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(72) Inventor: **Van der Velden, Albertus Petrus Wilhelmus**
6828 HE Arnhem (NL)

(74) Representative: **Bartelds, Erik Arnold & Siedsma**
Sweelinckplein 1
2517 GK Den Haag (NL)

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

(54) **Flushing device for a toilet and holder for an active substance for use therein**

(57) A flushing device for a toilet, comprising a, preferably built-in, reservoir for flushing water and a flushing mechanism received in the reservoir, and means protruding through a wall of the reservoir for introducing a cleaning tablet therein. A water-permeable holder for the tablet connects to the introducing means and extends in

the reservoir. The holder extends in line with the introducing means over a considerable part of the reservoir. The holder can further be deformable, while it is also possible to envisage the holder being arranged movably, for instance pivotally, in the reservoir.

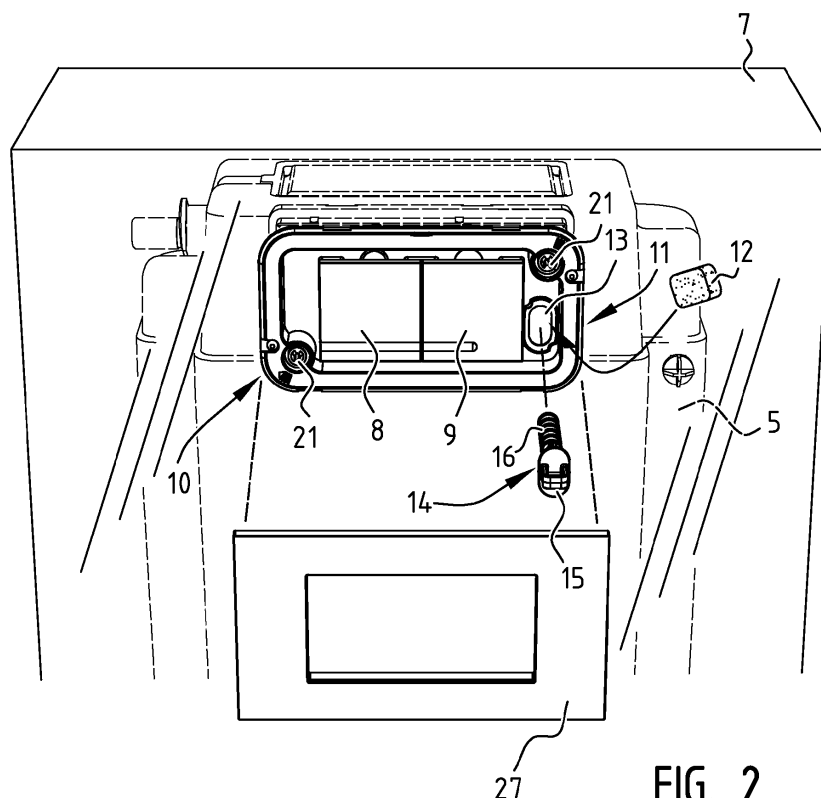


FIG. 2

Description

[0001] The invention relates to provisions for cleaning toilet bowls and the associated flushing water reservoirs.

[0002] The invention relates particularly to a flushing device for a toilet comprising a reservoir for flushing water and a flushing mechanism received in the reservoir, and means protruding through a wall of the reservoir and extending substantially horizontally for introducing therein a dose of active substance, in particular a cleaning tablet, and a water-permeable holder for the active substance which connects to the introducing means and extends in the reservoir. Such a flushing device is known, for instance from WO 03/044291 A1.

[0003] It is already known to suspend an active substance in a toilet bowl, generally below the upper edge of the bowl, for instance in the form of a toilet block or toilet capsule in a holder. The active substance, usually a cleaning agent or disinfectant, then serves to clean or disinfect the toilet bowl and is entrained by the flushing water flowing past during each flush of the toilet. This manner of supplying active substance to the flushing water is not very effective and results in a relatively high consumption of active substance. The toilet blocks or capsules have to be replaced regularly. This replacement is an unpleasant and unhygienic operation as the holder is after all located in the toilet bowl.

[0004] Systems are therefore already known wherein the active substance is supplied prior to a flush to the water present in the flushing reservoir. Use is once again made here of a holder which is suspended in random manner in the flushing reservoir. In the case of a free-standing toilet this can be realized in simple manner because the flushing reservoir is then freely accessible by lifting a cover. It is however no easy matter to introduce an active substance in the case of a toilet with a built-in reservoir situated behind a wall on which the toilet bowl is usually mounted. Special provisions are necessary in this case.

[0005] WO 2010/087700 A2 from the same applicant thus describes a system for introducing cleaning tablets into a built-in flushing water reservoir, wherein use is made of a tube which protrudes through the control panel of the flushing device and which is closed by a cap with a shank which functions as pressing member. A cleaning tablet is introduced into the tube and then pressed inward by the shank, after which the cap finally closes the opening of the tube. When it is pressed out of the tube, the cleaning tablet falls to the bottom of the flushing water reservoir. This entails the risk of a tablet affecting the operation of the flushing mechanism, for instance because it impedes the movement of the flushing tube.

[0006] Described in the above stated patent publication WO 03/044291 A1 are a number of different mechanisms for introducing a cleaning agent into a flushing water reservoir. Most of the shown solutions appear to involve a freely accessible reservoir, although a built-in reservoir is shown in figure 11 of this document. This

reservoir is connected via a pipe to an opening in the wall which can be closed with a valve. The pipe debouches into a flat cage which appears to be mounted against the wall of the built-in reservoir. With this construction there is a risk of a tablet becoming stuck in the pipe or at the transition from the pipe to the cage, whereby the active substance does not come into contact with the flushing water. Furthermore, the shown built-in reservoir does not seem to be accessible for maintenance or interim cleaning, and there do not appear to be provisions for inspecting or replacing the cage or holder for the cleaning agent.

[0007] Described in EP 2 226 437 A1 is a flushing device provided with a mechanism for introducing cleaning or fragrance tablets into a built-in flushing reservoir. These introducing means comprise a tray mounted on a tiltable cover plate, a slide track connecting to this tray and a holder at the bottom of the cistern. The slide track serves here to bridge the distance between a control panel on a front side of a wall and the built-in reservoir on the rear side.

[0008] FR 2 804 143 describes yet another introducing mechanism for cleaning tablets. This is a flushing device with a holder for a cleaning tablet which is mounted on the end of a slide track. This slide track is mounted on a cover member which closes an opening in a cover of a flushing reservoir. The holder can be formed integrally with the slide track or can be suspended therefrom by means of rods.

[0009] The invention therefore has for its object to provide a flushing device of the above described type, wherein the stated drawbacks do not occur, or at least do so to lesser extent.

[0010] According to a first aspect of the invention, this is achieved in the case of such a flushing device in that the holder extends in line with the introducing means over a considerable part of the reservoir as seen in horizontal direction. There is hereby sufficient space to introduce cleaning tablets without the risk of these tablets being caught on the upper side of the holder or, conversely, falling wide of the holder into the reservoir. This latter risk occurs particularly in introducing mechanisms with which tablets can be pressed with force into the reservoir, as described in the earlier document WO 2010/087700 A2 of applicant.

[0011] Since it is an aim to use increasingly smaller amounts of water for flushing, and flushing water reservoirs are thus also becoming increasingly smaller, it is not practical to accommodate a large holder for the active substance in the reservoir. It is therefore recommended that the holder has a lengthwise dimension in line with the introducing means which is greater than a dimension of the holder transversely of the direction of the lengthwise dimension. A relatively slender holder is thus obtained which takes up little space in the flushing reservoir.

[0012] According to another aspect of the invention, the holder is deformable and/or is arranged movably in the reservoir. This ensures that for inspection or maintenance purposes the holder can be taken out of the res-

ervoir through or along the introducing means, which after all form a passage in the wall of the reservoir.

[0013] In a preferred embodiment of the flushing device the introducing means comprise a tubular introducing member and the holder is suspended movably from the introducing member. The holder can thus be moved between a position of use, in which it extends substantially vertically in the flushing water reservoir such that the tablets with active substance lie on the bottom of the holder in the flushing water, and another position in which the holder can be taken out of the reservoir through or along the introducing means, or can be placed back in the reservoir following inspection or replacement.

[0014] For this purpose the holder is preferably suspended pivotally about an axis from the introducing member. A pivoting movement can be realized in structurally simple manner.

[0015] When an opening covered by a control panel is formed in the wall of the reservoir and the introducing member protrudes through the opening, it is recommended that the pivot axis is located close to an edge of the opening and close to an edge of the holder. The holder can thus be brought into line with the opening by means of the pivoting, whereby it can be easily taken out of or placed back into the reservoir.

[0016] A structurally simple solution is achieved here when the flushing device is provided with a bracket which is attached to the introducing member and defines the pivot axis. Such a bracket can be arranged in simple manner at a desired position on the tubular introducing member and, if desired, be displaced along the tubular introducing member in order to optimize the pivoting movement.

[0017] In order to make the flushing device suitable for application in different toilet configurations the opening can be formed in a front wall and/or an upper wall of the reservoir.

[0018] A flushing device with flexible application is obtained when openings are formed in both the front wall and the upper wall, one of which openings is covered by the control panel and one by a cover. The flushing device can thus be used with both front operation and top operation.

[0019] In order to prevent the holder becoming jammed against a wall of the reservoir during the pivoting movement, a side of the holder lying opposite the pivot axis is preferably chamfered or rounded.

[0020] When the holder is open on its upper side, it can be fixed easily to the introducing means. The holder is then also structurally simple as it in fact takes the form of a bag.

[0021] The holder can preferably be manufactured from a liquid-permeable fabric or a mesh material.

[0022] The device according to the invention provides particular advantages when the reservoir is a built-in reservoir situated behind a wall to which a bowl of the toilet is attached, and the introducing means extend through the wall.

[0023] The invention also relates to a combination of a holder and an introducing member for use in a flushing device as described above, and to a holder intended for use in such a flushing device or in such a combination.

[0024] The invention will now be further elucidated on the basis of two embodiments, wherein reference is made to the accompanying drawing in which corresponding components are designated with reference numerals increased by 100 at a time, and in which:

Figure 1 is a schematic perspective view of a toilet with a built-in reservoir, in which the two alternative operating options are shown,

Figure 2 is a perspective front view of the flushing device of figure 1, wherein a part of the control panel has been detached to enable introduction of a cleaning tablet,

Figure 3 is a schematic side view of an introducing tube and a holder suspended therefrom,

Figure 4 is a partially cut-away perspective view of the flushing device of figure 1 with the holder and a cleaning tablet,

Figure 5 is a partially cut-away perspective view of the flushing device from a different angle, wherein the holder is shown schematically,

Figure 6 is a view corresponding to figure 5 which shows how the holder is removed from the reservoir,

Figure 7 is a partially cut-away perspective view of an alternative embodiment of the flushing device with a control on the upper side,

Figure 8 is a view corresponding to figure 3 of the introduction of a cleaning tablet into the holder of the flushing device of figure 7, and

Figure 9 is a perspective view which shows how the holder can be taken out of the flushing device of figure 7.

[0025] Figure 1 shows a toilet 1 consisting of a toilet bowl 2 with seat 3 and cover 4, and a built-in reservoir 5. This built-in reservoir 5 is connected via a flushing conduit 6 to toilet bowl 2, but is situated behind a wall 7 to which toilet bowl 2 can be attached. Received in built-in reservoir 5 is a flushing mechanism 24 which is operated by spring-loaded pushbuttons 8, 9 for respectively a full or half flush. These buttons 8, 9 are incorporated into a control panel 10 mounted in the shown embodiment in wall 7. The movements of buttons 8, 9, which in this situation are in substantially horizontal orientation, are converted by a suitable mechanism to a vertical movement of flushing tube 25 of flushing mechanism 24. It is however also possible to envisage control buttons 108, 109 being situated in a horizontal top surface 26 above built-in reservoir 5, whereby a more direct operation of flushing mechanism 24 is possible.

[0026] The flushing device according to the invention is provided with means 11 for introducing into reservoir 5 a dose of active substance, in the shown embodiment in the form of a cleaning tablet 12. Introducing means 11

are here of the type as described in the earlier document WO 2010/087700 A2 of applicant and comprise a tubular introducing member 13 arranged adjacently of pushbuttons 8, 9 in control panel 10. This tubular introducing member 13 is closed by a combined closing and pressing member 14 consisting of a cap 15 and a shank 16 protruding therefrom. In the shown embodiment tubular introducing member 13 has a somewhat elongate cross-sectional form which is adapted to that of tablet 12. Introducing means 11 are concealed from view by a finishing edge 27 which surrounds pushbuttons 8, 9 and is snapped fixedly to the rest of control panel 10. Control panel 10 is in turn attached to built-in reservoir 5 by means of screws 21.

[0027] In order to prevent cleaning tablet 12 dropping freely into reservoir 5 and sinking to the bottom 17 thereof after leaving the tubular introducing member 13, the flushing device is provided with a holder 18 which connects to the free outer end of introducing tube 13 and extends in reservoir 5 to below the level WL of the water in reservoir 5 prior to a flush. In the shown embodiment holder 18 takes the form of a bag which is open on the upper side 19, and of which in any case the bottom 20 thus lies below the water level WL. Holder 18 is water-permeable so that cleaning tablet 12, which will come to rest on the bottom 20 of holder 18 after being introduced, can come into contact with the flushing water and gradually release its active substance to the flushing water. Holder 18 can for instance be formed from a water-permeable fabric or have a mesh-like structure. Particularly suitable as material for holder 18 are plastics which can well withstand a prolonged presence in reservoir 5 that is always partially filled with water.

[0028] Holder 18 has a lengthwise dimension L in line with the tubular introducing member 13 and a transverse dimension or width B in the direction transversely thereof. Holder 18 further has a height dimension H which determines the depth to which holder 18 extends into reservoir 5. According to a first aspect of the invention, the lengthwise dimension L substantially corresponds to the depth of reservoir 5, i.e. the distance between front wall 22 and rear wall 23 thereof. Having holder 18 extend over a considerable part of the depth of reservoir 5 allows the cleaning tablets 12 leaving the tubular introducing member 13 sufficient space to perform their falling movement into holder 18 without becoming caught here and so becoming stuck above the water surface WL. The lengthwise dimension L is moreover chosen such that there is no risk of a tablet 12, which is pressed with force out of tube 13, flying over holder 18 and coming to lie between holder 18 and rear wall 23 and then remaining caught there or falling from there to the bottom 17 of reservoir 5.

[0029] Since flushing water reservoirs are becoming increasingly smaller because it is an aim to reduce flushing device water consumption, the space available for holder 18 in reservoir 5 is however limited. The actual flushing mechanism 24 is after all also accommodated in reservoir 5, and this mechanism has to meet increas-

ingly higher standards in order to still generate sufficient flushing force with a small quantity of water and is therefore relatively complex and voluminous. In order to leave sufficient space free for flushing mechanism 24 the transverse dimension B of holder 18 is considerably smaller than its lengthwise dimension L. Holder 18 is thus elongate in top view. The transverse dimension B need in practice be only slightly greater than the largest dimension of tablet 12 in order to prevent the latter becoming caught in holder 18.

[0030] According to another aspect of the invention, holder 18 can be deformable, while holder 18 can in addition or instead also be arranged movably in reservoir 5. These two measures, which serve to allow removal of holder 18 from reservoir 5 for inspection and maintenance purposes, are combined in the shown embodiment. Holder 18 is to some extent deformable here, or at least less stiff than the surrounding parts of the flushing device. Holder 18 is on the other hand however sufficiently form-retaining to maintain the position shown in figure 4 between the front and rear walls 22, 23, despite the fact that it is connected at only two points to the tubular introducing member 13.

[0031] The connection here between holder 18 and introducing member 13 is a pivoting connection. Clamped onto the outer end of introducing member 13 is a bracket 28 provided with two protruding arms 29. These arms 29 are inserted through openings in side walls 30 of holder 18, wherein the two mutually opposite openings in holder 18 define a virtual pivot axis A. Holder 18 is pivotable around this axis A between the substantially vertical position of use as shown in figures 4 and 5 and a substantially horizontal position as shown in figure 6 in which holder 18 can be taken out of reservoir 5 through an opening 31. In the shown embodiment the virtual pivot axis A lies close to lower edge 32 of the opening and close to the front side of holder 18. This placing of the pivot axis A achieves that as a result of the pivoting movement holder 18 is brought into line with opening 31.

[0032] In order to create sufficient space for pivoting movement of holder 18 and to prevent it jamming against rear wall 23 of reservoir 5, a portion 33 of holder 18 located diametrically opposite the pivot axis A is chamfered. A recess 34 is further also formed in the front side of holder 18, whereby the front wall can pass the outer end of tube 13 during the pivoting movement. Once holder 18 has pivoted from the position of use to the horizontal position, following release of control panel 10 it can be pulled out of reservoir 5 through opening 31 and the neck part 35 mounted thereon. Holder 18 can on the one hand then be inspected and optionally exchanged, while space is in this way also created to inspect flushing mechanism 24 and optionally carry out maintenance operations thereon.

[0033] In the shown embodiment reservoir 5 takes a modular form in the sense that it has an opening 31 and 37 in respectively its front wall 22 and its upper wall 36. In the embodiment of figures 4-6 opening 37 is closed

with a cover 38, while in opening 31 is arranged neck 35 which is closed by control panel 10.

[0034] It is however also possible to interchange the position of neck 35 and control panel 10 on the one hand and cover 38 on the other, as can be seen in figures 7 and 9. Flushing mechanism 124 can in that case be operated by the buttons 108, 109 placed directly thereabove. Introducing means 111 are also oriented vertically in this embodiment. The tubular introducing member 113 extends straight down from control panel 110 into holder 118. Holder 118 is attached here via a bracket 128 to introducing tube 113 in the same way as in the first embodiment. Although the pivoting nature of the suspension is less critical in this embodiment than in the first embodiment, this is still an advantage because it results in more freedom of movement during the removal of control panel 10.

[0035] Although the invention has been elucidated above on the basis of a number of embodiments, it will be apparent that it is not limited thereto but can be varied in many ways. The choice of the form and dimensions of the holder could thus be other than in the shown embodiment, while materials other than those stated could also be applied. A type of movement of the holder other than a pivoting movement would also be possible, for instance a sliding movement along a guide. It is even possible to envisage the holder not being movable but only being deformable to the extent that it can be easily taken out of the reservoir.

[0036] The scope of the invention is therefore defined solely by the following claims.

Claims

1. Flushing device for a toilet (1), comprising a reservoir (5) for flushing water and a flushing mechanism (24) received in the reservoir (5), and means (11) protruding through a wall (22) of the reservoir (5) and extending substantially horizontally for introducing therein a dose of active substance, in particular a cleaning tablet (12), and a water-permeable holder (18) for the active substance which connects to the introducing means (11) and extends in the reservoir (5), **characterized in that** the holder (18) extends in line with the introducing means (11) over a considerable part of the reservoir (5) as seen in horizontal direction.
2. Flushing device as claimed in claim 1, **characterized in that** the holder (18) has a lengthwise dimension (L) in line with the introducing means (11) which is greater than a dimension (B) of the holder (18) transversely of the direction of the lengthwise dimension (L).
3. Flushing device as claimed in claim 1 or 2 or as claimed in the preamble of claim 1, **characterized**

in that the holder (18) is deformable and/or is arranged movably in the reservoir (5).

4. Flushing device as claimed in claim 3, **characterized in that** the introducing means (11) comprise a tubular introducing member (13) and the holder (18) is suspended movably from the introducing member (13).
5. Flushing device as claimed in claim 4, **characterized in that** the holder (18) is suspended pivotally about an axis (A) from the introducing member (13).
6. Flushing device as claimed in claim 5, **characterized in that** an opening (31) covered by a control panel (10) is formed in the wall (22) of the reservoir (5), the introducing member (13) protrudes through the opening and the pivot axis (A) is located close to an edge (32) of the opening (31) and close to the edge of the holder (18).
7. Flushing device as claimed in claim 5 or 6, **characterized by** a bracket (28) which is attached to the introducing member (13) and defines the pivot axis (A).
8. Flushing device as claimed in claim 6 or 7, **characterized in that** the opening (31; 37) is formed in the front wall (22) and/or the upper wall (36) of the reservoir (5).
9. Flushing device as claimed in claim 8, **characterized in that** identical openings (31; 37) are formed in the front wall (22) and the upper wall (36), one of which openings is covered by the control panel (10) and one by a cover (38).
10. Flushing device as claimed in any of the claims 5-9, **characterized in that** a side (33) of the holder (18) lying opposite the pivot axis (A) is chamfered or rounded.
11. Flushing device as claimed in any of the foregoing claims, **characterized in that** the holder (18) is open on its upper side (19).
12. Flushing device as claimed in any of the foregoing claims, **characterized in that** the holder (18) is manufactured from a water-permeable fabric or a mesh material.
13. Flushing device as claimed in any of the foregoing claims, **characterized in that** the reservoir (5) is a built-in reservoir situated behind a wall (7) to which a bowl (2) of the toilet (1) is attached, and the introducing means (11) extend through the wall (7).
14. Combination of a holder (18) and an introducing

member (13), evidently intended for use in a flushing device as claimed in any of the claims 4-13.

15. Holder (18), evidently intended for use in a flushing device as claimed in any of the claims 1-13 or in a combination as claimed in claim 14. 5

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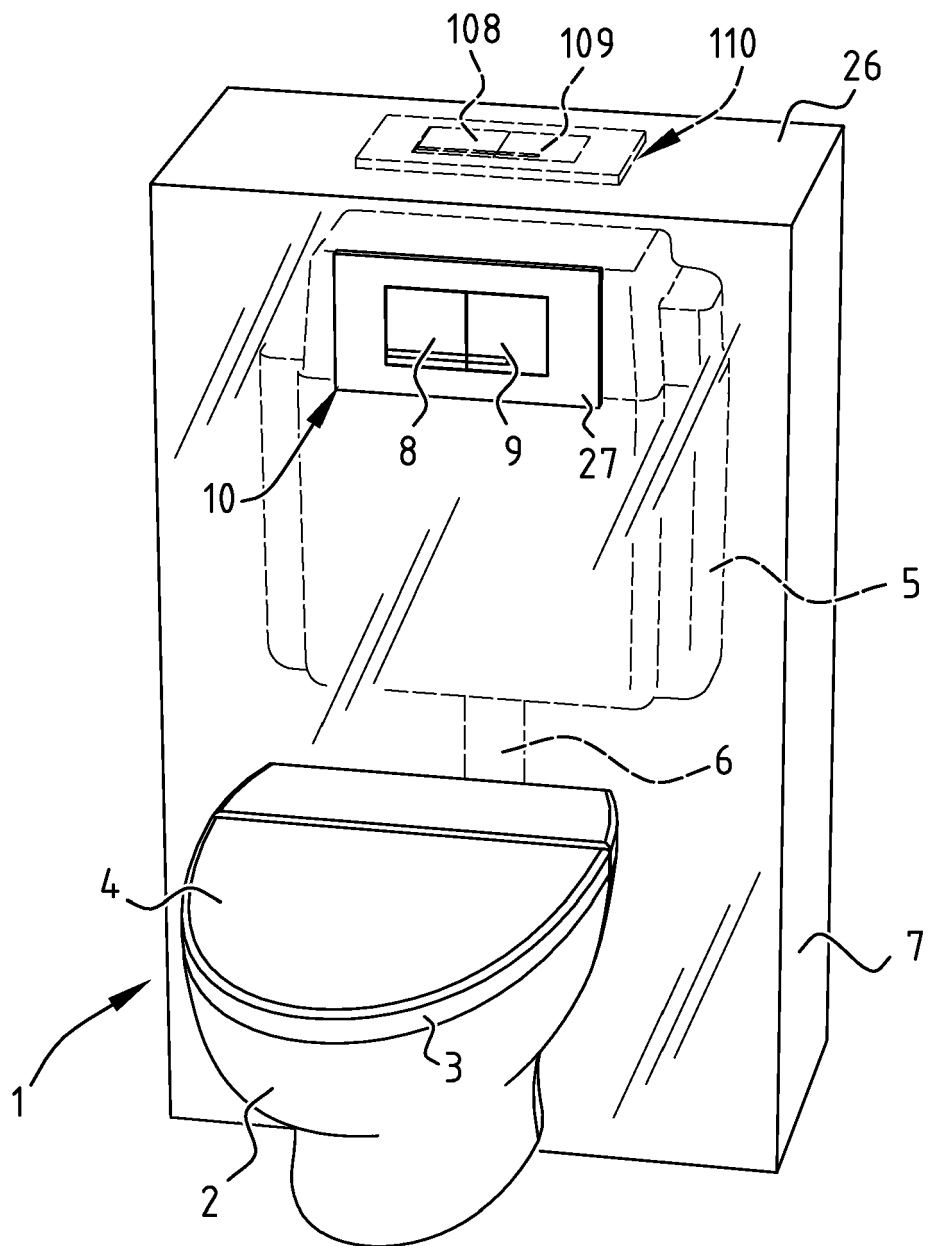


FIG. 1

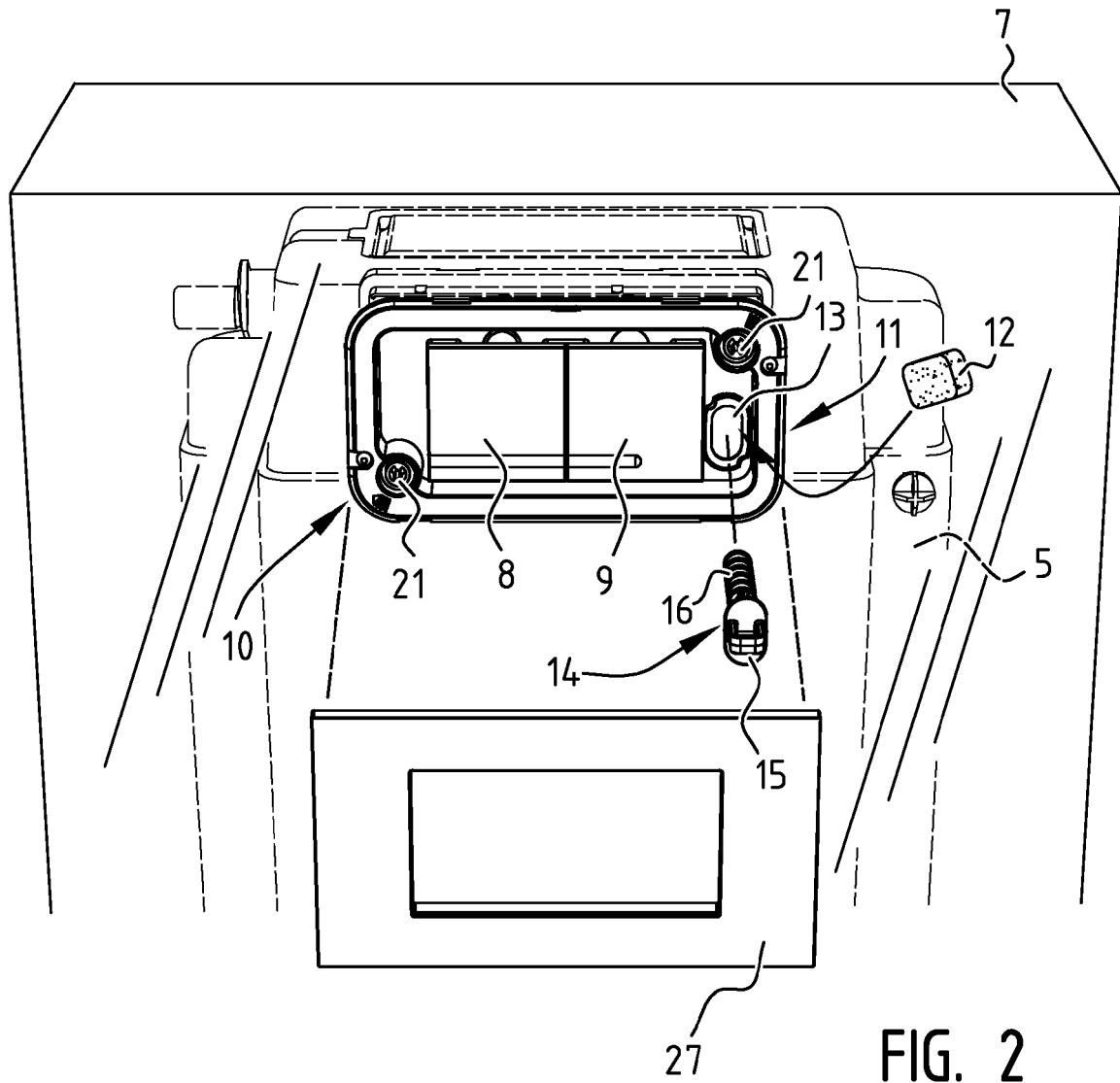


FIG. 2

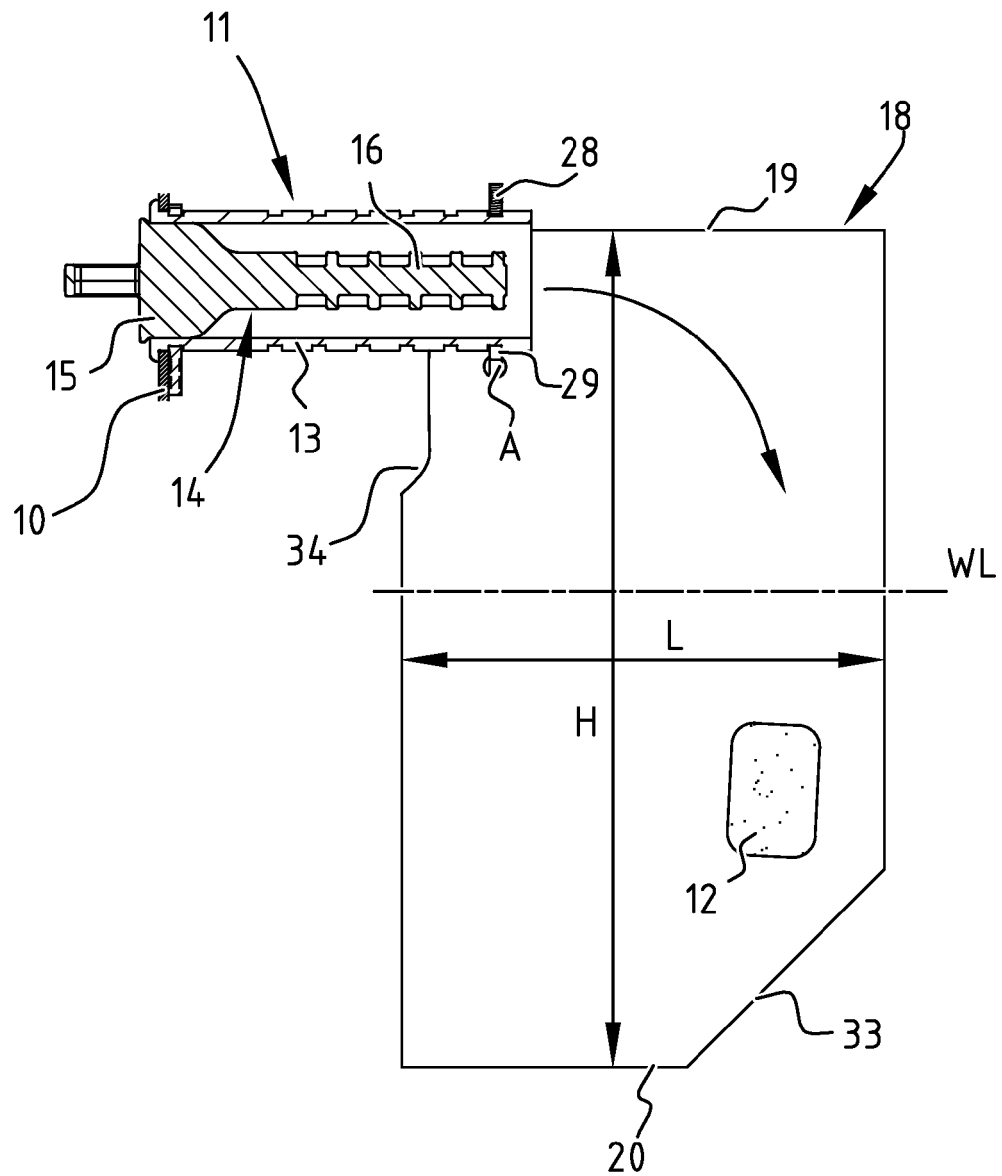


FIG. 3

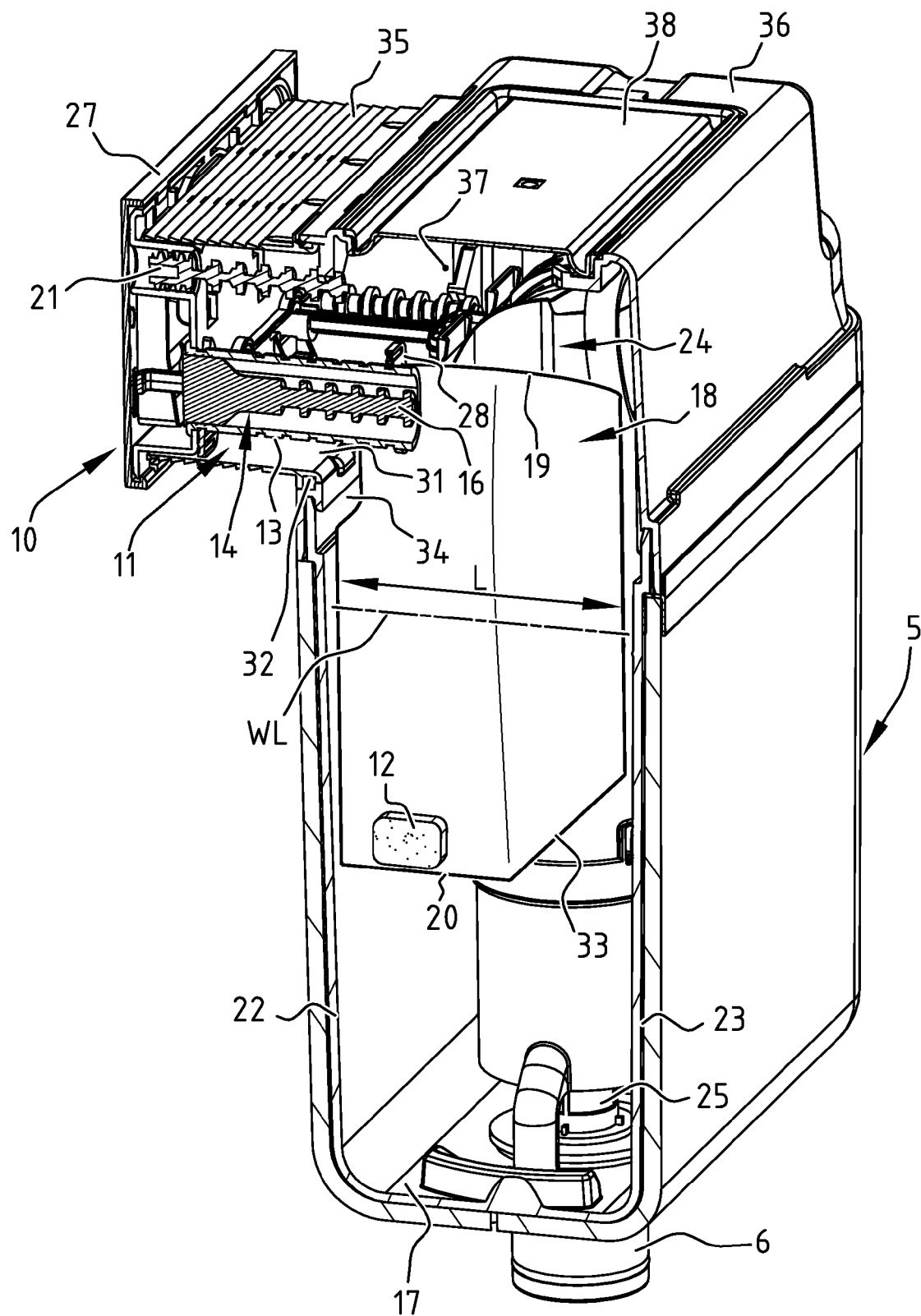


FIG. 4

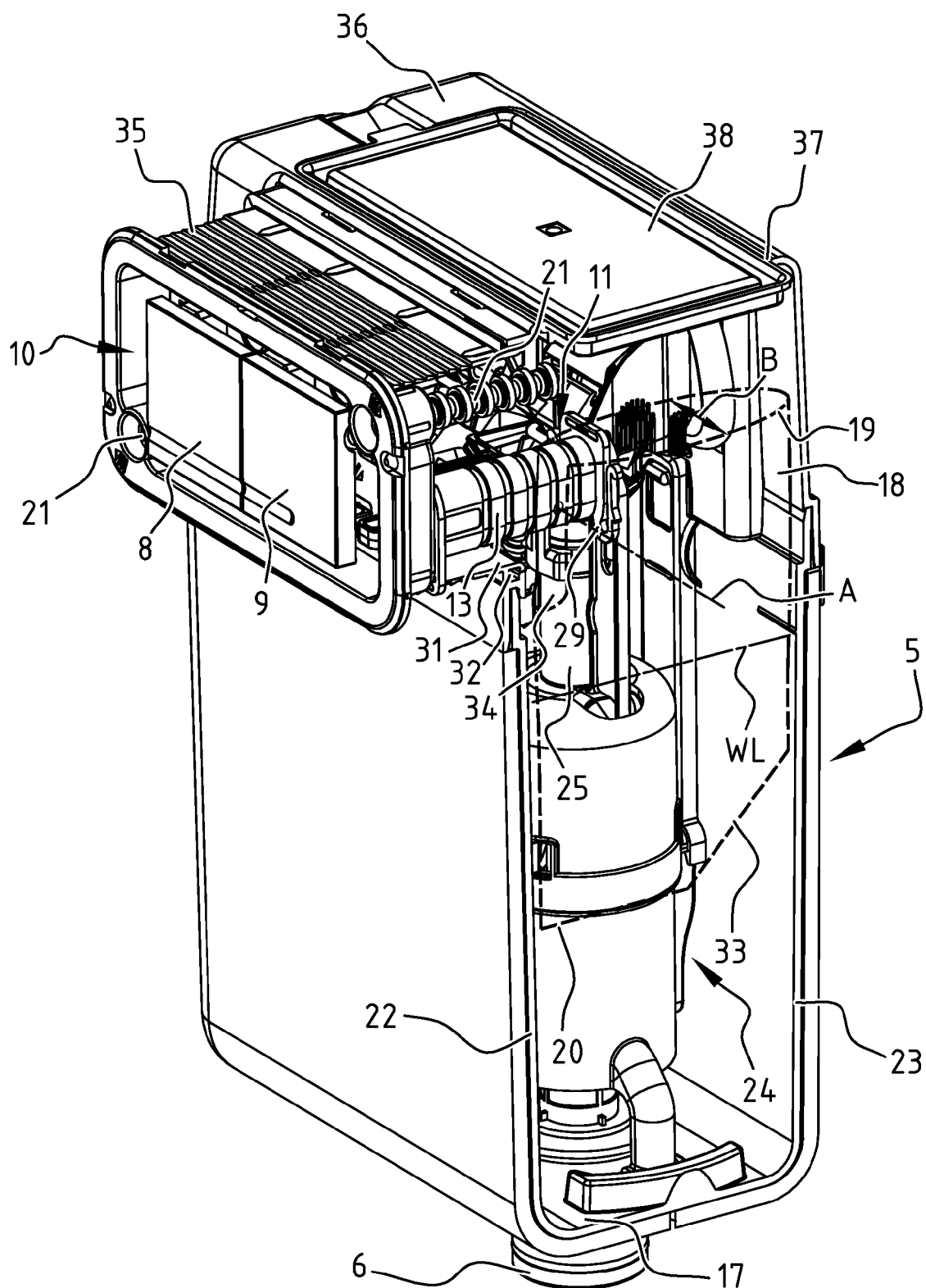


FIG. 5

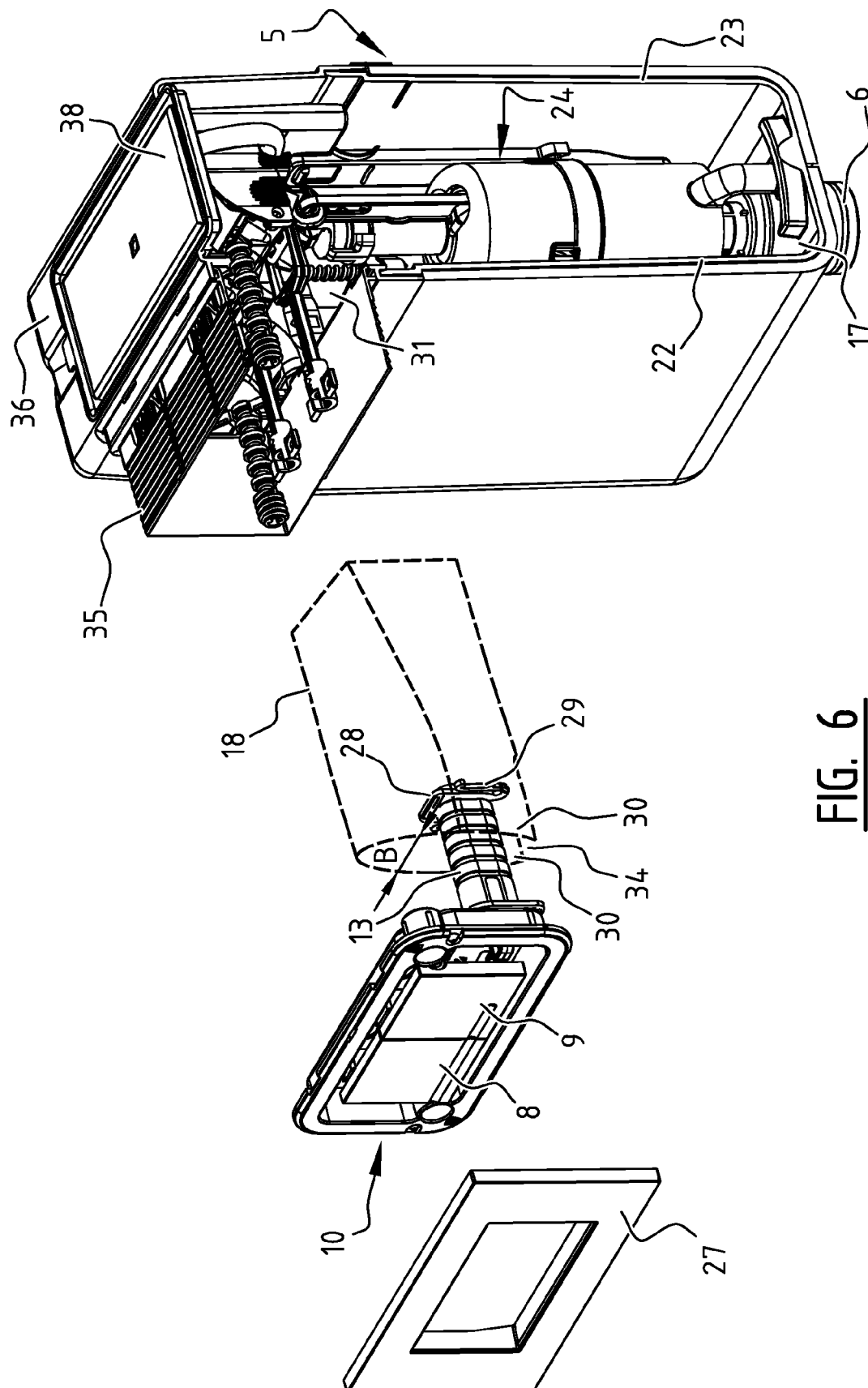


FIG. 6

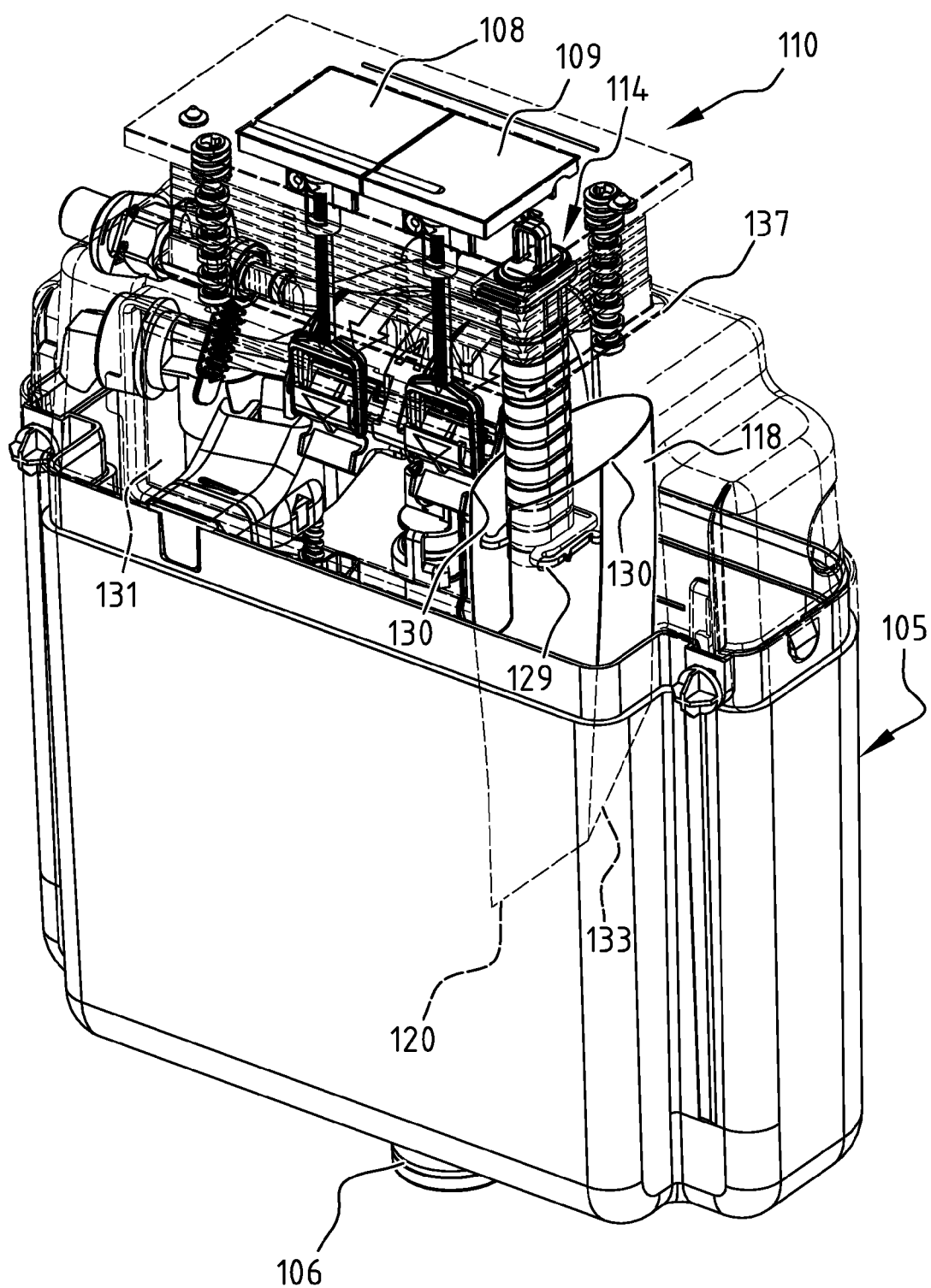
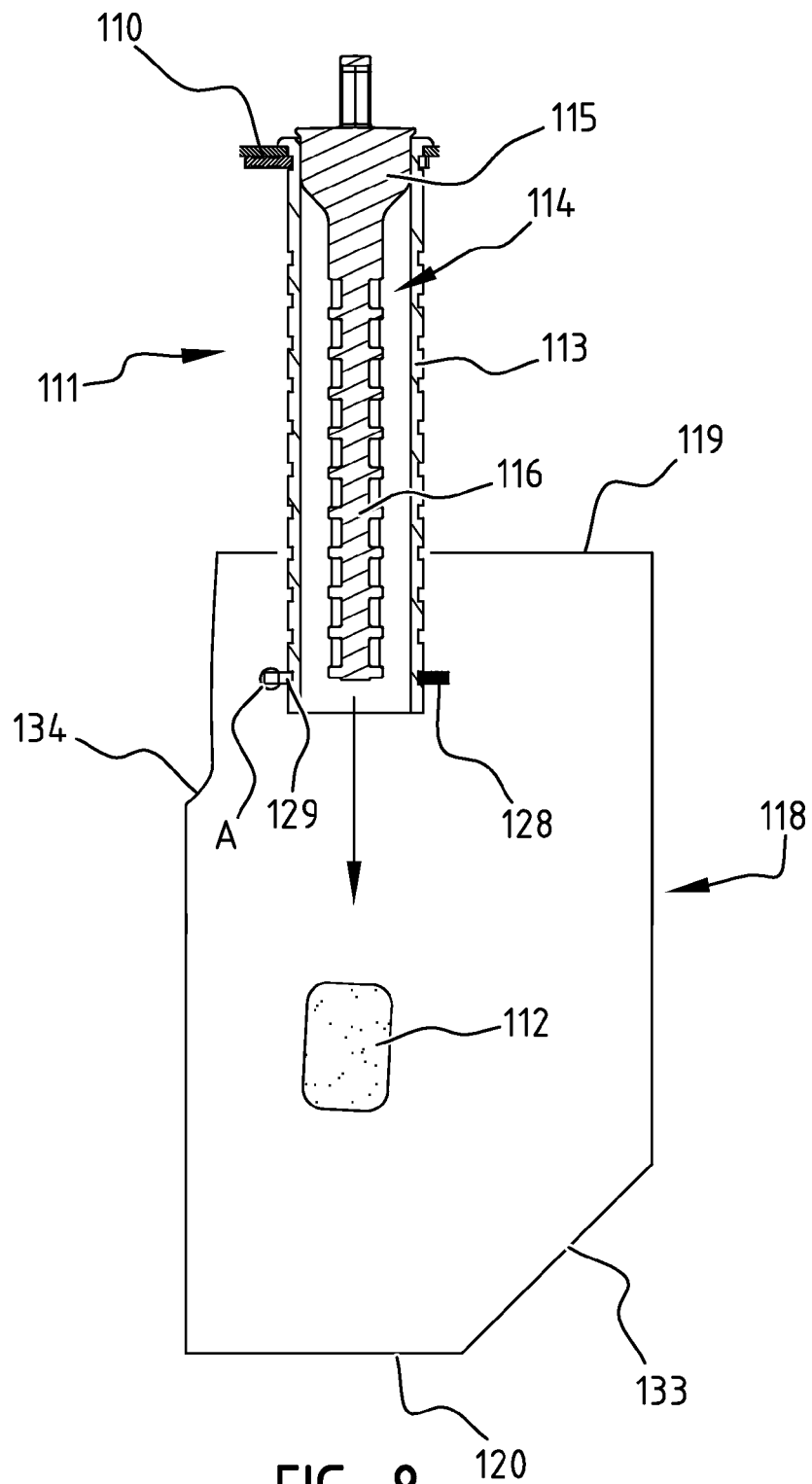


FIG. 7



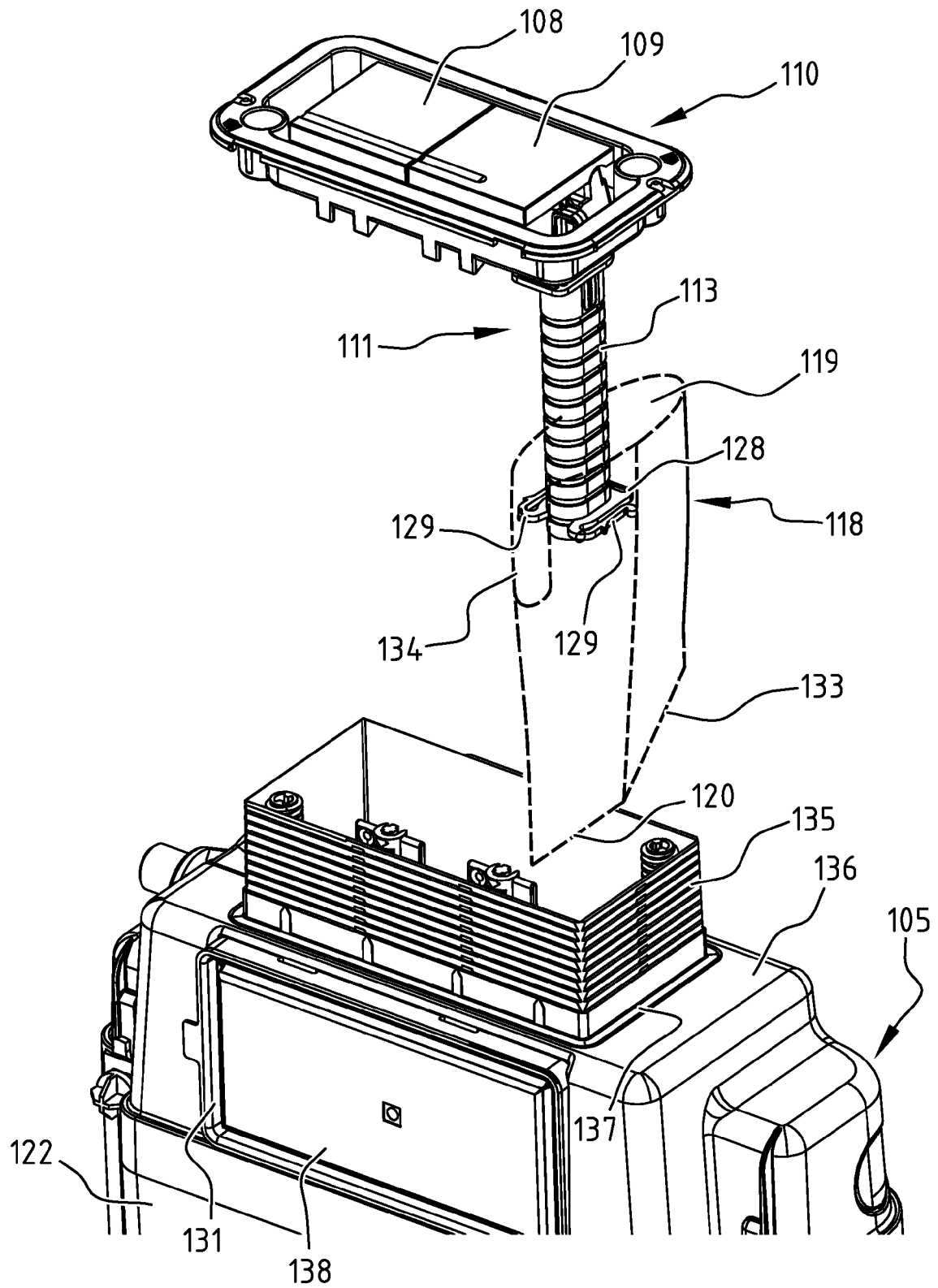


FIG. 9



EUROPEAN SEARCH REPORT

Application Number
EP 14 15 8560

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	W0 03/044291 A1 (ARSENIUK ROMAN [PL]) 30 May 2003 (2003-05-30) * page 1, paragraph 2-3 * * page 3, last paragraph - page 4, line 2 * * page 4, paragraph 5 * * figures 7,11 *	1-4, 11-15	INV. E03D9/03 E03D1/012
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			TECHNICAL FIELDS SEARCHED (IPC)
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The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 6 June 2014	Examiner Urbahn, Stephanie
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			

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ON EUROPEAN PATENT APPLICATION NO.**

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For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

REFERENCES CITED IN THE DESCRIPTION

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