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SEPARATION TOILET AND A KIT FOR CONVERTING A TOILET TO A SEPARATION TOILET

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ABSTRACT

The present disclosure relates to an apparatus for converting a combined waste toilet into a separation waste toilet, where a toilet bowl of the combined waste toilet includes a solid waste opening and a liquid waste opening separated from the solid waste opening. The apparatus may include a solid waste valve disposed over the solid waste opening in the toilet bowl. This valve, when disposed in a closed position, closes off the solid waste opening, and when in an open position receives solid waste therethrough. A solid waste bin is in communication with the solid waste opening for receiving solid waste when the solid waste valve is in the open position. A liquid waste tank is disposed elevationally below the toilet bowl. A liquid waste valve arrangement is in communication with the liquid waste opening in the toilet bowl for receiving only liquid waste. The liquid waste valve arrangement is positionable in a first position to enable a passage of the liquid waste received from the liquid waste opening through the liquid waste valve arrangement into the liquid waste tank, and in a second position to enable blocking the flow of the liquid waste through the liquid waste valve arrangement.

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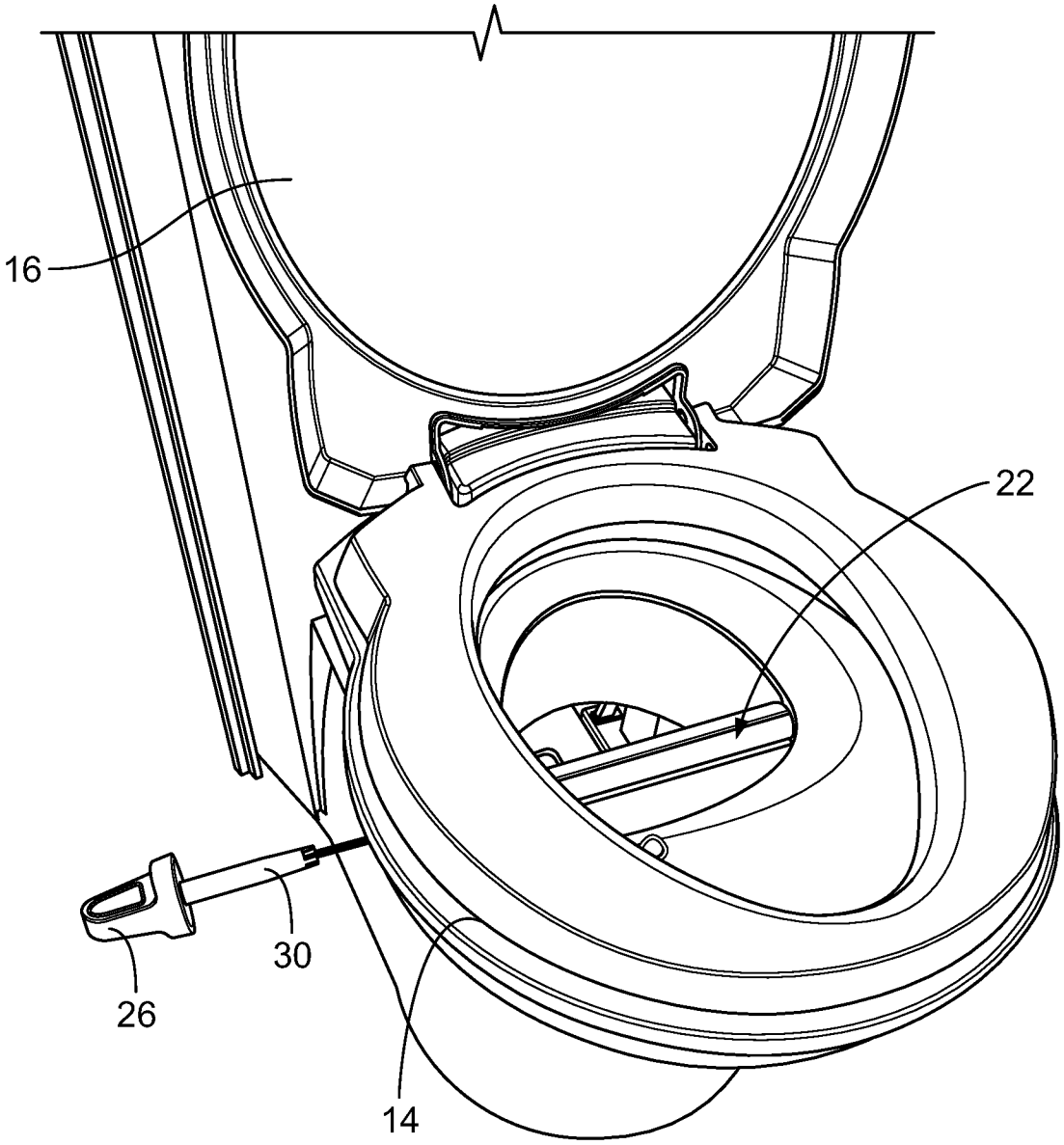

FIG. 6

SEPARATION TOILET AND A KIT FOR CONVERTING A TOILET TO A SEPARATION TOILET

FIELD

[0001] The present disclosure relates generally to toilets. More particularly, the present disclosure relates to a separation toilet and a kit for converting a toilet to a separation toilet.

BACKGROUND

[0002] This section merely provides background information related to the present disclosure and may not constitute prior art.

[0003] Vehicles, including but not limited to recreational vehicles ("RVs" in the United States and "Caravans" in Europe), tractor trailers, airplanes, boats, trains, and the like, often incorporate sanitation systems for the comfort and convenience of the occupants. It is necessary to periodically empty such sanitation system. It is known in the pertinent art to provide a portable waste transfer tank for the transfer waste from an on-board sanitation system to a disposal site.

[0004] It is also generally known to configure or adapt these types of vehicle toilets and other toilets to separate solid waste from liquid waste. Such toilets may be generally referred to as separation toilets and allow for the separate collection and treatment of these waste streams. The separation of urine and feces is beneficial because it reduces odor, facilitates easier handling and processing, and enables the potential reuse of nutrients found in urine as fertilizer. These toilets

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are often used in vehicles and other off-grid locations, environmentally conscious households, and areas with limited water resources, as they require little or no water for flushing and help to minimize the environmental impact of human waste.

[0005] While known separation toilets may have proven to be generally suitable for their intended purposes, known devices are all associated with limitations. Accordingly, a continuous need remains in the art for improvements to separation toilets.

SUMMARY

[0006] This section provides a general summary of the disclosure, and is not a comprehensive disclosure of its full scope or all of its features.

[0007] In one aspect the present teachings relate to an apparatus for converting a combined waste toilet into a separation waste toilet, where a toilet bowl of the combined waste toilet includes a solid waste opening and a liquid waste opening separated from the solid waste opening. The apparatus may comprise a solid waste valve disposed over the solid waste opening in the toilet bowl. The solid waste valve, when disposed in a closed position, closes off the solid waste opening, and the solid waste opening is configured for receiving solid waste therethrough when the solid waste valve is in an open position. The apparatus may further include a solid waste bin in communication with the solid waste opening for receiving solid waste when the solid waste valve is in the open position. The apparatus may further include a liquid waste tank disposed elevationally below the toilet bowl. The liquid waste valve arrangement is in communication with the

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liquid waste opening in the toilet bowl for receiving only liquid waste. The liquid waste valve arrangement is positionable in a first position to enable a passage of the liquid waste received from the liquid waste opening through the liquid waste valve arrangement into the liquid waste tank, and also in second position to enable blocking the flow of the liquid waste through the liquid waste valve arrangement. According to another particular aspect of the present teachings, an apparatus is disclosed for converting a combined waste toilet into a separation waste toilet, where a toilet bowl of the combined waste toilet includes a solid waste opening and a liquid waste opening separated from the solid waste opening. The apparatus may comprise a solid waste valve disposed over the solid waste opening in the toilet bowl. The solid waste valve, when disposed in a closed position, closes off the solid waste opening, and the solid waste opening is configured for receiving solid waste therethrough when the solid waste valve is in an open position. The apparatus further may include a solid waste bin in communication with the solid waste opening for receiving solid waste when the solid waste valve is in the open position. The apparatus may also include a liquid waste tank disposed elevationally below the toilet bowl. A liquid waste valve arrangement may be included which is in communication with the liquid waste opening in the toilet bowl for receiving only liquid waste. The liquid waste valve arrangement includes a hose valve in communication with a tank valve. The hose valve is rotationally positionable in a first position to enable a passage of the liquid waste received from the liquid waste opening through the hose valve, through the tank valve, and into the liquid waste tank. The hose valve is also positionable in a second position to

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enable blocking the flow of the liquid waste through the liquid waste valve arrangement.

[0008] According to yet another particular aspect of the present teachings an apparatus is disclosed for converting a combined waste toilet into a separation waste toilet, where a toilet bowl of the combined waste toilet is supported on a lower housing and the toilet bowl includes a solid waste opening and a liquid waste opening separated from the solid waste opening. The apparatus may comprise a solid waste valve disposed over the solid waste opening in the toilet bowl. The solid waste valve, when disposed in a closed position, closes off the solid waste opening, and the solid waste opening is configured for receiving solid waste therethrough when the solid waste valve is in an open position. The apparatus further may include a solid waste bin in communication with the solid waste opening for receiving solid waste when the solid waste valve is in the open position. A liquid waste tank may be included which is disposed elevationally below the toilet bowl. A liquid waste valve arrangement is included which is in communication with the liquid waste opening in the toilet bowl for receiving only liquid waste. The liquid waste valve arrangement is movable between an open position and a closed position. The liquid waste valve arrangement includes a hose valve in communication with a tank valve. The hose valve has a first part, a second part, a projecting handle associated with the first part, and a first waste fluid flow opening formed in the second part. The tank valve has a first part and a second part. The first part of the tank valve is rotationally coupled to the second part of the hose valve. The second part has a second waste fluid flow opening

located to be in flow communication with the first waste fluid flow opening when the liquid waste valve arrangement is in the open position, thus permitting flow of the liquid waste therethrough into the liquid waste tank, and to block flow through the liquid waste valve arrangement when the liquid waste valve arrangement is in the closed position.

[0008] Further areas of applicability will become apparent from the description provided herein. The description and specific examples in this summary are intended for purposes of illustration only and are not intended to limit the scope of the present disclosure.

DRAWINGS

[0009] The present teachings will become more fully understood from the detailed description, any appended claims and the following drawings. The drawings are for illustrative purposes only and are not intended to limit the scope of the present disclosure.

[0010] FIG. 1 is a side and rear perspective view of a separation toilet constructed in accordance with the present teachings.

[0011] FIG. 2 is side view of the separation toilet of FIG. 1.

[0012] FIG. 3 is a rear view of the separation toilet of Figure 1.

[0013] FIG. 3A is a perspective view of a liquid waste tank shown removed from the toilet for purposes of illustration.

[0009] FIG. 4 is a perspective view of a portion of the separation toilet of FIG. 1 with a cover of a solid waste valve assembly articulated to a closed position.

[0014] FIG. 5 is a perspective view of the portion of the separation toilet of FIG. 4 illustrated with a cover of the solid waste valve assembly articulated to an open position.

[0015] FIG. 6 is a perspective view of the separation toilet of FIG. 1 illustrated with a control knob of the solid waste valve assembly removed for servicing / cleaning of the separation toilet.

[0016] FIG 7 is a cross-sectional view taken through the separation toilet of FIG. 1.

[0017] FIG. 8A is a perspective view of a portion of the separation toilet of FIG. 1, further illustrating a liquid waste valve assembly of the present teachings, the liquid waste valve assembly shown articulated to an open position.

[0018] FIG. 8B is a perspective view of the portion of the separation toilet similar to FIG. 8A, illustrating the liquid waste valve assembly articulated to a closed position.

[0019] FIG. 8C is another perspective view of the portion of the separation toilet similar to FIG. 8A showing the liquid waste valve assembly partially exploded.

[0020] FIG. 9 is a cross-sectional view taken through the liquid waste valve assembly.

[0021] FIG. 10A is a partial perspective cutaway view of the rotatable hose connection of Figure 9 showing the handle in the open position, enabling urine flow through the valve and exposing the vent pathway to atmosphere..

[0022] Figure 10B shows the hose valve and tank valve in perspective separated from one another.

[0023] Figure 10C shows the handle of the hose valve in the closed position, which prevents urine flow through the liquid waste valve assembly and closes off the vent pathway.

[0024] Figure 11 is a cross-sectional view illustrating a rotatable hose connection between a bowl of the toilet and the liquid waste tank that accommodates rotational movement of the bowl of the toilet.

DETAILED DESCRIPTION

[0025] The following description is merely exemplary in nature and is not intended to limit the present disclosure, its application, or uses. It will be understood that throughout the drawings, corresponding reference numerals indicate like or corresponding parts and features.

[0026] With general reference to drawings, a separation toilet constructed in accordance with the present teachings is shown and generally identified at reference character 10. The term “separation toilet” will be understood to mean a toilet configured to separate solid waste (e.g., feces) from liquid waste (e.g., urine). While a particular toilet is shown in the drawings, it will be understood that the various features of the present teachings are not limited to this particular

toilet. In this regard, the various features of the present teachings may be adapted individually or in any combination for a wide variety of toilets.

[0027] In one particular application, the toilet 10 is intended for use within a motor vehicle such as a recreational vehicle or the like. After a reading of the remainder of this detailed description, however, those skilled in the art will readily appreciate that the present teachings are not limited to such use. Rather, various of the teachings of the present teachings have applicability to other vehicle and non-vehicle applications.

[0028] As will become apparent below, the present teachings are generally directed to but not limited to the following aspects:

I. a solid waste valve assembly;
II. a liquid waste valve assembly including a urine hose valve combined with urine tank valve;
III. a rotatable hose connection; and
IV. a conversion kit with a rotating urine hose connection.

[0029] Before addressing the above aspects of the present teachings, an understanding of the exemplary embodiment shown in the drawing is warranted. The toilet 10 is shown to generally include a lower housing 12, an upper bowl 14, and a lid 16. As is known in the art, the bowl 14 may be rotatably mounted on the lower housing 12. In this manner, the lower housing 12 may be fixedly mounted with a caravan, for example, but the bowl 14 may be articulated within the caravan to accommodate space limitations and preferences. A side of the lower housing 12 may be open to allow for the introduction of one or more waste collecting containers. Such waste collecting containers may be inserted into the lower housing 12 and removed from the lower housing 12 through a door (not

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shown) in an exterior wall of a caravan, for example. In the embodiment illustrated, the rear side of the lower housing is an open side.

[0030] The one or more waste collecting containers is preferably shown to include a liquid waste tank 18 (e.g., for urine) and a solid waste bin 20 (e.g., for feces). The solid waste bin 20 is shown in FIG. 2 in dashed lines and simplified form. The solid waste bin 20 is an open top bin.

[0031] **I. Solid Waste Valve Assembly**

[0032] With particular reference to Figures 4 through 7, the toilet 10 is illustrated to include a solid waste valve assembly 22. The solid waste valve assembly 22 may include a cover or lid 24 and a handle 26 for controlling articulation of the cover 24. The cover 24 is shown in Figures 4 and 7, for example, in a closed position. The open position of the cover 24 is shown in Figure 5 for example. In the closed position, the cover 24 (and therefore the solid waste valve assembly 22) closes an opening 28 in a rearward portion of the interior of the bowl 14. In this regard, the cover 24 is sized and configured to selectively close the opening 28. In the open position, the opening 28 in the rearward portion of the interior of the bowl 14 allows solid waste to drop into the solid waste bin 20 under gravity. In the closed position, odor from the solid waste bin 20 otherwise entering the caravan through the opening 28 is substantially reduced or eliminated.

[0033] The handle 26 is manually rotatably from a first or closed position (as shown in Figure 4, for example) to a second or open position (shown in Figure 5, for example). As shown in Figure 6, the handle 26 includes an extension 30 that non-rotatably engages the cover 24 and defines an axis about

which the cover 24 rotates between its closed position and its open position. Explaining further, when the handle 26 is rotated from the first position to the second position, the cover 24 is correspondingly rotated from the closed position to the open position.

[0034] As particularly shown in Figure 6, the handle 26 may be pulled in the direction of the axis of the extension 30 and thereby removed from the cover 24. In this manner, the cover 24 may be removed from the toilet 10 and the toilet may be more thoroughly cleaned without interference from the cover.

[0035] II. Liquid Waste Valve Arrangement

[0036] With particular reference to Figures 3A, 8A-8C and 9, the toilet 10 is shown to include a liquid waste valve arrangement 32 disposed on the liquid waste tank 18. With specific reference to Figures 1-3, in this embodiment the liquid waste tank 18 is at least partially housed within the lower housing 122 of the toilet 10, and therefore forms a relatively compact structure. The liquid waste tank includes at least one removable cap 18A which may be removed to permit easy emptying of the liquid waste from the tank 18. In this embodiment, a handle 18B is integrally formed on the liquid waste tank 18 to permit easy removal, emptying and re-installation of the liquid waste tank into the lower housing 12.

[0037] The liquid waste valve arrangement 32 is carried on the liquid waste tank 18 and generally includes a hose valve 34 and a tank valve 36. The hose valve 34 includes a first or inner part 34A and a second or outer part 34B. The tank valve 36 correspondingly includes a first or inner part 36A and a second or outer part 36B. The flow of liquid waste or urine through the liquid waste valve

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assembly 32 and into the liquid waste tank 18 is shown at arrows 38 and 40 in Figure 9. The air flow venting the liquid waste tank 18 to atmosphere is shown at arrow 42 in Figure 9.

[0038] The first part 36A of the tank valve 36 is non-rotatably carried on the liquid waste tank 18. The first part 34A of the hose valve 34 includes a nudge or extension 42 received within a groove 44 in the liquid waste tank 18, and the first part 34A is thereby non-rotatably supported relative to the liquid waste tank 18. The second part 34B of the hose valve 34 includes a handle 46. Rotation of the handle 46 from a closed position shown in Figure 8A to an open position shown in Figure 8B rotates the second part 34B relative to the first part 34A.

[0039] With further reference to Figures 9 and 9a, the second part 34B of the hose valve 34 is telescopically coupled for rotation with the first part 36A of the tank valve 36. Referring specifically to Figure 9, this rotatable coupling is accomplished by a protruding thread 36A1 on the first part 36A which engages with a protruding thread 34A1 of the first part 34 of the hose valve 34. An O-ring 35 is interposed internally between a distal portion of the second end 34B of the hose valve 34 and an interior area of the first end 36A of the tank valve 36. The O-ring 35 in some embodiments may be a conventional silicone or rubber O-ring and helps to provide a fluid tight seal between the hose valve 34 and the tank valve 36. By rotating the second part 34B of the hose valve 34, the second part 36B of the tank valve 36 also rotates.

[0040] Each of the four valve parts of the liquid waste valve assembly 32 (e.g., the first and second parts 34A and 34B of the hose valve 34, and the first

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and second parts 36A and 36B of the tank valve 36) includes a hole or opening for the passage of liquid or urine. Thus, as shown in Figures 8C and 9, first part 34A of the hose valve 34 includes hole 34C while the second part 36B of the tank valve 36 includes hole 36C. The liquid waste valve assembly 32 is articulable between a closed position (shown in Figure 8A, for example) to a open position (shown in Figures 8B and 9, for example). In the open position, the holes 34C and 36C in the first and second parts 34A and 34B, respectively, of the hose valve 34 are aligned. This permits air to vent from the interior of the liquid waste valve assembly 32, as well as from the liquid waste tank 18, to atmosphere through a vent pathway formed by a port 36E, a channel 36F and a vent port 36G in the second end 36B of the tank valve 36. Furthermore, when in the open position, with the holes 34C and 36C in the first and second parts 36A and 36B, respectively, of the tank valve 36 aligned, liquid or urine may pass through the liquid waste valve assembly 32 and through a primary discharge port 36D into the liquid waste tank 18. In this example the primary discharge port 36D is integrally formed with the second part 36B of the tank valve 36, but in some embodiments it may be formed as a separate component and attached (either threadably or via adhesives) to the second part 36B of the tank valve.

[0041] Referring briefly to Figures 10A-10C, it can be seen that the hose valve 34 has an outer part 34K which is engaged with an inner part 36X of the tank valve 36, and where the inner tank valve part 36X has a U-shaped cutout 36X1 over the vent pathway port 36E in the outer tank valve part 36i, and laterally spaced apart hole 36Z in the urine flow pathway. The inner 36X tank valve portion

also includes an interior wall 34L which helps to form separate compartments for venting and waste fluid flow. The hose valve 34 consists of the inner part 34H of the hose valve 34 and the outer part 34K of the hose valve 34, which can rest within the inner part 36X of the tank valve 36. The hose valve 34 inner part 34H also has a U-shaped cutout 34H1. The inner part 34H of the hose valve 34 and the outer part 36i of the tank valve 36 are locked into position and thus do not rotate. The handle 46 on the inner part 34H of the hose valve 34 pulls the inner part 36X of the tank valve 36 into rotation, so that holes 34K1 and 36i1 are not aligned with their corresponding U-shaped cutouts 34H1 and 36X1. By doing so, the venting parth as well as the urine flow pathway is shut off. This is illustrated in Figure 10c.

[0042] III. Rotatable Hose Connection

[0043] With particular reference to the cross-sectional view of Figure 11, the toilet 10 is shown to include a connection elbow 48 for connecting a liquid outlet 50 of the bowl 14 of the toilet 10 with a hose leading to the liquid waste tank 18. The elbow 48 includes a first end 48A rotatably coupled to the outlet 50 and a second end 48B rotatably coupled to a hose.

[0044] Conversion Kit for Converting a Toilet to a Separation Toilet

[0045] The present teachings also provide a conversion kit for converting a toilet to a separation toilet. In this regard, a toilet similar to that shown in Figure 1 may conventionally include a bowl adapted and configured to deliver combined waste (e.g., liquid and solid) to a common waste holding tank. For users of such a conventional toilet, the present teachings provide a kit for converting the toilet to a separation toilet. The kit may include the bowl 14, liquid waste tank 18 (including the liquid waste valving arrangement 32), and solid waste tank 20 described above. In this particular example, the kit may also include the elbow 48 for connecting the outlet 50 of the bowl 14 with the liquid waste tank 18 through a hose.

[0046] While one or more specific examples have been discussed in the specification and illustrated in the drawings, it will be understood by those skilled in the art that various changes may be made and equivalence may be substituted for elements thereof without departing from the scope of the present teachings. For example, while the present teachings have been described in connection with a mobile compressor refrigerator, the invention is not so limited and may be extended to other applications. Moreover, many modifications may be made to adapt a particular situation or material to the present teachings without departing from the essential scope thereof. Therefore, it may be intended that the present teachings not be limited to the particular examples illustrated by the drawings and discussed in the specification as the best mode of presently contemplated for carrying out the present teachings but that the scope of the

present disclosure will include any embodiments following within the foregoing description and any appended claims.

[0047] In the claims which follow and in the preceding description of the invention, except where the context requires otherwise due to express language or necessary implication, the word “comprise” or variations such as “comprises” or “comprising” is used in an inclusive sense, i.e. to specify the presence of the stated feature but not to preclude the presence or addition of further features in various embodiments of the invention.

[0048] It is to be understood that, if any prior art publication is referred to herein, such reference does not constitute an admission that the publication forms a part of the common general knowledge in the art, in Australia or any other country.

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THE CLAIMS DEFINING THE INVENTION ARE AS FOLLOWS:

1. An apparatus for converting a combined waste toilet into a separation waste toilet (22), where a toilet bowl of the combined waste toilet includes a solid waste opening and a liquid waste opening separated from the solid waste opening, the apparatus comprising:

a solid waste valve (22) disposed over the solid waste opening (28) in the toilet bowl (14), the solid waste valve, when disposed in a closed position, closing off the solid waste opening, and the solid waste opening being configured for receiving solid waste therethrough when the solid waste valve is in an open position;

a solid waste bin (20) in communication with the solid waste opening (28) for receiving solid waste when the solid waste valve (22)is in the open position;

a liquid waste tank (18) disposed elevationally below the toilet bowl (14);

a liquid waste valve arrangement (32) in communication with the liquid waste opening (50) in the toilet bowl (14) for receiving only liquid waste;

the liquid waste valve arrangement (32) being positionable in:

a first position to enable a passage of the liquid waste received from the liquid waste opening (50) through the liquid waste valve arrangement (32) into the liquid waste tank (18), and

a second position to enable blocking the flow of the liquid waste through the liquid waste valve arrangement (32).

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2. The apparatus of claim 1, further comprising a cover (24) positionable over the solid waste opening (28) in the toilet bowl.

3. The apparatus of claim 2, wherein the cover (24) is movable between an open position in which solid waste is able to fall through the solid waste opening (28), and a closed position closing off the solid waste opening.

4. The apparatus of claim 3, further comprising a handle (26) having an extension (30), the extension in communication with the cover (24) for moving the cover between the open and closed positions when the handle is moved between first and second positions.

5. The apparatus of claim 4, wherein the extension (30) is removable from the cover (24) enabling removal of the cover from the toilet bowl (14).

6. The apparatus of claim 1, wherein the liquid valve waste arrangement (32) includes a hose valve (34) in flow communication with a tank valve (36), the hose valve being movable relative to the tank valve between an open position permitting a flow of the liquid waste therethrough, and a closed position blocking the flow of the liquid waste therethrough.

7. The apparatus of claim 6, wherein the hose valve (34) is rotationally coupled to the tank valve (36), and rotationally movable between the open and the closed positions.

8. The apparatus of claim 6, wherein the tank valve (36) includes a first part (34A) and a second part (34B), and wherein the hose valve (34) includes a first part (34A)and a second part (34B), the first part (36A) of the tank valve (36) being in communication with the second part (34B) of the hose valve (34), and the second part (36B) of the tank valve being in communication with the liquid waste tank (18).

9. The apparatus of claim 8, wherein the second part (34B) of the hose valve (34) includes:

a manually graspable handle (46) for enabling manual rotation of the hose valve; and

an opening (36c) through which the liquid waste may flow.

10. The apparatus of claim 8, wherein the first part (34A) of the hose valve (34) is non-rotationally coupled to the liquid waste tank (18).

11. The apparatus of claim 8, further comprising a 90 degree coupling (48) for coupling the liquid waste opening (50) in the toilet bowl (14) with the first part (34A) of the hose valve (34).

12. The apparatus of claim 8, wherein the tank valve (36) includes a vent (36g) in communication with the hose valve (34), the vent enabling venting an interior of the hose valve to atmosphere when the hose valve is in the open position.

13. The apparatus of claim 1, further including the combined waste toilet.

14. The apparatus of claim 1, wherein the hose valve telescopically engages with the tank valve.

15. The apparatus of claim 8, wherein the hose valve (34) includes an interior wall (34L) for further separating flow paths for the liquid waste and venting of the interior of the hose valve to atmosphere.

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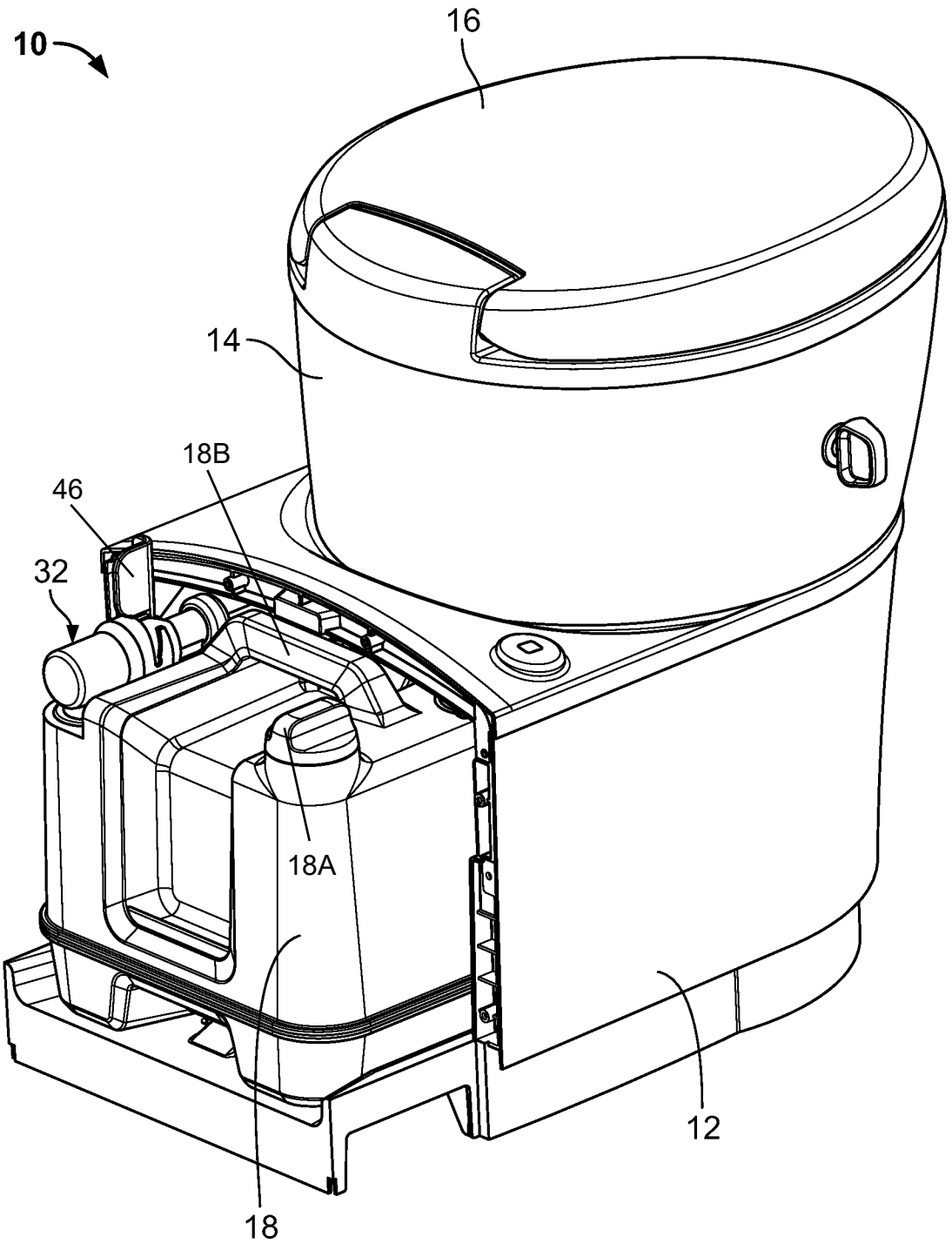

FIG. 1

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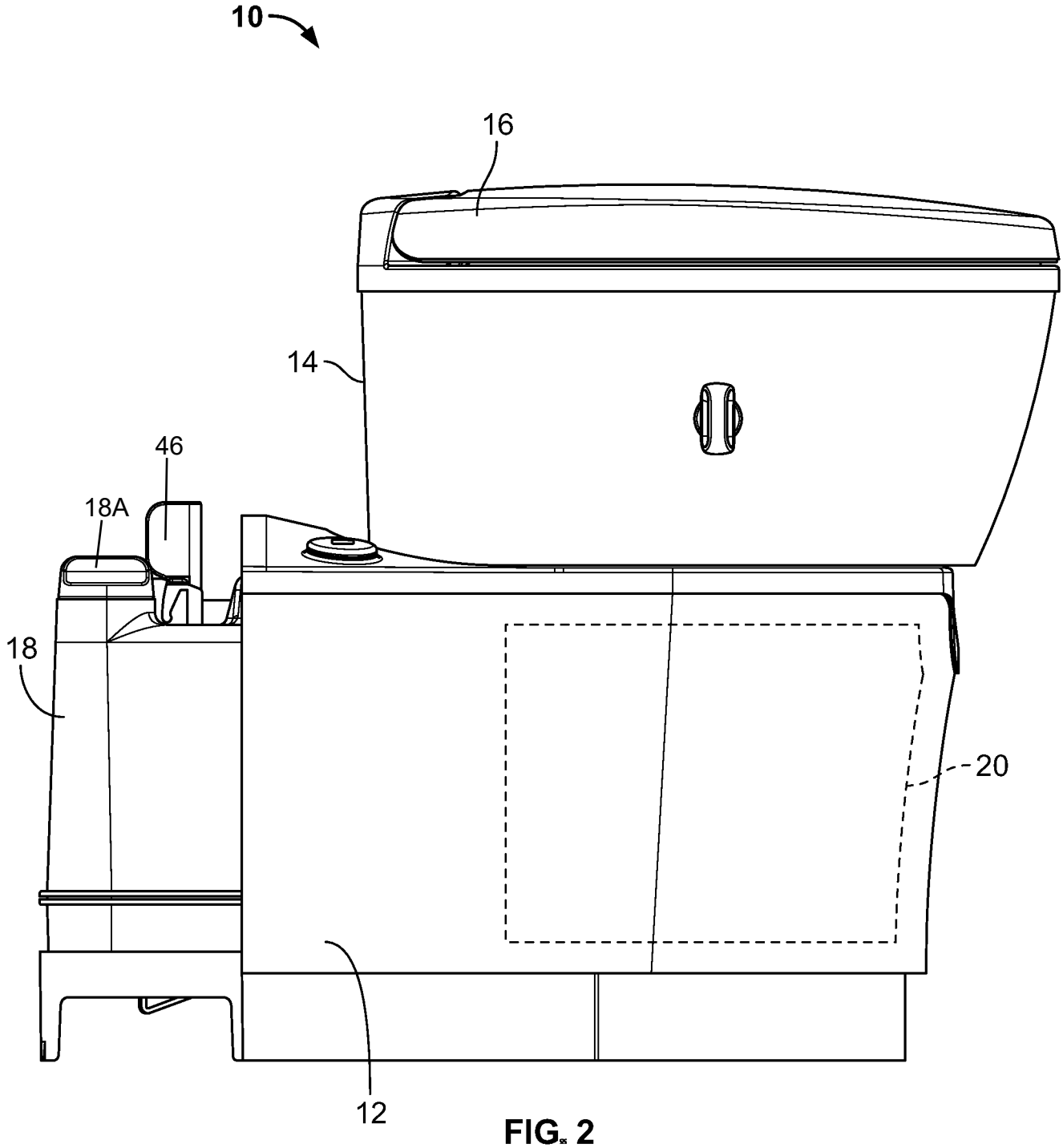

FIG. 2

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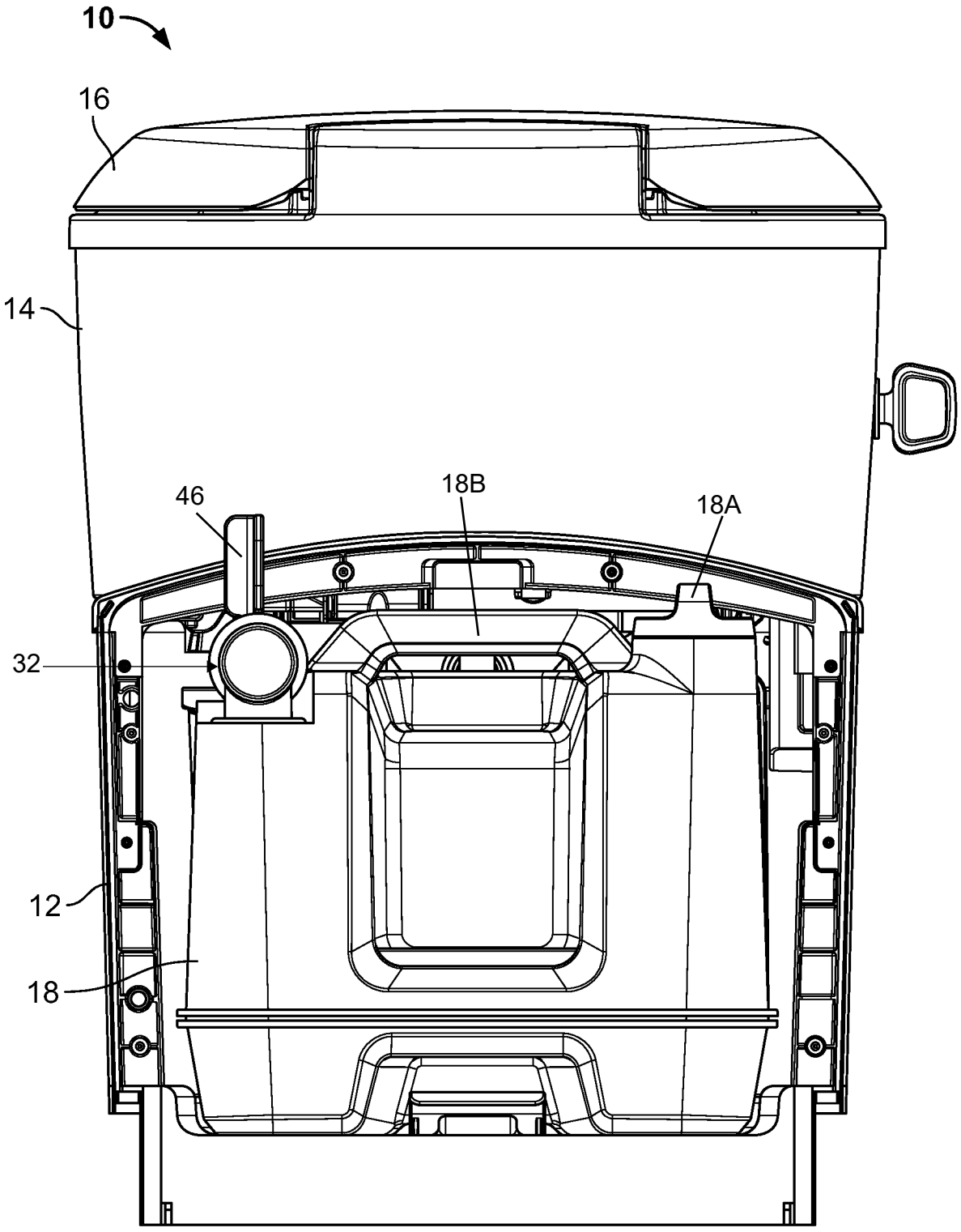

FIG. 3

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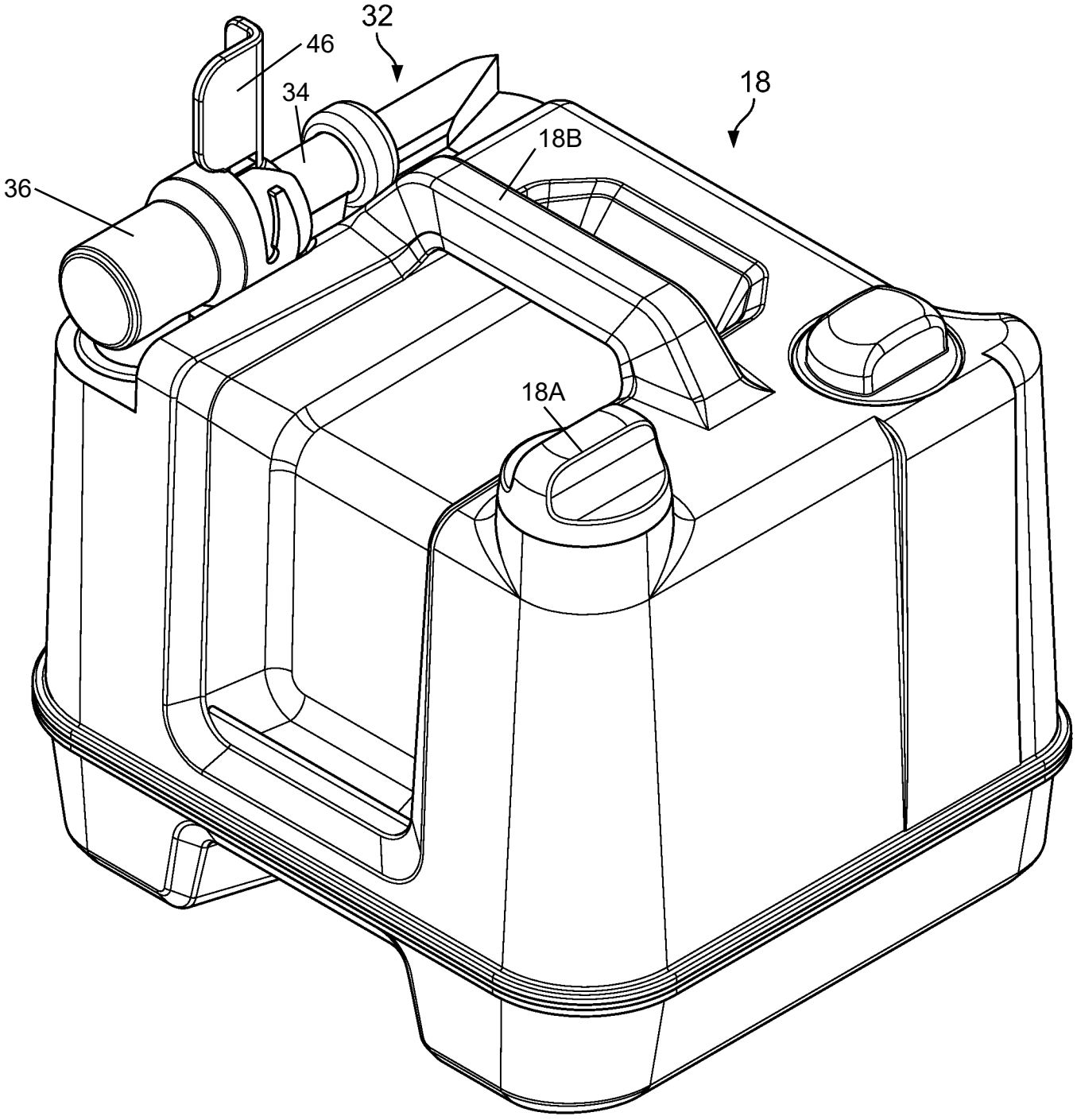

FIG. 3A

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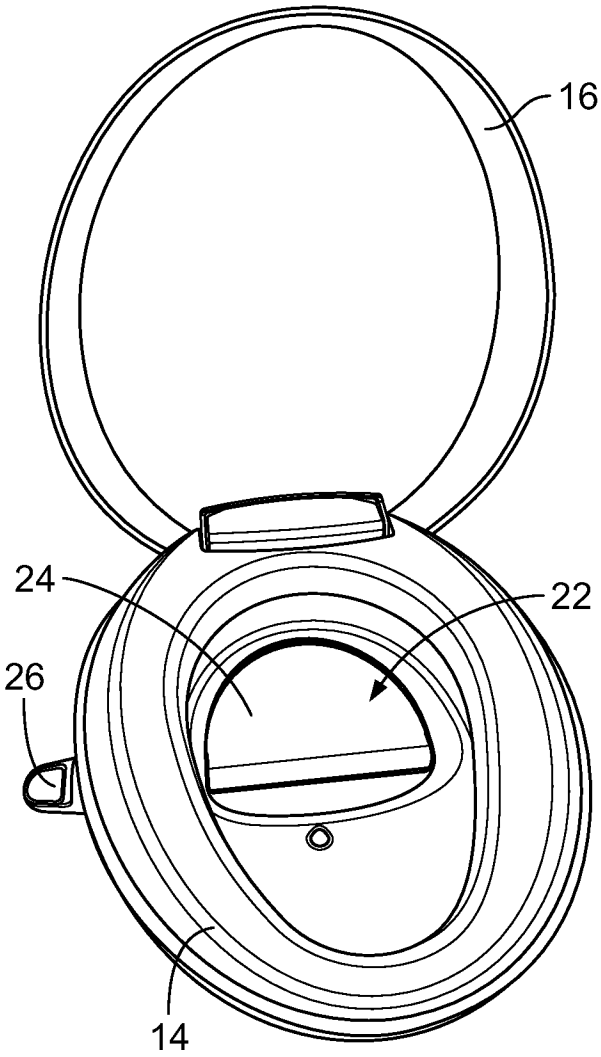

FIG. 4

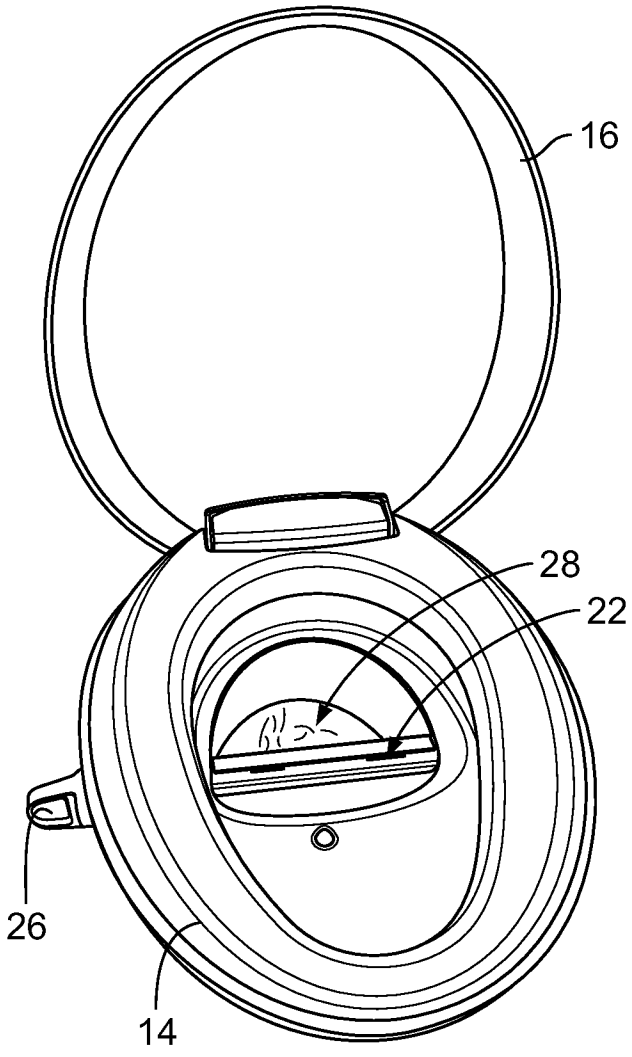

FIG. 5

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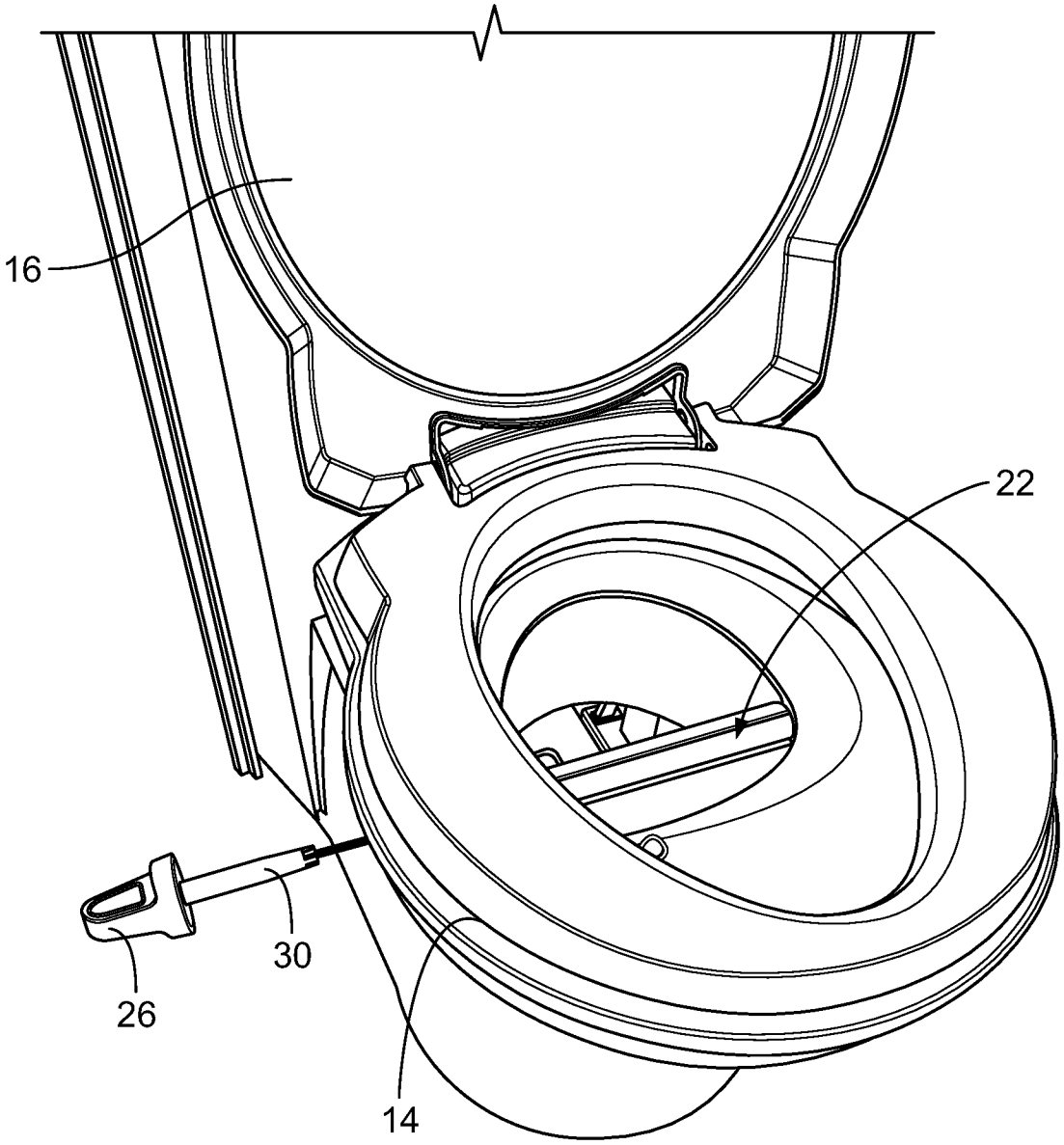

FIG. 6

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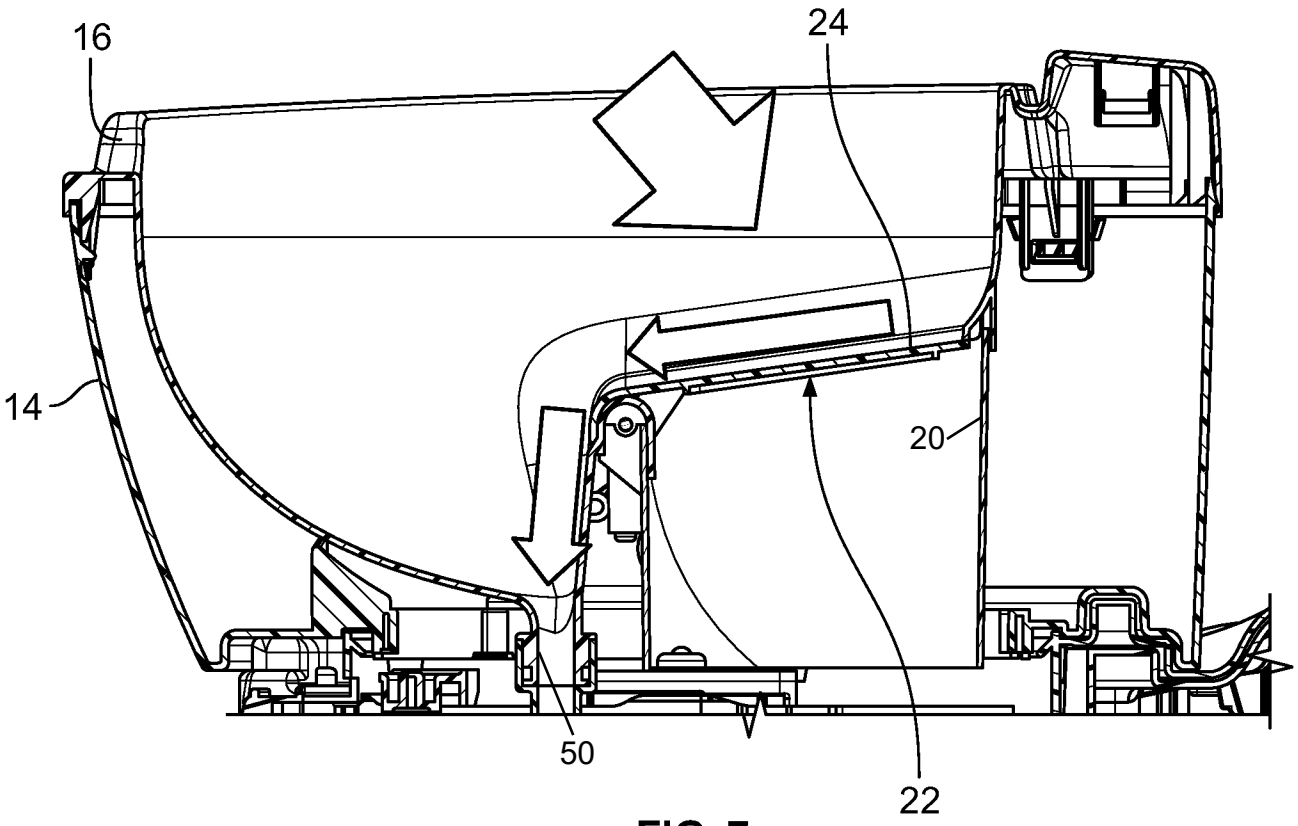

FIG. 7

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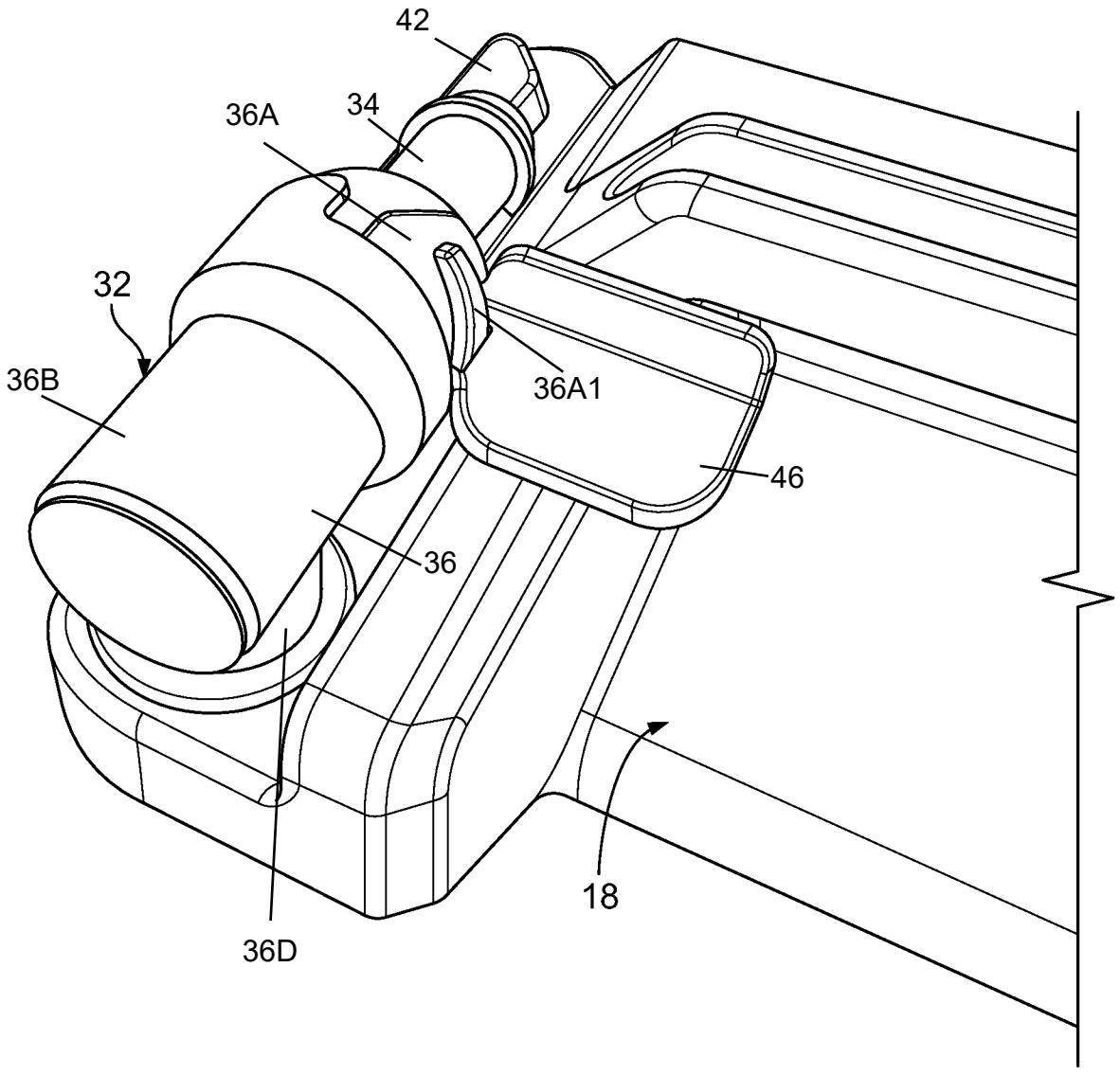

FIG. 8A

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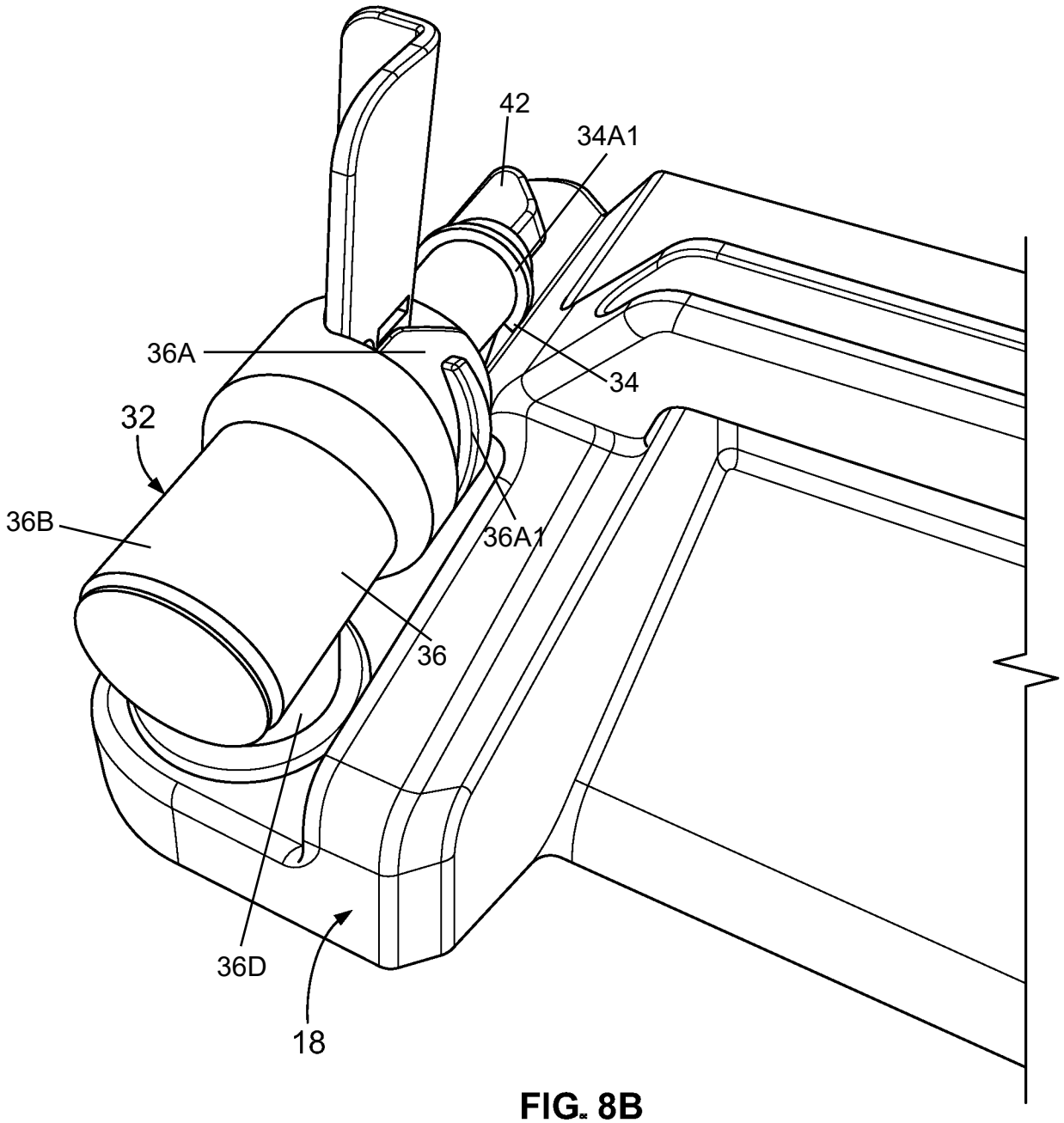

FIG. 8B

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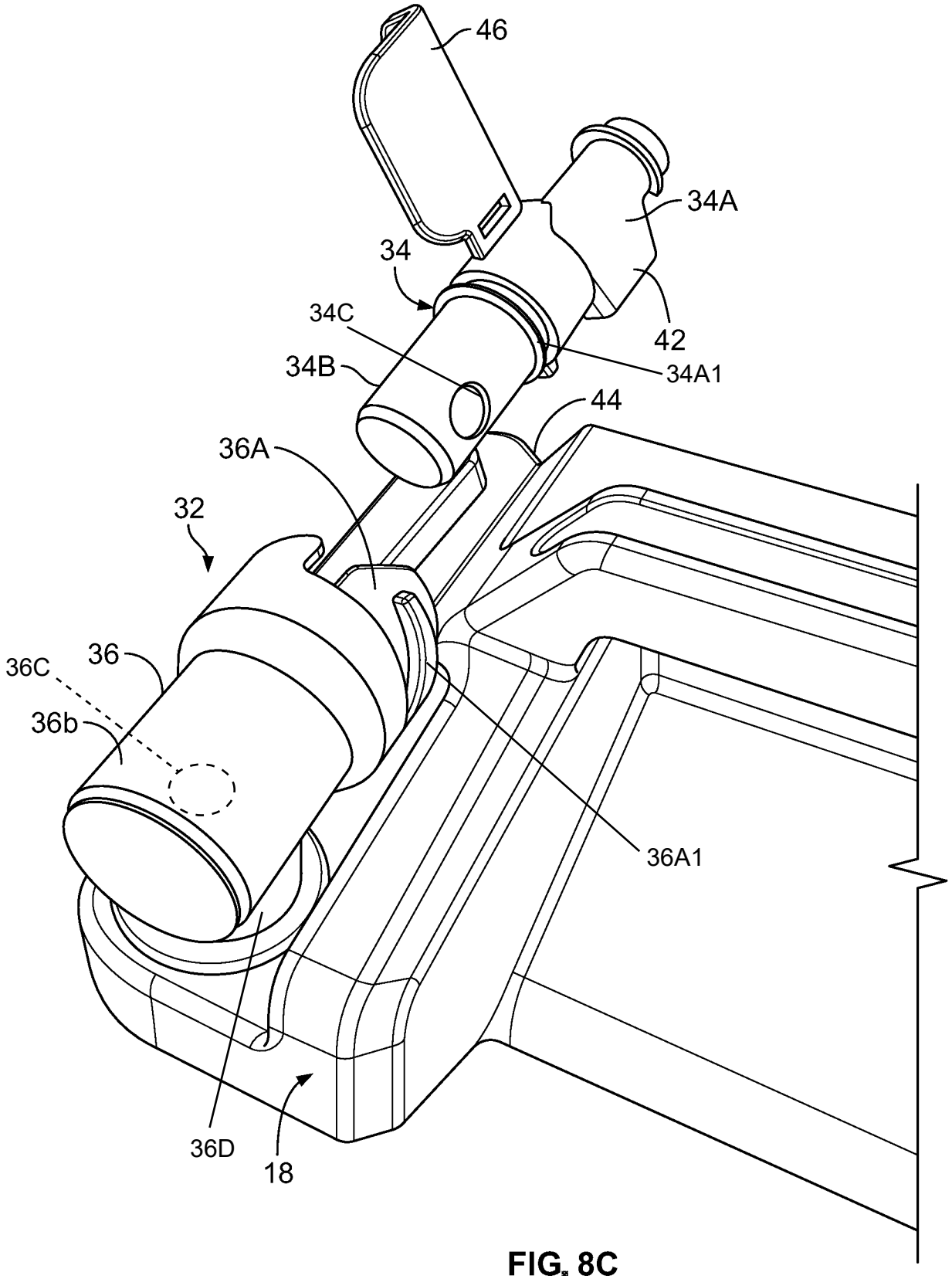

FIG. 8C

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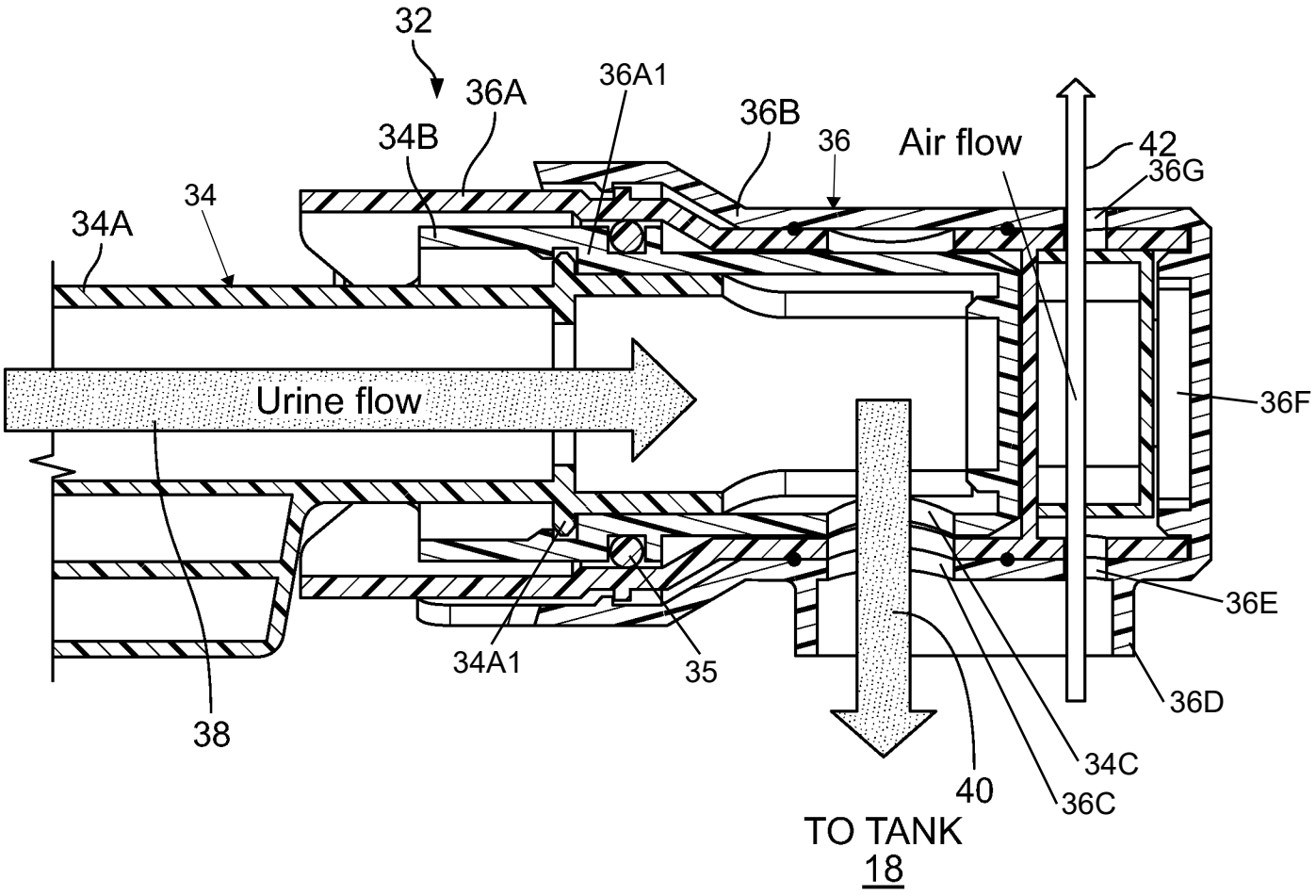

FIG. 9

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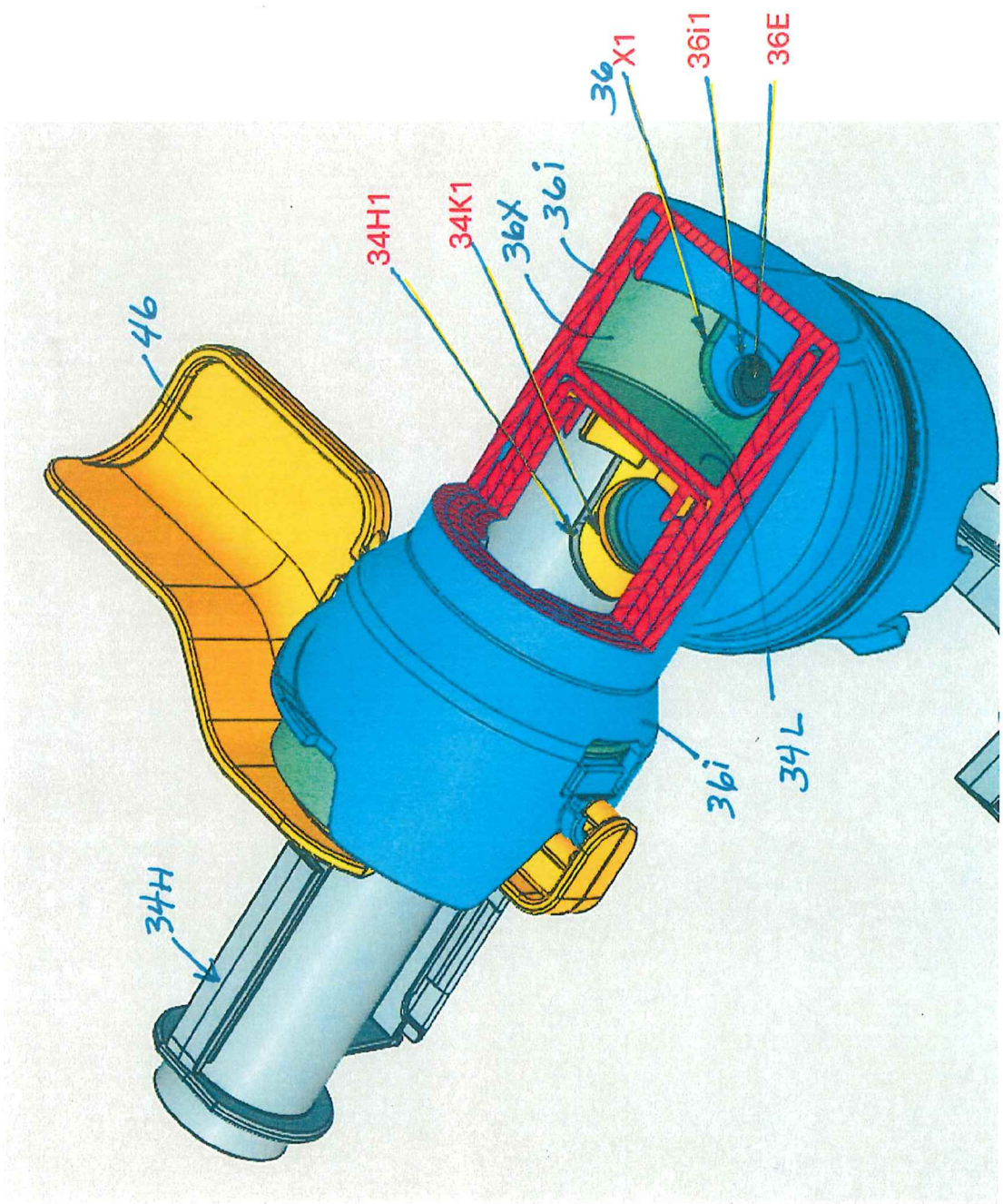

FIG. 10A

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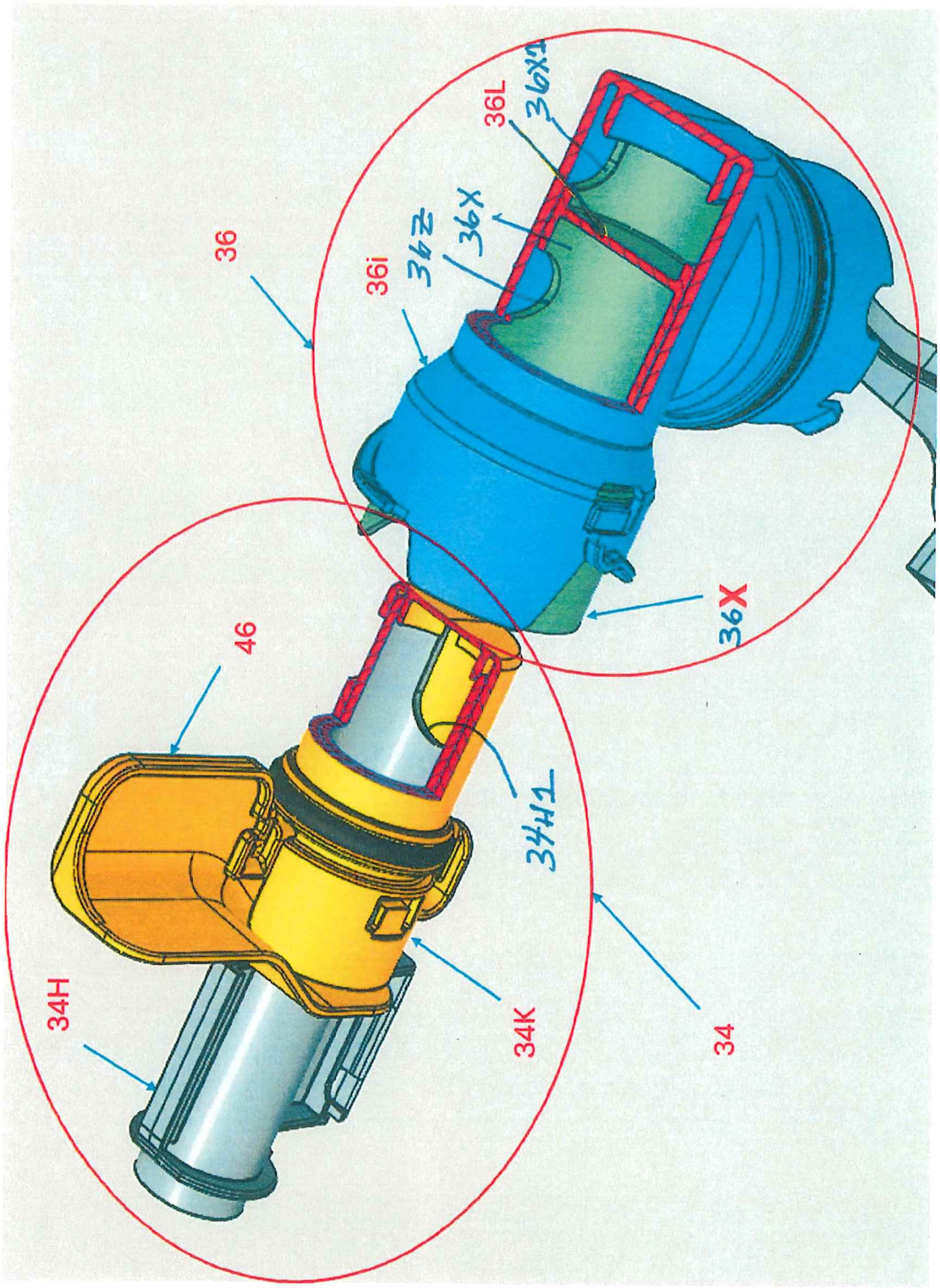

FIG. 10B

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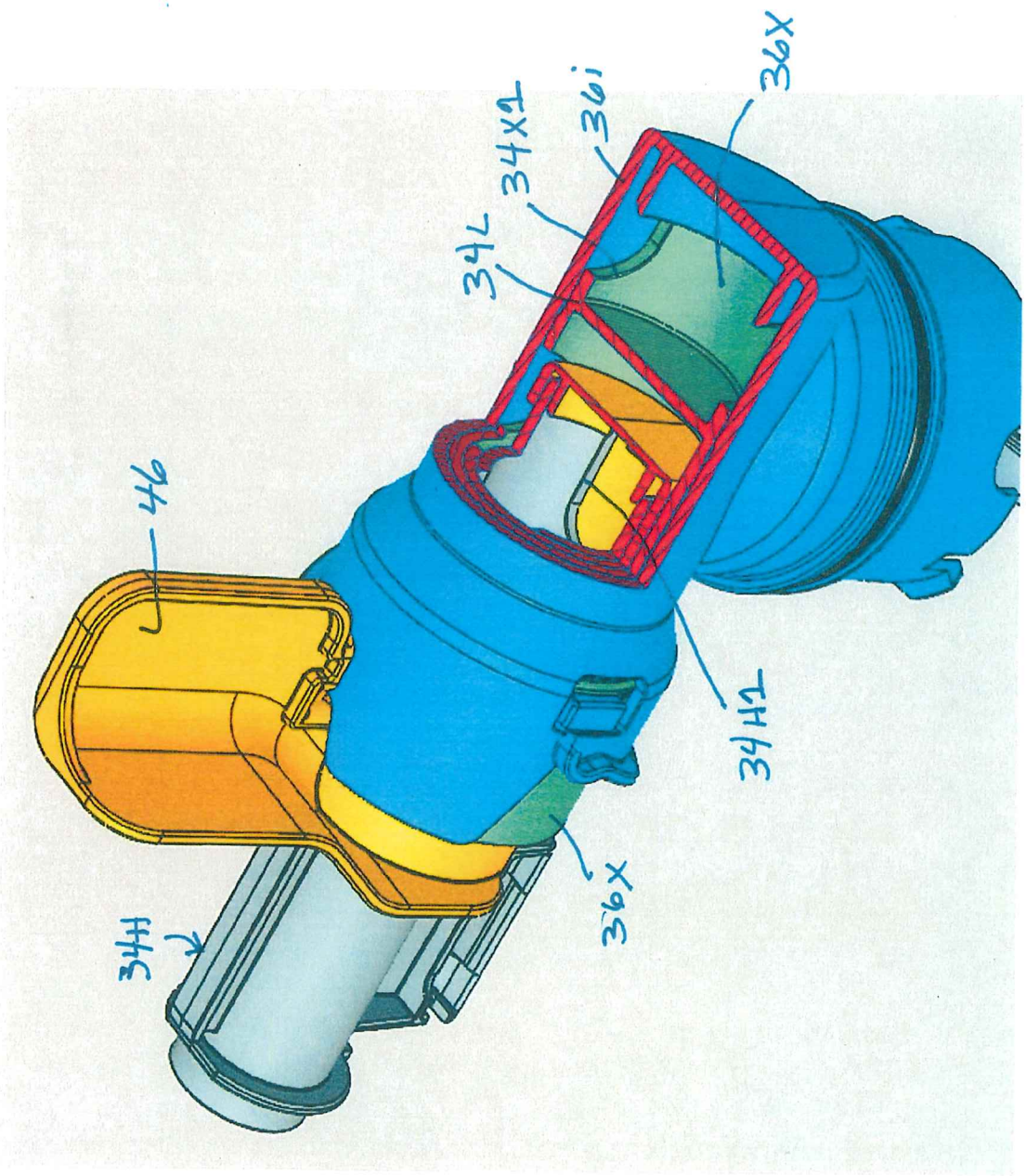

FIG. 10C

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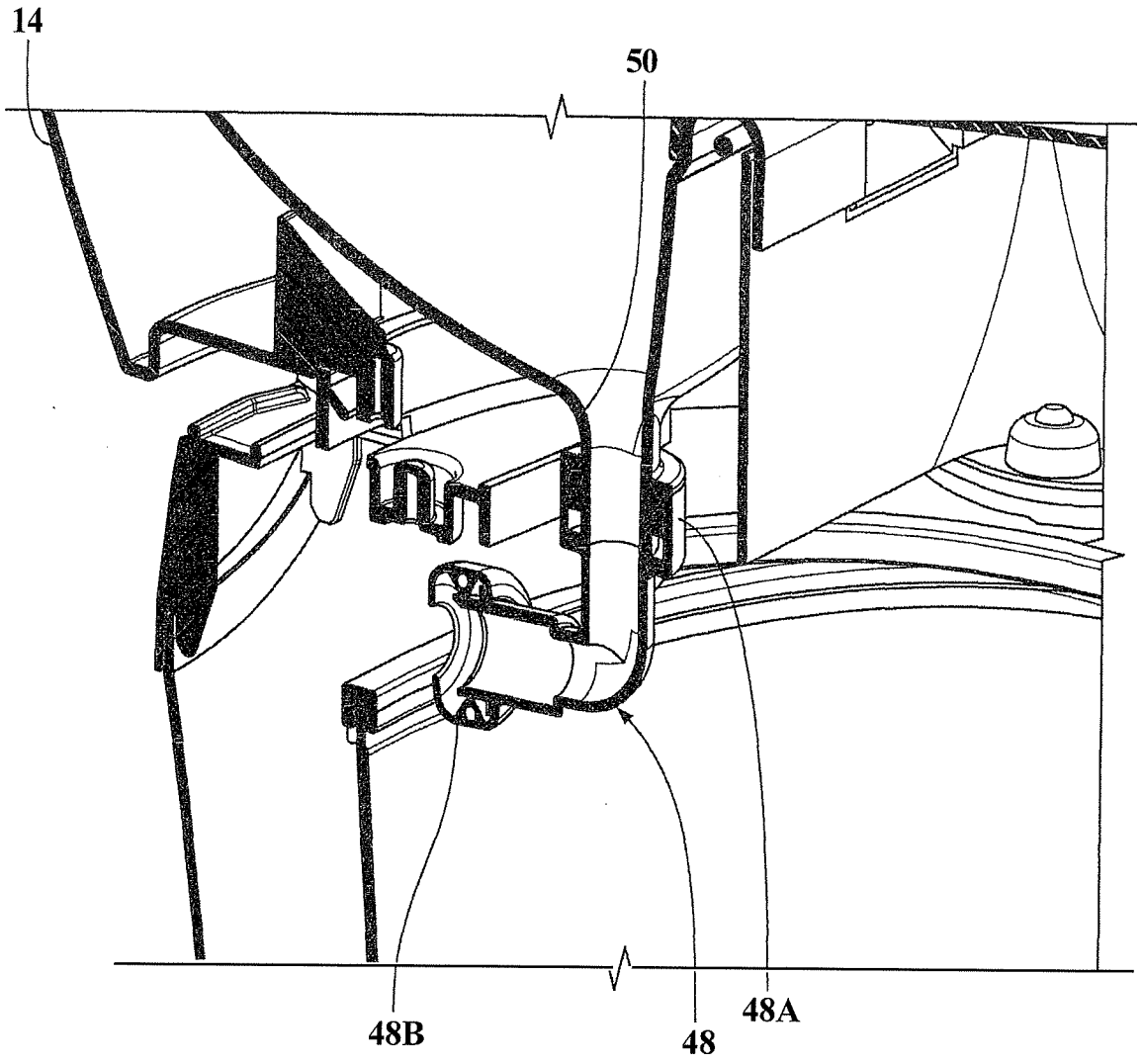

FIG. 11