



(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
21.11.2012 Bulletin 2012/47

(51) Int Cl.:
E03D 5/02 (2006.01)

(21) Application number: **11166539.4**

(22) Date of filing: **18.05.2011**

(84) Designated Contracting States:
AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO RS SE SI SK SM TR
Designated Extension States:
BA ME

(72) Inventor: **Bente, Robertus Cornelis Wilhelmus Maria**
6815 EJ, Arnhem (NL)

(74) Representative: **'t Jong, Bastiaan Jacob Inaday B.V.**
Hengelsestraat 141
7521 AA Enschede (NL)

(71) Applicant: **Wisa B.V.**
6827 BP Arnhem (NL)

(54) **Pneumatic flush control for a flush mechanism of a toilet**

(57) The invention relates to a pneumatic flush control for a flush mechanism of a toilet, wherein the flush mechanism comprises an actuating member for starting the flush action, the pneumatic flush control comprising:
- a master unit having a housing with a push button slidably arranged in the housing and a first bellows arranged in the housing between the push button and a wall of the housing;
- a slave unit having a housing with a control member for actuating the actuating member of the flush mechanism,

which control member is slidably arranged in the housing and a second bellows arranged in the housing between the control member and a wall of the housing; and
- a fluid line arranged between the first and second bellows for providing a fluid connection between the first and second bellows;

wherein the second bellows is provided with a pressure equalization opening for equalizing the pressure in the second bellows to the ambient pressure, wherein the pressure equalization opening comprises a restriction.

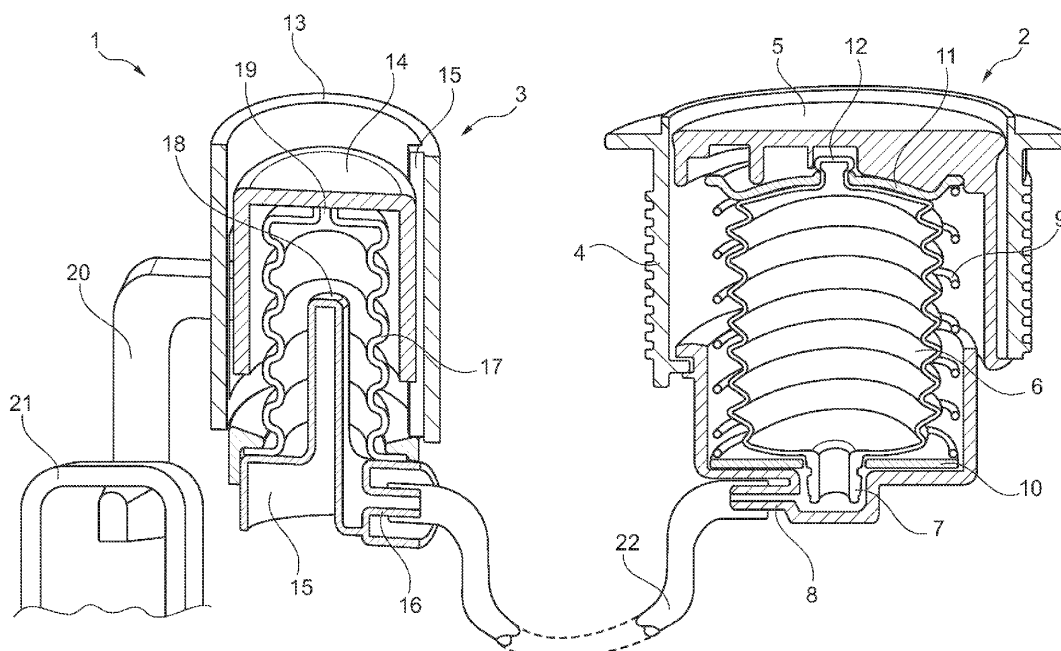


Fig. 1

Description

[0001] The invention relates to a pneumatic flush control for a flush mechanism of a toilet, wherein the flush mechanism comprises an actuating member for starting the flush action, the pneumatic flush control comprising:

- a master unit having a housing with a push button slidably arranged in the housing and a first bellows arranged in the housing between the push button and a wall of the housing;
- a slave unit having a housing with a control member for actuating the actuating member of the flush mechanism, which control member is slidably arranged in the housing and a second bellows arranged in the housing between the control member and a wall of the housing; and
- a fluid line arranged between the first and second bellows for providing a fluid connection between the first and second bellows.

[0002] Such a pneumatic flush control is for example known from WO 2009 036490. When the push button of the master unit is pressed, the first bellows will be compressed and the fluid, in particular air, will be pumped through the fluid line towards the second bellows, which will accordingly expand. Due to the expansion of the second bellows, the control member will be moved and will cause the actuation of the flush mechanism.

[0003] Generally, there will be a direct coupling between the first and second bellows. If wear of some components of the flush mechanism occurs, some play could result in the pneumatic flush control. This play could negatively influence the effectiveness of the control.

[0004] If a small leak occurs in one of the bellows or the fluid line, a further negative influence on the control could arise.

[0005] WO 2009 036490 has some small holes in the push button. These small holes are covered by a part of the bellows, such that by pressing the push button the holes are closed. When the push button is released some air could pass the small holes into the bellows to restore the desired quantity of air in the pneumatic system.

[0006] The small holes in the push button have a negative effect on the appearance of the push buttons and are clearly visible. Also when releasing the push button, some noise can be generated by the air being sucked into the bellows. Furthermore, this construction of the prior art is expensive as special care has to be taken, that the bellows is sufficiently firm to expand back to an original shape, while the part closing of the small holes should be flexible enough to let equalization air to be dragged in.

[0007] A further disadvantage of the small holes in the push button is that the small holes easily get clogged by dirt from fingers pushing the push button. Also part of the bellows could stick to the small hole, permanently closing or keeping open the small hole.

[0008] EP 1719847 discloses a pneumatic flush control in which the master unit is provided with a bellows, which is movably arranged in a housing. In uncompressed state, the bellows is disconnected from the fluid line, such that the pressure in the system can be equalized. When the push button is pressed, the bellows is pressed into a connection with the fluid line, such that the pneumatic circuit is closed and the compressed air from the master unit is pressed to the slave unit.

[0009] An additional disadvantage of EP 1719847 is that only a single master unit with push button can be present in the pneumatic flush control. Because the bellows of the master unit will be disconnected when not used, the pneumatic system is always open when at least one push button is not pressed. Having two master units with push buttons, will always result in an open pneumatic system and disfunctioning of the flush control, as always one master unit with push button will be unused.

[0010] Because the bellows is pressed into the connection each time the button is pressed, wear could occur resulting in constant leakage. It could also occur that the bellows gets stuck in the connection and does not disconnect when the push button is released.

[0011] It is therefore an object of the invention to reduce the above mentioned disadvantages of the prior art.

[0012] This object is achieved according to the invention with a pneumatic flush control according to the preamble, which is characterized in that the second bellows is provided with a pressure equalization opening for equalizing the pressure in the second bellows to the ambient pressure, wherein the pressure equalization opening comprises a restriction.

[0013] The appearance of the pneumatic flush control is not influenced with the invention, as the pressure equalization opening is arranged at the slave unit, which is typically arranged in the cistern of a toilet.

[0014] The use of a restriction in the pressure equalization opening ensures that equalization is possible, while the air is not directly pushed out of the system when the push button is pressed.

[0015] In an embodiment of the pneumatic flush control according to the invention the master unit further comprises spring means for urging the first bellows to an uncompressed state.

[0016] The spring means ensure that the push button and the first bellows return to the original position. If some air was depleted from the pneumatic system, the spring will urge the first bellow to the original position, such that air can be taken in through the equalization opening.

[0017] The spring means could be integrated with the bellows, for example by making the bellows of a resilient material.

[0018] In a preferred embodiment of the pneumatic flush control according to the invention the pressure equalization opening is arranged on the surface of the second bellows directed towards the control member, such that upon pressurizing the second bellows, the pressure equalization opening is pressed close against the

control member.

[0019] Because the pressure equalization opening is pressed close against the control member, virtually no air will escape when the push button is pressed. As soon as the push button is released, the pressure equalization opening is freed such that air can be sucked in for equalization. The time for equalization will be shorter as virtually no air was pushed out the system when the push button was pressed.

[0020] Preferably the second bellows is made of a resilient material, such that the second bellows returns to an original shape when the pressure is equalized. However, also spring means could be used for urging the second bellows to its original shape.

[0021] In another preferred embodiment the housing of the slave unit comprises two telescopic arranged housing parts, wherein the control member is fixedly attached to one of the housing parts.

[0022] In yet another embodiment a fluid line connection is arranged in a first of the housing parts and the bellows is arranged over the fluid line connection.

[0023] Preferably, the first housing part comprises an elongate protrusion, extending into the bellows. This elongate protrusion function as a guide for the bellows and prevents it from collapsing or being pushed askew.

[0024] In still another embodiment of the pneumatic flush control according to the invention the control member comprises a hook part to couple to the actuating member of the flush mechanism.

[0025] With the hook part, the control member can simply couple to the flush mechanism of a known toilet. In the known toilets the flush mechanism is often controlled by a lever. The hook part of the pneumatic flush control can simple replace the known lever, such that a conventional flush mechanism can be used with the invention.

[0026] These and other features of the invention will be elucidated in conjunction with the accompanying drawings.

Figure 1 shows a schematic, perspective and partially cross sectional view of an embodiment according to the invention.

Figures 2 and 3 show two positions of the slave unit of the embodiment according to figure 1.

[0027] Figure 1 shows an embodiment 1 of a pneumatic flush control according to the invention. The flush control 1 has a master unit 2 and a slave unit 3.

[0028] The master unit 3 has a housing 4 in which a push button 5 is slidably arranged. A first bellows 6 is arranged between the push button 5 and the housing 4. The bellows 6 has a connection opening 7 on the bottom which connects to connection 8 of the housing 4.

[0029] A spring 9 is arranged around the bellows 6 and presses against washers 10, 11, such that the push button 5 is urged outward. Because the bellows 6 has a protrusion 12, which is fixed in the washer 11, the spring 9 will also urge the bellows 6 to an uncompressed state.

[0030] The slave unit has two housing parts 13, 14 which are telescopic arranged. A rib 15 provides a guide for the sliding movement of the housing parts 13, 14 relative to each other.

[0031] The bottom 15 of the housing part 13 is provided with a connection 16. Through this connection 16 air can be fed to the second bellows 17, which is arranged between the housing part 14 and the bottom 15 of the housing part 13. The bottom 15 has an elongate protrusion 18, which provides a guide for the second bellows 17 and also reduces the volume of the bellows 17 resulting in a quicker response when air is fed to the bellows 17.

[0032] A pressure equalization opening 19 is provided at the top of the bellows 17. The size of the opening 19 is such that it functions as a restriction.

[0033] At the outer wall of the housing part 14 a control member 20 is arranged, which connects with an actuating part 21 of a flush mechanism of a toilet (not shown).

[0034] The connection 8 of the master unit 2 is connected to the connection 16 of the slave unit 3 by fluid line 22, such that a fluid connection is provided between the first bellows 6 and the second bellows 17.

[0035] When the push button 5 is depressed resulting in a compression of the bellows 6. Air from the bellows 6 is transported through the fluid line 22 into the second bellows 17, such that the bellows expands pushing the housing part 14 up. When the housing part 14 is moved up, the control member 20 also moves up resulting in actuation of the actuation member 21. (See also figure 2).

[0036] When the second bellows 17 expands due to air being fed through connection 16, the pressure equalization opening 19 is pushed against the inside of the top of the housing part 14, such that the opening 19 is substantially sealed off and no air can escape when the push button 5 of the master unit 2 is pressed.

[0037] As soon as the push button 5 of the master unit 2 is released, the spring 9 will urge the first bellows 6 to an uncompressed state. As a result air will be sucked from the second bellows 17 of the slave unit 3 back through the fluid line 22 into the first bellows 6.

[0038] The second bellows 17 will return to its original shape when air is sucked out through connection 16. The pressure force keeping the equalization opening 19 closed will be removed and the opening 19 will open, such that additional ambient air can flow into the second bellows 17 to equalize the pressure.

[0039] Because the pressure equalization opening 19 is opened each time the push button 5 is released, there will always be sufficient air in the pneumatic system composed out of the first bellows 6, the fluid line 22 and the second bellows 17 to ensure proper functioning of the pneumatic flush control 1, when the push button 5 is depressed the next time.

Claims

1. Pneumatic flush control for a flush mechanism of a

toilet, wherein the flush mechanism comprises an actuating member for starting the flush action, the pneumatic flush control comprising:

the flush mechanism.

- a master unit having a housing with a push button slidably arranged in the housing and a first bellows arranged in the housing between the push button and a wall of the housing; 5
 - a slave unit having a housing with a control member for actuating the actuating member of the flush mechanism, which control member is slidably arranged in the housing and a second bellows arranged in the housing between the control member and a wall of the housing; and 10
 - a fluid line arranged between the first and second bellows for providing a fluid connection between the first and second bellows; 15
- characterized in that** the second bellows is provided with a pressure equalization opening for equalizing the pressure in the second bellows to the ambient pressure, wherein the pressure equalization opening comprises a restriction. 20
2. Pneumatic flush control according to claim 1, wherein the master unit further comprises spring means for urging the first bellows to an uncompressed state. 25
 3. Pneumatic flush control according to claim 1 or 2, wherein the pressure equalization opening is arranged on the surface of the second bellows directed towards the control member, such that upon pressurizing the second bellows, the pressure equalization opening is pressed close against the control member. 30
 4. Pneumatic flush control according to claim 3, wherein the second bellows is made of a resilient material, such that the second bellows returns to an original shape when the pressure is equalized. 35
 5. Pneumatic flush control according to any of the preceding claims, wherein the housing of the slave unit comprises two telescopic arranged housing parts, wherein the control member is fixedly attached to one of the housing parts. 40
 6. Pneumatic flush control according to claim 5, wherein a fluid line connection is arranged in a first of the housing parts and the bellows is arranged over the fluid line connection. 45
 7. Pneumatic flush control according to claim 5 or 6, wherein the first housing part comprises an elongate protrusion, extending into the bellows. 50
 8. Pneumatic flush control according to any of the preceding claims, wherein the control member comprises a hook part to couple to the actuating member of 55

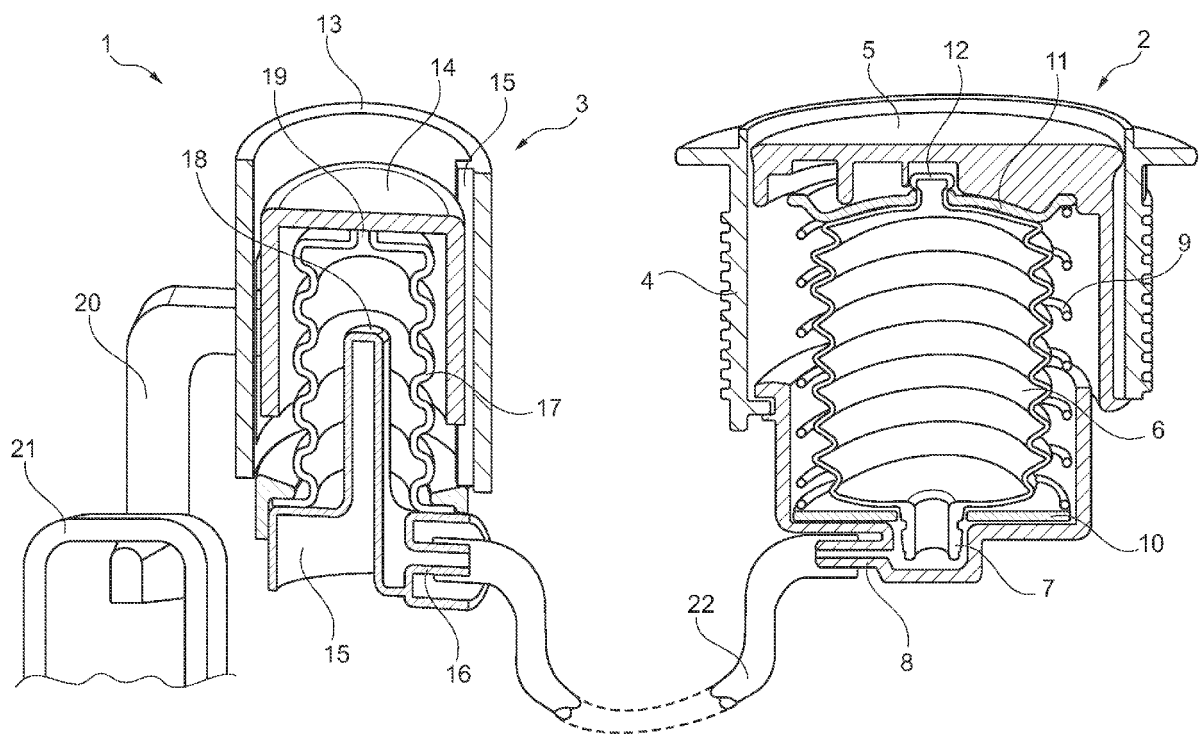


Fig. 1

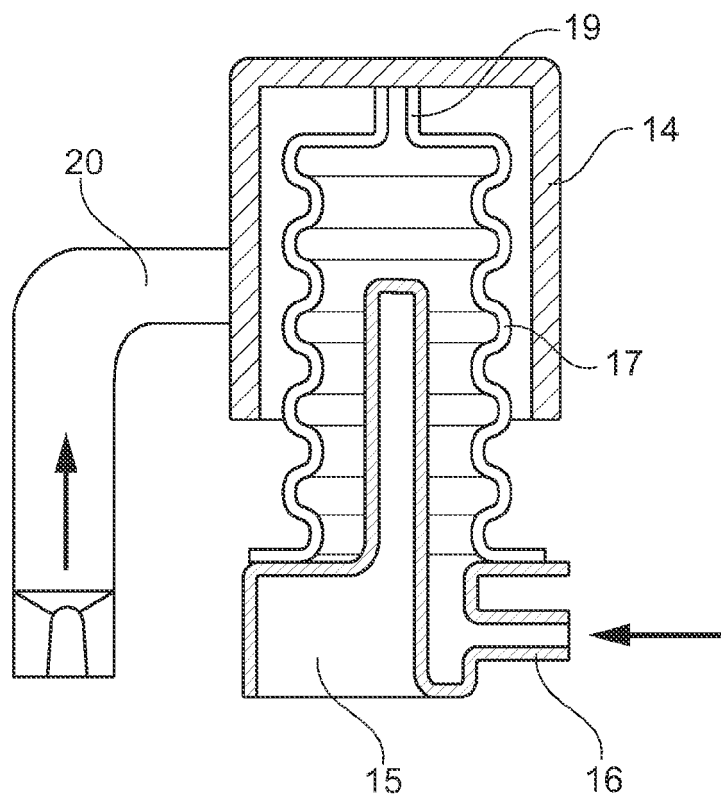


Fig. 2

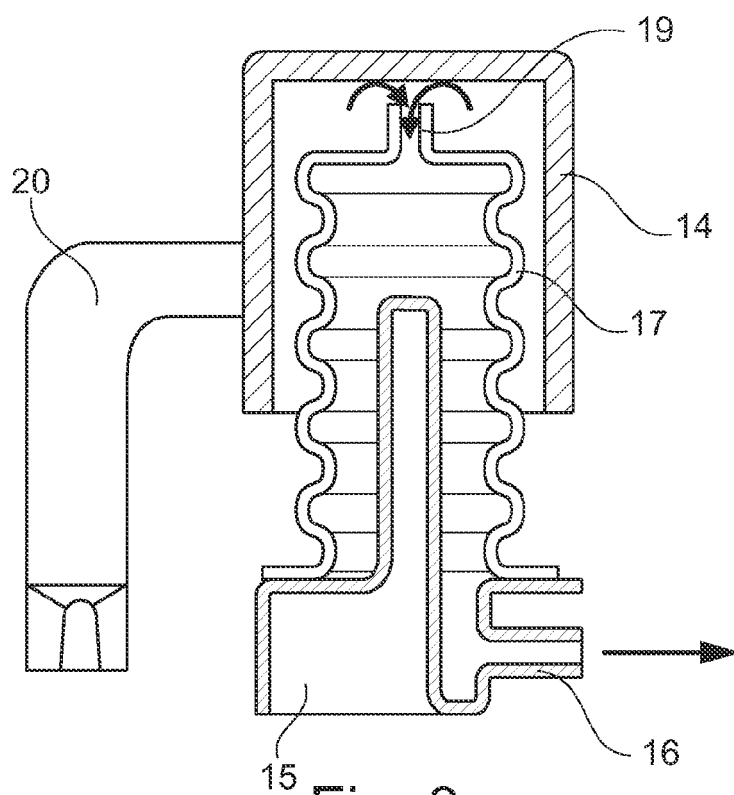


Fig. 3



EUROPEAN SEARCH REPORT

Application Number
EP 11 16 6539

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X,D	EP 1 719 847 A2 (GROHEDAHL SANITARSYSTEME GMBH [DE]) 8 November 2006 (2006-11-08)	1,2,4,7	INV. E03D5/02
Y	* paragraph [0014] - paragraph [0021]; figures *	5,6	
Y	EP 1 719 846 A2 (GROHEDAHL SANITARSYSTEME GMBH [DE]) 8 November 2006 (2006-11-08) * paragraph [0015] - paragraph [0021]; figures *	5,6	
The present search report has been drawn up for all claims			TECHNICAL FIELDS SEARCHED (IPC)
			E03D
Place of search		Date of completion of the search	Examiner
The Hague		25 October 2011	De Coene, Petrus
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

2
EPO FORM 1503 03.92 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 11 16 6539

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
The members are as contained in the European Patent Office EDP file on
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

25-10-2011

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
EP 1719847 A2	08-11-2006	DE 102005020749 A1	09-11-2006
EP 1719846 A2	08-11-2006	DE 102005020748 A1	09-11-2006

REFERENCES CITED IN THE DESCRIPTION

This list of references cited by the applicant is for the reader's convenience only. It does not form part of the European patent document. Even though great care has been taken in compiling the references, errors or omissions cannot be excluded and the EPO disclaims all liability in this regard.

Patent documents cited in the description

- WO 2009036490 A [0002] [0005]
- EP 1719847 A [0008] [0009]