent module is used to prevent back suction of water from the toilet bowl with a pressure flush to accelerate the flushing water. The subject matter of the invention consists in that the intermittent module comprises an inlet section and an outlet outlet section. The inlet section has an inlet for the accelerated flushing water and at least one outlet nozzle for targeting the stream of the accelerated flushing water. The outlet section has at least one opening for receiving the targeted stream of accelerated flushing water from the outlet nozzle and at least one connection for connecting the outlet of the accelerated flushing water to the toilet bowl. At the same time, an air gap is provided between the outlet nozzle and the opening.

The purpose of the invention is to interrupt the line of accelerated flushing water, so that if the flow is reversed, water from the toilet bowl is not sucked into the water supply line. This is achieved by creating an air gap. In order for the accelerated flushing water to overcome the gap, a targeted stream must be created by the outlet nozzle to overcome the safety air gap, whereupon the accelerated flushing water continues through the outlet section of the intermittent module. The targeted stream reaches the outlet section of the intermittent module via the opening for receiving the targeted stream. If the flow is reversed, the opening does not create any flow, but instead air is sucked through the outlet nozzle, thus protecting the water line from contamination. As for the accelerated flushing water, after the first injection of the accelerated flushing water into the outlet section of the intermittent module, a so-called siphon effect occurs due to the pressures present in the water in the outlet section, whereby the outlet section tends to suck the incoming accelerated flushing water through the opening for receiving the targeted water stream. Thus, the energy loss of the accelerated flushing water is at an acceptable level.

Preferably, at least one distributor of the accelerated flushing water may be integrated in the inlet section between the inlet for accelerated flushing water and the at least two outlet nozzles to distribute the accelerated flushing water to the individual outlet nozzles. If the intermittent module is intended for deployment in toilets with multiple injection nozzles of accelerated flushing water into the toilet bowl, this embodiment of the invention is highly advantageous.

In another preferred embodiment of the invention, the intermittent module comprises at least one rectifier for directing the targeted stream of accelerated flushing water arranged in the air gap. Although the outlet nozzle produces a targeted stream of water, it is relatively common for the streamlines in the targeted stream of water to have a diverging behavior that causes energy and water loss in the gap region. With a rectifier, these losses are minimized without compromising the safety function of the air gap.

Preferably, the embodiment of the invention is one in which the rectifier comprises a through conical ribbed body with annular ribs, the narrower base of which is inverted towards the outlet nozzle, while the wider base of which faces the opening for receiving the targeted stream of accelerated flushing water. The deformation of the targeted stream increases with the increasing

distance from the outlet nozzle, and therefore the expanding conical shape directs the gradually expanding streamline towards the opening. In addition, it is advantageous that the gaps between the annular ribs do not impede air access in the event of flow reversal, so that the function of the air gap is not limited. At the same time, the rectifier is provided with at least one shield for catching and diverting the sprayed flushing water away from the conical ribbed body. This is advantageous for the reason that there is a slight loss of energy in the rectification of the targeted flow, which is manifested by a squirt of water. This water needs to be captured and drained properly.

Preferably, the shield is arranged perpendicularly to the targeted stream of accelerated flushing water so that as many of the departing water droplets as possible adhere to the shield.

Advantageously, at least some of the annular ribs are beveled towards the targeted stream of water from their outer circumference towards their inner circumference. The bevel of the annular ribs creates a funnel shape that "smooths" the targeted stream, thereby reducing the streamlines' divergence, thereby maintaining the stream targeting, which then results in a better siphon effect at the outlet section of the intermittent module.

In an advantageous embodiment of the rectifier of the intermittent module, at least one annular rib is provided with an elastic O-ring having a diameter corresponding to the diameter of the targeted stream of the accelerated flushing water with a diameter deviation of up to $\pm 10\%$. The added O-ring directs the targeted stream, but due to its elasticity it is at the same time pliable so as not to deform the targeted stream.

In another preferred embodiment of the rectifier of the intermittent module, the annular ribs are made of elastic material. The elastic ribs direct the targeted stream which, by its energy, deflects the ribs from their resting position, thereby reducing the gaps between the ribs for air entrainment and improving energy conservation in the accelerated flushing water. If there is a flow fault, the elastic ribs will return to their rest position, and if the stream is reversed, the elastic ribs will expand due to elasticity and the flowing air, so that the sucked air has less resistance.

The intermittent module may preferably have a rectifier designed differently. The preferably designed rectifier comprises at least two concentric rectifying tubular elements telescopically arranged relative to each other for an extended state when the targeted stream is flowing correctly and for a retracted state when the targeted stream is not flowing correctly. The advantage of this embodiment is that, if the targeted stream is as it should be, it is rectified, almost as if the air gap did not exist, on the other hand, if the correct stream is not present, then, due to the fact that the rectifier is provided with at least one means for setting the retracted state of the rectifying tubular elements as the default state of the rectifier, the air gap is ready to prevent an accident by sucking air instead of water from the toilet bowl.

Preferably, the means for setting the retracted state of the rectifier as the default state comprises a spring. The spring is strong enough to keep the rectifier in the retracted state in the default state, but at the same time is not too strong so that the water stream can "pull" the rectifier down and out of the retracted state under the flow time of the targeted stream.

Preferably, the intermittent module is provided with a splash water collection vessel arranged in the area below the inlet section, the outlet section and the air gap. The escaped water drops by gravity into the collection vessel. It is advantageous if the collection vessel is provided with at least one drain for the collected water into the toilet bowl.

The invention also includes a toilet with pressure flushing for accelerating flushing water, the toilet substantially comprising a connection to a water supply line, further comprising at least one reservoir of pressurized flushing water connected to the connection, further comprising a flushing valve connected to the reservoir of the pressurized flushing water, further comprising at least one injection nozzle which is connected to the flushing valve via the accelerated flushing water line for injecting the accelerated flushing water into the toilet bowl, and last but not least the toilet bowl.

The subject matter of the invention is that the intermittent module interrupts the water line of the accelerated flushing water between the flushing valve and the injection nozzle, wherein the water line downstream of the flushing valve is connected to the inlet of the inlet section of the

intermittent module and at the same time the water line of the flushing water upstream of the injection nozzle is connected to the connection of the outlet section of the intermittent module. Such an arrangement of the intermittent module downstream of the flushing valve is important to allow the reservoir of the pressurized water to collect energy from the water pressure in the water supply line.

It is preferable if the intermittent module is placed in the toilet with pressure flushing in a horizontal position. The horizontal position is most advantageous because of the siphon effect in the outlet section of the module. In addition, it is also practical in terms of the design of the entire toilet with pressure flushing because it is the least space-consuming.

Last but not least, it is advantageous if the collection vessel of the intermittent module is arranged at the upper edge of the toilet bowl. Due to the dripping of water into the container, it is advantageous that it is accessible for regular cleaning.

Advantages of the invention include the possibility of its use in toilets with pressure flush, because although the invention allows for the physical interruption of the water line to prevent the suction of contaminated water, the invention also minimizes the energy loss of the accelerated flushing water. The invention is simple in design and therefore easy and not too economically expensive to deploy in new products. The intermittent module can be easily cleaned and serviced.

Brief description of the drawings

The present invention will be explained in more detail in the following drawings, where:

Figure 1 shows a partially open model of a toilet with pressure flushing with an intermittent module according to the invention,

Figure 2 shows an open model of a toilet with pressure flushing with an intermittent module according to the invention,

- Figure 3 shows a top view of a model of an intermittent module installed on a toilet with pressure flushing,
- Figure 4 shows a model of a rectifier consisting of a conical ribbed body,
- Figure 5 shows a section through the model of a rectifier according to Fig. 4,
- Figure 6 shows a model of a rectifier consisting of a conical ribbed body and fitted with elastic O-rings,
- Figure 7 shows a schematic drawing of a rectifier with elastic annular ribs,
- Figure 8 shows the principle of the function of the rectifier according to Fig. 7,
- Figure 9 shows a model of a rectifier consisting of a telescopic arrangement of concentric tubular elements,
- Figure 10 shows a section through the model in Fig. 9,
- Figure 11 shows a section through the model of the intermittent module with the rectifier extended according to the model in Fig. 9,
- Figure 12 shows a section through the model of the intermittent module with a retracted rectifier according to the model in Fig. 9,
- Figure 13 shows the wiring diagram of the intermittent module for a toilet with pressure flushing.

Preferred embodiments of the invention

It shall be understood that the specific embodiments of the invention described and illustrated hereinafter are presented for purposes of illustration and not as a limitation of the invention to the examples provided. Those skilled in the art will find or be able to provide, using routine experimentation, a greater or lesser number of equivalents to the specific embodiments of the invention described herein.

Figure 1 shows a model of a toilet 3 with pressure flushing. Within the model, the intermittent module 1 is visible, which is in a horizontal position above the top of the toilet bowl 2. Figure 2 shows the same model of a toilet 3 with pressure flushing, but uncovered to allow other components of the toilet 3 with pressure flushing to be observed, including the reservoir 17 of the pressurised flushing water and the flushing valve 19.

Figure 3 shows a detailed illustration of the intermittent module 1. The intermittent module 1 consists of an inlet section 4 which exhibits an inlet 5 of accelerated flushing water consisting of a pipe, a distributor 10 of the accelerated flushing water stream and outlet nozzles 6. The inlet section 4 may be plastic, but the choice of the appropriate material is not restrictive in terms of function. In the illustrated embodiment of the invention, the inlet section 4 has just two outlet nozzles 6 and a distributor 10, which distributes the accelerated flushing water in a 70 to 30 ratio. The outlet nozzle 6 forms a targeted stream of accelerated flushing water to overcome the air gap.

The outlet section 7 is designed to capture the targeted stream that crosses the air gap and to divert it via a connection 9 to the outlet of the accelerated flushing water formed by flexible hoses 23 leading to the injection nozzles 20 of the toilet 3. The outlet section 7 has openings 8 into which the targeted stream falls. The outlet section 7 is similar in material design to the inlet section 4. The outlet section 7 with the subsequent flexible hoses 23 is at least partially flooded with water from the previous flushing. Due to the presence of water in the next flushing, the water present is agitated, causing a siphon effect which as a result helps to force water into the opening 8. The longer is the outlet section 7, the more effective the siphon effect is. Flexible hoses 23 are clearly visible in Figure 3.

The air gap in this embodiment of the invention is fitted with a rectifier 11, which is formed by a conical body of annular ribs 12. The rectifier 11 does not touch the inlet section 4 or the outlet section 7 for hygienic reasons. A collection vessel 16 is located below the intermittent module 1. Shields 13 form a part of the rectifier 11 to capture the sprayed water.

Figure 4 and Figure 5 show the rectifier 11. In the figures, the annular ribs 12 are visible, which rectify by their bevel into a funnel shape an unshown targeted stream passing through. Furthermore, the shields 13 for collecting splashed water are clearly visible and, last but not least, the installation sleeves 21 can be seen. The installation sleeves 21 represent one possible solution which meets the condition that the rectifier 11 does not touch the inlet section 4 and the outlet section 7.

Figure 6 illustrates an embodiment of the invention in which the two annular ribs 12 of the rectifier 11 have an elastic O ring 14 attached to them. The O ring 14 assists in directing the targeted stream, and can adapt to the flow due to its elasticity. The diameter of the O-ring 14 is chosen to match the targeted stream, but as this cannot be guaranteed in 100% of cases of flowing targeted streams, a deviation of up to 10% in size from the expected diameter of the targeted stream is chosen. O ring 14 is made of silicone for example.

Fig. 7 shows a rectifier 11, the annular ribs 12 of which are flexible, made of silicone for example. In order to stay in a conical arrangement, they are fixed to a skeleton 22, which is the supporting element. As can be seen from Fig. 8, the advantage of the elastic annular ribs 12 is that when the targeted water stream is flowing properly, the gap for air suction is narrow, see mark b, since the deflection of the annular ribs 12 from the position a to the position β occurs due to the passing of the targeted stream. If the stream is interrupted, the annular ribs 12 return to position a and the air passage gap returns to its size, see mark a. Conversely, if the stream is reversed, the annular ribs 12 open to the gap shown by mark c by tilting to position γ, thereby increasing the passage for the air of the rectifier 11.

Figure 9 and Figure 10 show another possible embodiment of the rectifier 11. This embodiment is formed by concentric tubular elements 15, which can telescopically extend or retract to activate or inactivate the rectifier 11. Figure 11 shows the rectifier 11 in an operating state where it is extended by the targeted stream almost across the entire air gap between the input section 4 and the output section 7. When the targeted stream is not present, the rectifier 11 is in the default i.e., retracted state as shown in Figure 12. The retracted, otherwise default state is provided by, for example, the springs not shown. The initial state is terminated by the presence of a targeted stream in the rectifier 11 which, by pressure on the walls of the tubular elements 15, expands them or is expanded by other suitable means from the moment of flushing. The rectifier 11 in this embodiment of the invention is plastic.

Figure 13 shows the wiring diagram of the intermittent module 1 for a toilet 3 with pressure flushing. The connection 18, the reservoirs 17 of the pressurized flushing water and the flushing valve 19 are upstream of the intermittent module 1 in terms of proper water flow.

Not only does the invention meet the requirement for hygienic protection against contamination of the water supply line, but it also minimizes the energy loss of the accelerated flushing water. First, it does not restrict the preparation of accelerated flushing water in the reservoirs 17 of the pressurized flushing water because it does not interrupt the water supply line. Second, by using rectifiers 11, it prevents the streamlines from splitting in the targeted stream, thus preventing energy and volume losses. Last but not least, due to the design of the outlet section 7, in which the opening 8 subsequently turns into a connection 9 of the outlet of the accelerated flushing water, and due to the fact that the outlet section 7 in the area of the connection 9 and the outlet of the accelerated flushing water is flooded with water after the first flushing, a siphon effect occurs after the impact of the targeted stream of the accelerated flushing water, caused by the sucking and that reduces the resistance imposed on the incoming accelerated flushing water, thereby reducing the energy loss of the flushing water.

Industrial applicability

The intermittent module for preventing back suction of water from the bowl of a toilet with a pressure flush and a toilet with a pressure flushing and with an intermittent module according to the invention will find application as sanitary equipment in human settlements.

List of relationship tags

- 1 intermittent module
- 2 toilet bowl
- 3 toilet with a pressure flush
- 4 inlet section of the intermittent module
- 5 inlet for accelerated flushing water
- 6 outlet nozzle
- 7 outlet section of the intermittent module
- 8 opening for receiving the targeted stream
- 9 connection for connecting the outlet of the accelerated flushing water
- 10 stream distributor
- 11 rectifier
- 12 annular rib
- 13 shield
- 14 O-ring
- 15 concentric tubular elements
- 16 collection vessel
- 17 reservoir of pressurised flushing water
- 18 connection to the water supply
- 19 flushing valve
- 20 injection nozzle
- 21 installation sleeve
- 22 supporting skeleton of elastic ring ribs
- 23 flexible hoses

CLAIMS

1. An intermittent module (1) for preventing back suction of water from the bowl (2) of a toilet (3) with a pressure flush for accelerating the flushing water, **characterized in that** it comprises an inlet section (4) having an inlet (5) for the accelerated flushing water and at least one outlet nozzle (6) for directing the flow of the accelerated flushing water, further comprising an outlet section (7) having at least one opening (8) for receiving a targeted stream of accelerated flushing water from the outlet nozzle (6) and at least one connection (9) for connecting the outlet of the accelerated flushing water to the toilet bowl (2), wherein an air gap is formed between the outlet nozzle (6) and the opening (8).
2. The intermittent module according to claim 1, **characterized in that** at least one distributor (10) of the stream of the accelerated flushing water is integrated in the inlet section (4) between the inlet (5) for the accelerated flushing water and the at least two outlet nozzles (6) for distributing the accelerated flushing water to the individual outlet nozzles (6).
3. The intermittent module according to claim 1 or 2, **characterized in that** it comprises at least one rectifier (11) for directing the targeted stream of accelerated flushing water arranged in the air gap.
4. The intermittent module according to claim 3, **characterized in that** the rectifier (11) comprises a through conical ribbed body with annular ribs (12), the narrower base of which is inverted towards the outlet nozzle (6), while its wider base faces the opening (8) for receiving a targeted stream of accelerated flushing water, and at the same time the rectifier (11) is provided with at least one shield (13) for catching and diverting the sprayed flushing water away from the conical ribbed body.
5. The intermittent module according to claim 4, **characterized in that** the shield (13) is arranged perpendicularly to the targeted stream of accelerated flushing water.

6. The intermittent module according to claim 4 or 5, **characterized in that** at least some of the annular ribs (12) are beveled towards the targeted stream of water from their outer circumference towards their inner circumference.
7. The intermittent module according to any one of claims 4 to 6, **characterized in that** at least one annular rib (12) is provided with an elastic O-ring (14) having a diameter corresponding to the diameter of the targeted stream of accelerated flushing water with a diameter deviation of up to +/- 10 %.
8. The intermittent module according to any one of claims 4 to 7, **characterized in that** the annular ribs (12) are made of an elastic material.
9. The intermittent module according to claim 3, **characterized in that** the rectifier (11) is formed by at least two concentric rectifying tubular elements (15) telescopically arranged relative to each other for an extended state when the targeted stream is flowing correctly and for a retracted state when the targeted stream is not flowing correctly, wherein the rectifier (11) is provided with at least one means for setting the retracted state of the rectifying tubular elements (15) as the default state of the rectifier (11).
10. The intermittent module according to claim 9, **characterized in that** the means for setting the retracted state of the rectifier (11) as a default state comprises a spring.
11. The intermittent module according to any one of claims 1 to 10, **characterized in that** it is provided with a splash water collection vessel (16) arranged in a region below the inlet section (4), the outlet section (7) and below the air gap.
12. The intermittent module according to claim 11, **characterized in that** the collecting vessel (16) is provided with at least one drain for collecting water into the toilet bowl (2).

13. A toilet (3) with pressure flushing for accelerating the flushing water comprising a connection (18) to a water supply from a water supply line, further comprising at least one reservoir (17) of pressurized flushing water connected to the connection (18), further comprising a flushing valve (19) connected to the reservoir (17) of the pressurized flushing water, further comprising at least one injection nozzle (20) which is connected to the flushing valve (19) via the accelerated flushing water line for injecting the accelerated flushing water into the toilet bowl (2), and from the toilet bowl (2), **characterized in that** the intermittent module (1) interrupts the water line of the accelerated flushing water between the flushing valve (19) and the injection nozzle (20), wherein the water line downstream of the flushing valve (19) is connected to the inlet of the inlet section (4) of the intermittent module (1) and, at the same time, the flushing water line upstream of the injection nozzle (20) is connected to the connection (9) of the outlet section (7) of the intermittent module (1).
14. The toilet with pressure flushing according to claim 13, **characterized in that** the intermittent module (1) is disposed in a horizontal position in the toilet (3) with pressure flushing.
15. The toilet with pressure flushing according to claim 13 or 14, **characterized in that** the collection vessel (16) of the intermittent module (1) is arranged at the upper edge of the toilet bowl (2).

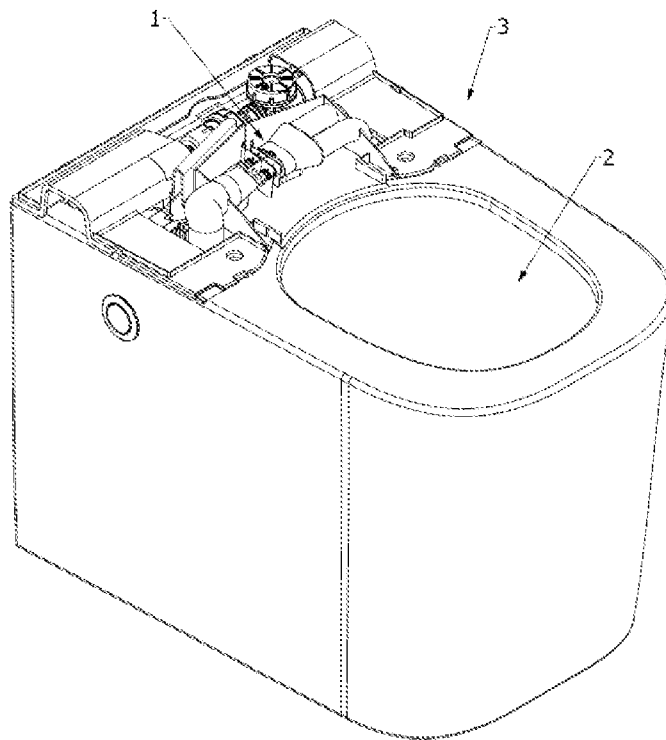


Fig. 1

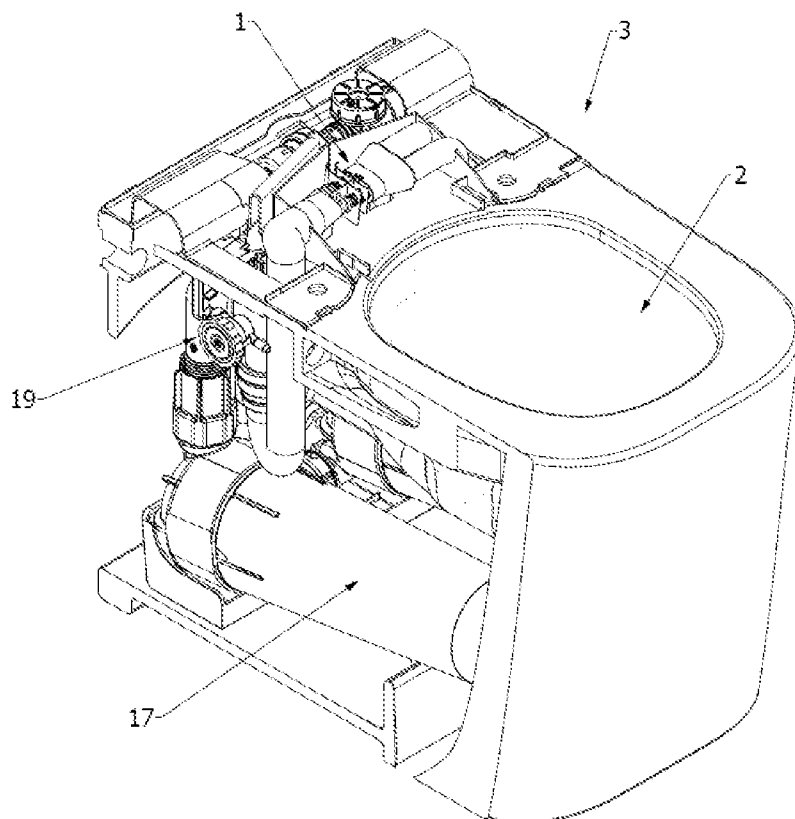


Fig. 2

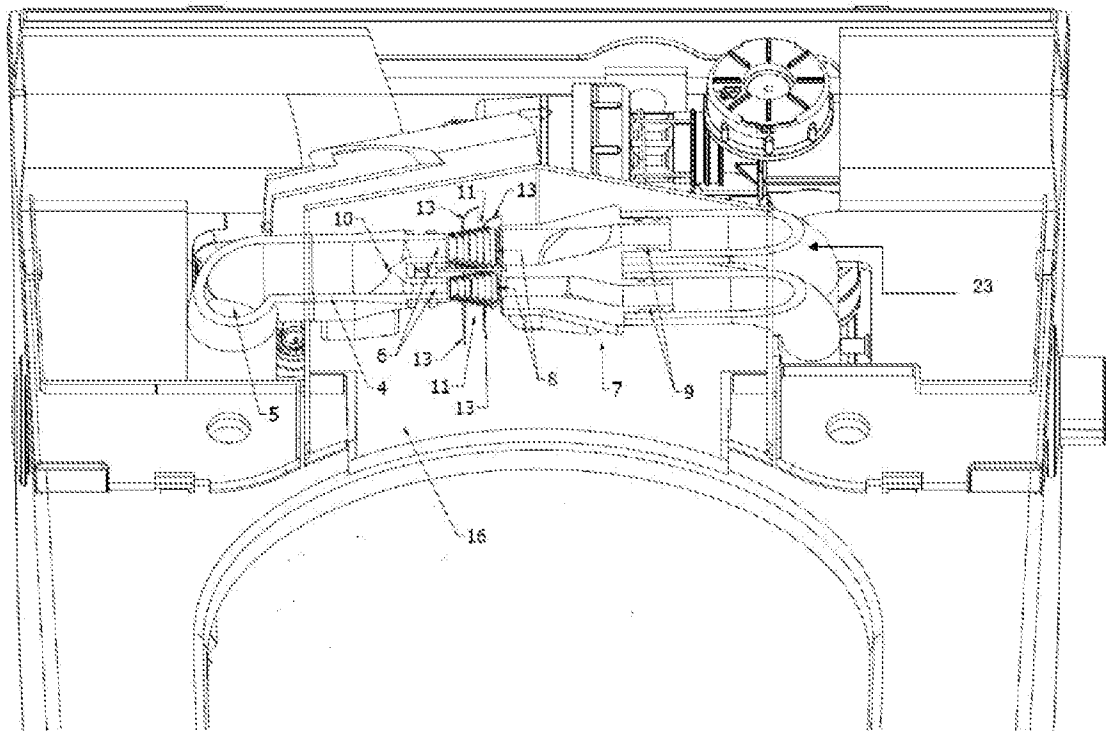


Fig. 3

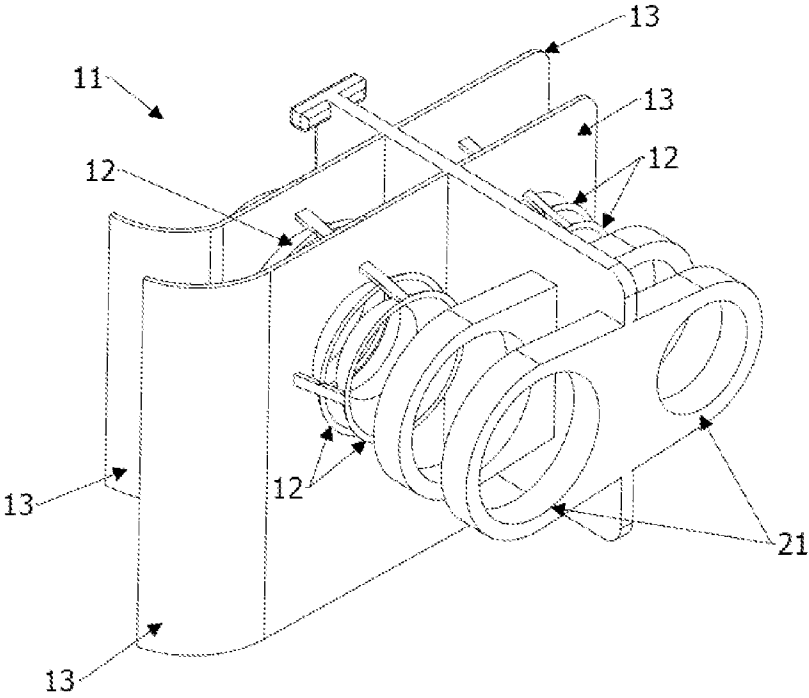


Fig. 4

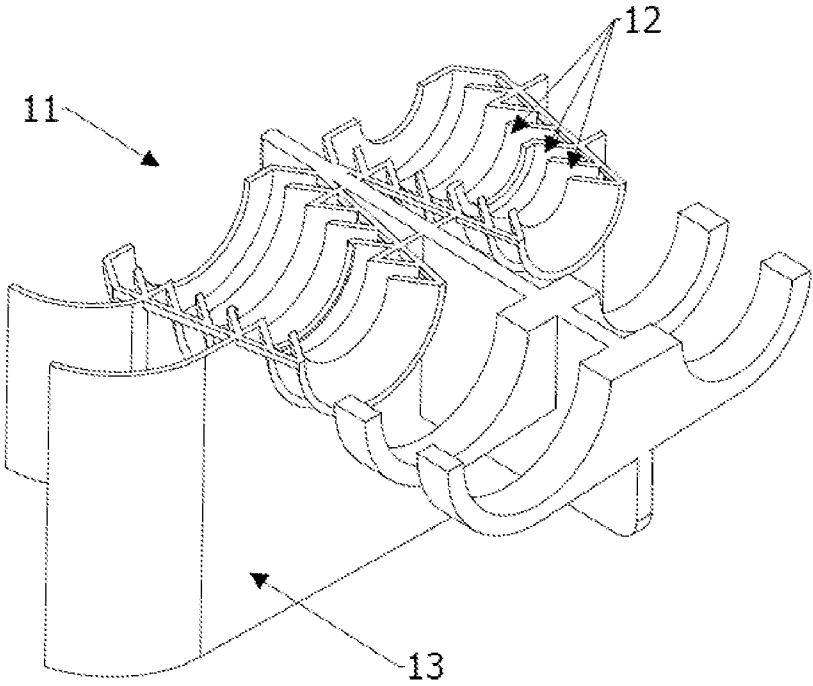


Fig. 5

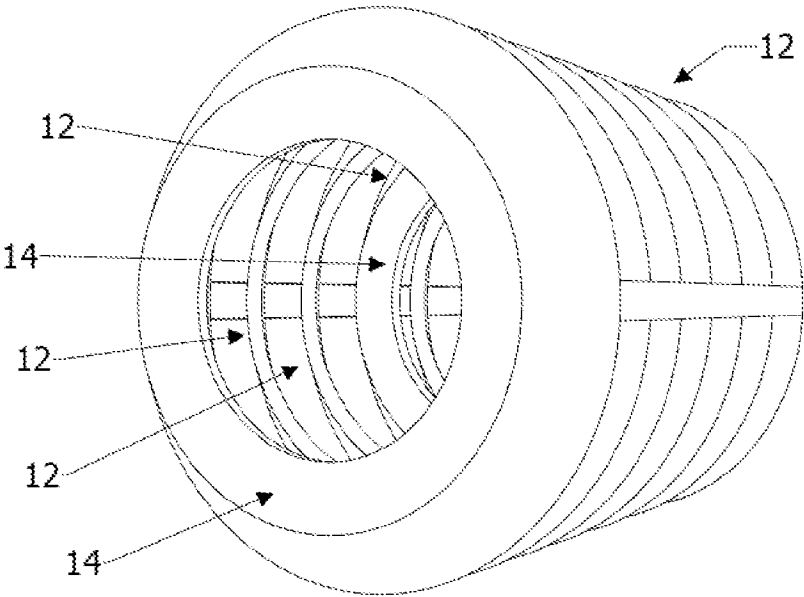


Fig. 6

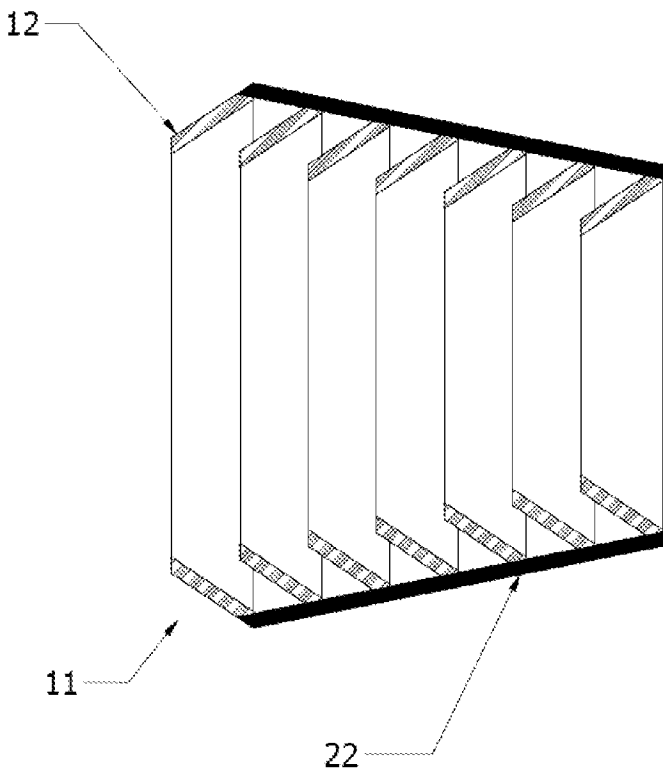


Fig. 7

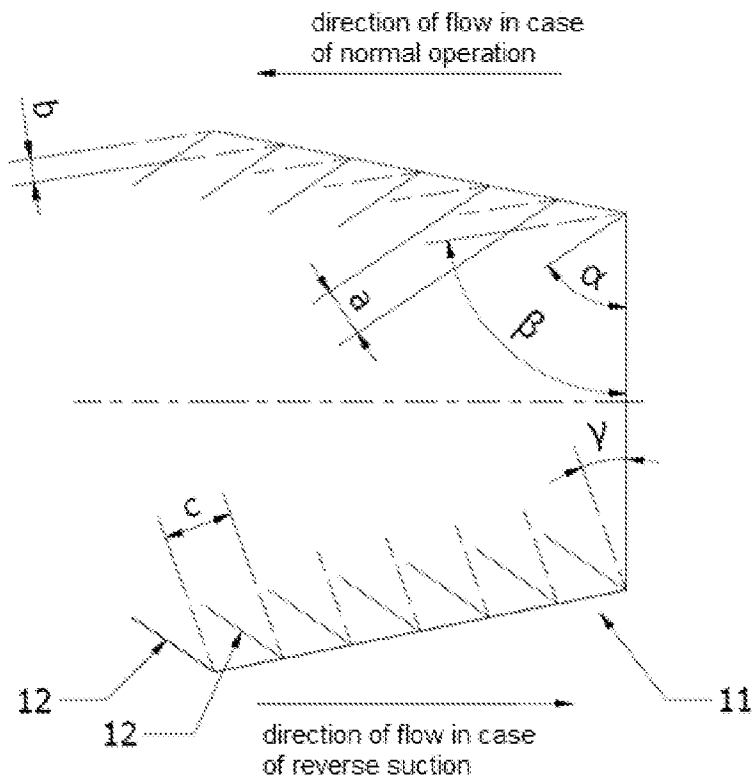


Fig. 8

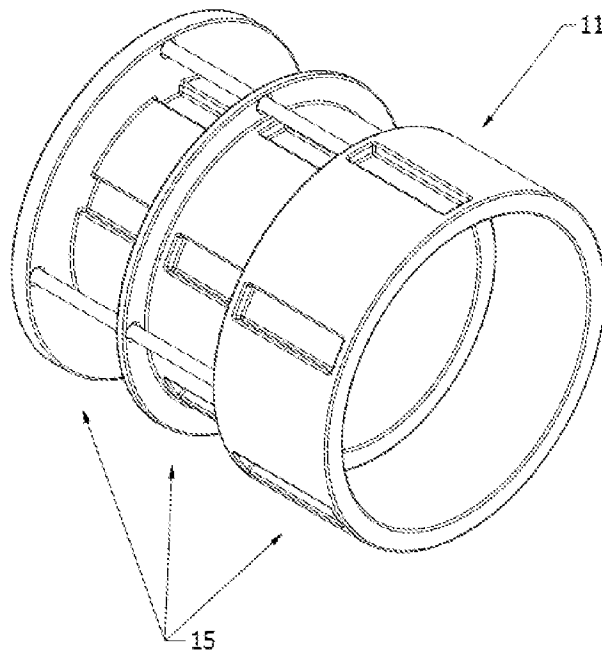


Fig. 9

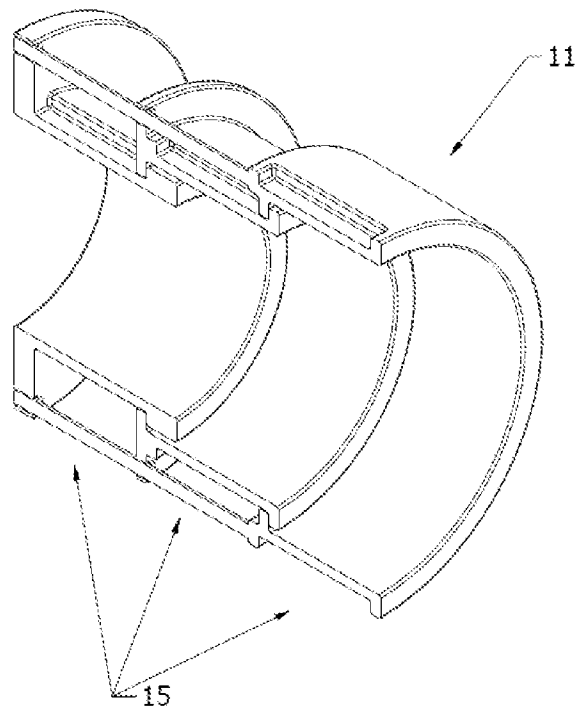


Fig. 10

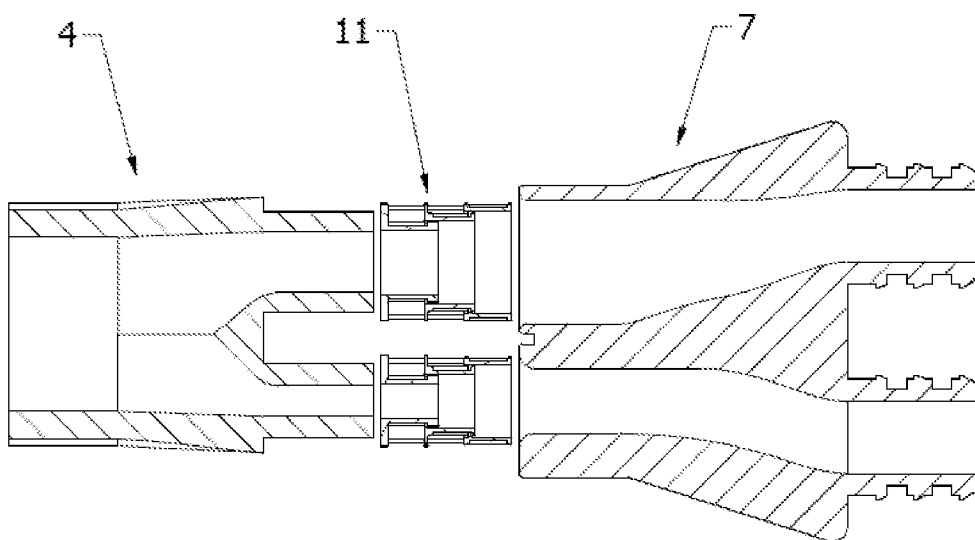


Fig. 11

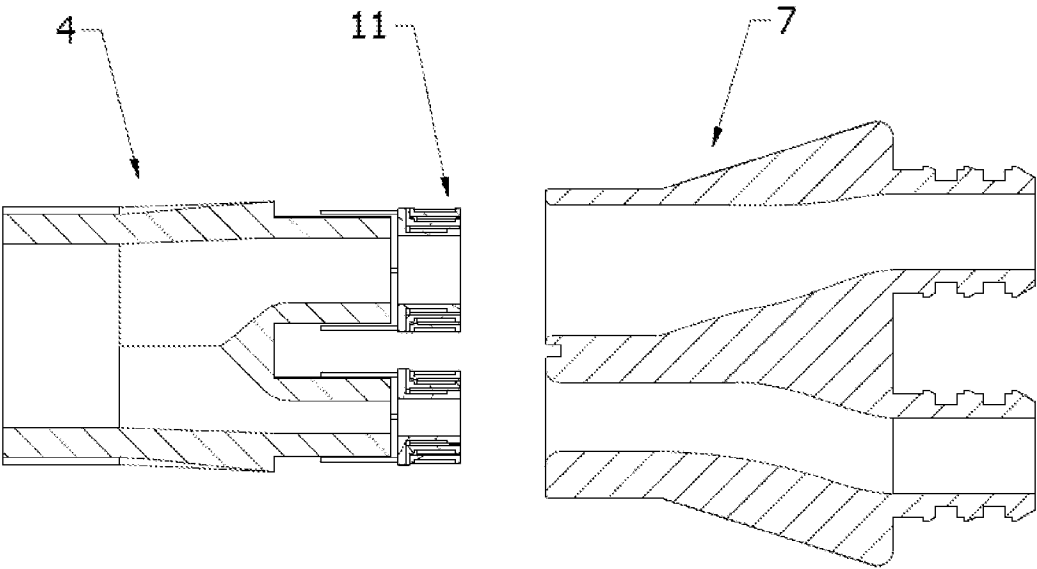


Fig. 12

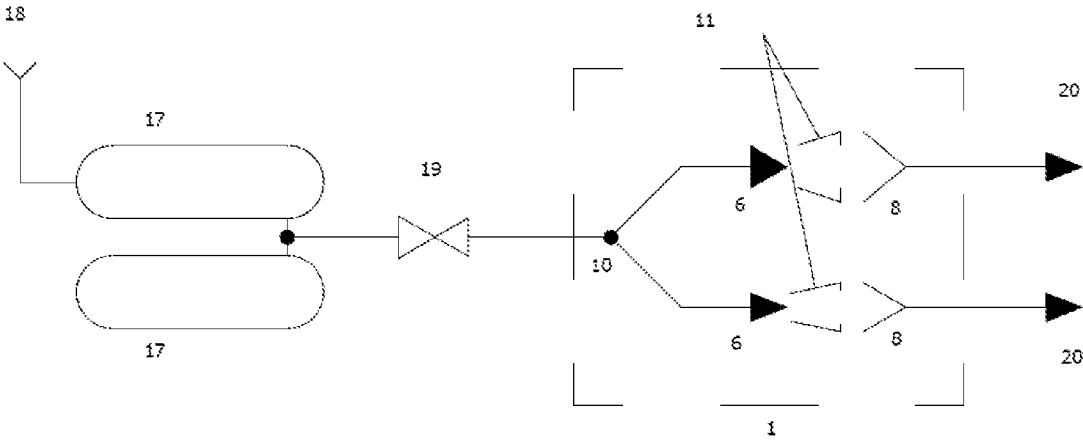


Fig. 13

INTERNATIONAL SEARCH REPORT

International application No
PCT/IB2022/052022

A. CLASSIFICATION OF SUBJECT MATTER
INV. E03C1/10 E03D3/10
ADD.

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)

E03C E03D

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

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

EPO-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	KR 101 592 233 B1 (IZEN CO LTD [KR]) 5 February 2016 (2016-02-05) the whole document -----	1, 3, 9-15
X	US 2020/284013 A1 (SATO YASUSHI [JP] ET AL) 10 September 2020 (2020-09-10) page 1, paragraph 15 - page 5, paragraph 52 page 7, paragraph 82 - page 9, paragraph 107; figures 1-3, 7, 8 -----	1, 3, 11-15 5
A		
X	FR 2 696 770 A1 (FACT ANAL SCP [FR]) 15 April 1994 (1994-04-15) the whole document -----	1, 2, 11-15
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☒ Further documents are listed in the continuation of Box C.

☒ See patent family annex.

* Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier application or patent but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"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

22 June 2022

Date of mailing of the international search report

30/06/2022

Name and mailing address of the ISA/
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INTERNATIONAL SEARCH REPORT

International application No
PCT/IB2022/052022

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 3 455 324 A (BIERI RUDOLF ET AL) 15 July 1969 (1969-07-15) column 1, line 34 - column 2, line 28 column 2, line 34 - column 3, line 35; figure -----	1, 11-15

INTERNATIONAL SEARCH REPORT

International application No.
PCT/IB2022/052022

Box No. II Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)

This international search report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:

2. ☐ Claims Nos.:
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:

3. ☐ Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box No. III Observations where unity of invention is lacking (Continuation of item 3 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

see additional sheet

1. ☐ As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.
2. ☒ As all searchable claims could be searched without effort justifying an additional fees, this Authority did not invite payment of additional fees.
3. ☐ As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:

4. ☐ No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims;; it is covered by claims Nos.:

Remark on Protest

- ☐ The additional search fees were accompanied by the applicant's protest and, where applicable, the payment of a protest fee.
- ☐ The additional search fees were accompanied by the applicant's protest but the applicable protest fee was not paid within the time limit specified in the invitation.
- ☐ No protest accompanied the payment of additional search fees.

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

This International Searching Authority found multiple (groups of) inventions in this international application, as follows:

1. claims: 1-15

An intermittent module for preventing back suction of water from the bowl of a toilet with a pressure flush for accelerating the flushing water, the module comprising an inlet section having an inlet for the accelerated flushing water and at least one outlet nozzle for directing the flow of the accelerated flushing water, further comprising an outlet section having at least one opening for receiving a targeted stream of accelerated flushing water from the outlet nozzle and at least one connection for connecting the outlet of the accelerated flushing water to the toilet bowl, wherein an air gap is formed between the outlet nozzle and the opening.

1.1. claims: 13-15

A toilet with pressure flushing for accelerating the flushing water comprising a connection to a water supply from a water supply line, further comprising at least one reservoir of pressurized flushing water connected to the connection, further comprising a flushing valve connected to the reservoir of the pressurized flushing water, further comprising at least one injection nozzle which is connected to the flushing valve via the accelerated flushing water line for injecting the accelerated flushing water into the toilet bowl, and from the toilet bowl, the intermittent module interrupting the water line of the accelerated flushing water between the flushing valve and the injection nozzle, wherein the water line downstream of the flushing valve is connected to the inlet of the inlet section of the intermittent module and, at the same time, the flushing water line upstream of the injection nozzle is connected to the connection of the outlet section of the intermittent module.

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/IB2022/052022

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
KR 101592233	B1	05-02-2016	NONE	

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			EP 3712338 A1	23-09-2020
			JP 6964261 B2	10-11-2021
			JP WO2019097966 A1	06-08-2020
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			CH 444076 A	15-09-1967
			DE 1972898 U	16-11-1967
			NL 6604924 A	17-10-1966
			US 3455324 A	15-07-1969
