

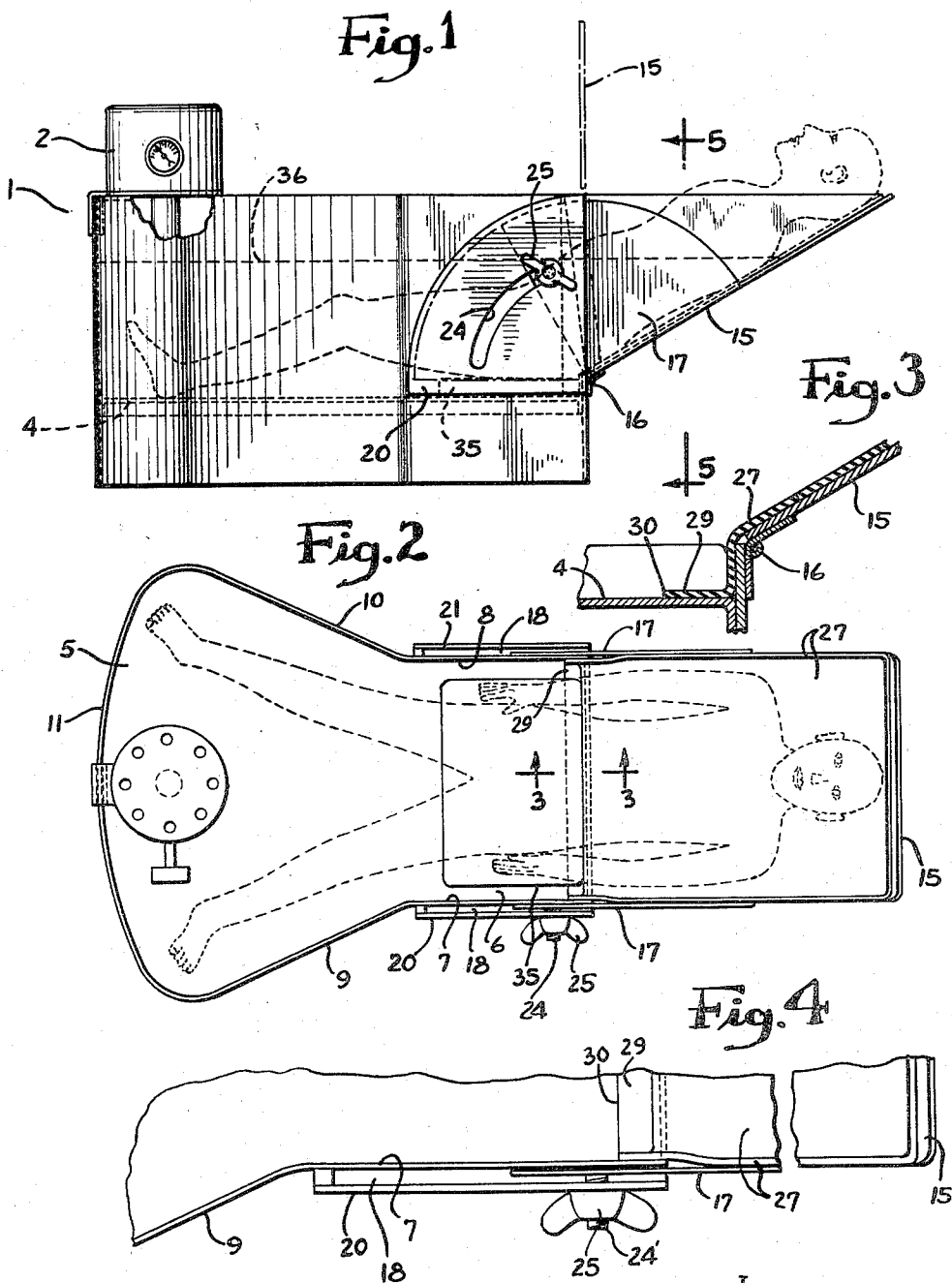
Aug. 9, 1960

L. B. NEWMAN
HYDROTHERAPY TANK

2,947,996

Filed May 23, 1957

2 Sheets-Sheet 1



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2 Sheets-Sheet 2

Fig. 6

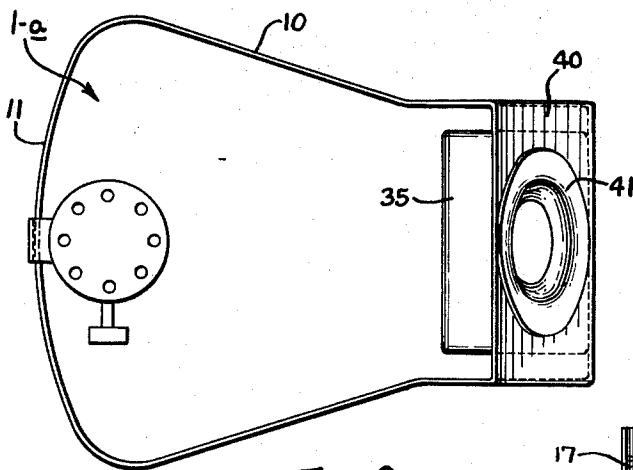
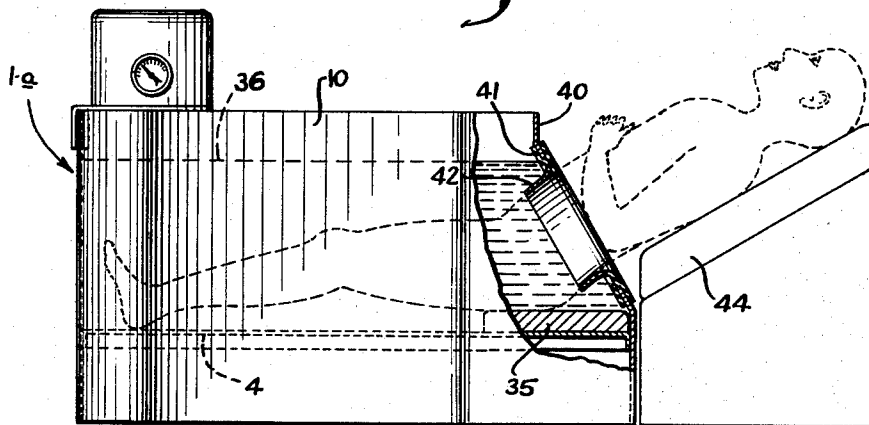


Fig. 7

Fig. 5

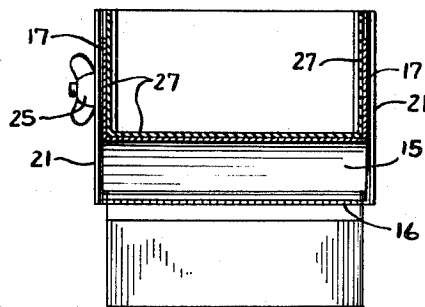
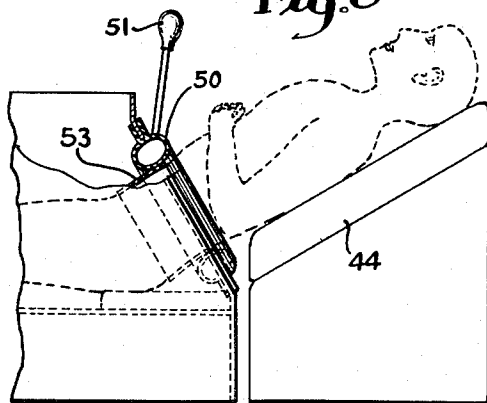


Fig. 8



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2,947,996

HYDROTHERAPY TANK

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10 Claims. (Cl. 4—178)

This invention is a further development of and an improvement in the hydrotherapy tank that is the subject of my Patent No. 2,587,644 of March 4, 1952, and the continuation thereof, No. 2,730,104 that issued January 10, 1956.

The beneficial effects of the combination of properly instituted hydrotherapy together with therapeutic exercise in the treatment of diseases and injury of the extremities have long been established. Hydrotherapy tanks that call for full body immersion are rather costly. Those which are not of the full body immersion type and therefore very much smaller in size and lower in cost, are so constructed that during treatment of the extremities the patient generally sits on a seat or stool above or in the tank with his leg immersed in the tank in a vertical or dependent position or sits in the tank with legs horizontal and the body in an erect or vertical position. This is objectionable from a therapeutic point of view and imposes serious limitations upon the possibilities of therapeutic exercise.

To secure maximum benefits from hydrotherapy the extremities must be in the best physiological positions while undergoing treatment. The new hydrotherapy tank of the present invention encompasses basic, fundamental, physiologic principles to secure maximum beneficial effects from hydrotherapy and to enhance the circulation of blood and lymph in the lower trunk and extremities. It is necessary not only to have the lower extremities in a nearly horizontal position during treatment, so that gravity can act in a beneficial manner, but also to have the body reclined for maximum circulation through the extremities, with the uphill return flow of blood and lymph a minimum. If the patient is in a hydrotherapy tank with his body at right angles to his legs during treatment, there results, due to angulation of the blood and lymph channels and due to increased intra-abdominal pressure, a partial compression of these vessels in the pelvis and lower abdomen, plus the adverse effects of gravity, which interferes with circulation and causes a damming back of fluids.

Any interference with circulation will result in abnormal physiologic effects, such as swelling, impaired tissue nutrition, and frequently pain in the lower extremities. If, while exercising the extremities in the hydrotherapy tank, the hips and knees are flexed by drawing the legs toward the body, there is produced a still greater interference with the blood and lymph flow. This is most marked when the patient's trunk is upright.

When the patient sits reclined, with the lower extremities in a horizontal position, gravity assists the return circulation and there is a decrease in the hydrostatic pressure in the extremities thereby facilitating in the return of the fluids to the heart.

Having the body and legs in a vertical or dependent position in itself favors edema which is further aggravated when the extremities are surrounded by warm water, which produces vasodilation and lessened tissue tone with subsequent loss of fluid through the walls of the blood and lymph vessels.

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The optimal position for the patient while in the hydrotherapy tank, in order to secure maximum physiologic and therapeutic benefits, is to have the lower extremities in an approximately horizontal position while the rest of the body is reclined, for in this way improved circulation with the other associated beneficial medical effects are produced. This is the position that allows for optimum therapeutic exercise of the lower extremities.

It is extremely uncomfortable, awkward and at times painful, for one who is sick, to sit with the body erect and the lower extremities in a horizontal position. Sick people may become dizzy or even faint if placed in a sitting position on a chair or stool by the tank or on a seat in the tank, while if they are reclined, these effects may not occur. This can be avoided with the tank of the present invention.

It is one of the objects of the present invention to provide a hydrotherapy tank which is smaller and therefore less costly than the full immersion type of tank and yet, which will permit a patient to receive hydrotherapy of the lower extremities while the patient is in a position in which the lower extremities are substantially horizontal and the patient's trunk is in a comfortable reclined position.

Due to the buoyant effect of immersion in water, it is much easier for a disabled person undergoing hydrotherapy to move his extremities for therapeutic exercise even though there may be marked muscular weakness or impairment. The warmth of the water in the hydrotherapy tank further aids in diminishing pain and muscular spasm. It is therefore one of the objects of the present invention to provide a hydrotherapy tank of the type above set forth wherein the tank permits full freedom of motion of the lower limbs and the hips of the patient while the lower limbs are substantially horizontal. It is a still further object of the present invention to provide a hydrotherapy tank wherein those benefits may be obtained while the patient's trunk is in a substantially reclining position.

In accordance with the principles of the present invention, the above desired results can be obtained by use of a hydrotherapy tank which is completely open at one end and to which a patient, who is reclining on a bed, may be brought. The patient's legs, pelvis and lower abdomen are moved into the tank from one end thereof, while the rest of the patient remains outside of the tank supported in a reclining position. The end of the tank is then closed by means of a closure of rubber or the like that fits around the patient with sufficient tightness to provide a water seal. The small pressure exerted by such a member around the abdomen will result in substantially no constriction of the flow of blood and lymph to or from the legs of the patient and will not interfere with the movement of the legs within the hydrotherapy tank.

In another embodiment of the present invention the beneficial effects above described are obtained by so constructing the hydrotherapy tank that the patient can be placed therein, and wherein the back of the tank may be swung to a position permitting the patient to be reclining at the desired angle while his legs are substantially horizontal.

It is a further object of the present invention to provide a hydrotherapy tank for the treatment of the lower extremities and the hip portion of the body in which the lower extremities may be received in a substantially horizontal position and which hydrotherapy tank is substantially wider where it receives the ends of the lower extremities than it is at the place where it receives the hips of the patient. By this arrangement the tank permits movement of the lower extremities in a horizontal direction to enable obtaining the beneficial effects to all

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movements of the hips, knees and feet resulting from such movement. At the same time, the tank is comparatively narrow at the portion thereof where the patient's hips are located. This is for convenience of the therapist. Also by reducing the required size of the tank, the initial cost thereof is reduced. Also there is a reduction of the quantity of water required and the time required for filling and emptying the tank.

It is a still further object of the present invention to provide a hydrotherapy tank of the above mentioned character wherein the back of the tank which is pivoted to permit the patient in the tank to be reclining, is joined with the sides of the tank by flexible material such as for instance, rubber or plastic, that makes a water-tight seal with the body of the tank and with the back wall thereof, whereby the back wall may be adjusted to its desired position at any time, even after the tank is filled and the patient has been placed therein.

It is a still further object of the present invention to provide a tank having an angularly adjustable back wall that may be adjusted to any angle over a wide range of adjustment as required for comfort of the particular patient to be treated, and wherein the back rest may be brought to a vertical position either for unusual therapy purposes or for convenience when the tank is not in use.

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 drawing forming a part thereof.

In the drawings:

Fig. 1 is a side view of a hydrotherapy tank embodying the present invention;

Fig. 2 is a top plan view thereof;

Fig. 3 is a fragmentary sectional view taken along the line 3—3 of Fig. 2;

Fig. 4 is an enlarged fragmentary portion of Fig. 2;

Fig. 5 is a sectional view taken along the line 5—5 of Fig. 1 and looking in the direction of the arrows;

Fig. 6 is a side view partially broken away and illustrating another embodiment of the present invention;

Fig. 7 is a top view of the tank of Fig. 6; and

Fig. 8 is a fragmentary side view, in partial section, illustrating another embodiment of the present invention.

In the accompanying drawing, like reference numerals designate like parts throughout.

In Fig. 1 there is shown at 1 a hydrotherapy tank in which a conventional hydro-massage apparatus 2 is placed. The tank, as is usual with hydro-massage tanks, includes a raised bottom wall 4 so that the patient in the tank is at a level more convenient to the hydro-therapist. The tank is wider at the front 5 than at the rear 6, the sides of the tank including short parallel wall sections 7—8 and divergent wall sections 9—10 that join the parallel sections with a front wall section 11, the sides 7, 8, 9, 10 and 11 forming, with the bottom 4, a tank is open at the back and is to be closed in a manner to be more fully set forth presently.

An angularly adjustable back 15 extends between the side walls 7 and 8 and is hinged to the back of the tank by a hinge 16. The back 15 has at the opposite ends thereof two arcuate side vanes 17 secured thereto that slide on the outside of the sides 7 and 8 within pockets 18 and 18' formed between the walls 7 and 8 respectively, and end cover plate members 20 and 21 which are secured to the outsides of the parallel wall section 7 and 8 in fixed spaced relation thereto.

The plate 20 has an arcuate slot 24 therein centered on the center of the hinge 16 and through which extends a shank 24' that is secured to and projects at right angles from the side vane 17 and is externally threaded to receive a wing nut 25, the tightening of which locks the adjustable back 15 in its adjusted position. The

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back 15 may be adjusted from a vertical position illustrated in dot dash lines in Fig. 1, which is the position of non-use thereof, to the inclined position illustrated wherein it makes an angle of 30 degrees within the horizontal.

A thin flexible rubber sheet member 27 is provided for sealing the back of the tank against water leakage. This sheet overlies the rear inner surfaces of the parallel wall sections 7 and 8, for substantially the full heights thereof, and also overlies the top of the raised bottom wall 4 along the rear edge thereof as indicated at 29, being sealed to said bottom edge 4 along a line of seal 30 extending the full width of the tank. It is also sealed to the inner surfaces of the wall section 7 and 8 from the bottom wall 4 to the top of said parallel wall sections.

The thin rubber sheet 27 provides a water tight seal for the back of the tank, and it is of sufficient size to permit flexing thereof to a position overlying the back 15 even when the back is in its fully reclined position. When the back 15 is raised towards its vertical position, the sheet 27, being a sheet of thin membranous rubber or the like, is freely flexible so as not to interfere with upward adjusting movement of the back 15.

A seat or pad 35 is provided on the inside of the tank on which the person receiving hydrotherapy, sits.

When the tank is filled with water to the desired level, as indicated for instance by the water level line 36, the hydrostatic pressure of the water on the sides of the sheet 27 does not force that sheet outwardly because the sheet is supported by the side vanes 17—17'.

When a patient is within the hydrotherapy tank of Fig. 1 in a reclining position as there illustrated, the patient has a freedom of angular side movement of the lower limbs and a freedom of movement of the hips as may be seen from Fig. 2. This is of importance for the reasons heretofore pointed out.

While I have herein spoken of a rubber sheet 27 as being one continuous sheet, it is obvious that it may consist of a series of strips providing a seal around the hinge portion of the tank as illustrated in Fig. 3 with separate or the same parts of the sheet also providing a water-tight seal between the parallel wall section 7—8 and the longitudinal and lower inner edges of the back rest 15, being sealed thereto so that the patient, under those circumstances, reclines directly upon the back rest 15.

In Fig. 6 there is shown another embodiment of the present invention wherein the hydrotherapy tank 1a that corresponds to the tank 1 is not provided with any back rest at all. In lieu thereof the back of the tank has a closure wall 40 at a slight angle to the vertical, which closure wall has a circular or oval opening therein of a size sufficiently large to permit a person to be positioned in the tank with both legs and the hips of the person located within the tank and the trunk of the person located outside of the tank, the legs and hips being positioned into the tank through the opening in the rear wall 40. A rubber grommet 41 fits around the opening in the wall 40, and forms a liquid tight closure seal therearound. The grommet has a very thin membranous rubber sleeve 42 integral therewith, which sleeve is stretched by the body of the person extending through the grommet. The sleeve 41 being very thin, closely hugs the body of the person receiving hydrotherapy and, due to the fact that it is also pressed against the body of the person by the hydrostatic pressure it forms a liquid tight seal around the person. The person may be supported in an inclined position by means of a back rest 44 which may be a part of or separate from the tank, as illustrated in Fig. 6.

In lieu of or in addition to the thin flexible sleeve 42 there may be provided an inflatable cuff 50 (Fig. 8) that is sealed to the grommet 41 around its entire periphery and which may be inflated in any desired man-

ner as for instance, by a hand pump 51, the particular means for forming the liquid tight seal of Figs. 7 and 8 are the same as disclosed in my prior Patents No. 2,587,644 and 2,730,104 to which reference may be had. The inflated cuff 50 is here shown as provided with a membranous rubber sleeve 53 corresponding to the sleeve 42. That sleeve, may be omitted.

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

What is considered new and sought to be secured by Letters Patent is:

1. A hydrotherapy tank comprising an open top receptacle narrow at one end and wide at the opposite end and having a transversely extending adjustable back at the narrow end for supporting in an inclined position the trunk of a person within the tank, hinge means connecting the back with the rest of the tank, the axis of turning of the hinge means being horizontal and transverse of the tank for varying the angle of inclination of a person in the tank, and means outside of the tank for locking the adjustable back in adjusted position.

2. A hydrotherapy tank comprising an open top water receptacle having an end closure wall of flexible material to support a person in the tank in an adjustable reclining position, an angularly adjustable backing support for said flexible wall, and hinge means mounting said backing support in position as part of said receptacle, the axis of turning of the hinge means extending horizontally in a direction transversely of the tank.

3. A hydrotherapy tank comprising an open top water receptacle having an end closure wall of flexible material to support the back of a person in the tank in an adjustable reclining position, and an angularly adjustable backing support for said flexible wall, said sides of the tank diverging from one another in a direction lengthwise of the tank from the end closure for most of the length of the tank to allow space for horizontal therapeutic exercise of the lower limbs of a person in the tank with the trunk of the person reclining on said flexible end closure.

4. A hydrotherapy tank having a front end substantially wider than the rear end, the tank having a tilting back wall across the narrow end of the tank, hinge means mounting the tilting back to the rest of the tank with the axis rotation of the hinge means extending horizontally transversely of the tank, and means for securing the back wall in its adjusted position.

5. A hydrotherapy tank having a front end substantially wider than the rear end, hydro-massage apparatus in the tank, the tank having side walls and a tilting back wall extending transversely between the side walls at the narrower rear end of the tank, hinge means securing the tilting back wall to the rest of the tank for pivotal movement about a horizontal axis extending transversely of the tank at said rear end, flexible water-proof membranous sheet material joined to the side walls of the tank and making liquid tight seals therewith and forming a liquid tight seal at the rear end of the tank and supported by the back wall, and backing supports for the sides of said sheet material to inhibit outward bulging thereof under the hydrostatic pressure.

6. A hydrotherapy tank comprising an open top water receptacle having an opening in an end thereof for receiving the lower extremities and hips of a person to be extended into the receptacle through the opening in

a generally horizontal direction while the trunk of the person remains outside of the tank, said opening having at least a portion thereof extending below the normal water level of the tank when the tank is in use, yielding means around the periphery of the opening for forming a water-tight seal between the trunk of the person and the periphery of the opening, the sides of the tank on opposite sides of the opening diverging from one another in the direction lengthwise of the tank and away from said opening to allow space for horizontal therapeutic exercise of the limbs within the tank.

7. A hydrotherapy tank comprising an open top water receptacle having side walls, an angularly adjustable end to support a person in the tank in an adjustable reclining position, said end including flexible water-proof sheet material forming a water tight seal at said angularly adjustable end of the tank and sealed to the side walls of the tank and flexible to permit adjustment for different angles of reclining of a person in the tank, a supporting backing member for said sheet, and hinge means having a horizontal axis extending transversely of the tank and connecting said backing member to the rest of the tank for angular adjustment about said hinge axis.

8. A hydrotherapy tank having a front end substantially wider than the rear end and sides connecting the front and rear ends and converging from the wide front end to the narrow rear end by a continuing convergence extending for most of the length of the tank, the tank having a horizontal bottom seating portion upon which a patient may sit and, extending therefrom, a back wall inclined at an angle to the vertical of at least substantially forty-five degrees.

9. A hydrotherapy tank having a foot end and a seating end, said foot end being substantially wider than the seating end, said tank having side walls diverging from one another in a direction lengthwise of the tank by a continuous divergence from the seating end to the foot end, said tank having a seating portion at the seating end of the tank and a back wall extending from the seating portion at an angle of the order of 45 degrees to the seating portion and in a position to act as a back rest for a reclining patient in the tank.

10. A hydrotherapy tank comprising an open top water receptacle having a bottom, spaced side walls and an end wall, a back-supporting member extending angularly upwardly from that end of the bottom of said tank which is furthest from said end wall, said side walls diverging from one another for most of their lengths in the direction from the backing support member towards said end wall to allow space for horizontal therapeutic exercise of the lower limbs of a person in the tank with the trunk of the person on said back-supporting member.

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