



(86) Date de dépôt PCT/PCT Filing Date: 2008/05/01
 (87) Date publication PCT/PCT Publication Date: 2008/11/13
 (85) Entrée phase nationale/National Entry: 2009/12/15
 (86) N° demande PCT/PCT Application No.: US 2008/062233
 (87) N° publication PCT/PCT Publication No.: 2008/137554
 (30) Priorité/Priority: 2007/05/07 (US11/745,289)

(51) Cl.Int./Int.Cl. *A47K 3/02* (2006.01),
A47K 3/00 (2006.01)
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 (54) Title: ACCELERATED TUB DRAIN

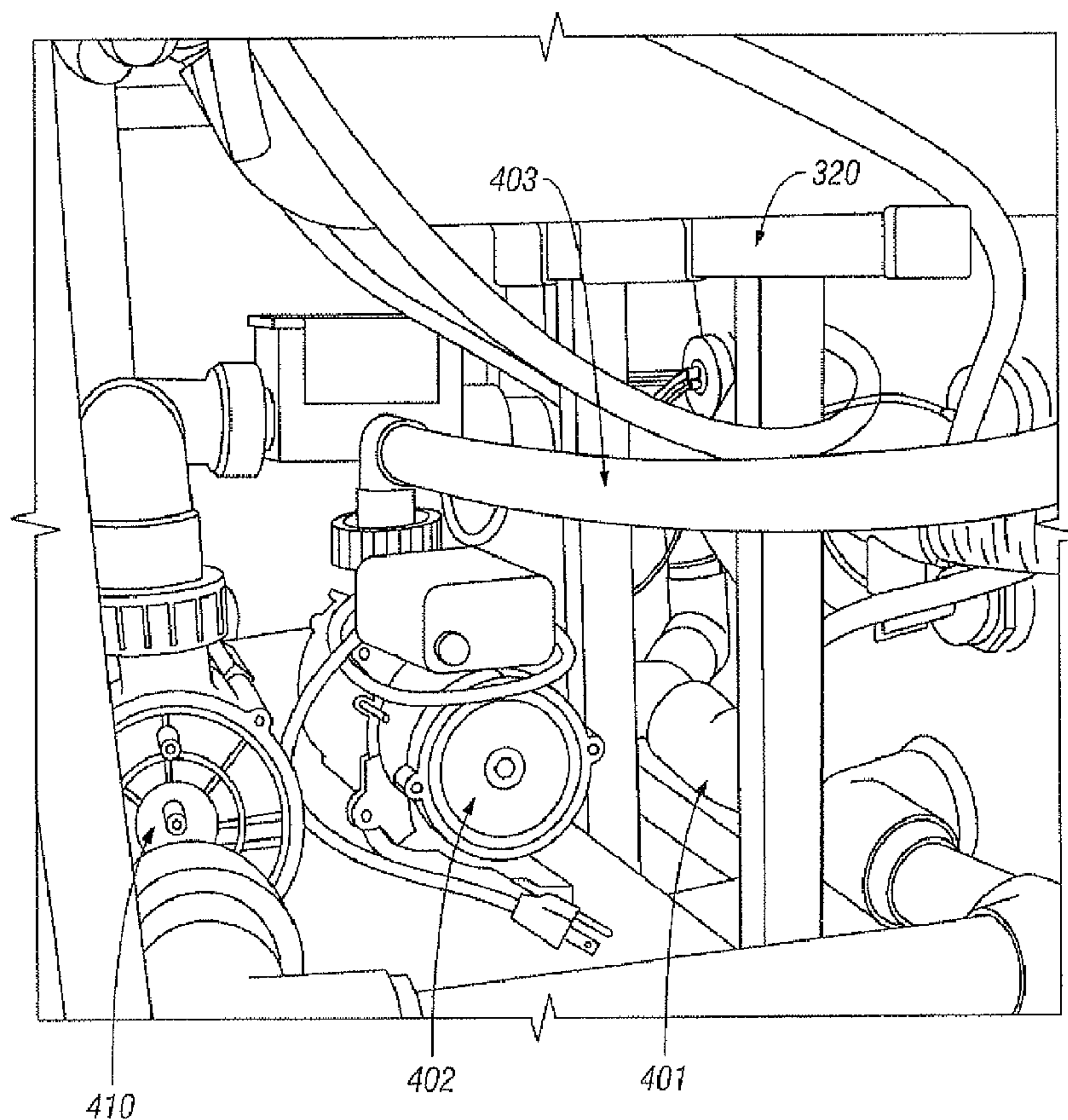


FIG. 4

(57) Abrégé/Abstract:

The present invention provides a drain system for a walk-in bathtub. The drain system includes a conventional drain opening in the bottom of the walk-in bathtub and a second drain opening in the side of the foot well of the bathtub. A motorized pump pumps

(57) **Abrégé(suite)/Abstract(continued):**

water out of the bathtub through the second drain opening in the foot well. A first drain line provides water outflow from the conventional drain opening to a primary drain pipe. A second drain line provides outflow from the motorized pump to the primary drain pipe, and a third drain line joins the primary drain pipe from an overflow opening near the top of the bathtub. A low water sensor is coupled to the second drain line and motorized pump and deactivates the pump when the water level in the bathtub is equal to or lower than the second drain opening.

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau(43) International Publication Date
13 November 2008 (13.11.2008)

PCT

(10) International Publication Number
WO 2008/137554 A3

(51) International Patent Classification:

A47K 3/02 (2006.01) A47K 3/00 (2006.01)

(21) International Application Number:

PCT/US2008/062233

(22) International Filing Date: 1 May 2008 (01.05.2008)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:

11/745,289 7 May 2007 (07.05.2007) US

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(81) Designated States (unless otherwise indicated, for every kind of national protection available): AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KN, KP, KR, KZ, LA, LC, LK, LR, LS, LT, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RS, RU, SC, SD, SE, SG, SK, SL, SM, SV, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

(84) Designated States (unless otherwise indicated, for every kind of regional protection available): ARIPO (BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MT, NL,

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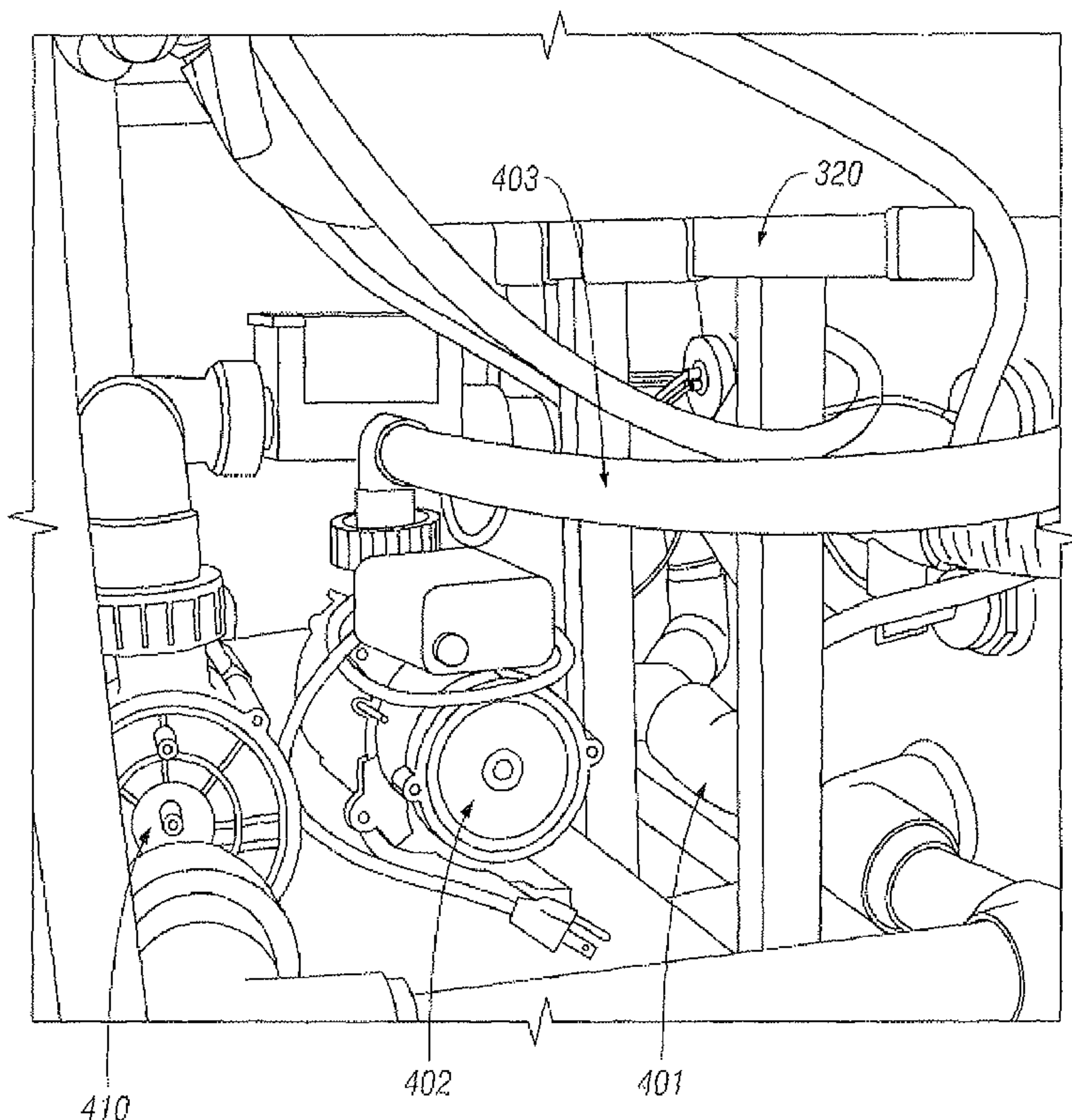


FIG. 4

(57) Abstract: The present invention provides a drain system for a walk-in bathtub. The drain system includes a conventional drain opening in the bottom of the walk-in bathtub and a second drain opening in the side of the foot well of the bathtub. A motorized pump pumps water out of the bathtub through the second drain opening in the foot well. A first drain line provides water outflow from the conventional drain opening to a primary drain pipe. A second drain line provides outflow from the motorized pump to the primary drain pipe, and a third drain line joins the primary drain pipe from an overflow opening near the top of the bathtub. A low water sensor is coupled to the second drain line and motorized pump and deactivates the pump when the water level in the bathtub is equal to or lower than the second drain opening.

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NO, PL, PT, RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

— *before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments*

Published:

— *with international search report*

(88) Date of publication of the international search report:
31 December 2008

ACCELERATED TUB DRAIN

TECHNICAL FIELD

The present invention relates generally to walk-in bathtubs and more specifically to a drain mechanism that allows water to drain from a tub significantly faster than simple gravity draining.

BACKGROUND OF THE INVENTION

Walk-in bathtubs comprise high tub walls with a high built in seat and a side door, allowing the user to walk into the tub from the side and sit down without having to climb down into a low bath tub. **Figure 1** shows a typical example of a walk-in bathtub in accordance with the prior art. Walk-in tubs are particularly suited for individuals who have physical limitations that make it difficult or dangerous to climb into and out of a regular, low bathtub or to stand up in a shower for extended periods of time. Such limitations might include physical disabilities or simply the reduced strength, balance and range of motion that typically occur with advancing age. Walk-in tubs are not only easier to enter and exit than conventional bathtubs they also reduce the chances of slips and falls compared to conventional tubs and showers.

In addition to safety, the ease of entering the tub via the side walk-in door also provides users with independence, allowing them to bathe without the assistance of another person when getting into and out of the tub.

However, because of their depth, walk-in bathtubs hold very large volumes of water. With seat heights approaching 17 inches above the tub floor water volume can reach 70 gallons or more. Typically, such large volumes require up to seven minutes to drain from the tub. This is particularly troublesome in the case of walk-in bathtubs because the occupant cannot open the side door and exit the tub until the water has drained, especially in models in which the side door opens to the inside and is held shut by water pressure.

Therefore it would be desirable to have a mechanism that speeds the drain time of walk-in baths beyond what is possible with simple gravity draining.

SUMMARY OF THE INVENTION

The present invention provides a drain system for a walk-in bathtub. The drain system includes a conventional drain opening in the bottom of the walk-in bathtub and a second drain opening in the side wall of the foot well of the walk-in bathtub. A motorized pump pumps water out of the walk-in bathtub through the second drain opening in the foot well. A first drain line provides water outflow from the conventional drain opening to a primary drain pipe. A second drain line provides water outflow from the motorized pump to the primary drain pipe, and a third drain line joins the primary drain pipe from an overflow opening near the top of the bathtub.

The drain lines from the pump and overflow opening join the primary drain pipe via a Y joint, wherein the drain line from the pump rises higher than the overflow opening and bends downward at approximately 45 degrees to join said Y joint. The bend in the second drain line above the height of the overflow opening prevents backflow. In addition, the drain line from the pump comprises a 1" hose that transitions into a 1.5" pipe at the bend above the overflow, producing an air pocket that breaks the siphon from the tub when the pump is not active.

The drain line from the conventional drain opening in the bottom of the tub also joins the primary drain pipe via a Y joint, which creates a venturi effect that speeds fluid flow through the pipe.

A low water sensor is coupled to the second drain pipe and motorized pump and deactivates the motorized pump when the water level in the walk-in bathtub is equal to or lower than the second drain opening.

With the pump activated, the drain system can produce a water outflow rate of 60 gallons per minute.

BRIEF DESCRIPTION OF THE DRAWINGS

The novel features believed characteristic of the invention are set forth in the appended claims. The invention itself, however, as well as a preferred mode of use, further objects and advantages thereof, will best be understood by reference to the following detailed description of an illustrative embodiment when read in conjunction with the accompanying drawings, wherein:

Figure 1 shows a typical example of a walk-in bathtub in accordance with the prior art;

Figure 2 shows a perspective view of a walk-in bathtub in accordance with a preferred embodiment of the present invention;

Figure 3 shows an example of a support frame in accordance with an embodiment of the present invention;

Figure 4 shows the plumbing of the suction drain in accordance with the present invention;

Figure 5 shows the suction pipe leading from the drain pump to the outlet on the opposite end of the tub;

Figure 6A shows the drain outlet assembly of the walk-in tub in accordance with a preferred embodiment of the present invention;

Figure 6B shows a close-up perspective view of the lower drain pipe junction;

Figure 7 shows the suction drain outlet in the foot well of the tub in accordance with the present invention;

Figure 8 shows a low water sensor in accordance with a preferred embodiment of the present invention; and

Figure 9 shows a lead from the low water sensor to the suction pipe.

Detailed Description

Figure 2 shows a perspective view of a walk-in bathtub in accordance with a preferred embodiment of the present invention. As shown, this embodiment has a side walk-in door **201** that opens to the inside of the tub **200**, unlike the door of the tub shown in **Figure 1**. Because the side door **201** opens to the inside, the water seal is largely maintained by outward hydrostatic pressure when the tub is filled with water.

Figure 3 shows an example of a support frame in accordance with an embodiment of the present invention. The frame **300** is designed to keep the side door from flexing when water is added to the bathtub or due to moisture changes in the bathroom. In addition, its design allows for quick and easy field and manufacturing installation. The cut out **310** on the faucet side makes it easy to install the plumbing. The five adjustable leveling feet **301-305** also enable reverse plumbing, which comprises running the faucets under the tub when the door needs to be on a particular side and the plumbing is on the opposite side. The adjustable feet **301-305** also allow one to drop the tub (if the tub plumbing can be recessed into the floor) to further drop the walk-in threshold making it even easier to get into the tub. In the preferred embodiment, the feet allow the tub to be dropped up to two and half inches. The frame **300** also includes a support **320** for the seat of the tub.

Figure 4 shows the plumbing of the suction drain in accordance with the present invention. This equipment is placed under the seat of the walk-in tub; the seat support **320** of the tub frame **300** is shown in **Figure 4**. A suction pipe **401** draws water through a dedicated outlet in the foot well of the tub (shown in **Figure 7**). In the embodiment depicted in **Figure 4**, suction is provided by a dedicated drain pump **402**. In the present example, the pump **402** is 5.5 amps and 0.45 hp and a 108 gallons-per-minute (gpm) rated suction produces a fluid flow through the suction pipe **401**. However, the size and power of the drain pump **402** and the gpm rate of the suction can vary according to the size of the tube. In an alternate embodiment, the existing whirlpool pump **410** provides the drain suction without the need for a separate drain pump.

Also shown in **Figure 4** is a hose **403** leading from the drain pump **402** to the outlet on the opposite end of the tub. The preferred embodiment of the invention uses a

1" hose that goes higher than the overflow opening and into a standard 1.5" pipe to break the siphon when the drain pump is not activated (see **Figure 6A**). However, different hose and pipe sizes can be used depending on the size of the tub and desired flow rate. **Figure 5** shows the suction hose **403** running along the back of the tub.

Figure 6A shows the drain outlet assembly of the walk-in tub in accordance with a preferred embodiment of the present invention. **Figure 6B** shows a close-up perspective view of the lower drain pipe junction. In one embodiment of the present invention the drain pipe configuration provides outlet paths for three sources of water.

The first outflow path is the hose **403** coming from the suction pump **402** described above. As shown in **Figure 6A**, the hose **403** bends upward above the overflow **602** and connects into a standard 1.5" pipe **603** which helps break the siphon. The transition from a 1" diameter to a 1.5" diameter creates an air pocket as the pipe size gets bigger. Without this air pocket, the entire line from the pump **402** to the primary drain pipe **600** would fill with water when the bathtub is filled causing the water to siphon out of the bath even if the conventional drain is closed and the pump **402** is not activated.

The 1.5" pipe drops down at approximately 45° to connect to the primary drain pipe **600** via a Y fitting **620** close to the overflow outlet **602**. The downward 45° angle helps prevent backflow.

The second and most obvious outlet path is from the conventional gravity drain at the bottom of the tub foot well. As shown in **Figure 6B**, this path is depicted by pipe **601** coming from the bottom of the tub and joining the primary drain pipe **600** via a Y joint **610**. This connection creates a venturi effect that accelerates fluid flow and removes the water from the conventional pipe **601** faster.

The third water outflow path comes from the conventional overflow **602** near the top of the tub as shown in **Figure 6A**.

Figure 7 shows the suction drain outlet in the foot well of the tub in accordance with the present invention. In this embodiment, the suction drain outlet **701** is placed next to the return outlet **702** for the whirlpool pump. When the suction drain is activated by the user (via on/off button **210** shown in **Figure 2**), the drain pump **402** begins pumping the water out through the drain outlet **701** in the foot well. As the water level

reaches the opening of the suction outflow **701**, a low water sensor shuts off the drain pump **402**.

Figure 8 shows the low water sensor **800** in accordance with a preferred embodiment of the present invention. **Figure 8** shows a lead **801** from the low water sensor to the suction pipe **403**. Because the suction outflow **701** is close to the bottom of the foot well most of the water has drained from the tub by the time the water level is even with the outflow opening. Switching off the drain pump at this point prevents air from being pumped through the system. The remainder of the water simply drains through the conventional drain opening at the bottom of the tub through pipe **601**.

Using the figure described in the example above, the present invention can produce a drain rate of approximately 60 gpm. Using only a conventional gravity drain, a 60 gallon walk-in tub would take approximately seven minutes to drain. With the present invention, the same 60 gallon tub can drain in approximately one minute to the level where the suction pump switches off and only the conventional drain removes the remaining water, which is right at the level of the door threshold. At this point the user can open the door without the remaining water spilling out.

Different model tubs allow the suction to be set lower due to the radius of the wall (there needs to be a flat surface). Modification to tub molds can allow suction closer to the floor. In an alternate embodiment of the present invention, the drain in the floor of the bathtub is used as the suction outlet, eliminating the need for a separate outlet in the wall of the foot well.

The present invention is advantageous to the user not simply for convenience but also for health reasons. Because the user is sitting upright in the tub much of the body is exposed as the water drains from foot well of the tub. Several minutes of such exposure could pose a health risk for some individuals as they wait for the tub to drain, especially when one considers that many walk-in tub users already have preexisting conditions (hence their need for a walk-in tub). By reducing the drain time to about a minute, the present invention allows the user to drain the water and exit the tub with minimal exposure time before drying off.

The description of the present invention has been presented for purposes of illustration and description, and is not intended to be exhaustive or limited to the

invention in the form disclosed. Many modifications and variations will be apparent to those of ordinary skill in the art. The embodiment was chosen and described in order to best explain the principles of the invention, the practical application, and to enable others of ordinary skill in the art to understand the invention for various embodiments with various modifications as are suited to the particular use contemplated. It will be understood by one of ordinary skill in the art that numerous variations will be possible to the disclosed embodiments without going outside the scope of the invention as disclosed in the claims.

CLAIMS

We claim:

1. A drain system for a walk-in bathtub, comprising:
 - (a) a first drain opening in the bottom of the walk-in bathtub;
 - (b) a second drain opening in the side of the foot well of the walk-in bathtub;
 - (c) a motorized pump that pumps fluid out of the walk-in bathtub through said second drain opening;
 - (d) a primary drain pipe;
 - (e) a first drain line that provides fluid outflow from said first drain opening to said primary drain pipe;
 - (f) a second drain line that provides fluid outflow from said motorized pump to said primary drain pipe; and
 - (g) a low water sensor coupled to said second drain line and motorized pump, wherein the low water sensor deactivated the motorized pump when the fluid level in the walk-in bathtub is equal to or lower than said second drain opening.
2. The drain system according to claim 1, further comprising:
 - (h) an overflow opening at the top of said walk-in bathtub to prevent water from overflowing the sides of the bathtub; and
 - (i) a third drain line that provides fluid outflow from said overflow opening to said primary drain pipe.
3. The drain system according to claim 2, wherein said second drain line and said third drain line connect to said primary drain pipe through a Y joint, wherein the second drain line rises higher than the overflow opening and bends downward at approximately 45 degrees to join said Y joint, wherein the bend in the second drain line above the height of the overflow opening prevents backflow from the overflow opening through the second drain line.

4. The drain system according to claim 3, wherein the second drain line comprises:
a 1 inch hose; and
a 1.5 inch pipe;
wherein said 1 inch hose leads from the drain pump to the 1.5 inch pipe, and the
1.5 pipe inserts into said Y joint; and
wherein the junction between the 1 inch hose and 1.5 inch pipe forms said bend in
the second drain line above the overflow opening and prevents siphoning
through the second drain line when the drain pump is not activated.
5. The drain system according to claim 1, wherein said first drain line connects to
said primary drain pipe through a Y joint, wherein said Y joint produces a venturi
effect that accelerates water outflow.
6. The drain system according to claim 1, wherein the drain system produces a fluid
outflow rate from the walk-in bathtub of 60 gallons per minute.
7. A drain system for a walk-in bathtub, comprising:
 - (a) a drain opening in the foot well of the walk-in bathtub;
 - (b) a motorized pump that pumps fluid out of the walk-in bathtub through said
drain opening;
 - (c) a primary drain pipe;
 - (d) a drain line that provides fluid outflow from said motorized pump to said
primary drain pipe, wherein the drain line includes a hose and a second pipe,
wherein the hose leads from the drain pump to the second pipe and the second
pipe connects to said primary drain pipe via a Y joint, wherein the second pipe
has a larger diameter than the hose and the junction between the hose and
second pipe creates an air pocket that prevents siphoning through the drain
line when the drain pump is not activated; and
 - (e) a low water sensor coupled to said drain line and motorized pump, wherein the
low water sensor deactivated the motorized pump when the fluid level in the
walk-in bathtub is equal to or lower than said drain opening.

8. The drain system according to claim 7, further comprising an overflow opening at the top of said walk-in bathtub connected to said primary drain pipe via said Y joint, wherein said drain line rises higher than the overflow opening and bends downward at approximately 45 degrees to join said Y joint, wherein the bend in the drain line is formed by the junction of said hose and second pipe and prevents backflow from the overflow opening.

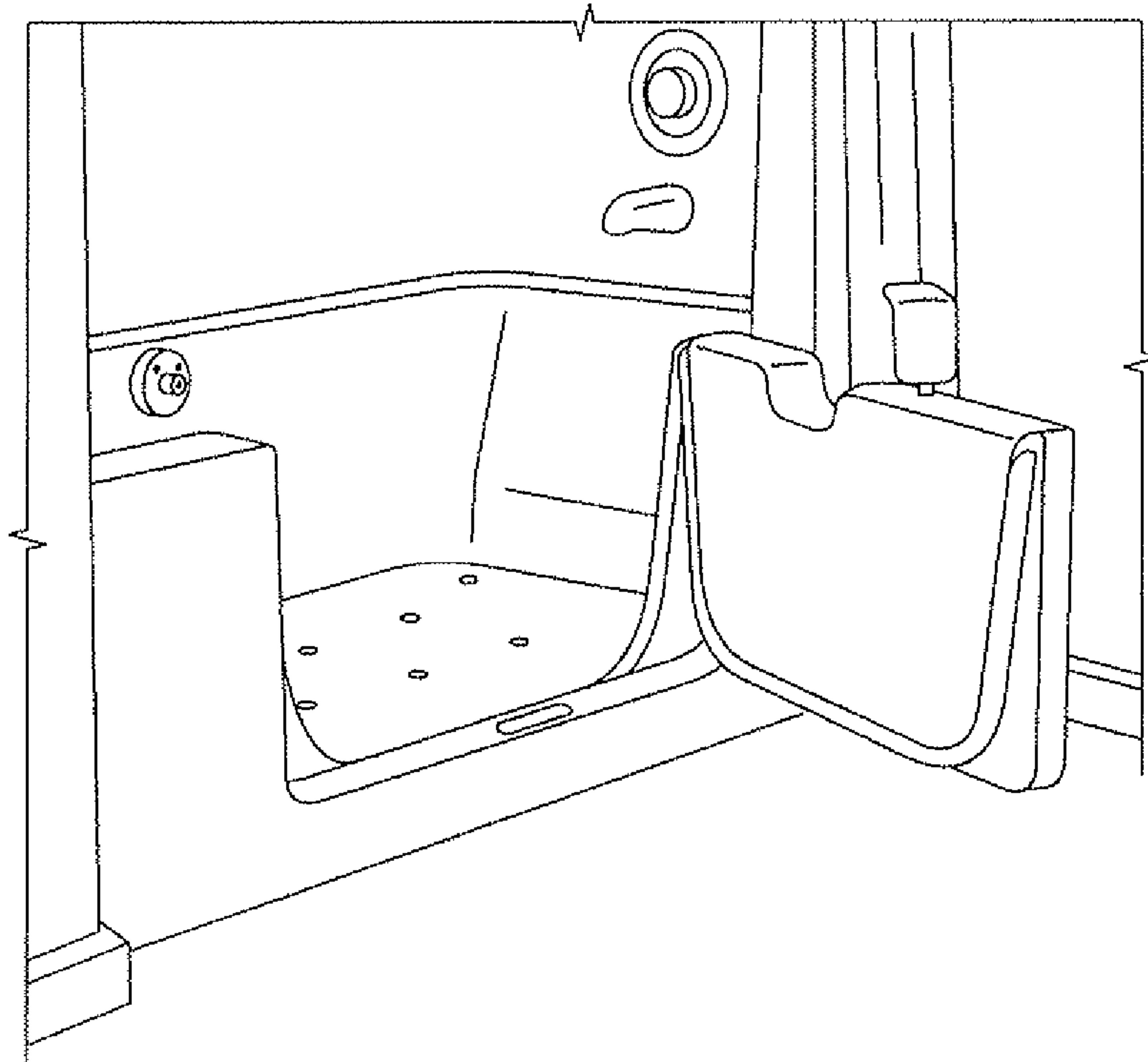


FIG. 1
(Prior Art)

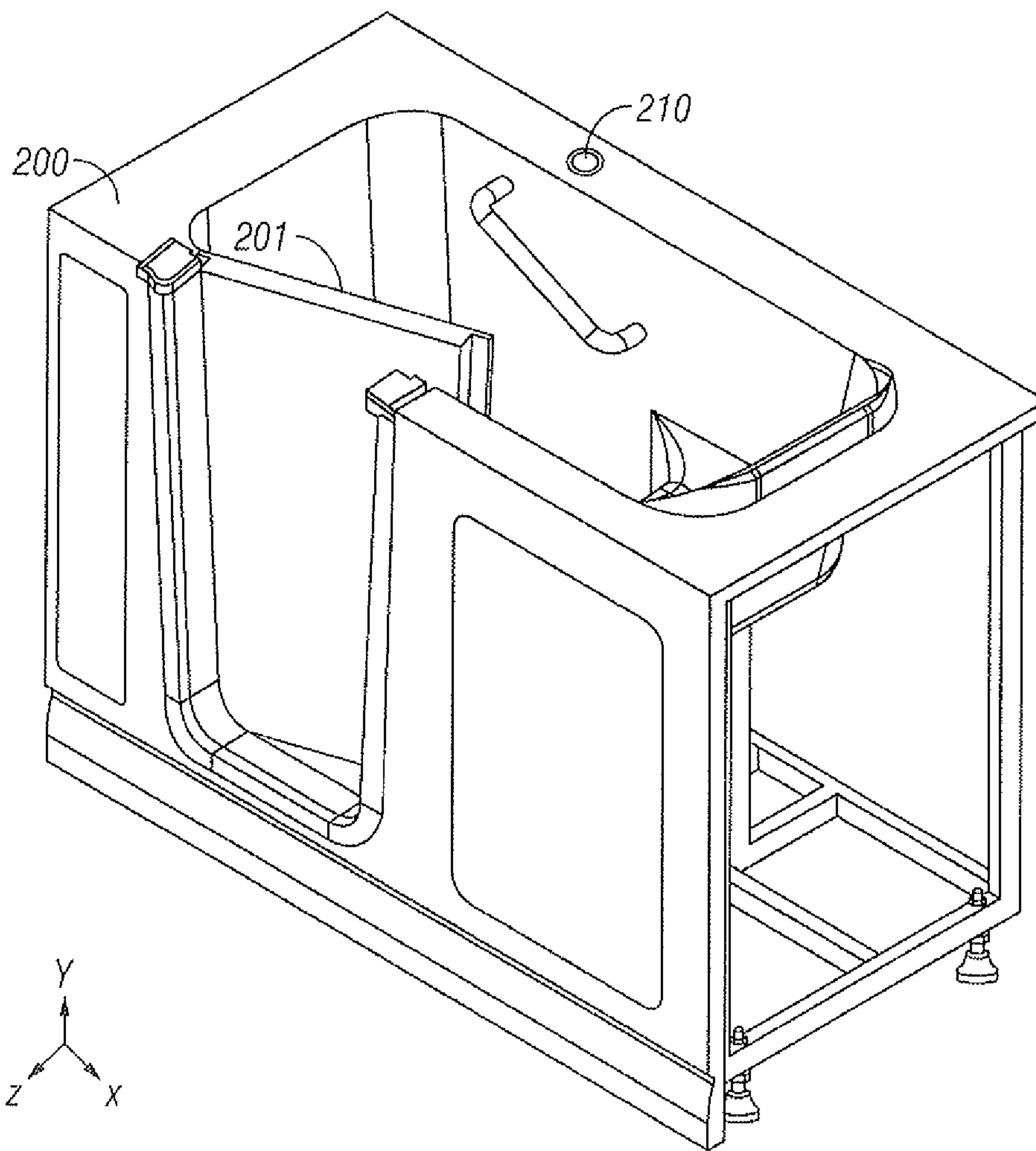


FIG. 2

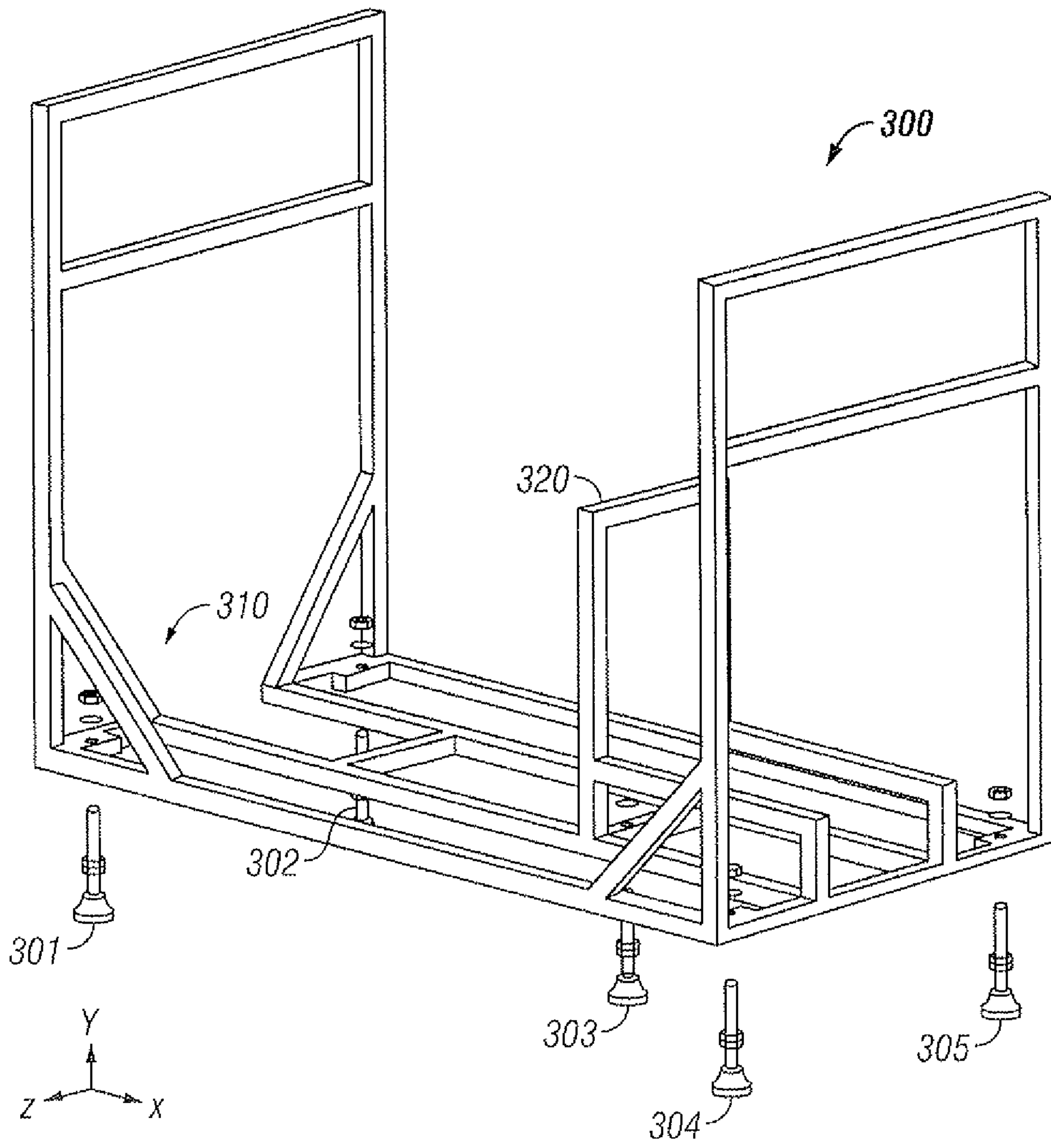


FIG. 3

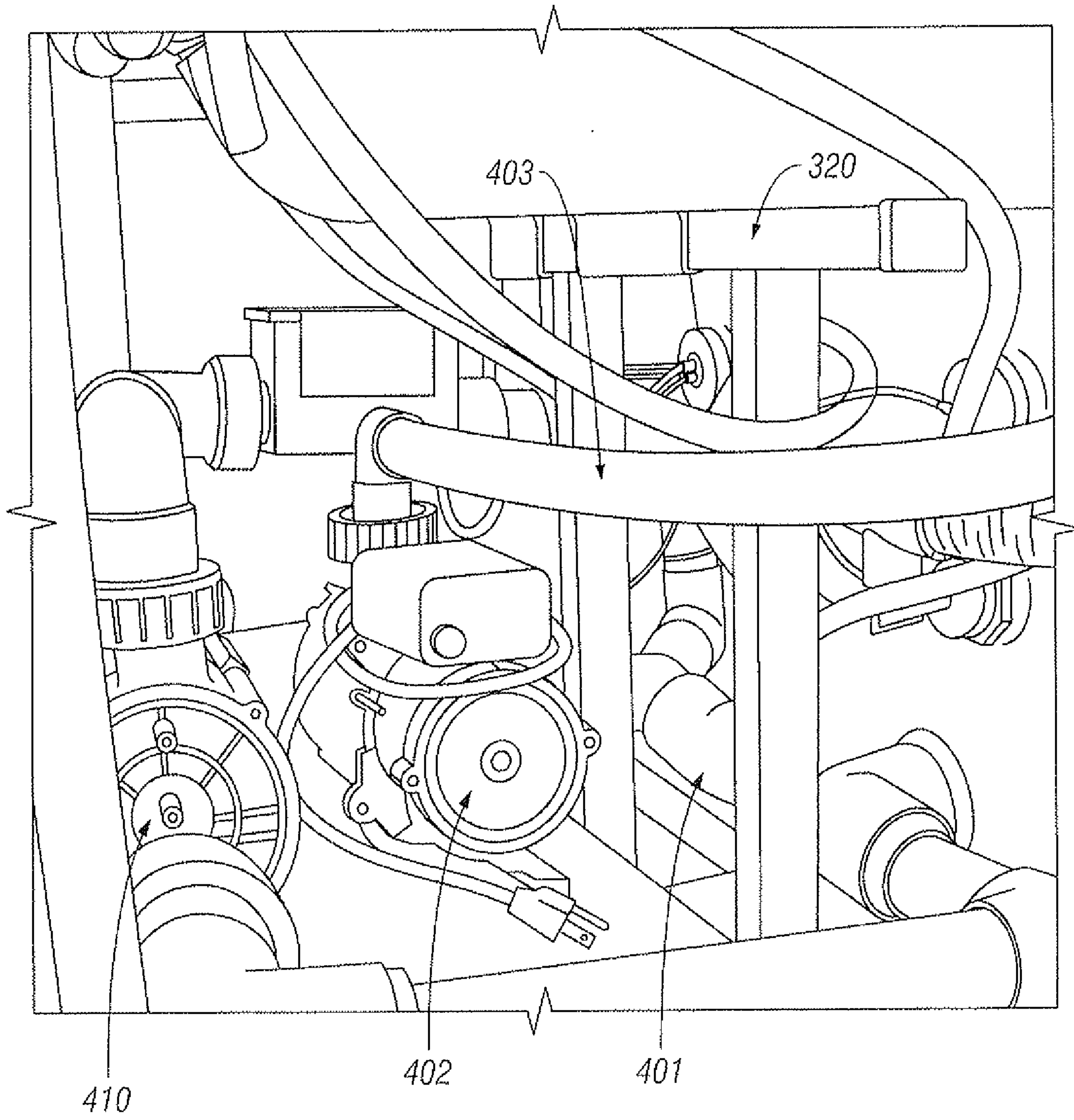


FIG. 4

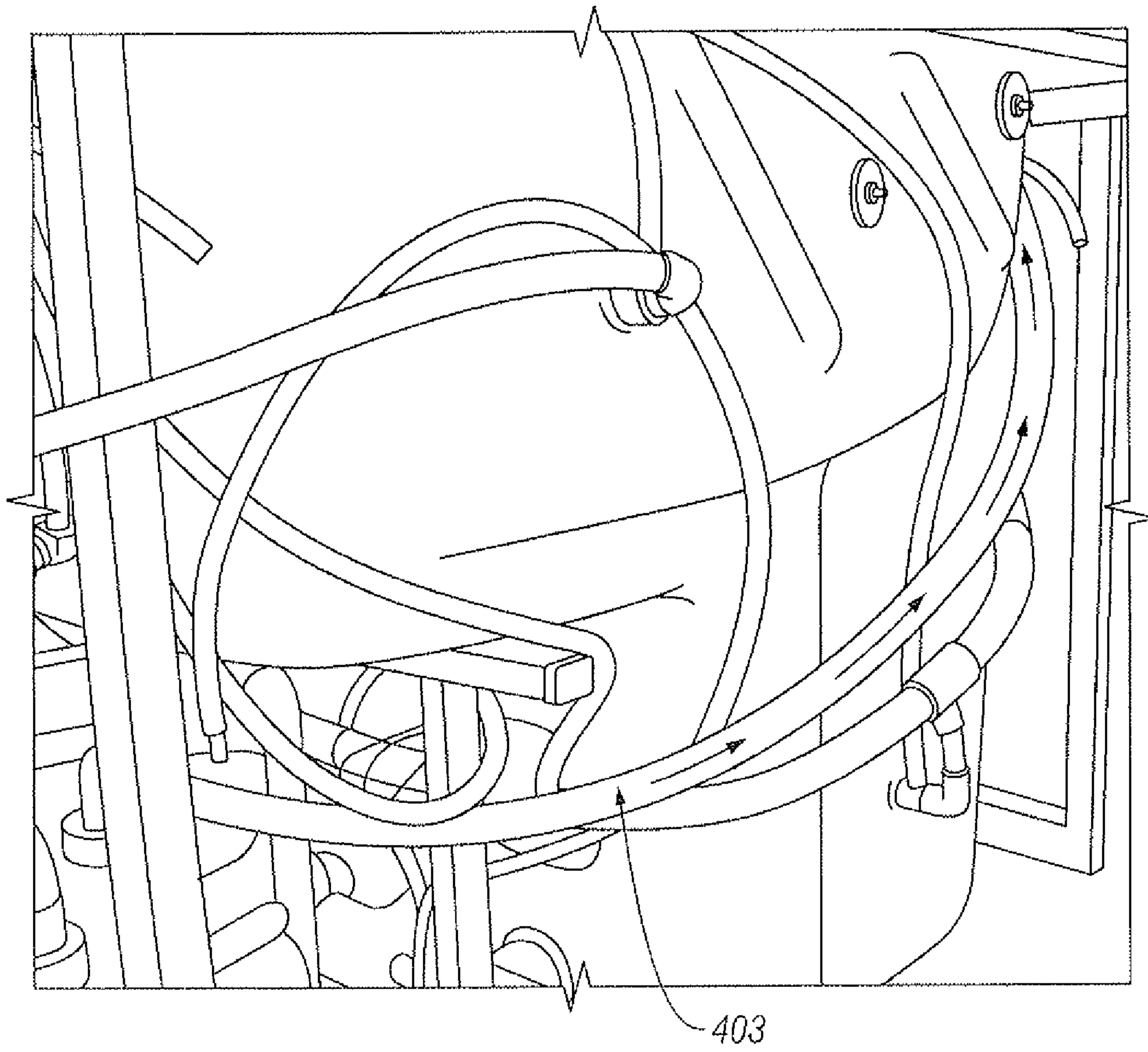


FIG. 5

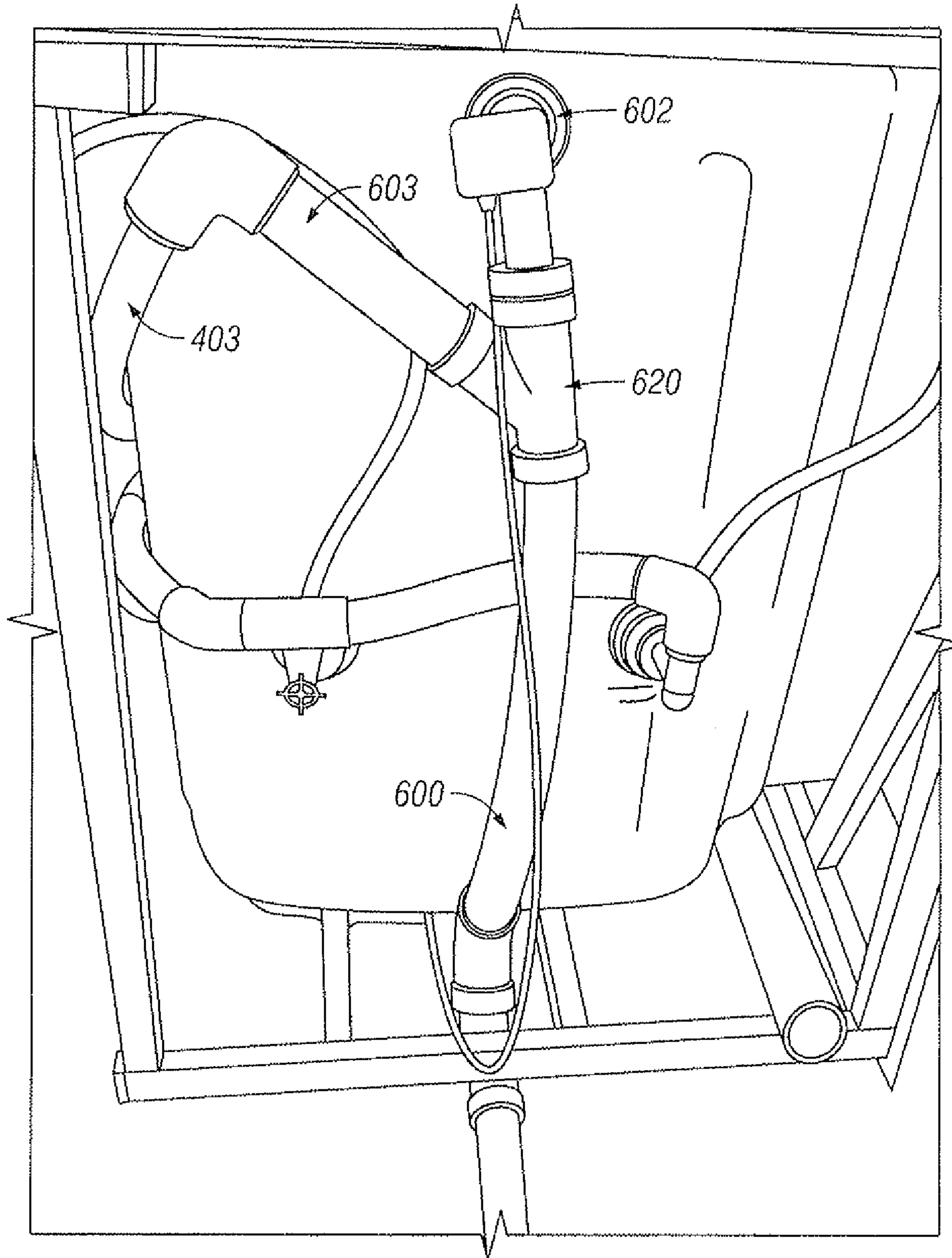


FIG. 6A

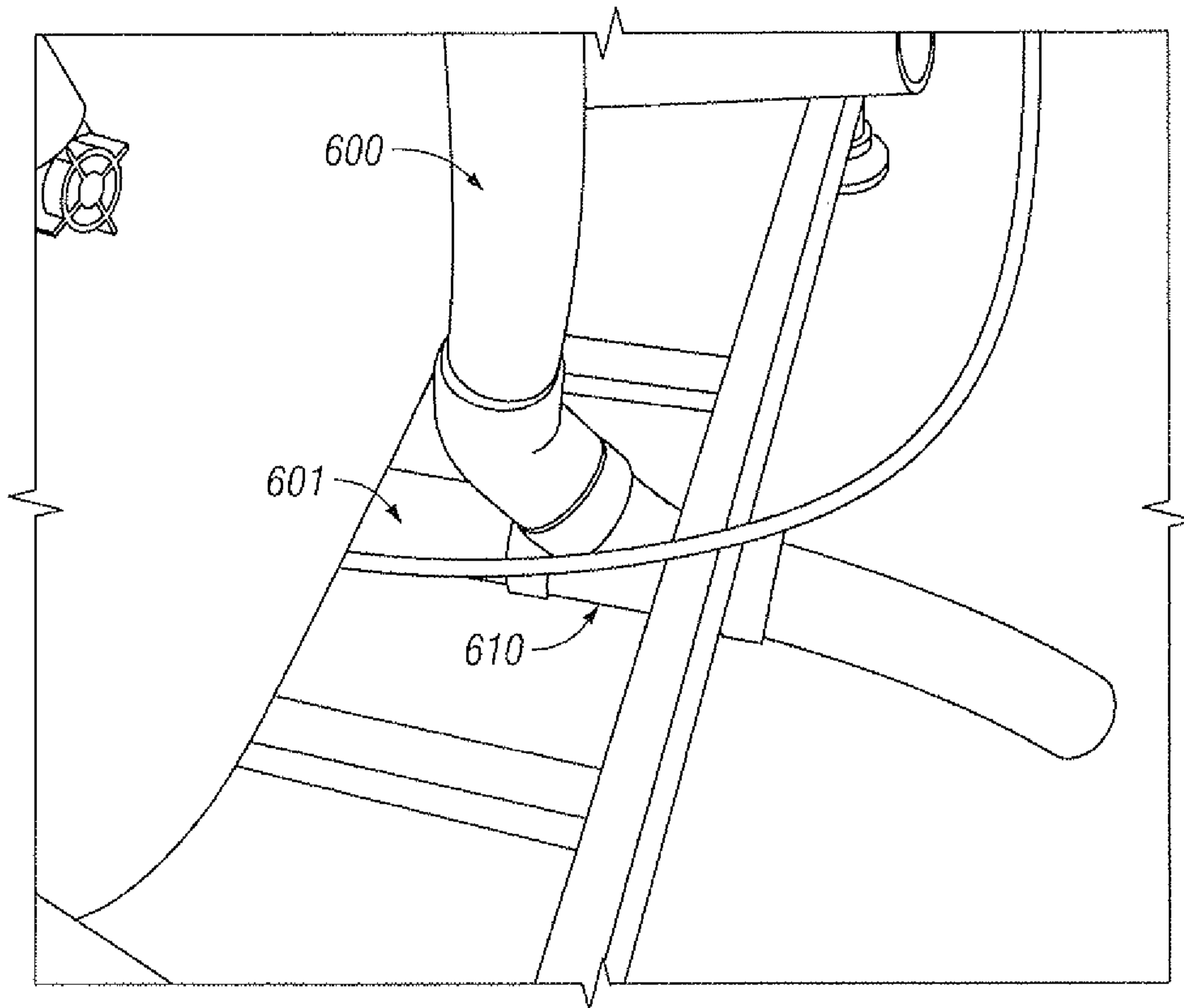


FIG. 6B

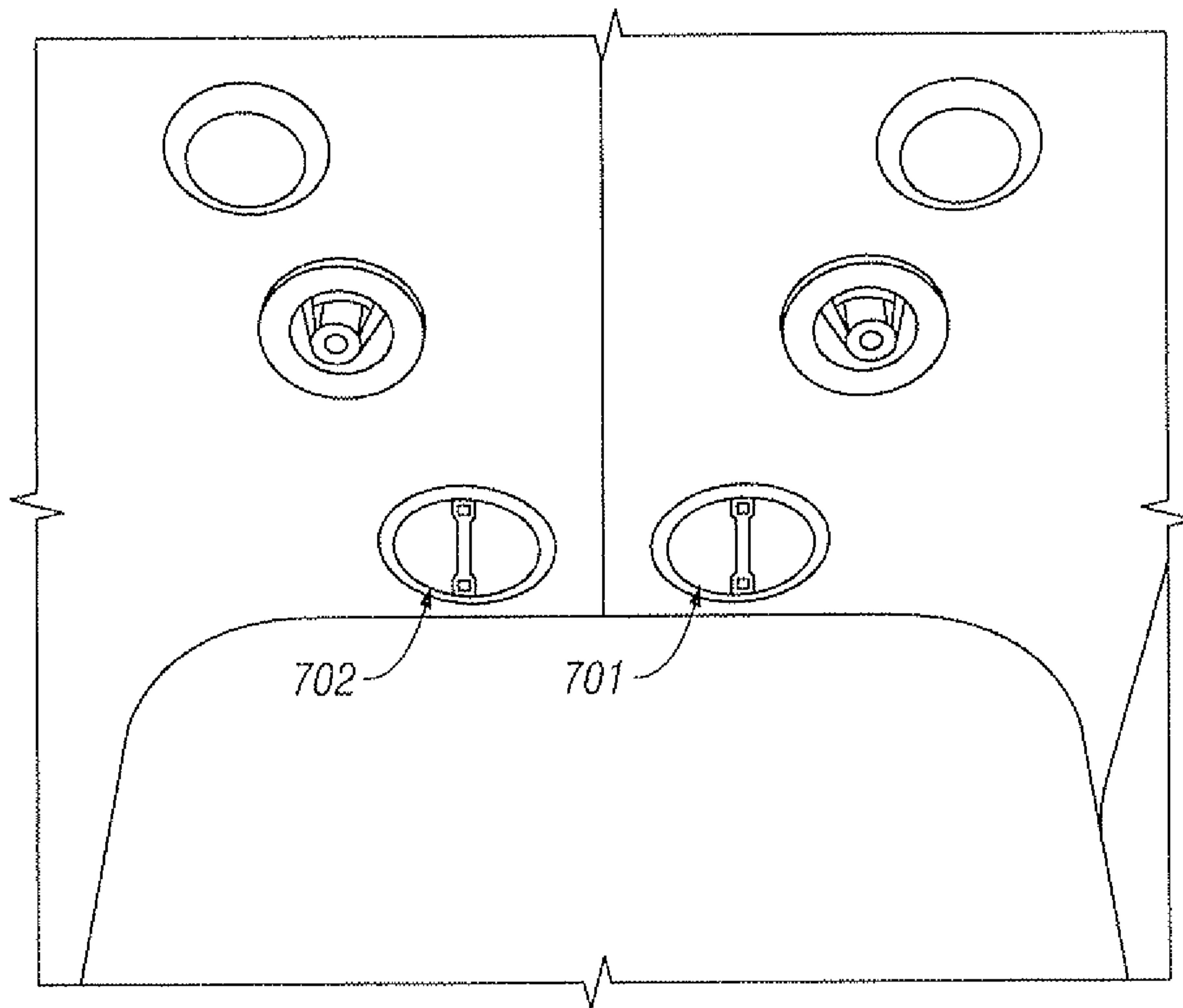


FIG. 7

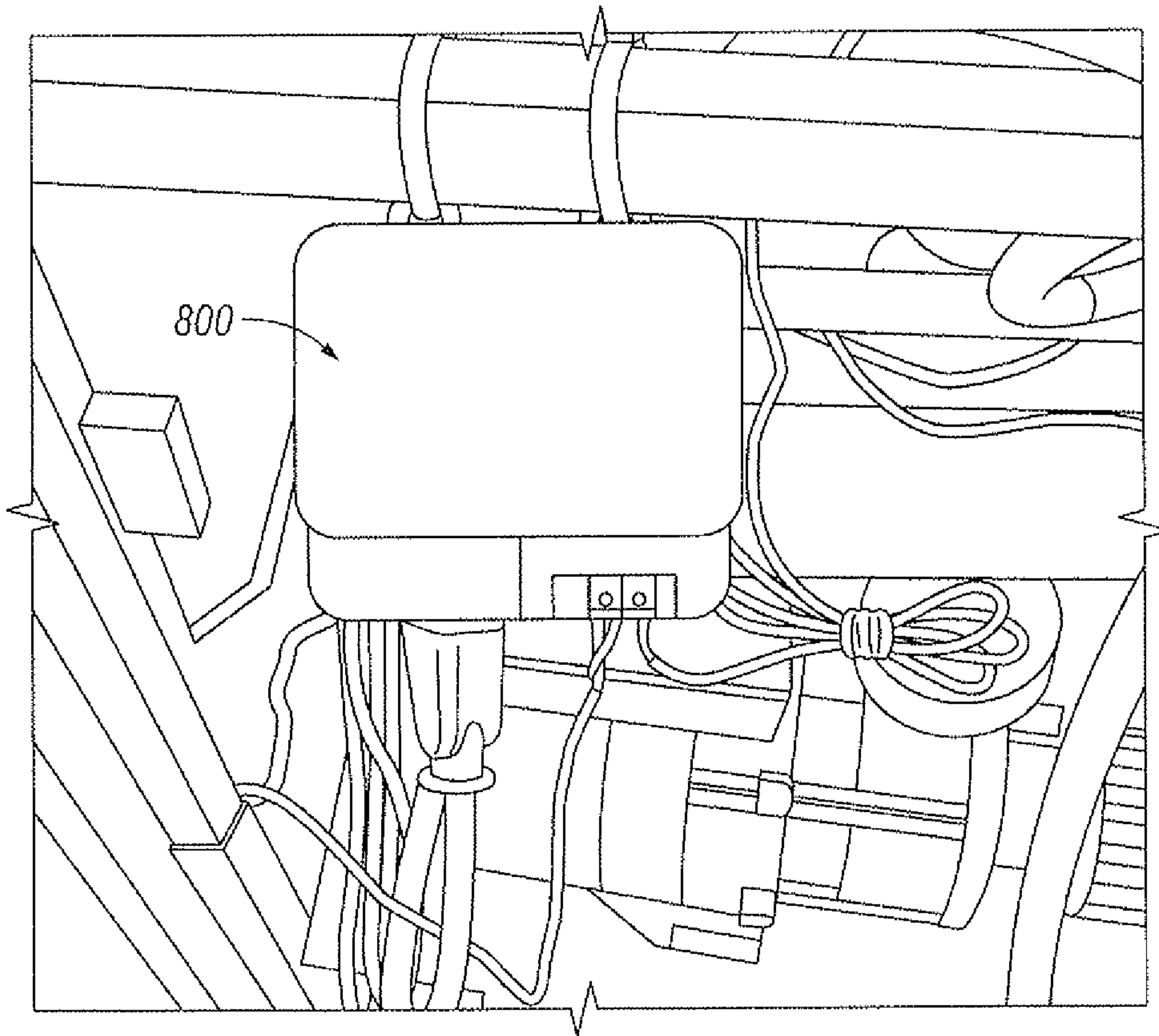


FIG. 8

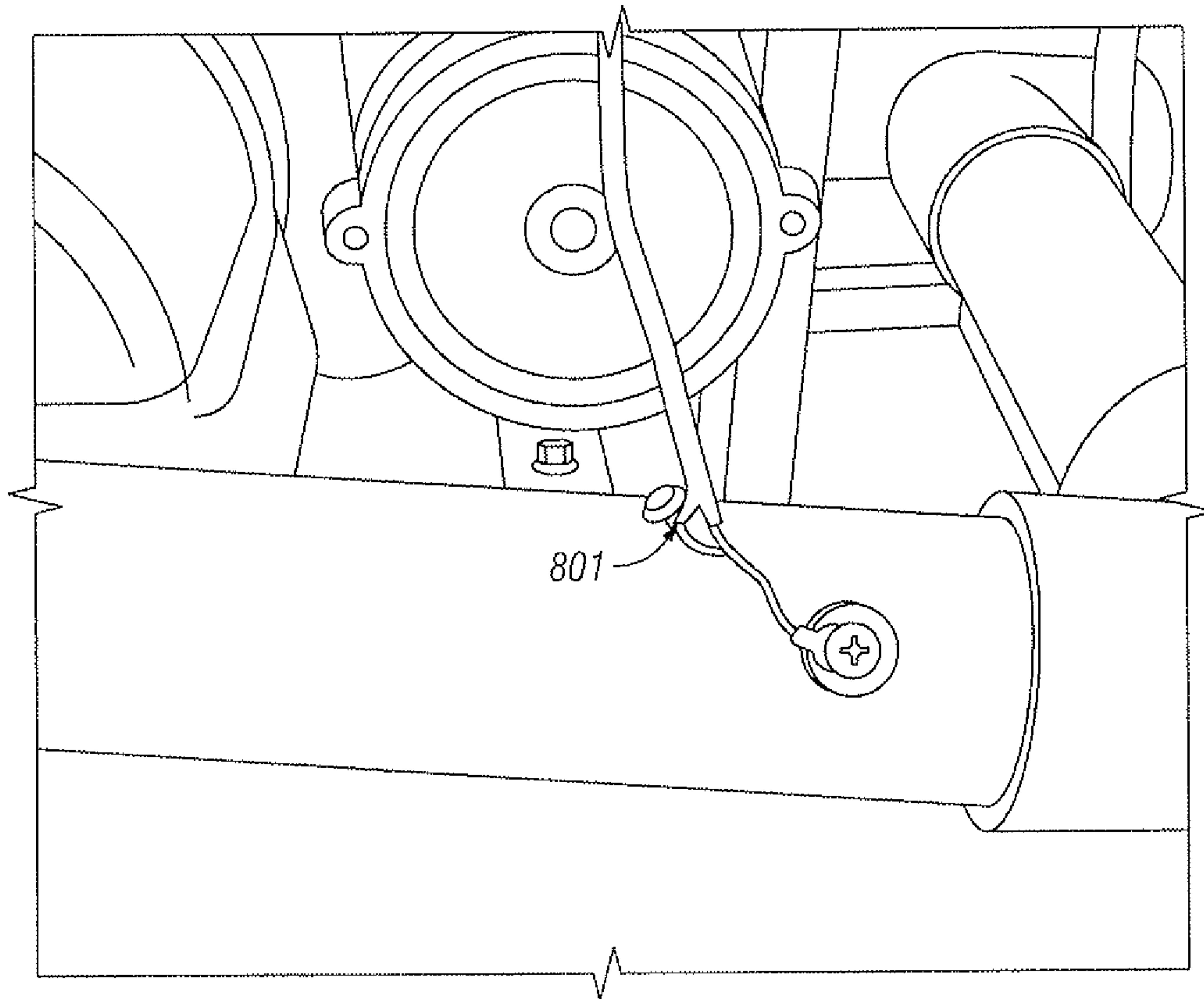
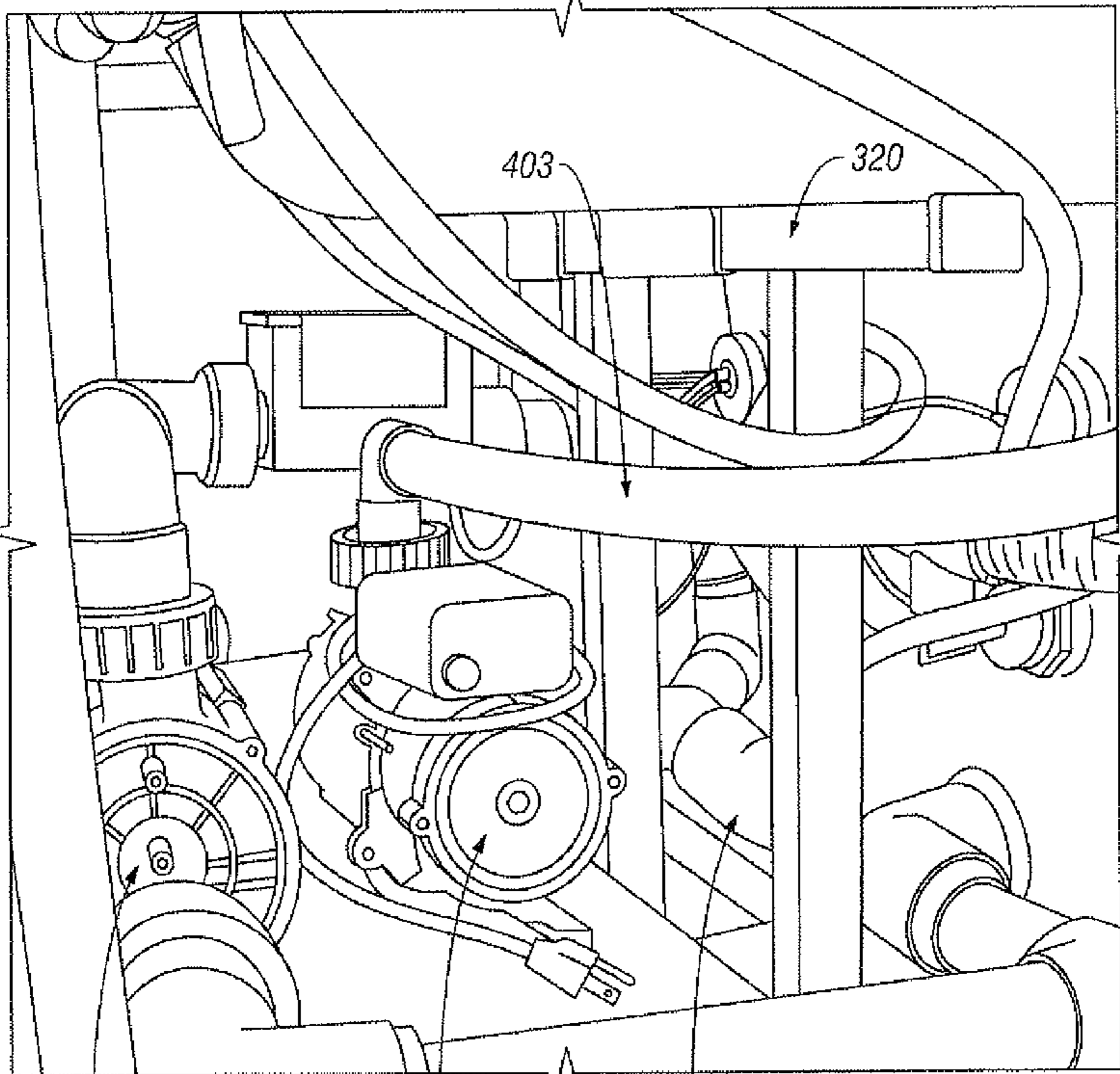


FIG. 9



410

402

401

FIG. 4