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HYDROTHERAPY TANK

2,587,644

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FIG. 1

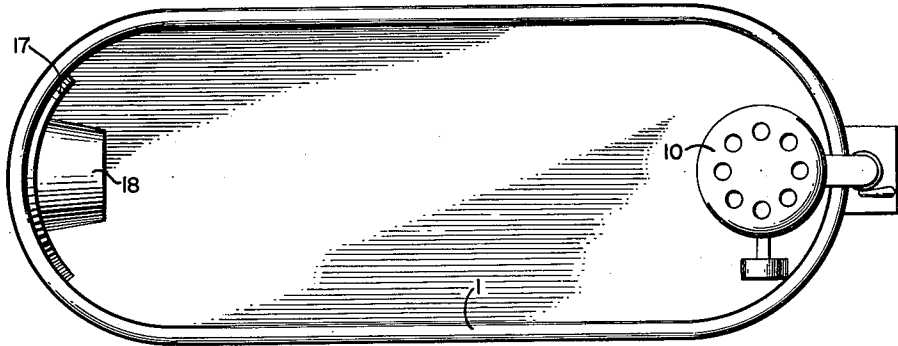


FIG. 2

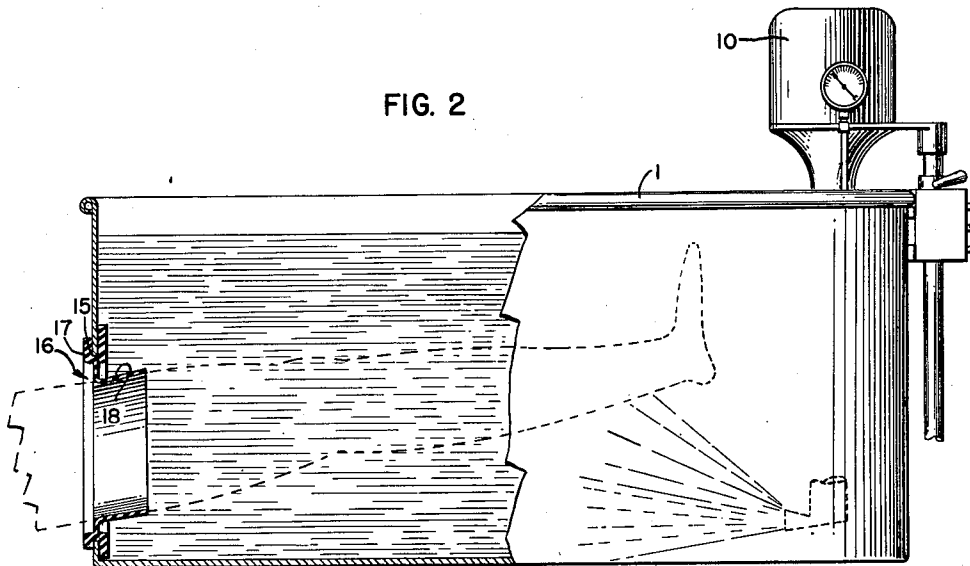
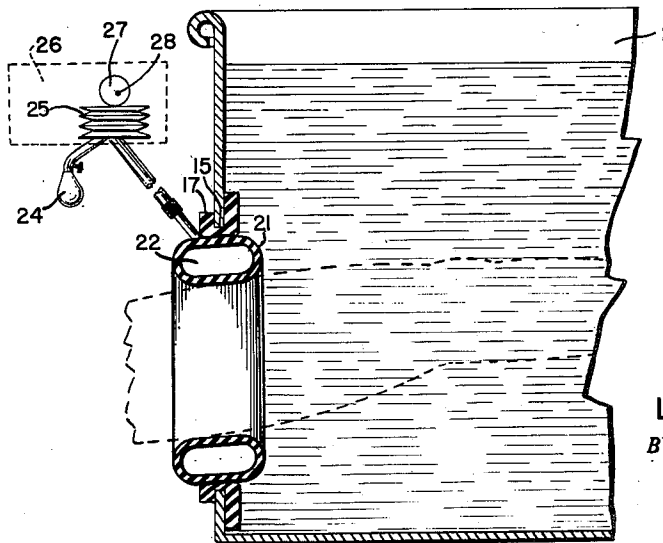


FIG. 3

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HYDROTHERAPY TANK

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4 Claims. (Cl. 128—370)

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This invention relates to tanks for hydrotherapy baths.

At the present date hydrotherapy tanks for the treatment of arms or legs are so designed that during treatment the limbs are in a more or less vertical or dependent position. For best therapeutic results the limbs being treated should be in a substantially horizontal position. Furthermore, in the use of present day hydrotherapy tanks in which the limb being treated must be in a pendent position, the patient must be in a sitting position rather than in a reclining position. Some patients must be in a reclining position for other than hydrotherapy reasons and therefore such very sick patients cannot be given hydrotherapy treatments for the legs or arms.

When an arm or leg is treated while in a nearly horizontal position, or even elevated above a horizontal position, many factors that aid in circulation are favorably influenced. In this position gravity comes into play and aids the return circulation of the extremity (venous and lymphatic return), edema is reduced, and the healing process is favorably influenced. It is one of the objects of the present invention to provide a hydrotherapy tank which is so constructed that the limb under treatment in the tank can be held in an approximately horizontal position or, if desired, may extend somewhat upwardly or downwardly depending upon the condition of the part treated. It is a further object of the present invention to provide a hydrotherapy tank which is so constructed that a patient may be in a sitting position or in a reclining position during treatment of an arm or leg. Patients that are very ill can be treated in a reclining position, as on a bed, stretcher or treatment table. It is a still further object of the present invention to provide a hydrotherapy tank wherein the leg being treated may be in a substantially horizontal position or only slightly below the top surface of the water, so that the limb is in view and can be readily given underwater hand massage, which is not easily done in the case of a leg hanging vertically into a hydrotherapy tank.

In accordance with the principles of the present invention a vertical wall of the tank is provided with a limb-receiving opening below what will be the level of the top of the water in the tank. The arm or leg is introduced into the tank through that opening and suitable means is provided for sealing against leakage of water from the tank at the opening through which the limb enters the tank. This leakage preventing

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means may consist of an elastic sleeve, or may consist of an inflatable cuff which is inflated by air into contact with the limb and thus seal against the outward leakage of water.

Certain circulatory afflictions that are benefited by hydrotherapy are also benefitted by periodic increase and decrease of pressure around the afflicted arm or leg. Such therapy generally consists of placing around an arm or leg an inflatable collar or cuff which is periodically inflated and deflated so that during the inflated interval it partially restricts the return venous circulation of blood through the afflicted parts. It is one of the objects of the present invention to provide a hydrotherapy tank which is so arranged that the afflicted parts can receive hydrotherapy treatment of the above mentioned nature at the same time.

The attainment of the above and further objects of the present invention will be apparent from the following specification taken in conjunction with the accompanying drawings forming a part thereof.

In the drawings:

Figure 1 is a top view of a hydrotherapy tank embodying the present invention;

Figure 2 is a side view of a hydrotherapy tank embodying the present invention, certain parts being shown in section; and

Figure 3 is a fragmentary view corresponding to a part of Figure 2 and illustrating a modification thereof.

Reference may now be had more particularly to the drawing wherein like reference numerals designate like parts throughout.

In the drawing, 1 indicates a metal hydrotherapy tank embodying the present invention. The tank may be of any desired shape and is here shown, by way of illustration, as being of a conventional oval shape adapted for treatment of an arm or a leg. The tank is closed at the bottom and open at the top. A hydromassage apparatus, indicated at 10, is mounted on the tank. The apparatus 10 consists essentially of an electric motor driven turbine ejector that blows a mixture of air and water in a generally horizontal direction through the water in the tank 1. For that purpose the hydromassage apparatus draws water from the tank 1 and ejects it back into the tank with the air mixture. The point of discharge of the apparatus 10 is preferably adjacent the bottom of the tank and the direction of discharge is generally horizontal, so that the air ejected from the hydromassage apparatus below the surface of the water moves upwardly and

horizontally, all in a manner well known in the art. The hydromassage apparatus 10 may be of any preferred construction such as, for instance, that shown in United States Patent No. 2,237,436, to which reference may be had.

The important feature of the hydrotherapy tank of the present invention lies in the provision of means whereby the arm or leg to be treated may be inserted into the tank below the top level of the water therein and extend in the tank in a generally horizontal direction or even upwardly by a slight or a great amount. To permit insertion of a limb into the tank and prevent leakage from the tank the tank wall has a generally circular opening 15 through which the limb is to be inserted. The opening is adjacent the bottom of the tank. A rubber sleeve 16 is releasably secured around the opening. The sleeve 16 includes a thickened rubber rim 17 which fits around the periphery of the opening 15 and snugly embraces the metal wall of the tank around the opening to seal against outward leakage of air around the joint between the sleeve and the tank. The sleeve 16 then includes a membranous tubular portion 18 through which the arm or leg is inserted and which is stretched by the arm or leg so that it closely embraces the same and prevents the leakage of water between the limb and the membranous tubular portion 18. The rubber tube portion 18 need be stretched only a slight amount by the limb and because the rubber is so exceedingly thin, water pressure on the outside of the sleeve 18 serves to cause the sleeve to seal around the limb.

In Figure 3 I have illustrated a modified means for sealing the space between the limb and the tank at the point of entrance of the limb into the tank to prevent escape of water therefrom. To that effect the tank opening 15 is provided with a hollow thin rubber tubular cuff 21. The rubber of the cuff is shown in exaggerated thickness for illustrative purposes. The limb is inserted through the tubular opening and then the space 22 of the cuff 21 is inflated by forcing air thereinto. This causes the cuff to embrace the leg or arm inserted therethrough with a greater or lesser amount of pressure, depending upon the pressure to which the space 22 is inflated, and thus to seal against the leakage of water between the limb and the cuff.

The space 22 may be inflated to the desired pressure by means of a rubber bulb-like air pump 24 of the type commonly used in blood pressure measuring devices. The air pressure is built up in the cuff 21 and in a bellows 25 of a conventional rhythmic constrictor 26, which may be of a standard construction and includes a motor driven eccentric 27 which turns about a pivot axis 28 to effect a periodic increase and decrease of the pressure in the cuff 21. The amount of air introduced into the system is such that the pressure varies between upper and lower limits, both of which are above atmospheric pressure, so that the cuff 21 remains inflated at all times and maintains a water-tight seal between the limb of the person and the tank. When the pressure is at its maximum the pressure is effective to restrict the circulation of blood in the limb and when the pressure is at a minimum it permits the blood to flow in the limb. This is particularly important in the treatment of peripheral vascular diseases. The combination of vascular therapy and hydrotherapy produces beneficial results. It is understood that the tank 1 of Figure 3 is provided with a hydrotherapy

apparatus 10 the same as is the tank of Figures 1 and 2.

The tank of the present invention may contain a single opening for receiving one limb or may contain two openings, one for each arm or one for each leg.

When an arm or leg is treated while in a nearly horizontal position, or at times in an elevated position above the horizontal, many factors that aid in circulation are favorably influenced. In this position gravity definitely aids the return circulation in the extremity (the venous and lymphatic return), edema is reduced, and the healing process continues much more favorably. Having the limb in the best position of treatment in the arm or leg hydrotherapy tank is extremely important for best results.

During treatment the patient may be in a sitting position or in a reclining position, as in bed or on a stretcher or on a treatment table. Patients that are very ill and must remain in a reclining position are enabled to receive hydrotherapy treatment by a tank of the present invention. Another advantage of the tank of the present invention is that it makes it very easy for a technician to institute underwater hand massage and passive motion, which is quite difficult in the case of a leg hanging vertically in a whirlpool tank. The elastic sleeves or inflatable cuffs for sealing the space between the limb and the tank may be easily attached to or detached from the tank.

A suitable support for the arm or leg within the tank can be readily provided.

In compliance with the requirements of the patent statutes I have here shown and described a preferred embodiment of my invention. It is, however, to be understood that the invention is not limited to the precise construction here shown, the same being merely illustrative of the principles of the invention.

What I consider new and desire to secure by Letters Patent is:

1. A hydrotherapy tank comprising an open top water receptacle having an opening for receiving a limb to be extended into the receptacle through the opening in a generally horizontal direction, yielding means for sealing the space between the limb and the periphery of the opening against water leakage, said yielding means comprising a water-proof flexible sleeve sealed around the periphery of the opening and open at both ends to permit insertion of a limb from the outside of the tank through the sleeve into contact with the ambient medium within the tank, said sleeve extending from the opening in a direction inwardly of the tank so that the pressure of the water in the tank presses on the outside of the sleeve to press the sleeve into sealing relationship to a limb inserted therethrough, and means for subjecting a limb in the tank to hydrotherapy.

2. A hydrotherapy tank comprising an open top water receptacle having an opening for receiving a limb to be extended into the receptacle through the opening in a generally horizontal direction, yielding means for sealing the space between the limb and the periphery of the opening against water leakage, said yielding means comprising a water-proof flexible sleeve sealed around the periphery of the opening and open at both ends to permit insertion of a limb from the outside of the tank through the sleeve into contact with the ambient medium within the tank, said sleeve extending from the opening in a direction inwardly of the tank so that the pressure of the water in

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the tank presses on the outside of the sleeve to press the sleeve into sealing relationship to a limb inserted therethrough, the sleeve having a single membranous wall the inner surface of which is adapted to embrace a limb and the outer surface of which is pressed by the water in the tank towards the limb, and the sleeve being of a diameter substantially smaller than that of the opening in the receptacle, and means for subjecting a limb in the tank to hydrotherapy.

3. A hydrotherapy tank comprising an open top water receptacle having an opening for receiving a limb to be extended into the receptacle through the opening in a generally horizontal direction, yielding means for sealing the space between the limb and the periphery of the opening against water leakage from the tank, said yielding means comprising a waterproof tubular member sealed around the periphery of the limb-receiving opening and extending into the tank and open at one end to the atmosphere outside of the tank and open at the opposite end to the interior of the tank and open between its two ends for receiving a limb that is to be inserted from the outside of the tank through the tubular member into contact with the liquid within the tank, said tubular member extending into the tank and completely surrounding and closely embracing within the tank a portion of a limb inserted therethrough and being made of flexible membranous material so that it may be pressed around a limb in sealing engagement therewith by a preponderance of pressure on opposite surfaces of the membranous material to press the sleeve into water sealing relationship to a limb inserted therethrough.

4. A hydrotherapy tank comprising an open top water receptacle having an opening for receiving a limb to be extended into the receptacle through the opening in a generally horizontal direction, yielding means for sealing the space between the limb and the periphery of the opening against

water leakage from the tank, said yielding means comprising a waterproof tubular member sealed around the periphery of the limb-receiving opening and extending into the tank and open at one end to the atmosphere outside of the tank and open at the opposite end to the interior of the tank and open between its two ends for receiving a limb that is to be inserted from the outside of the tank through the tubular member into contact with the liquid within the tank, said tubular member extending into the tank and completely surrounding and closely embracing within the tank a portion of a limb inserted therethrough and being made of flexible membranous material so that it may be pressed around a limb in sealing engagement therewith by a preponderance of pressure on opposite surfaces of the membranous material to press the sleeve into water sealing relationship to a limb inserted therethrough, said membranous tubular member having a thickened peripheral portion integral therewith for facilitating holding of the member in sealing relationship to the tank.

LOUIS B. NEWMAN.

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