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3,340,870 9/1967 Steltz et al. 128/66
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[54] **HYDROTHERAPEUTIC DEVICE**
9 Claims, 4 Drawing Figs.

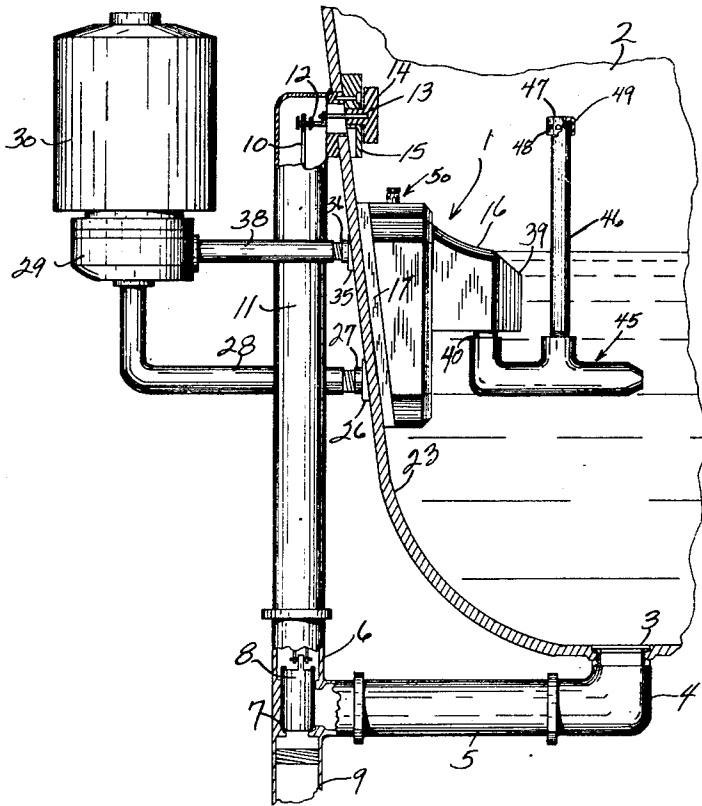
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4/180, 173, 178; 103/113 R, 113 S, 2 A

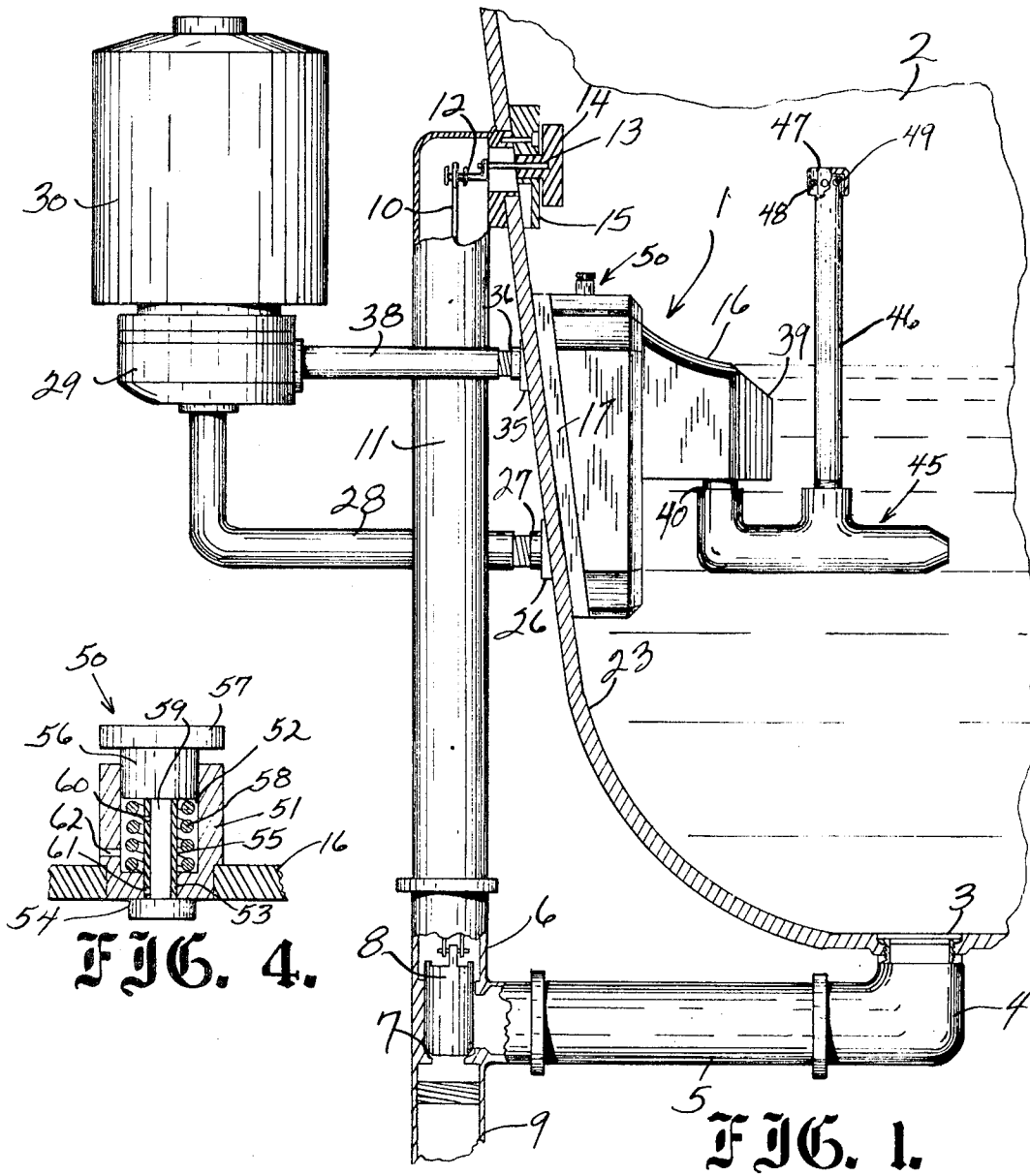
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ABSTRACT: A hydrotherapeutic unit to be permanently installed with a bathtub or tank. The unit includes a manifold mounted on the end wall of the tub and the manifold defines a water supply chamber and a return chamber. A pair of conduits extend through the end wall of the tub on opposite sides of the waste valve operating mechanism and one conduit establishes communication between the supply chamber and the discharge side of a pump located outside of the tub, while the second conduit establishes communication between the return chamber and the suction side of the pump.

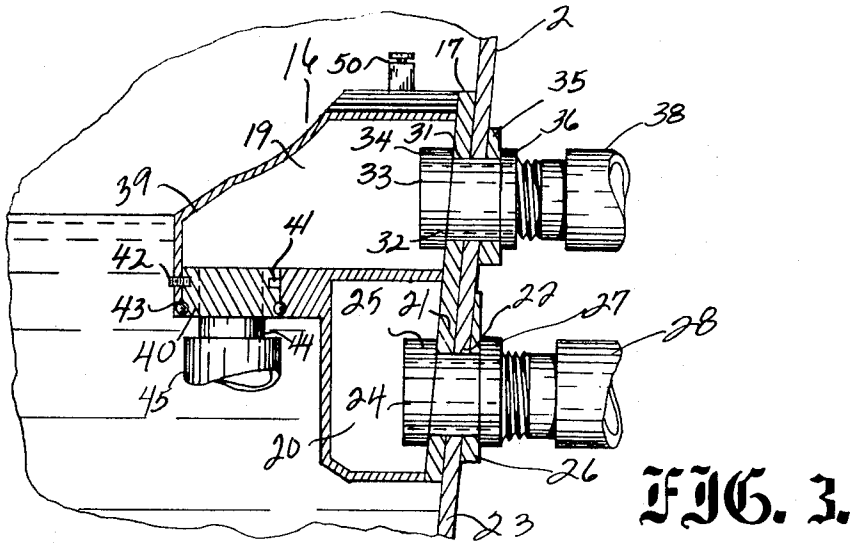
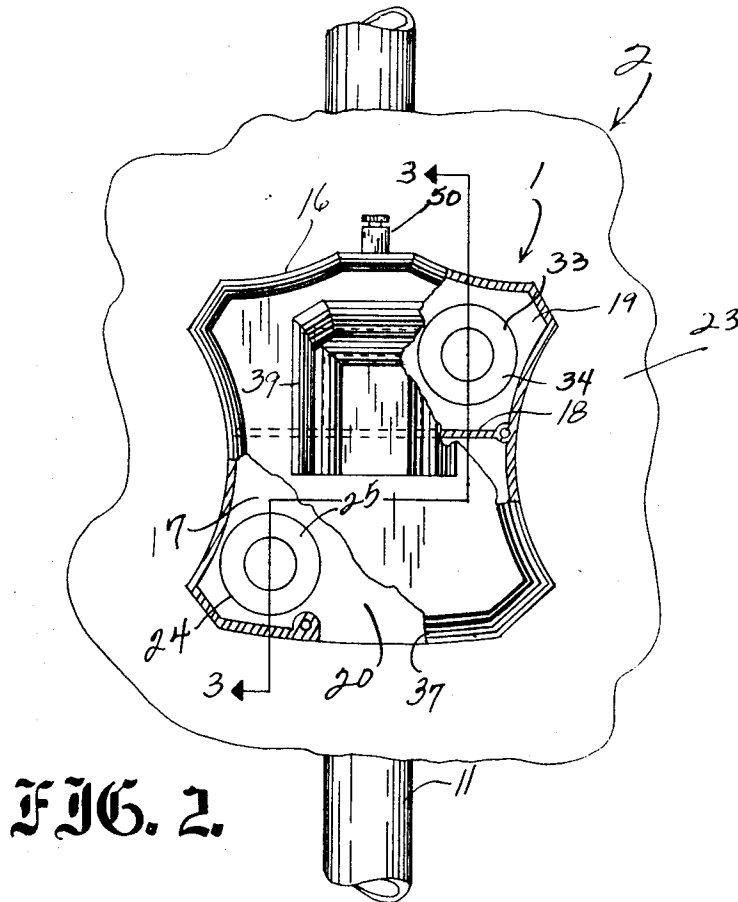
A nozzle assembly is located within the tub and is connected to the supply chamber so that water discharged by the pump is delivered to the supply chamber and then ejected under high pressure from the nozzle assembly within the body of water in the tub. The water is recirculated from the tub through the return chamber to the pump.





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HYDROTHERAPEUTIC DEVICE

The invention relates to a hydrotherapeutic apparatus to be permanently installed with a bathtub or tank.

A hydrotherapeutic unit is used for the treatment of sore muscles, rheumatic conditions and the like and is normally associated with a household bathtub or a therapeutic tank. One form of hydrotherapeutic unit is shown in U.S. Pat. No. 3,340,870. In the unit shown in that patent, the motor and pump are located outside of the tub and water is supplied to the nozzle assembly located in the tub through an inlet opening provided in the end wall of the tub beneath the waste valve control opening. Water is ejected under high pressure from the nozzle assembly within the body of water in the tub and is recirculated to the pump through a return line which communicates with the standard drain opening in the bottom of the tub.

To install the hydrotherapeutic unit of the type shown in U.S. Pat. No. 3,340,870, it is necessary to modify the waste valve control mechanism and offset it from the centerline of the tub so that water can be supplied to the nozzle assembly through an opening in the end wall which is located along the centerline of the tub. In addition, with the unit shown in U.S. Pat. No. 3,340,870, it is necessary to modify the drain fitting to provide a connection to the suction side of the pump.

The present invention is directed to an improvement over the hydrotherapeutic unit shown in U.S. Pat. 3,340,870. According to the invention, a manifold is mounted on the end wall of the tub and defines a supply chamber and a return chamber. A pair of conduits extend through the end wall of the tub on opposite sides of the waste valve control rod and one conduit is connected between the supply chamber and the discharge side of a pump located on the outside of the tub, while the second conduit establishes communication between the return chamber and the suction side of the pump. In addition, the supply chamber is connected to a nozzle assembly located within the tub, and an opening in the manifold provides communication between the tub and the return chamber.

When the pump is operated, water is discharged from the pump to the supply chamber and is ejected under high pressure from the nozzle assembly within the body of water in the tub. The water is recirculated from the tub through the return chamber to the suction side of the pump.

As the conduits or nipples, which are connected to the supply chamber and the return chamber of the manifold, are offset from the longitudinal centerline of the tub, it is not necessary to modify the waste valve control mechanism in order to install the hydrotherapeutic unit with a standard bathtub. Moreover, the water is returned to the pump through the return conduit which extends through the end wall of the tub, and it is not necessary to alter the waste drain fitting to provide a connection to the pump. Therefore, the hydrotherapeutic unit of the invention can be installed without modification to existing plumbing facilities, for the connections to the pump are made through the two openings in the wall of the tub.

As a further advantage, by mounting the pump at a level above the manifold, complete drainage of the water from the pump and connecting conduits is achieved.

The hydrotherapeutic unit of the invention is particularly adaptable for use with household bathtubs, but can also be used with therapeutic tanks, pools and the like. The unit can be installed with bathtubs in new building construction as well as being installed with existing tubs.

As the pump motor is located outside of the tub, the inherent danger of a possible electrical short is eliminated, and this provides a distinct advantage over hydrotherapeutic units in which the pump and motor are submerged in the water in the tub.

Other objects and advantages will appear in the course of the following description.

The drawings illustrate the best mode presently contemplated of carrying out the invention.

In the drawings:

FIG. 1 is a vertical section of a standard bathtub incorporating the hydrotherapeutic unit of the invention;

FIG. 2 is a fragmentary front view of the end wall of the bathtub showing the manifold with parts broken away in section;

FIG. 3 is a section taken along lines 3-3 of FIG. 2; and

FIG. 4 is an enlarged fragmentary vertical section showing the air vent mechanism for the manifold.

The drawings illustrate a hydrotherapeutic unit 1 to be installed with a household bathtub 2. The bottom surface of the bathtub is provided with a drain opening and a standard drain fitting 3 is secured within the opening and is connected to the upper end of an elbow 4, while the opposite end of the elbow is connected by a pipe 5 to a standard waste valve fitting 6. The waste valve fitting 6 defines a valve seat 7 which is adapted to be closed off by a conventional gate valve 8. The lower end of fitting 6 is threaded and is connected to a drain-pipe 9.

The waste valve 8 is operated by a standard control mechanism which includes a rod 10 connected to the valve. The rod 10 extends upwardly within a tubular housing 11 and the upper end of the rod 10 is connected by a link 12 to a shaft 13 while the opposite end of the shaft carries a hand knob 14 located within the tub. Shaft 13 extends through the central opening in a overflow ring 15 and the ring is secured to the flange of the housing 11 by screws, not shown. As previously noted, the waste valve 8 and the mechanism for operating the valve are of standard construction and in themselves form no part of the present invention.

According to the invention, a manifold 16 is mounted on the inner surface of the end wall of the tub and is located in alignment with the longitudinal centerline of the tub. The manifold 16 is secured to a backplate 17 by a series of screws and the backplate 17 is mounted flatwise against the end wall of the tub.

Manifold 16 includes a central horizontal wall 18, best shown in FIG. 3, which divides the manifold into an upper supply chamber 19 and a lower return chamber 20. As shown in FIG. 3, the backplate 17 is provided with an opening 21 which is in alignment with an opening 22 in the end wall 23 of the tub. A nipple 24 extends through the aligned openings 21 and 22 and the flange 25 of the nipple bears against the inner surface of the backplate 17. The outer end of nipple 24 projects outwardly beyond the end wall of the tub and receives a wedge-shaped ring 26. A locknut 27 is engaged with outer end of the nipple and by threading the nut 27 on the nipple, the backplate 17 is secured to the end wall 23 of the tub.

To supply water to the supply chamber 19, a conduit or hose 28 is connected to the outer end of the nipple 24 and the opposite end of the conduit 28 is connected to the discharge side of a pump 29 driven by a motor 30.

The backplate 17 is also provided with an opening 31 which communicates with the return chamber 20 and is disposed in alignment with an opening 32 formed in the end wall 23 of the tub. A nipple 33 similar in construction to nipple 24, extends within the aligned openings 31 and 32 and the flange 34 on the inner end of the nipple 33 bears against the backplate 17. A wedge-shaped 35 is disposed around the outer projecting end of the nipple and a locknut 36, similar to locknut 27, is threaded onto the nipple and serves to secure the back plate to the end wall 23.

The pump and motor are mounted outside of the tub in any convenient location as for example, a partition wall stud. The motor-pump unit should be mounted so that the discharge and suction lines of the pump are slightly higher than the nipples 24 and 33 on manifold 16 to assure complete drainage of the pump.

During operation of the hydrotherapeutic unit water in the tub is at a level, as shown in FIG. 1, above the lower end of the manifold and is drawn to the return chamber through an opening 37 formed in the lower wall of the manifold. In addition, a conduit 38 or hose connects the outer end of nipple 33 to the suction side of the pump 29 so that water within the return chamber will be continuously returned to the pump.

As best shown in FIG. 2, the housing 11 which contains the waste valve control rod 10 is located along the longitudinal centerline of the tub and the nipples 24 and 33 are offset from the centerline and are located on opposite sides of the centerline so that water can be supplied to the manifold and returned from the manifold without interfering with the normal position or operation of the waste valve control mechanism.

The manifold 16 is provided with a spout 39 which communicates with the supply chamber 19, and the lower end of the spout receives an adapter or coupling 40. The adapter 40 is provided with a circumferential groove 41 and a setscrew 42 extends through the wall of the spout 39 and is received within the groove. The connection of setscrew 42 with groove 41 permits rotation of the adapter 40 but prevents the adapter from being withdrawn axially from the spout.

To seal the joint between the adapter 40 and spout 39, a resilient O-ring 43 is located within a second groove formed in the adapter.

The lower end 44 of the adapter 40 has a reduced diameter and is press fitted within the nozzle assembly 45. Water from chamber 19 is discharged under high pressure from the nozzle assembly within the body of water in the tub. During operation, air is drawn into the high-pressure liquid stream through a stand pipe or inlet tube 46 which communicates with the nozzle assembly. The upper open end of the pipe entering the tube is controlled by a rotatable cap 47 having a series of air inlet openings 48 which can be rotated into alignment with similar openings 49 in the inlet tube. By rotating the cap 47, the openings 48 can be brought into partial or full alignment with the openings 49 in the tubes to thereby control the air-flow into the inlet tube.

The construction of the nozzle assembly and the air inlet tube can be of a conventional type such as that disclosed in U.S. Pat. No. 3,340,870.

During operation of the unit, the nozzle assembly 45 is located beneath water level and the upper end of the inlet pipe 46 will project above the water level so that air can be drawn through the inlet pipe by the aspirating effect of the water being discharged through the nozzle assembly. Air being drawn through the inlet pipe will be mixed with the water stream to provide an aerated, high-pressure stream of water which is discharged from the nozzle assembly.

As previously mentioned, the water level in the tub, as shown in FIG. 1, is adapted to be above the level of the nozzle assembly 45 and will thereby normally fill the return chamber 20 and the conduit 38. When the tub is initially filled with water, an air pocket will develop in the upper supply chamber 19 and in order to vent the air from the chamber 19 an air vent assembly 50 is provided in the manifold 16.

As best shown in FIG. 4, the air vent assembly 50 includes a body 51 which is mounted in an opening in the manifold 16. The body 51 is provided with a large, upper, axial recess 52 and a smaller diameter, lower recess 53 which communicates with the upper recess. A valve 54 is carried by a stem 55 which is slidable within the recess 53. The upper end of stem 55 is connected to the base 56 of a pushbutton 57, and base 56 is mounted for sliding movement in the upper recess 52.

To urge the valve 54 upwardly to the closed position, a coil spring 58 bears between the lower end of recess 52 and the lower end of the base 56. The force of spring 58 acts to urge the base 56 upwardly to maintain the valve 54 in the closed position.

Stem 55 is provided with an axial passage 59 and radial ports 60 and 61 extend through the wall of the stem and communicate with the upper and lower ends of the passage. In addition, a vent hole 62 extends through the wall of body 51 and communicates with recess 52.

By depressing pushbutton 57, valve 54 will open, exposing port 61 to chamber 19 of the manifold. With port 61 exposed, air from chamber 19 will pass through port 61, passage 59, port 60, recess 52 and hole 62 to the atmosphere. Thus the air in the manifold chamber 19 can be readily vented by merely depressing the pushbutton 57.

In operation of the hydrotherapeutic unit, the water is initially introduced into the tub and as the water level rises it will fill the chamber 20 and partially fill the upper chamber 19. Due to the position of the manifold 16 and the nozzle assembly 45 in relation to the elevation of the pump, an air pocket will be formed in the upper chamber 19 when the tub is filled with water. With the tub filled with water, the pump motor is actuated but there will be no circulation until the air vent valve 54 is opened for a few seconds to exhaust the air from the chamber 19. After the air is exhausted, the pump 29 will then operate to pump the water to the nozzle assembly 45 where the water will be ejected or discharged in the body of water in the tub. As the water is discharged, air will be drawn inwardly through the air inlet tube 46 by an aspirating action and mixed with the water to provide an aerated stream. Water is returned from the tub to the pump through opening 37, return chamber 20, nipple 24 and conduit 28.

As the water is introduced and withdrawn from the tub through the two nipples 24 and 33 which extend through openings in the end wall of the tub on opposite sides of the waste valve operating mechanism, it is not necessary to alter any of the existing plumbing to install the hydrotherapeutic unit of the invention. The only modification is that two holes be drilled in the end wall of the tub. This not only simplifies the installation of the unit with existing bathtubs but also prevents conflict with the various local pumping codes.

The design of the manifold and the location of the pump with respect to the manifold insures complete drainage of the pump and manifold when the water is drained from the tub through the drain opening.

As both the pump and motor are located outside the tub, the inherent danger of short circuits, which is present in a device in which the pump and motor are submerged in the water in the bathtub, is eliminated.

Various modes of carrying out the invention are contemplated as being within the scope of the following claims particularly pointing out and distinctly claiming the subject matter which is required as the invention.

I claim:

1. A hydrotherapeutic unit, comprising a tub to contain water and having a drain opening in the bottom surface thereof and having a waste valve control opening in the end wall of the tub in alignment with the longitudinal centerline of the tub, a drainline connected to the drain opening, waste valve means located in the drainline for opening and closing the drainline, control means connected to the waste valve means and disposed in alignment with the longitudinal centerline of the tub, said control means including an operating member extending within said waste valve control opening, a manifold mounted on the inner surface of the end wall of the tub and defining a supply chamber and a return chamber, a nozzle assembly disposed within the tub and connected to the supply chamber whereby water from the supply chamber is delivered to the nozzle assembly and is ejected from the nozzle assembly within the tub, first conduit means providing communication between the tub and the return chamber, pumping means located on the exterior of the tub, second conduit means extending through the end wall of the tub and providing communication between the supply chamber and the discharge side of said pumping means, and third conduit means extending through an opening in the end wall of the tub and providing communication between the return chamber and the suction side of the pumping means, said second and third conduit means being offset from a vertical plane passing through the longitudinal centerline of the tub and being located laterally of said control means.

2. The unit of claim 1, wherein said second and third conduit means are located on opposite sides of said plane.

3. The unit of claim 1, wherein said chambers are located at different vertical levels, and said unit includes air vent means connected to the upper portion of the chamber which is located at the highest vertical level.

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4. The unit of claim 1, wherein said supply chamber is located at a level above said return chamber and said unit includes air vent means connected to the supply chamber for selectively releasing air from said chamber.

5. The unit of claim 4, wherein said air vent means comprises fourth conduit means providing communication between said supply chamber and the atmosphere, valve means for opening and closing said fourth conduit means, and an operating member located on the exterior of the manifold and operably connected to said valve means for opening and closing said valve means.

6. The unit of claim 4, wherein the upper portion of the supply chamber extends to a level above the pump and above said second and third conduit means, said air vent means being located in said upper portion of the supply chamber

above the level of said pump.

7. The unit of claim 1, wherein said manifold includes a hollow casing and is provided with a generally horizontal wall which extends across the interior of the casing and divides the casing into an upper supply chamber and a lower return chamber.

8. The unit of claim 1, wherein said supply chamber is located above the level of the return chamber and both the supply chamber and the return chamber extend laterally in both directions from the longitudinal centerline of the tub.

9. The unit of claim 1, wherein said supply chamber is located at a level above said return chamber and said first conduit means is located at the lower end of said return chamber.

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