March 20, 1956 C. JACUZZI ET AL 2,738,787

HYDROTHERAPY APPARATUS

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FIG_1

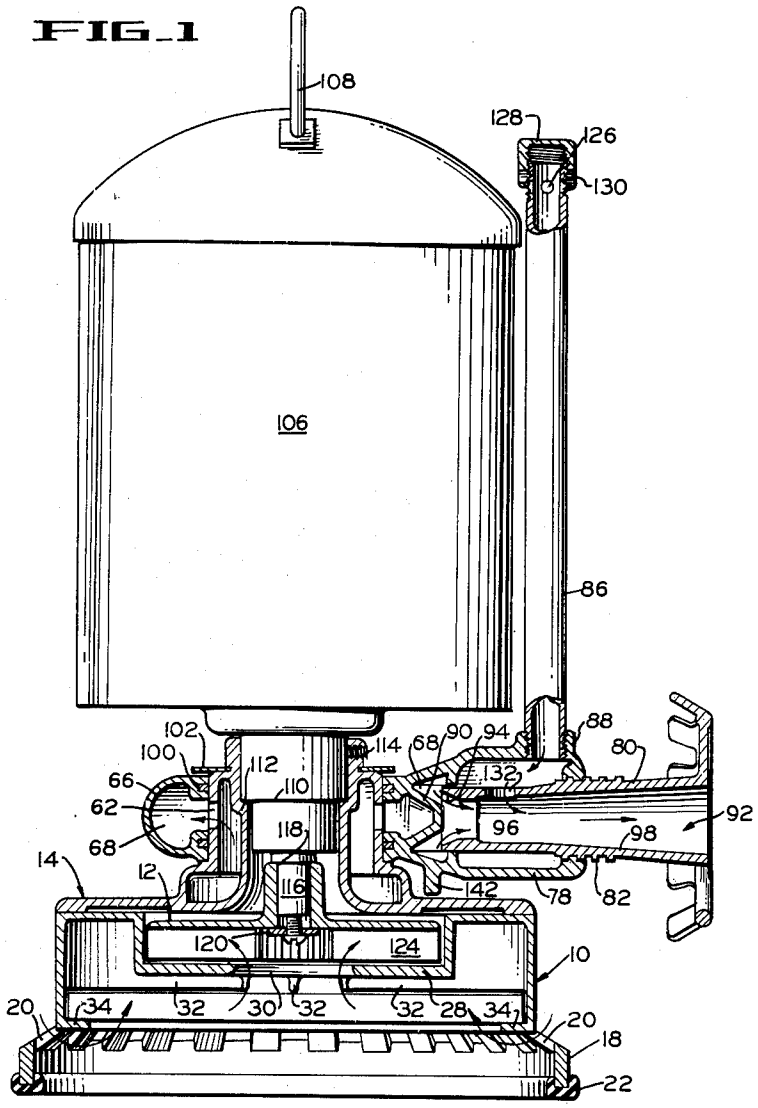
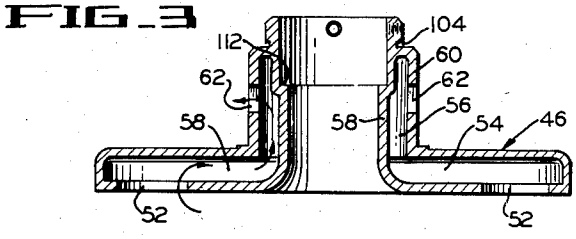


FIG_3



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HYDROTHERAPY APPARATUS

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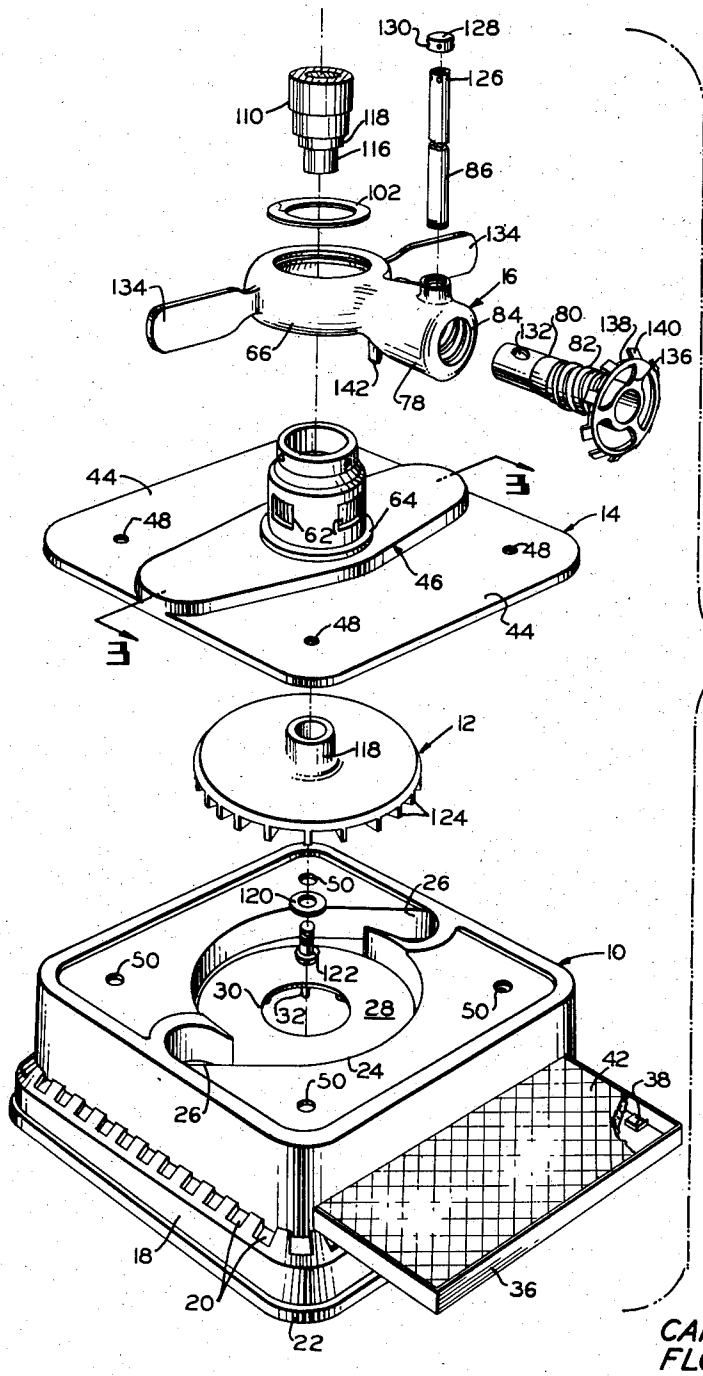


FIG_2

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HYDROTHERAPY APPARATUS

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Application August 5, 1954, Serial No. 448,054

8 Claims. (Cl. 128—66)

This invention relates to hydrotherapy apparatus, and more particularly to an improved circulator pump assembly adapted to be employed in bath tanks and tubs for the treatment of patients and to be used by non-patients for the therapeutic effects to be derived from hydro-massage.

An object of the invention is to provide a compact and relatively light weight circulator pump assembly which may be readily moved from place to place and which may be positioned for use at any desired location within a bath tub, or the like.

A further object of the invention is to provide a circulator pump assembly particularly adapted for use in a tub or tank as hydrotherapy apparatus, with said assembly having a horizontally disposed outlet nozzle so supported with respect to the tub or tank as to permit, as by pedipulation, ready rotative positioning thereof about a vertical axis.

A further object of the invention is to provide a circulator pump of the type described having a nozzle assembly which is horizontally and rotatably movable, with said assembly being so formed and disposed with respect to the pumping element that it will remain in any given position of adjustment without any tendency to be moved therefrom by reaction force of the outlet flow from the nozzle.

A further object of the invention is to provide a circulator pump having an adjustably positionable nozzle assembly embodying novel foot-control means for both varying the directional position of the nozzle and the rate of outlet flow therethrough.

Still a further object of the invention is to provide in a pump of the type described a venturi-type outlet nozzle which itself serves as the movable element of the water flow control valve.

And yet a further object of the invention is to provide in association with the inlet side of a pump of the type described novel means for filtering the water delivered to the pumping element.

These and other objects and advantages of the invention will be apparent from the following description taken in conjunction with the drawings forming part of this specification, and in which:

Figure 1 is a sectional view of the pump of the invention, the motor housing being shown in side elevation;

Figure 2 is a view in perspective showing the components of the pump assembly; and

Figure 3 is a view in section taken along lines 3—3 of Figure 2.

With immediate reference to Figure 2, the apparatus of the invention comprises, broadly, a pump housing **10**, an impeller-type pump element **12**, a top **14** for the housing, and a nozzle assembly **16**. In the housing **10**, which is provided with a base portion **18** having a plurality of inlet apertures **20** and a channel-shaped rubber footing **22**, there is formed an impeller chamber **24** having in communicaion therewith a pair of oppositely disposed and oppositely directed volute-shaped passageways **26**. The

housing wall **28** forming the bottom of chamber **24** is provided with a centrally disposed opening **30** through which water passes into the eye of impeller **12**, said wall **28** being provided at its underside with guide vanes **32**. Slidably disposed between guide vanes **32** and flange members **34** forming a part of housing **10** and supported by said flange members is a rectangular frame **36** having a plurality of lugs **38** serving to support and hold a filter pad **42** in place therein. Water passing through the apertures **20** is filtered by the pad **42** before entering the impeller chamber **24**.

The housing top **14** is provided with a plate portion **44** and a flow passageway portion indicated generally at **46** and shown in detail in Figure 3. The plate portion **44** of the housing top is provided with bolt holes **48** disposed in matching relation with bolt holes **50** formed in housing **10** whereby top **14** is secured to housing **10** by bolts, not shown. The flow passageway portion **46** of the housing top **14** has defined therein: apertures **52** disposed in overlying relation with the outer ends of volute-shaped passageways **26**; radially directed flow passageways **54** communicating at their inner ends with a vertically disposed annular passageway **56**, defined between the integral internal sleeve **58** and external shell **60** portions of flow passageway portion **46**; and circumferentially spaced apertures **62** formed in external shell portion **60**.

Nozzle assembly **16**, which is supported on annular shoulder **64** formed integral with passageway portion **46** of housing top **14** and mounted for rotation about the external shell portion **60** of said passageway portion, comprises: a ring-shaped member **66** having an annular chamber **68** defined therein in communication with apertures, or ports, **62**; a nozzle housing **78** extending radially from said ring-shaped member and formed integral therewith; a nozzle member **80** provided with external threads **82** disposed in engagement with internally threaded opening **84** of nozzle housing **78**; and an air delivery tube **86** having its lower end in threaded engagement with the internally threaded boss **88** forming a part of nozzle housing **78**.

Formed within chamber **68** integral with member **66** is a frusto-conical valve seat **90**. The passageway **92** formed in nozzle **80** serves as a venturi, said passageway having an outwardly flared rearward portion **94**, a throat portion **96**, and an outwardly tapered forward portion **98**. Sealing rings **100** are disposed within annular grooves formed in member **66**, and a snap ring **102** carried within annular groove **104** formed in the upper end of sleeve **58** serves to retain the nozzle assembly against any appreciable vertical movement.

An electrical motor of the submersible type, not shown, is disposed within a sealed casing **106**, said casing being provided with a carrying bail **108**. Depending from the casing **106** is a stationary double diametral hub **110** which is supported on internal shoulder **112** formed in sleeve **58** and secured to said sleeve, as by set screws **114**. Motor shaft **116** extends through hub **110**, and hub portion **118** of the impeller **12** is secured to said shaft against relative rotation therewith, as by a key, not shown, and against endwise movement with respect to said shaft by shoulder **118** integral with said shaft, thrust washer **120** and screw **122**.

Casing **106** is movable upwardly with respect to hub **110**, either by way of the buoyant action of the water on the casing when the water level reaches a predetermined height or by a lifting motion imparted to bail **108**, to close a switch, not shown, disposed within the casing, thereby energizing the electric motor. Conversely, when the water level drops to a predetermined point, the casing moves downwardly to a slight degree to cause said switch to be opened, thereby de-energizing said motor. This float-type switch control aspect of casing **106** does not

per se form part of the present invention, and thus the switch arrangement is not disclosed in detail.

When the motor is energized to drive the impeller **12**, water is drawn through the ports **20** and housing opening **30** into the eye of the impeller to be centrifugally urged outwardly by the impeller blades **124** into the volute-shaped passages **26**. The pressurized water then follows the following course before issuing as a jet stream from nozzle **80**: upwardly through apertures **52** in the fluid passageway portion 46 of housing top 14; radially inwardly through passages **54**; upwardly through annular passageway **56**; radially outwardly through ports **62** into chamber **68**; and around valve seat **90** and through the nozzle **80**.

Air tube **86** is provided at its upper end with a plurality of radially spaced apertures **126** and with a rubber cap **128** frictionally engaged therewith, said cap **128** having a plurality of radially spaced apertures **130**. The amount of air induced into the jet stream through the tube **86** and aperture **132** formed in the nozzle **80** is controlled by adjusting the degree of registry of holes **126** and **130**. When cap apertures **130** are fully out of registry with tube apertures **126**, the cap **128** serves as an air-tight closure for tube **86**.

Means are provided in the circulator pump assembly described for enabling the user of the apparatus to control with his feet both the rate of outlet flow of water and the directional orientation of the outlet flow, thus enabling the user to accomplish these adjustments without shifting his position. Thus, the rotatable nozzle assembly **16** is provided with a pair of oppositely directed foot bars **134** (Figure 2) whereby this rotatable assembly may be foot-steered, or oriented, and nozzle **80** is provided with a foot controlled handle comprising ring **138** and equi-spaced radially extending fingers **140** which are sufficiently spaced apart to enable the user to insert a toe between adjacent ones and thereby impart a rotary adjustment motion to nozzle **80**. Rotary motion of nozzle **80** in a clockwise, with reference to Figure 2, direction serves to thread the nozzle inwardly of nozzle housing **78** to bring that internal wall portion of the nozzle which defines the outwardly flared rearward portion **94** of nozzle passage **92** into valve closing engagement with seat **90**. The nozzle assembly **16** is further provided with a downwardly projected lug **142** serves, in association with the side edges of portion **46** of housing top **14**, as a stop member to limit the degree of pivotal movement which may be imparted to the nozzle assembly.

It will be appreciated that the arrangement of the nozzle assembly is such, i. e. the ring-shaped member **66** and the nozzle member are rotated together during positional orientation of the nozzle, that there is no tendency of the nozzle to be reactively moved to a neutral position under the action of the jet stream issuing from the nozzle. That is to say, the nozzle will not kick back to a given position when adjusted to another, and thus it is not necessary to employ any means to hold the nozzle in a given position of adjustment. If such holding means were needed, free pedipulation of the apparatus would be prevented.

From the foregoing description, it will be apparent that the hydrotherapy apparatus of the invention enables the accomplishment of the objects initially set forth herein, and while a specific embodiment of the apparatus has been illustrated and described it is to be understood that all substantial equivalents thereof are considered to be within the spirt and scope of the invention.

What is claimed is:

1. Hydrotherapy apparatus comprising a housing, an impeller disposed therein for rotation, passageway means defined in said housing and disposed beneath the level of said impeller, a nozzle assembly pivotally mounted on said housing above said impeller, intercommunicating passageway means defined in said housing and said assembly adapted for the delivery of water from said impeller to and through said assembly, and a pair of oppositely directed foot bars extending outwardly from said assembly whereby said assembly may be pivotally oriented by foot.

2. Hydrotherapy apparatus comprising a housing, an impeller disposed therein for rotation, passageway means defined in said housing for the delivery of water to said impeller, a nozzle assembly pivotally mounted on said housing, intercommunicating passageway means defined in said housing and said assembly adapted for the delivery of water from said impeller to and through said assembly, said nozzle assembly further comprising a valve seat fixedly disposed within the passageway means defined therein and an open-ended outlet nozzle mounted for endwise movement toward and into passageway means closing engagement with said valve seat and away from said seat, said outlet nozzle having a venturi passage therethrough forming part of the passageway means of said assembly.

3. Hydrotherapy apparatus as set forth in claim 2, said outlet nozzle being threadably associated with said assembly whereby rotary movement thereof results in said endwise movement, said outlet nozzle having at its outer end a plurality of spaced apart and radially extending finger elements whereby rotary leverage may be readily applied to said nozzle by foot.

4. Hydrotherapy apparatus comprising a housing, an impeller disposed therein for rotation, passageway means defined in said housing for the delivery of water to said impeller, a nozzle assembly mounted on said housing for pivotal movement about a vertical axis, intercommunicating passageway means defined in said housing and said assembly adapted for the delivery of water from said impeller to and through said assembly, said nozzle assembly further comprising a valve seat fixedly disposed within the passageway means defined therein and an open-ended horizontally directed outlet nozzle mounted for endwise movement toward said seat and into passageway means closing engagement therewith and away from said seat and into passageway means opening relation therewith, means carried by said outlet nozzle whereby said endwise movement can be imparted thereto by foot, and means comprising a pair of oppositely directed foot bars extending horizontally from said assembly at right angles to said outlet nozzle whereby said assembly may be pivoted in either direction by foot.

5. Hydrotherapy apparatus as set forth in claim 4 said outlet nozzle being threadably associated with said assembly whereby rotary movement thereof results in said endwise movement, with said foot control means carried by said nozzle comprising a plurality of spaced apart and radially extending finger elements.

6. Hydrotherapy apparatus comprising a housing, an impeller disposed therein for rotation, a nozzle assembly mounted on said housing for pivotal movement about a vertical axis, said assembly being in flow outlet relation to said impeller, a vertically disposed tube mounted on said assembly whereby air may be aspirated into said assembly, and a rubber cap rotatably fitted on the upper end of said tube, said cap and the upper end of said tube having complemental apertures adapted to be brought into and out of registry by rotative movement of said cap, with said cap being adapted to air seal said tube when said apertures are out of registry.

7. Hydrotherapy apparatus adapted to be supported on the bottom of a tank or the like comprising a housing, an impeller disposed therein for rotation, a nozzle assembly including a horizontally disposed nozzle mounted on said housing, passageway means defined in said housing and nozzle assembly for the delivery of fluid from said impeller through said assembly, and means supporting said nozzle assembly for horizontally directed rotative movement relative to the bottom of said tank.

8. Hydrotherapy apparatus comprising a housing, an impeller disposed therein for rotation about a vertical axis, flow passageway means carried by said housing including a hub-like member, said means being adapted to

receive fluid from said impeller and channel it upwardly into said hub-like member and radially outwardly through said hub-like member, a ring-shaped member sleeved on said hub-like member for free rotative movement thereon, said ring-shaped member being adapted to receive the fluid passing through said hub-like member, an outlet nozzle for said ring-shaped member, and means connecting said nozzle to said ring-shaped member to prevent

relative horizontally directed pivotal movement therebetween.

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