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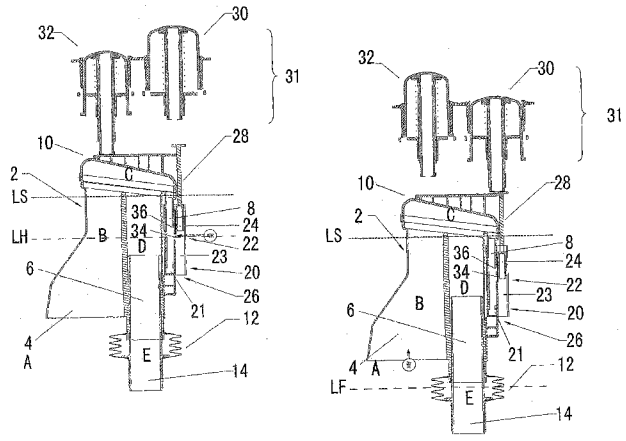
(54) **Title:** TUBE SIPHON DISCHARGING TWO DIFFERENT QUANTITIES OF FLUSH WATER



(57) **Abstract:** A discharge control module for a water flushing system comprising an outlet valve flush chamber (2) secured to a housing member (20); the housing member (20) having a channel (21) to receive an air inlet passage means (8); the air inlet passageway means (8) being connected to the outlet valve flush chamber (2) through a duct (11), said air inlet passageway means (8) having at least one predefined opening (9) along the duct (11); a sliding member (24) disposed within a compartment (23) of the housing member (20); at least one breather hole (34) at interfacing walls of said housing member (20); at least one suction hole (36) at the interfacing walls of said housing member (20); and an actuating means (31) wherein the sliding member (24) can be moved up or down in the compartment (23) of said housing member (20). Due to the Bernoulli effect created by the water flow through the flush chamber (2), the sliding member (24) is hold in position by underpressure through the suction hole (36).

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TUBE SIPHON DISCHARGING TWO DIFFERENT QUANTITIES OF FLUSH WATER

FIELD OF INVENTION

The present invention relates to a dual-flush control module and more particularly relates to a dual-flush discharge control module for fluid flushing system, utilizing syphonic action of flowing fluid for full-flush or partial-flush discharge for use in toilet cistern.

BACKGROUND OF INVENTION

A regular toilet generally uses around 6 litres of water for a full flush. Such large volume is not always required though, especially when flushing urine. With the increasing scarcity of water, this wastage of processed water is getting to be less and less acceptable. The limits of the local sewage capacity also make it prudent to use less water. As such, various attempts had been made in designing a dual flush system wherein there is an option for a half-flush of 3-4 litres of water. However, the attempts had been either not effective enough or had serious reliability problems. Such systems have often been plagued by numerous and complex parts which are costly to manufacture, assemble and also maintain.

Current dual-flush systems contain a large number of parts which in turn have many points of failure, and do invariably fail very frequently. This not only entails a high maintenance cost but also render many systems unusable until a well-trained maintenance crew arrives to fix or replace the faulty parts. There is provided another type of flush system disclosed at GB 2 041 421, which includes a discharge unit for toilet. Said discharge unit can be preset to give either a single flush or dual flush action by rotatably positioning a cap to close off (for single flush), or open (for dual flush) a siphon-breaking air vent cooperating with a valve member on flushing piston. However the invention only restricted for diaphragm action flush chamber. Another invention disclosed in GB 2 270 528 having a venting aperture at intermediate level in a side wall of its siphon chamber to provide reduce flush volume when it open. This invention also restricted for use in diaphragm action flush chamber only.

It is a principle object of the present invention, therefore to provide a simple dual-flush apparatus comprising only a few parts, easy for manufacture, assemble and is more reliable as well as reduce constant maintenance, repair and replacement. In addition the present invention can be works in either pump action flush chamber or diaphragm action flush chamber.

SUMMARY OF INVENTION

Accordingly, the present invention provides a discharge control module for water flushing system having a syphonic outlet valve flush chamber characterized in that the discharge control module comprises a housing member attached at outlet valve flush chamber, said housing member can be adjustably moveable along a duct of air inlet passageway means to variably define volume of water to be discharged in partial-flush; an air inlet passageway means connected to outlet valve flush chamber through a duct, said air inlet passageway means having a predefined opening along the duct and enclosed by the housing member; a sliding member disposed within a compartment of the housing member; at least one breather hole at interfacing walls of said housing member; and at least one suction hole at the interfacing walls of said housing member if required; and an actuating means wherein the actuating means includes full-flush actuator and partial-flush actuator; wherein the actuating means is activated to initiate fluid flow in outlet valve flush chamber by either pump or diaphragm action; and wherein the sliding member acting as a float means to enable sliding member to move up-or-down at the compartment of said housing member to determined either partial-flush or full-flush water to be discharged from container; and wherein the sliding member is in a position above to and exposes the breather hole but completely covers the suction hole when fluid in container is at standby level (**LS**).

In case of partial-flush, the partial-flush actuator is activated, the sliding member remain at it position above the breather hole as in standby level (**LS**); the Bernoulli effect causes sliding member retained in its position to covers the suction hole by the lower pressure at the duct arising from water flowing in the outlet valve flush chamber; which lower pressure, acting through said suction hole, pulls the sliding member towards the interfacing wall of the housing member and thereby

sealing off the suction hole and holding up the sliding member as the water level falls; when the water level falls and exposes at said breather hole, air is enable to rush through the passageway means and breaks the flow in the outlet valve flush chamber; and without Bernoulli effect, said sliding member falls to uncover said suction hole and to float with the water level as water is refilling the container.

In case of full-flush, the full-flush actuator is activated, said full-flush actuator lower said sliding member to covers both suction hole and breather hole; the Bernoulli effect causes sliding member retained in its position to cover both suction hole and breather hole by the lower pressure arising from flowing water in the outlet valve flush chamber; which lower pressure, acting through both said holes, pulls the sliding member towards the interfacing wall of the housing member and thereby sealing off both said suction and breather holes and holding up the sliding member when the water level falls; when the water level falls and exposes the opening at inlet port of the outlet valve flush chamber, air is enable to rush through said inlet port and breaks the fluid flow in said outlet valve flush chamber; and without Bernoulli effect, said sliding member falls to uncovers both suction and breather holes and floats with the water level as water is been refilled in the container.

The present invention can be incorporate into any syphonic flushing modules for pump action flush chamber. However, the present embodiment could also work equally well with diaphragm action flush chamber. In addition, the use of Bernoulli principal can also be used whereby the sliding member is replaced with sinker means instead of floating means. In such a replacement, the direction of the flush actuator will be reversed; namely to pull the said sliding member that act as sinker means (**FIGS. 6** and **7**).

BRIEF DESCRIPTION OF DRAWINGS

The drawings constitute a part of this specification and include an exemplary or preferred embodiment of the invention. It should be understood, the disclosed preferred embodiments are merely exemplary of the invention, which may be embodied in various forms.

In the appended drawings:

FIG. 1 is a perspective view illustrating preferred embodiments of dual-flush discharge control module in accordance with one mode of present invention.

FIG. 2 is an exploded side view illustrating the preferred embodiments of dual-flush discharge control module in **FIG. 1**.

FIG. 3 is a side view illustrating the preferred embodiments of dual-flush discharge control module in partial-flush position.

FIG. 4 is a side view illustrating the preferred embodiments of dual-flush discharge control module in full-flush position.

FIG. 5 is an enlarged perspective view illustrating part of the preferred embodiments of dual-flush discharge control module with an adjustable mechanism for partial-flush volume control.

FIG. 6 is a side view illustrating another mode of preferred embodiments of dual-flush discharge control module in partial-flush position.

FIG. 7 is a side view illustrating the preferred embodiments of dual-flush discharge control module of **FIG. 6** in full-flush position.

DETAILED DESCRIPTION OF PREFERRED EMBODIMENT

A detailed description of preferred embodiments of the invention is disclosed herein. It should be understood, however, the disclosed preferred embodiments are merely exemplary of the invention, which may be embodied in various forms. Therefore, the details disclosed herein are not to be interpreted as limiting, but merely as the basis for the claims and for teaching one skilled in the art of the invention.

The present invention relates to a dual-flush control module for syphonic action toilets and more particularly relates to a dual-flush discharge control module (**1**) for water flushing system, utilizing syphonic action of flowing water for full-flush or partial flush discharge. However, the dual-flush discharge control module can also be used for any flush system which uses a syphonic action to transfer water from the cistern. Referring to **FIG. 1**, the discharge control module (**1**) is generally disposed at one side of a syphonic outlet valve flush chamber (**2**). In the preferred embodiment,

the discharge control module (**1**) is disposed at flush outlet passage (**6**). Nevertheless, the discharge control module (**1**) may also work when it is disposed at flush inlet passage (**4**), or in between both flush inlet and outlet passages.

FIG. 2 illustrates the components of the discharge control module (**1**) and the preferred embodiment assembly sequences. The present invention consists of few parts which are reliable, easier for assemble and low manufacturing cost as compared to conventional dual-flush systems. The dual-flush discharge control module (**1**) generally comprises an air inlet passageway means (**8**), a housing member (**20**), a sliding member (**24**) and an adjustable locking mechanism (**26**). The air inlet passageway means (**8**) is preferably an integral part projected from outlet valve flush chamber (**2**) that adjacent to flush outlet passage (**6**). Accordingly, the air inlet passageway means (**8**) is configured at one side of the outlet valve flush chamber (**2**) through a duct (**11**) projected from said outlet valve flush chamber (**2**). The air inlet passageway means (**8**) is preferably includes a predefined opening (**9**) along the duct (**11**) and enclosed by housing member (**20**).

Referring to **FIG. 3**, the housing member (**20**) comprises an integrally formed channel (**21**) configured adjacent to its body. The inner side of the housing member (**20**) is provided with at least one aperture. The aperture may include a breather hole (**34**) or a suction hole (**36**), or both at its interfacing wall. The housing member (**20**) is configured at one side of outlet valve flush chamber (**2**). Accordingly, the channel (**21**) of the housing member (**20**) is moveably attached and enclosed the duct (**11**) of the air inlet passageway means (**8**) by the means of piston join. There is provided a sliding member (**24**) configured within the housing member (**20**). Particularly, said sliding member (**24**) is disposed within a compartment (**23**) of the housing member (**20**). The outlet valve flush chamber (**2**) is connected to at least one actuating means (**31**). Said actuating means (**31**) may include full-flush actuator (**30**) or half-flush actuator (**32**). In the preferred embodiment, the full-flush actuator (**30**) is connected to the sliding member (**24**) via actuator bracket (**28**). The sliding member (**24**) acting as a float means so that enable to move up-or-down at the compartment (**23**) of the

housing member (**20**), to determined either partial-flush or full-flush water to be discharged from container or cistern.

It will be appreciated that the housing member (**20**) further comprises a locking mechanism (**26**) integrally disposed at its body. One function of the locking mechanism (**26**) is to connect housing member (**20**) to the air inlet passageway means (**8**) to which adjustably attached to body of the outlet valve flush chamber (**2**). The locking mechanism (**26**) also allows the adjustment of the housing member (**20**) to lower or raise the breather hole (**34**) in relation to the outlet valve flush chamber (**2**). This enables the water volume of the half-flush to be adjusted depending on the required usage and also the size and shape of the cistern (**FIG. 5**).

The operation cycle of the flushing system will be described herein so that the present invention can be fully understood and appreciated. A full cistern will contain water up to standby level **LS** as shown in **FIG.3** and **FIG.4**. After utilising the toilet, user may press the full-flush or half-flush actuators (**30**, **32**) to flush out solid or liquid waste from the toilet.

Operation of Half-Flush

In the event the user presses the half-flush actuator (**32**), the actuator will reach on top of flush chamber head (**10**) and thereby push the entire outlet valve flush chamber (**2**) down by about 30-40mm. This action is associated with cushion means (**12**) disposed at bottom part body of the flush outlet passage (**6**) that acting as spring force biasing means to enable entire outlet valve flush chamber (**2**) to be move up-and-down.

As can be seen in **FIG.3**, at pump action flush chamber, the water at standby level (**LS**) in section (**B**) area of the outlet valve flush chamber (**2**) is only slightly lower than the divider between the flush inlet passage (**4**) and the flush outlet passage (**6**), with the (**C**) area containing air at ambient pressure. When the outlet valve flush chamber (**2**) moves down, the water from section (**B**) will rush into section (**C**), pushing out most of the air contained in the flush chamber head (**10**) to the flush

outlet passage (**6**). Thereafter the water will continue and flow into section (**D**) and thence to section (**E**), at toilet tube (**14**). At this point, due to the lack of air in section (**C**) at the top part of the outlet valve flush chamber (**2**), the water flows from section (**A**) into sections (**B**), (**C**), (**D**) and (**E**) through syphonic action.

As the water is being flushed out through syphonic action, the water level in the cistern or the container starts dropping from the original standby level (**LS**). The sliding member (**24**) that disposed within the compartment (**23**) of the housing member (**20**) will not pushed down by the half-flush actuator (**32**), wherein in this position said sliding member (**24**) only covers suction hole (**36**) but not breather hole (**34**). The water will continue flows into section (**C**) through the bottom opening of the flush inlet passage (**4**) and minor volume through the passage in the air inlet passageway means (**8**).

Due to the Bernoulli principle acting upon the speed of the water flowing through section (**C**), a pressure differential is created between the housing member (**20**) and air inlet passageway means (**8**) at the suction hole (**36**), wherein the pressure at housing member (**20**) being greater than at the air inlet passageway component (**8**). In this event, the sliding member (**24**) will held in place at the suction hole (**36**) due to lower-pressure at the air inlet passageway means (**8**). This in turn seals the suction hole tightly. Even when the water level fall below the level of the suction hole (**36**), the pressure differential in the suction hole (**36**) will keeps said sliding member (**24**) attached to the inner side wall of the housing member (**20**), and stop it from falling with the falling water level.

When the water level exposes the breather hole, as depicted by line (**LH**), the breather hole (**34**) is exposed to the atmospheric air. The lower pressure created by syphonic flow of water through sections **A-B-C-D**, causes atmospheric air rushing into air inlet passageway component (**8**) through the breather hole (**34**) and finally into section (**C**) area of the outlet valve flush chamber (**2**). The filling of air in section (**C**) breaks the syphonic water flow and thus syphonic flush action stops. The outlet valve

flush chamber (2) that containing air in section (C) will then be rises up in tandem with the refilling of water in the cistern or container from the half-flush level (**LH**) to the standby level (**LS**).

Operation of Full-Flush

In the event the user presses the full-flush actuator (**30**), the syphonic flush action starts in the same way as described above for the half-flush. In addition, full-flush actuator (**30**) pressing down the flush chamber head (**10**) and which connected to the actuator bracket (**28**), in turn pushes down the sliding member (**24**) in the housing member (**20**) underneath the said actuator bracket (**28**) to covers both the suction hole (**36**) and the breather hole (**34**) (**FIG. 4**).

At this point, the user would have release the full-flush actuator. As such, the sliding member (**24**) that acting as float means, which is being less dense than water, has a natural tendency to rise back. If this continues, the breather hole (**34**) will soon be exposed. In such situation, the expose of the breather hole (**34**) will let the atmospheric air flow into the outlet valve flush chambers (**2**) through the air inlet passageway means (**8**) and thereby break the water flow at half-flush.

However, due to the Bernoulli principle acting upon the speed of the water flowing through section (**C**), the pressure differential created between the housing member (**20**) and air inlet passageway means (**8**) at both breather hole (**34**) and suction hole (**36**), i.e. the pressure at housing member (**20**) being greater than at the air inlet passageway means (**8**). In this event, the sliding member (**24**) is pushed against both breather hole (**34**) and suction hole (**36**). This in turn seals the breather hole tightly. Even when the water level falls below the level of the breather hole (**34**), the pressure differential in breather hole (**34**) and suction hole (**36**) will keep the sliding member (**24**) attached to the inner side wall of the housing member (**20**) instead of falling with the water level, and entirely sealing the breather hole (**34**).

As such, the atmospheric air is unable to enter the outlet valve flush chamber (**2**)

through the breather hole (**34**) to break the syphonic flow of the water to the toilet bowl. The water level will keeps dropping until it reaches the full flush level (**LF**), wherein the atmospheric air is finally able to enter the outlet valve flush chamber (**2**) through the bottom end opening of the flush inlet passage (**4**), breaking the syphonic flow of water. The water level in the cistern will rises back to standby level (**LS**) again. At this point, there is not flowing water to create any pressure differential, the sliding member (**24**) will get back to its position above the breather hole (**34**) and covers the suction hole (**36**) when fluid in container is rises back to standby level (**LS**).

The present invention can be incorporate into any syphonic flushing modules for pump action flush chamber. However, the present embodiment may also work equally well with diaphragm action flush chamber. In addition, the use of Bernoulli principal can also be used whereby the sliding member (**24**) is replaced with sinker means instead of floating means. In such a replacement, the direction of the flush actuator will be reversed; namely to pull the said sliding member (**24**) that act as sinker means (**FIGS. 6** and **7**).

By using concept of differential water pressures, the present invention enables and increase the efficiency of water volume control for dual flush systems without the need for complicated, expensive and numerous components. While in the foregoing specification this invention has been described in relation to certain preferred embodiments thereof and many details have been set forth for purpose of illustration, it will be apparent to those skilled in the art that the invention is susceptible to additional embodiments and that certain of the details described herein can be varied considerably without departing from the basic principles of the invention.

CLAIMS

1. A discharge control module for water flushing system having a syphonic outlet valve flush chamber characterized in that the discharge control module comprises:

a) an outlet valve flush chamber (**2**) secured with a housing member (**20**);

b) the housing member (**20**) having a channel (**21**) to receive an air inlet passage means (**8**);

c) the air inlet passageway means (**8**) connected to outlet valve flush chamber (**2**) through a duct (**11**), said air inlet passageway means (**8**) having at least one predefined opening (**9**) along the duct (**11**);

d) a sliding member (**24**) disposed within a compartment (**23**) of the housing member (**20**);

e) at least one breather hole (**34**) at interfacing walls of said housing member (**20**);

f) at least one suction hole (**36**) at the interfacing walls of said housing member (**20**); and

g) an actuating means (**31**);

wherein the actuating means (**31**) is activated to initiate fluid flow in outlet valve flush chamber (**2**) by either pump or diaphragm action; and

wherein the sliding member (**24**) acting as a float means to enable sliding member (**24**) to move up-or-down at the compartment (**23**) of said housing member (**20**) to determined either partial-flush or full-flush water to be discharged from container; and wherein the sliding member (**24**) is in a position above to and exposes the breather hole (**34**) but completely covers the suction hole (**36**) when fluid in container is at standby level (**LS**).

2. A discharge control module as claimed in claim **1** wherein the actuating means (**31**) includes full-flush actuator (**30**) and partial-flush actuator (**32**).

3. A discharge control module as claimed in claim **1** wherein the housing member (**20**) can be adjustably moveable along the duct (**11**) of air inlet passageway means (**8**) to variably define volume of water to be discharged in partial-flush.

4. A discharge control module as claimed in claim **1** wherein the sliding member (**24**) includes at least one aperture positioned to overlap and expose the breather hole (**34**) at housing member (**20**).

5. A discharge control module as claimed in claim **1** wherein in case of partial-flush, the partial-flush actuator (**32**) is activated, the sliding member (**24**) remains at it position above the breather hole as in standby level (**LS**);

the Bernoulli effect causes sliding member (**24**) retained in its position to cover the suction hole (**36**) by the lower pressure at the duct (**11**) arising from water flowing in the outlet valve flush chamber (**2**); which lower pressure, acting through said suction hole (**36**), pulls the sliding member (**24**) towards the interfacing wall of the housing member (**20**) and thereby sealing off the suction hole (**36**) and holding up the sliding member (**24**) as the water level falls;

when the water level falls and exposes at said breather hole (**34**), air is enable to rush through the passageway means (**8**) and breaks the flow in the outlet valve flush chamber (**2**); and

without Bernoulli effect, said sliding member (**24**) falls to uncover said suction hole (**36**) and to float with the water level as water is refilling the container.

6. A discharge control module as claimed in claim **1** wherein in case of full-flush, the full-flush actuator (**30**) is activated, said full-flush actuator (**30**) lower said sliding member (**24**) to covers both suction hole (**36**) and breather hole (**34**);

the Bernoulli effect causes sliding member (**24**) retained in its position to cover both suction hole (**36**) and breather hole (**34**) by the lower pressure arising from flowing water in the outlet valve flush chamber (**2**); which lower pressure, acting through both said holes (**36**, **34**), pulls the sliding member (**24**) towards the interfacing wall of the housing member (**20**) and thereby sealing off both said suction and breather holes (**36**, **34**) and holding up the sliding member (**24**) when the water level falls;

when the water level falls and exposes the opening at inlet port (**4**) of the outlet valve flush chamber (**2**), air is enable to rush through said inlet port (**4**) and breaks the fluid

flow in said outlet valve flush chamber (**2**); and

without Bernoulli effect, said sliding member (**24**) falls to uncovers both suction and breather holes (**36, 34**) and floats with the water level as water is been refilled in the container.

7. A discharge control module for water flushing system having a syphonic outlet valve flush chamber characterized in that the discharge control module comprises:

a) an outlet valve flush chamber (**2**) secured with a housing member (**20**);

b) the housing member (**20**) having a channel (**21**) to receive an air inlet passage means (**8**);

c) the air inlet passageway means (**8**) connected to outlet valve flush chamber (**2**) through a duct (**11**), said air inlet passageway means (**8**) having at least one predefined opening (**9**) along the duct (**11**);

d) a sliding member (**24**) disposed within a compartment (**23**) of the housing member (**20**);

e) at least one breather hole (**34**) at interfacing walls of said housing member (**20**); and

f) an actuating means (**31**);

wherein the actuating means (**31**) is activated to initiate fluid flow in outlet valve flush chamber (**2**) by either pump or diaphragm action; and

wherein the sliding member (**24**) acting as sinker means that connected to the actuating means (**31**) by a link (**33**), said sliding member (**24**) enable to move vertically within the compartment (**23**) of said housing member (**20**); and

wherein the sliding member (**24**) is positioned below the breather hole (**34**) and said breather hole (**34**) is exposes when the fluid in container is at standby level (**LS**).

8. A discharge control module as claimed in claim **7** wherein the actuating means (**31**) includes full-flush actuator (**30**) and partial-flush actuator (**32**).

9. A discharge control module as claimed in claim **7** wherein the link (**33**) is connected to full-flush actuator (**30**).

10. A discharge control module as claimed in claim **7** wherein the housing member (**20**) can be adjustably moveable along the duct (**11**) of air inlet passageway means (**8**) to variably define volume of water to be discharged in partial-flush.

11. A discharge control module as claimed in claim **7** wherein the sliding member (**24**) includes at least one aperture positioned to overlap and expose the breather hole (**34**) at housing member (**20**).

12. A discharge control module as claimed in claim **7** wherein in case of partial-flush, the partial-flush actuator (**32**) is activated, the sliding member (**24**) remain at it position below the breather hole as in standby level (**LS**); and
when the fluid level falls and exposes at said breather hole (**34**), air is enable to rush through the passageway means (**8**) and breaks the fluid flow in the outlet valve flush chamber (**2**).

13. A discharge control module as claimed in claim **7** wherein in case of full-flush, the full-flush actuator (**30**) is activated, said full-flush actuator (**30**) raises said sliding member (**24**) to covers the breather hole (**34**);
the Bernoulli effect causes sliding member (**24**) retained in its position to cover both the breather hole (**34**) by the lower pressure at the duct (**11**) arising from flowing water in the outlet valve flush chamber (**2**); which lower pressure, acting through said breather hole (**34**), pulls the sliding member (**24**) towards the interfacing wall of the housing member (**20**) and thereby sealing off breather holes (**34**) and holding up the sliding member (**24**) when the water level falls;
when the water level falls and exposes at inlet port (**4**) of the outlet valve flush chamber (**2**), air is enable to rush through the opening of said inlet port (**4**) and breaks the fluid flow in said outlet valve flush chamber (**2**); and
without Bernoulli effect, said sliding member (**24**) falls to uncovers said breather holes (**34**) and floats with the water level as water is been refilled in the container.

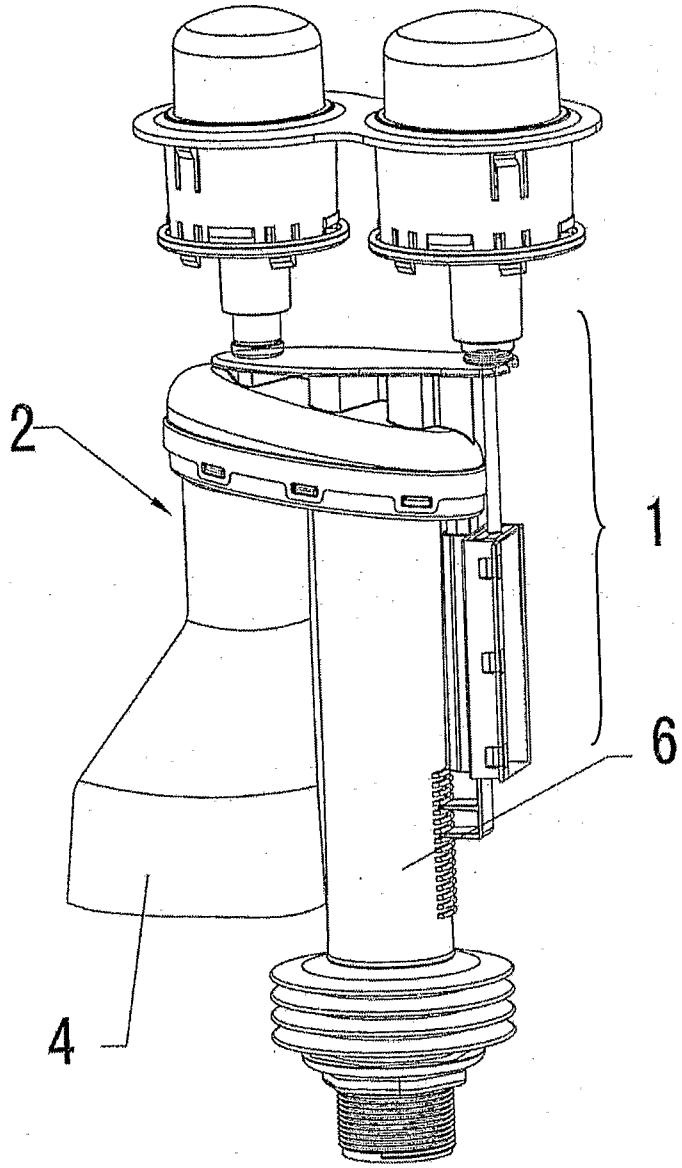

FIG. 1

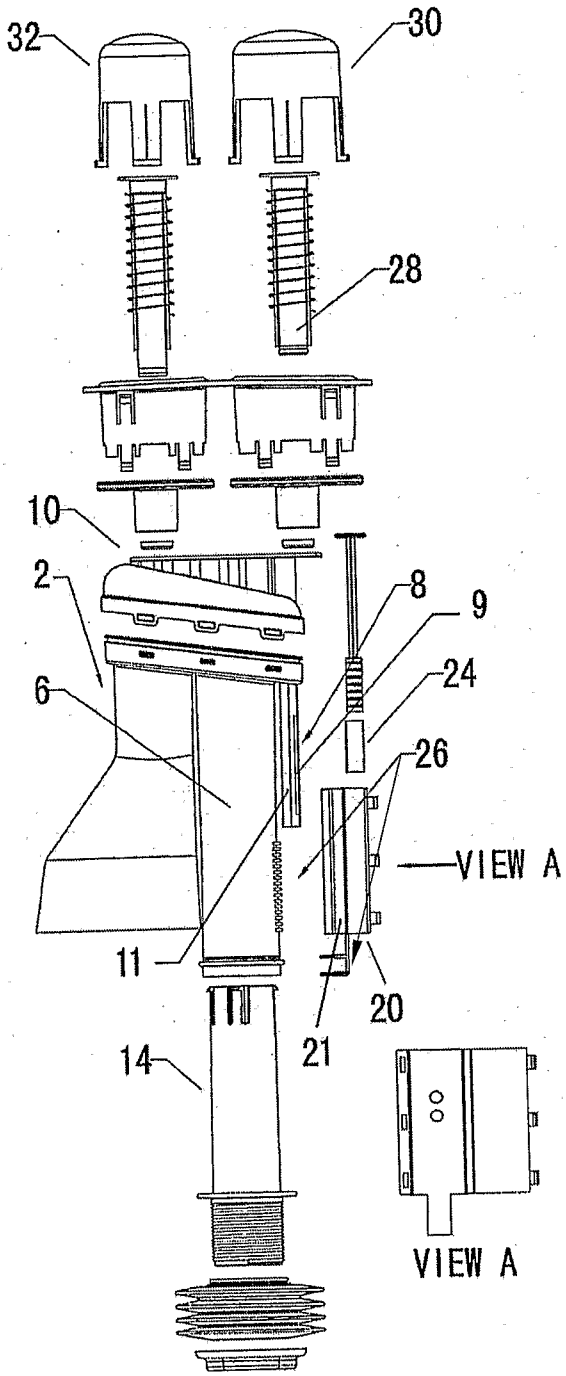

FIG. 2

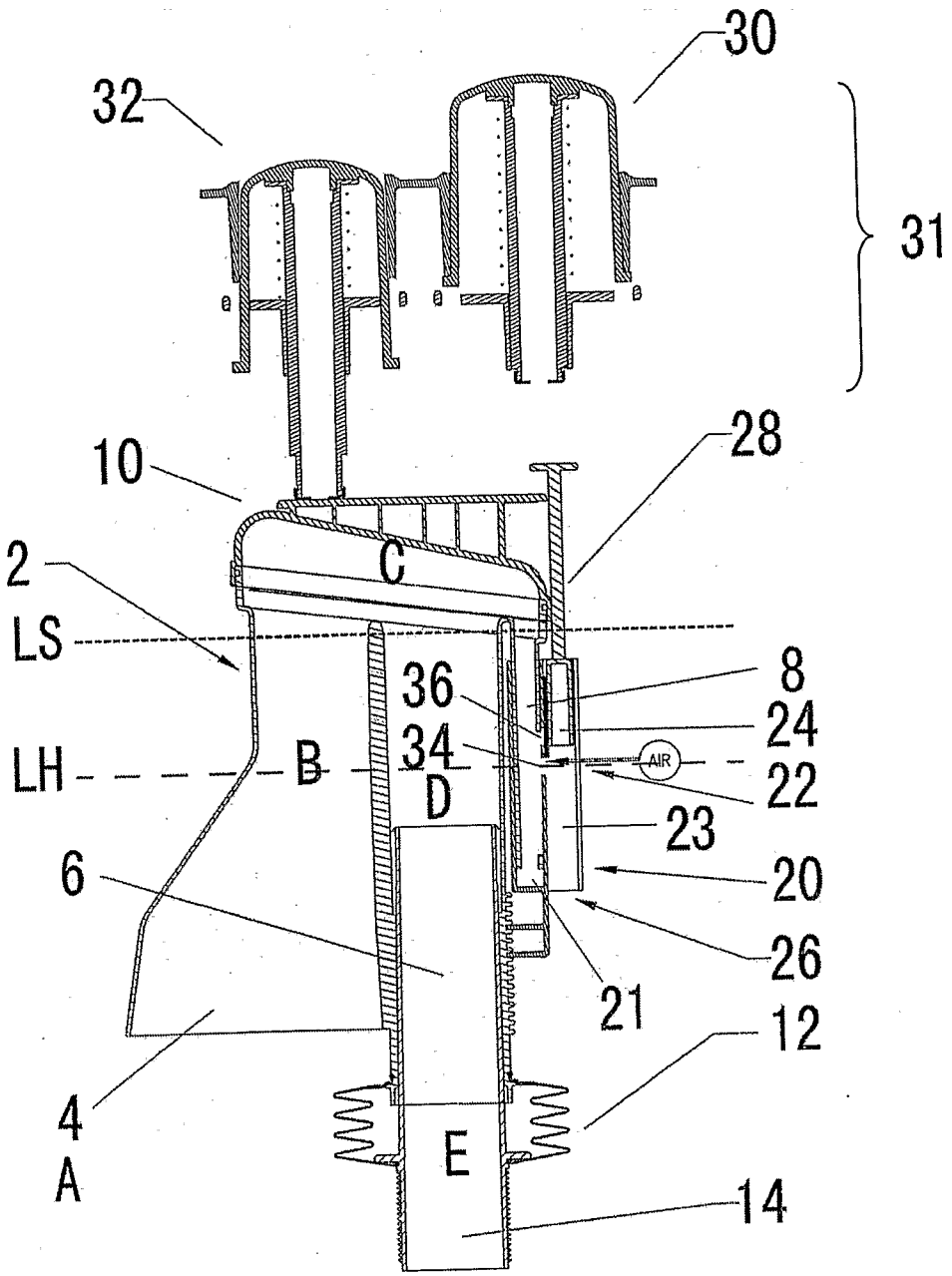

FIG. 3

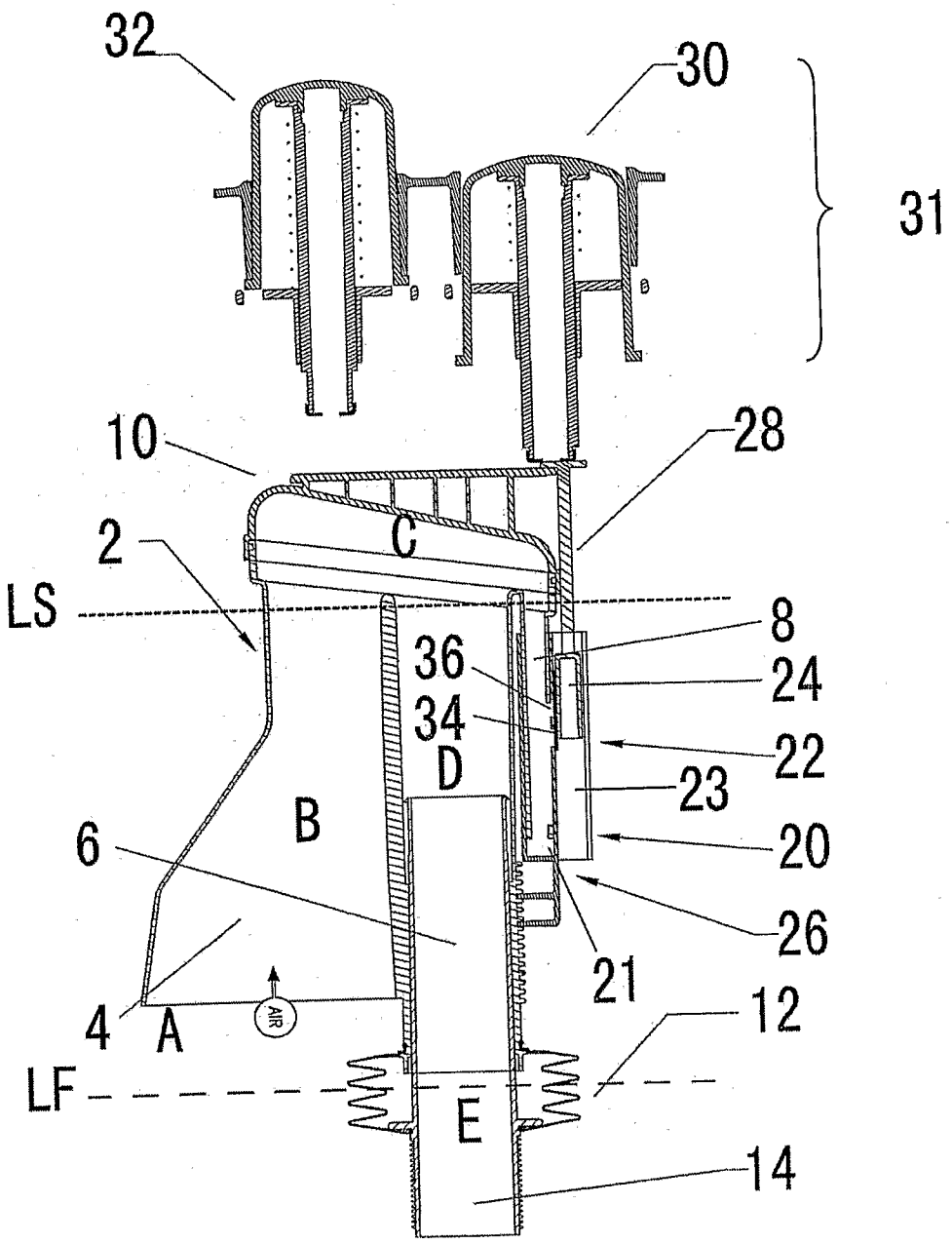

FIG. 4

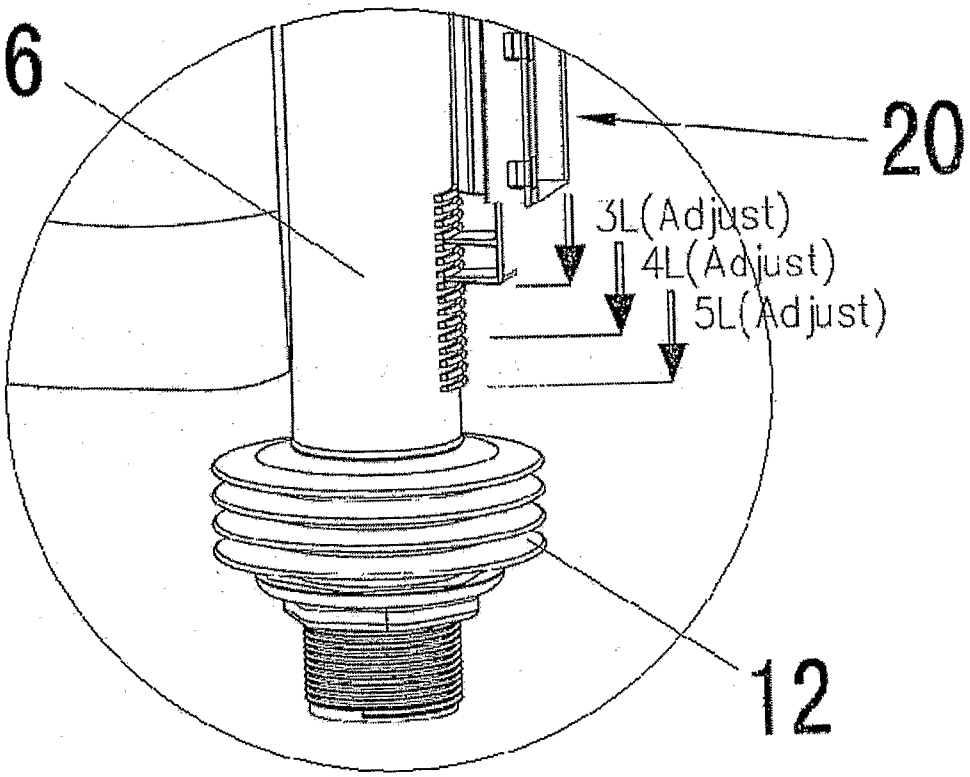

FIG. 5

FIG. 6

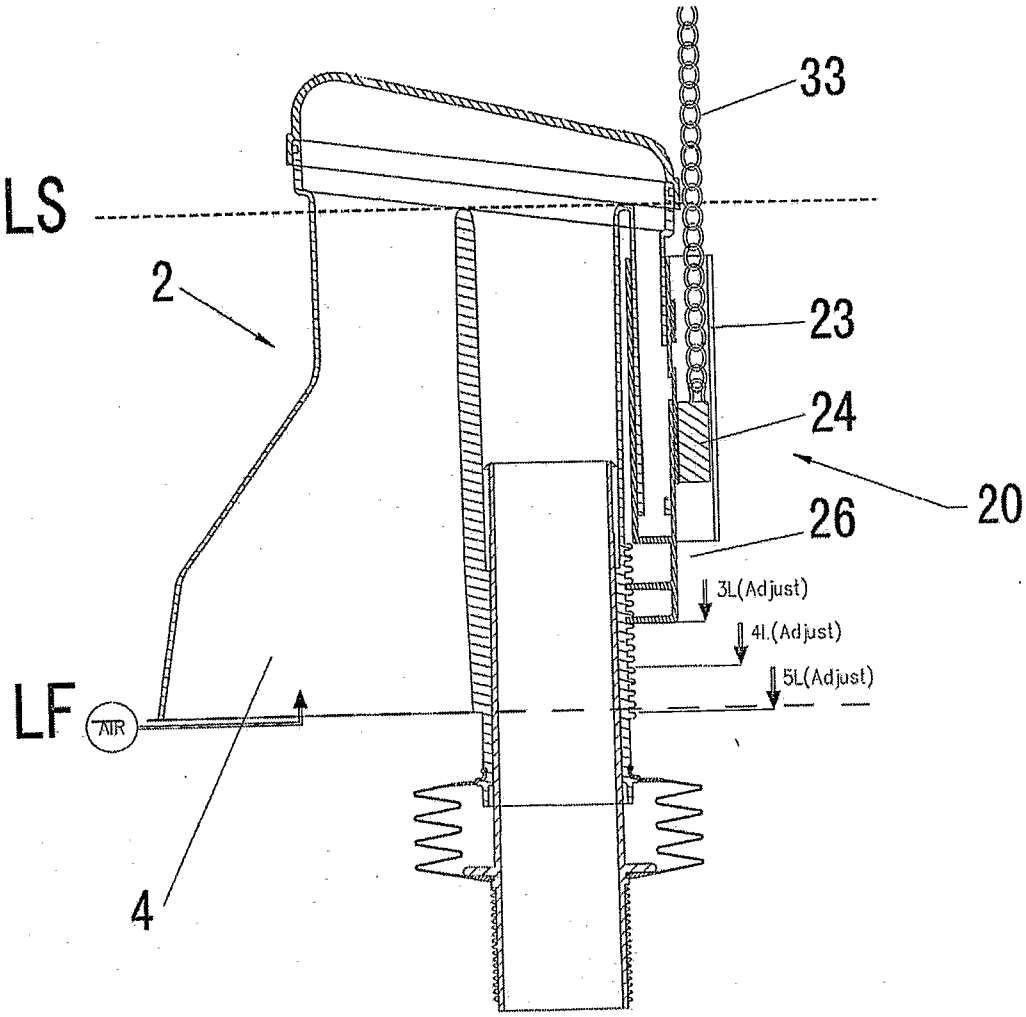

FIG. 7

INTERNATIONAL SEARCH REPORT

International application No
PCT/MY2007/000013

A. CLASSIFICATION OF SUBJECT MATTER
INV. E03D1/07 E03D1/14

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)
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 practical, search terms used)
EPO-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X Y A	US 5 140 712 A (WANG-ON KWOK [HK]) 25 August 1992 (1992-08-25) the whole document	7-9,12 10 5,6,13
Y	EP 0 967 337 A2 (DUDLEY THOMAS LTD [GB] THOMAS DUDLEY LTD [GB]) 29 December 1999 (1999-12-29) the whole document	10
A	GB 491 039 A (SAMUEL BLACKBURN BARNARD; ELIZABETH HANNAH GAUNT) 25 August 1938 (1938-08-25) the whole document	5,6,13
A	EP 0 236 098 A (HANDYMATE LTD [GB]) 9 September 1987 (1987-09-09) the whole document	5,6,13

☐ 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 document 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	Date of mailing of the international search report
26 June 2007	02/07/2007

Name and mailing address of the ISA/	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL – 2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax: (+31-70) 340-3016	Geisenhofer, Michael

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

Continuation of Box II.1

Claim 1 lacks essential features for a clear and complete definition of the invention as required by Article 6 PCT. Since it is neither clear why two holes (breather hole 34 and suction hole 36) are used nor in which geometrical relation these two holes are provided relative to each other and relative to the sliding member, the inventive concept underlying the suction hole (fixing the sliding member within the compartment due to the Bernoulli effect) remains unsufficintly defined. For the purpose of search, it was assumed that the features of current claims 5 and 6 are present in a "virtuel" independent claim 1*. Thus, the search report is only valid for a true combination of the features of originally filed claims 1, 5 and 6 as independent claim 1.

INTERNATIONAL SEARCH REPORT

International application No.
PCT/MY2007/000013

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

see FURTHER INFORMATION sheet PCT/ISA/210

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 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:

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 fee, this Authority did not invite payment of any additional fee.

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.

[ ] No protest accompanied the payment of additional search fees.

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No
PCT/MY2007/000013

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 5140712 A	25-08-1992	NONE	
EP 0967337 A2	29-12-1999	DE 69917377 D1	24-06-2004
		DE 69917377 T2	18-08-2005
		ES 2222014 T3	16-01-2005
		GB 2338723 A	29-12-1999
		US 6256801 B1	10-07-2001
GB 491039 A	25-08-1938	NONE	
EP 0236098 A	09-09-1987	NONE	