

Sept. 26, 1939.

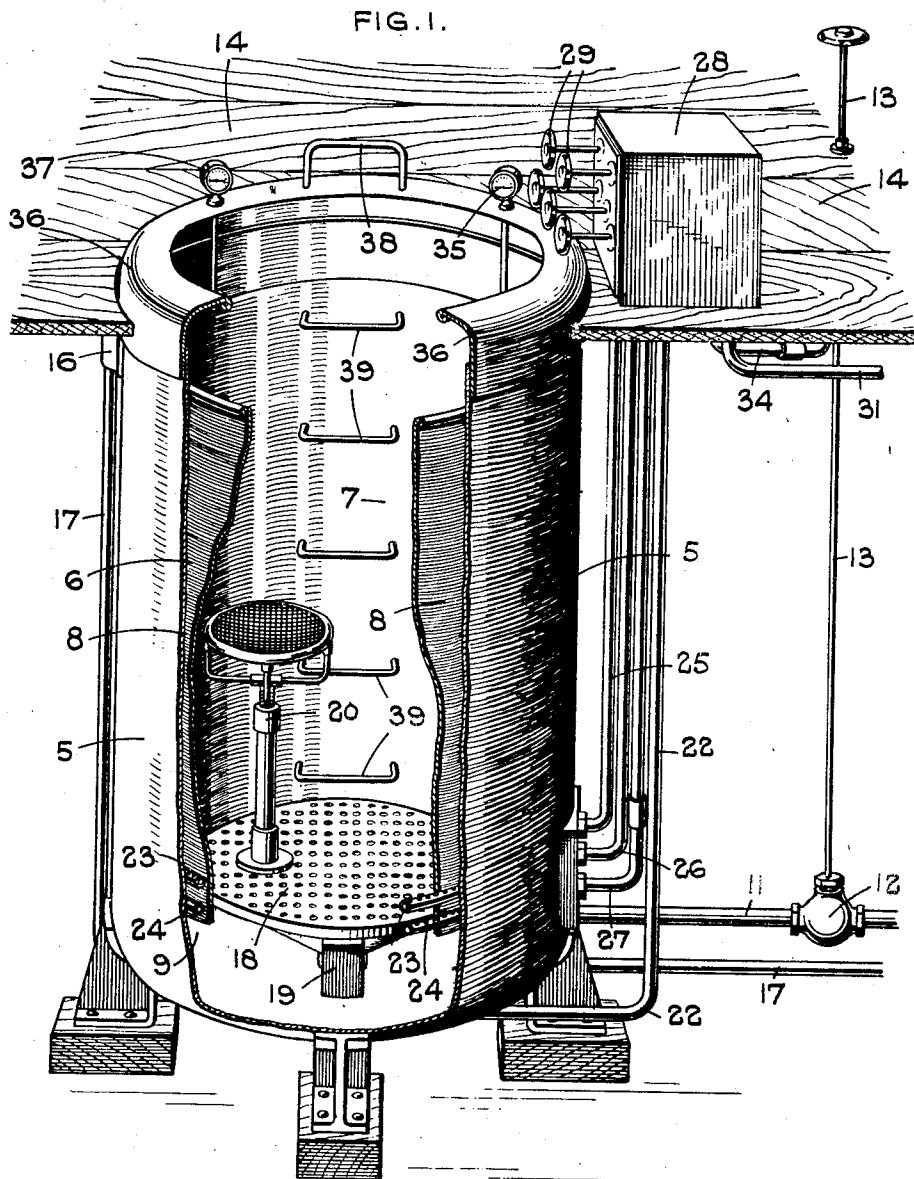
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2,174,445

BATH

Filed May 25, 1938

2 Sheets-Sheet 1



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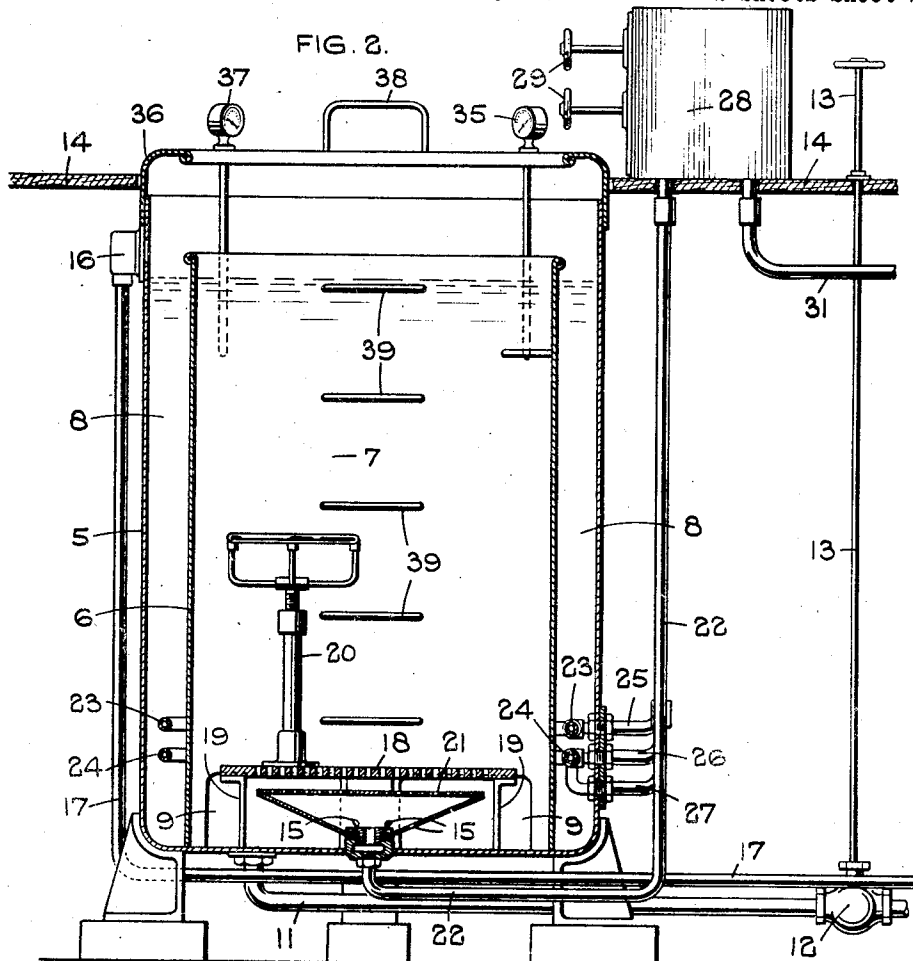
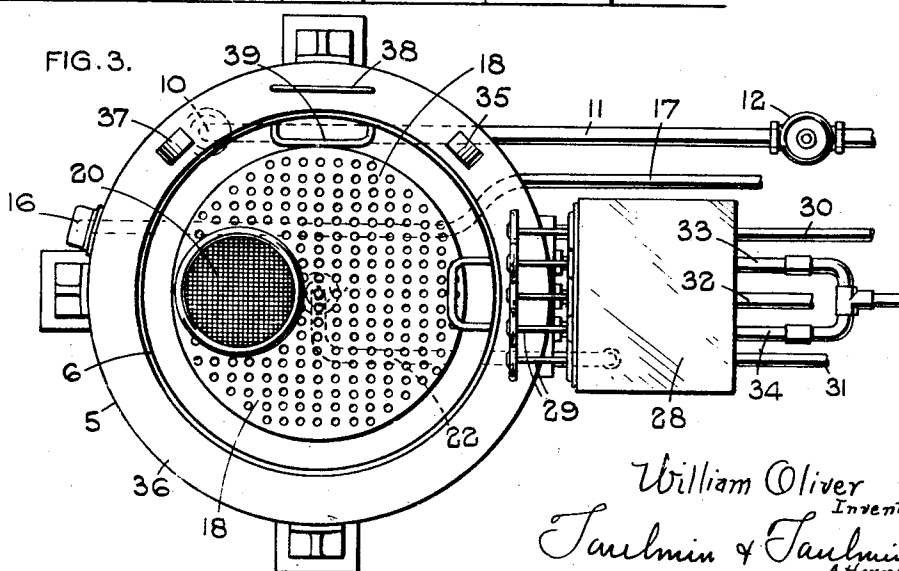
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UNITED STATES PATENT OFFICE

2,174,445

BATH

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Application May 25, 1938, Serial No. 210,070
In Great Britain August 9, 1937

12 Claims. (Cl. 128—368)

This invention relates to baths for medical or recuperative treatment, and the invention has for its object to provide an improved construction.

According to the present invention, a bath is provided having means whereby air or a mixture of air and other suitable gas, hereinafter generally referred to as air or gas, under pressure may be admitted below the liquid level.

The bath may be constructed with two compartments which communicate at top and bottom, one being the main compartment used by the bather, and the other being a circulation compartment, and means are provided for admitting air or gas under pressure to the lower part of one or both compartments so that the liquid may be caused to circulate upwardly in one compartment and downwardly in the other.

For instance, if air or gas under pressure is admitted to the lower part of the circulation compartment, the liquid in that compartment will be lightened so that a downward flow will take place in the main compartment occupied by the bather, while an upward flow will take place in the circulation compartment.

Further, assuming that means are provided for admitting the air or gas under pressure at the lower part of the main or bather's compartment, the bather's skin may be bombarded by the water particles which take the place of the air or gas bubbles as they pass upwardly through the liquid and against the downward flow of water causing a vibrating massage effect due to the struggle between the air or gas bubbles and the water flow.

Either the introduction of air or gas under pressure to the main compartment or to the circulation compartment may be used alone, or both may be used simultaneously. If it is desired to produce and maintain a downward flow in the main compartment, then less air or gas per unit volume of water under pressure is admitted to the main compartment than to the circulation compartment in order to adjust the relative water densities in the main and circulating compartments.

Referring to the drawings:

Figure 1 is a perspective view of one construction according to this invention partly cut away to expose the interior.

Figure 2 shows the same in sectional elevation.

Figure 3 is a plan view of same.

In the construction illustrated in the accompanying drawings the bath includes a cylindrical open topped container 5 within which is mounted an open-ended cylindrical sleeve 6 of diameter

substantially less than that of the container 5 so as to form a main or treatment compartment 7 within the sleeve 6 and an annular circulation compartment 8 in the form of a jacket completely surrounding the treatment compartment.

The sleeve 6 extends down to the base of the container 5 and is secured thereto but the walls of the container 5 project above the plane of the top of the sleeve 6 so that liquid caused to flow upwardly in the circulation compartment 8 can pass over the upper edge of the sleeve forming the wall of the treatment compartment.

Communication between the two compartments at the lower portion thereof is established by openings 9 formed in the sleeve and a continuous circulation of liquid between the two compartments can be effected as will hereinafter be described.

In the base of that portion of the container 5 which communicates with the compartment 8 is an outlet opening 10 from which extends a drain pipe 11 provided with a valve 12 controllable by the rod 13 extending through the operating floor 14 to a suitable control position. A further outlet may communicate with the pipe 11 for draining liquid from the treatment compartment 7 and to facilitate cleaning of the bath after use.

At a suitable level in the wall of the container 5 slightly below the level of the upper edge of the sleeve 6 is mounted an automatic water level valve 16 connected to the drain by a pipe 17 and arranged to maintain the water level in the bath at the predetermined height, surplus water flowing away through the pipe 17 to the drain.

Within the lower part of the treatment compartment a perforated plate 18 is supported on stools 19 to form the floor upon which the bather can stand and supported from this floor is a seat 20.

The seat and/or the perforated floor may be omitted if desired but where used are preferably made of material such as non-corrosive metal and are constructed so as to allow the liquid and air or gas to reach the bather's skin as freely as possible.

Below the plate 18 is mounted a diffuser for compressed air or gas in the form of a shallow inverted conical compartment closed by a top plate 21 having relatively fine perforations therein and into this diffuser extends a pipe 22 for supplying compressed air or gas.

About six small holes 15 are formed in the diffuser near the apex where the supply pipe enters, these holes providing an exit for drain-

ing water from the diffuser after the air supply has been turned off. Any air or gas escaping through these holes when the air is turned on, bubbles freely up the sides of the inverted cone and passes into the main bubble stream in the treatment compartment.

In the lower part of the circulation compartment 8 two annular perforated pipes 23 and 24 are mounted one above the other, the pipe 23 being connected with an external pipe 25 for the supply of compressed air or gas, whilst the pipe 24 communicates with two external pipes 26 and 27 for the supply of hot and cold water or steam as specified later herein.

The two annular pipes 23 and 24 are disposed horizontally at slightly spaced relationship and the perforations may be conveniently disposed to set up the desired circulation in the compartment 8 and to cause the desired intermingling of the discharge from the two pipes.

The pipes 22, 25, 26 and 27 extend into a valve control box 28 mounted on the floor 14 at the desired control position and in this box are mounted valves operable by the controls 29 to regulate the various supplies to the pipes extending between the box and the bath.

Extending into the valve control box are water and air or gas supply pipes including the hot water pipe 30, cold water pipe 31, hot water by-pass pipe 32 and a pair of air or gas pipes 33 and 34 communicating with the main air or gas supply and adapted to provide air or gas under pressure to the pipes 22 and 25 leading into the treatment and circulation compartments as above mentioned.

The hot water by-pass pipe 32 communicates with a by-pass pipe leading to the annular perforated pipe 24 and within the control box 28 is a thermostatically controlled by-pass valve with which is associated a thermostat 35 and which is adapted to control the temperature of the bath automatically by thermostatic regulation of the hot water supplied through the by-pass pipes.

The hot water pipe 30 communicates with the pipe 26 through one of the control valves in the box 28 and the cold water pipe 31 similarly connects with the pipe 27 so that supplies of hot and cold water can be passed to the annular perforated pipe 24 in the desired proportions.

The pipe 33 communicates with the pipe 25 through a further control valve and the pipe 34 with the air supply pipe 22 again through a control valve enabling independent control of the air discharged into the compartments.

At the upper edge of the container 5 is mounted a splash coping 36 on which are mounted the thermostat 35 and a dial type thermometer 37 each extending into the circulation compartment 8.

Mounted on the coping 35 is a hand rail 38 and secured within the sleeve 6 are a number of ladder rungs 39 enabling the bather to descend to the perforated floor 18.

The bath is shown of circular shape in plan but may be of rectangular, square or any other shape if desired or convenient.

In operation the bath is filled to the still level defined by the automatic overflow valve, the temperature of the bath being regulated in the desired manner by suitable control of the supplies of hot and cold water, the thermostat being set as required and the by-pass valve opened to allow the thermostatic control.

Thereafter the temperature of the bath is automatically controlled and maintained at the

predetermined level since the thermostatically controlled valve in the hot water by-pass regulates the supply of by-passed hot water to maintain the bath temperature against losses due to radiation and the like. The water level is, of course, automatically maintained by the automatic overflow 16.

The patient or bather then enters or is placed in the treatment compartment and either rests on the seat 20 or stands on the perforated floor 18 and the air or gas supply to the diffuser in the base of the treatment compartment is turned on to the desired strength.

The diffuser discharges the air or gas into the treatment compartment in a large number of fine streams through the fine perforations 21 and air or gas bubbles pass upwardly through the water and impinge upon the skin of the patient.

The treatment is equivalent to a gentle vibratory but widespread system of stimulated massage due to the gentle bombardment by the water particles which take the place of the air or gas bubbles passing upwardly through the liquid.

In order to simulate the conditions obtaining under natural conditions in certain natural baths, supplies of gases such as carbon dioxide or hydrogen sulphide may be used instead of or in addition to the air supplied to the diffuser.

Air or gas may now be supplied to the perforated diffuser 23 in the circulation compartment and again the air or gas is discharged into the liquid in the compartment in a plurality of fine streams or bubbles which pass upwardly through the liquid.

When the liquid in the circulation compartment is sufficiently lightened in relation to the liquid in the treatment compartment a liquid circulation is set up in the bath, the liquid flowing upwardly in the circulation compartment under the effect of the discharge from the diffusing pipe 23, over the top of the sleeve 6 and downwards in the treatment compartment back to the circulation compartment through the openings 9.

This downward liquid flow produces a secondary massaging effect and constantly sweeps the patient's skin clear of foreign matter produced by the temperature of the bath and the air bombardment from below. Thus the patient is continually subjected to the bombardment from the constantly rising bubbles of air or gas and at the same time is washed by a downward liquid current which also contains finely divided air or gas bubbles practically in the form of an emulsion. During the entire treatment period the water or liquid can be maintained at a constant pre-selected temperature by the inflow of a sufficient amount of hot water controlled by the thermostatic by-pass valve above referred to, this inflow being accompanied by the outflow of surplus water at the automatic water level valve, thus preventing any rise in the water level.

It will be appreciated that the water level is such that the head and neck of the bather are always above the normal water level and to this end the seat 20 may be adjustable for height above the floor 18.

One of the main features of this bath and the reason why it is such a powerful medium for massage is that the streams of bubbles rising through the liquid in the bather's compartment are strongly resisted by the down flow of water from the circulation compartment. This causes the rising bubbles to "skid" about and the result is a vibrating "punch" on the bather's body, the

strength of which depends on the relative forces of air and water.

The vigour of the upward bombardment and of the contra downward flow in the treatment compartment can be controlled by means of the valves in the control box 28 and the treatment can be regulated in accordance with the requirements of the patient.

Where a supply of steam is available this may be utilised for heating the water in the bath, in place of the supply of hot water above described, such steam being passed into the bath through the perforated annulus.

Various chemical salts can be added to the body of the water in the bath for the purpose of reproducing mineral baths of any desired character in accordance with the particular treatment it is intended to impart and in this way a mineral or any other desired bath can be produced under controlled artificial conditions and can be made available to patients unable to visit the sites where natural baths of a special character are now available.

The bath contains no moving mechanical parts and the entire circulation and bombardment is obtained by means of lightly compressed air or gas supplied from an external source.

By diffusing a sufficient quantity of air into the circulation compartment 8 the water in this compartment with its air content becomes lighter than the water in the central compartment with the result that the circulation is set as above mentioned and the artificial head created in the circulation compartment 8 causes the water to flow over the top of the sleeve 6 in a continuous cataract pouring into the treatment compartment and over the skin of the occupant of such compartment.

Insofar as the bather is concerned a feeling of complete relaxation is attained since the bather, whilst immersed up to the neck in water has no tendency either to float or sink, these tendencies being cancelled by the upward thrust of the air bubbles and the balancing downward flow of water. There is therefore an entire absence of the feeling of oppression which is associated with submersion in still hot water.

The bombardment of the bather's skin produces a gentle but thorough massaging effect which, due to its distribution and uniformity, is particularly advantageous and invigorating to all parts of the body.

What I claim then is:

1. A bath for medical treatment having a treatment compartment and a circulation compartment, said compartments communicating with one another to permit circulation of liquid therebetween, a diffuser in the lower part of said treatment compartment, means for supplying air under pressure to said diffuser, said diffuser being adapted to discharge said air into the liquid in a plurality of relatively fine streams flowing normally upwards through the liquid in said compartment and a further diffuser for admitting air under pressure into the circulation compartment below the normal liquid level therein causing the liquid to circulate upwardly in the circulation compartment and downwardly in the treatment compartment in opposition to the movement of said streams of air.

2. A bath according to claim 1, wherein the diffuser in the treatment compartment comprises a shallow compartment having fine perforations

through which the air can be discharged in a plurality of fine streams.

3. A bath according to claim 1, wherein the diffuser in the treatment compartment comprises a shallow compartment with a top plate extending over a substantial part of the cross section of the treatment compartment and having fine perforations through which the air can be discharged in a plurality of fine streams distributed throughout the volume of liquid in said compartment.

4. A bath for medical treatment including an outer container with an open top, an inner sleeve within said container defining a treatment compartment within said sleeve and a circulation compartment between the exterior of said sleeve and the interior of said container, means establishing communication between said compartments to permit circulation of liquid therebetween, means for admitting air under pressure into said treatment compartment below the normal liquid level therein, said means being adapted to discharge said air into the liquid in a plurality of relatively fine streams flowing normally upward through the liquid in said compartment and means causing the liquid to circulate upwardly in the circulation compartment and downwardly in the treatment compartment in opposition to the movement of said streams of air.

5. A bath according to claim 4, wherein the walls of the outer container extend above the level of the top of the inner sleeve and means are provided for causing the liquid to flow upwardly in the circulation compartment, over the upper edge of said sleeve and downwardly in the treatment compartment, said inner sleeve having in its lower portion holes establishing communication between the lower part of the two compartments.

6. A bath for medical treatment including an outer container with an open top, an inner sleeve within said container defining a treatment compartment within said sleeve and a circulation compartment between the exterior of said sleeve and the interior of said container, means establishing communication between said compartments to permit circulation of liquid therebetween, a diffuser in the lower part of said treatment compartment, means for supplying air under pressure to said diffuser, said diffuser being adapted to discharge said air into the liquid in a plurality of relatively fine streams flowing normally upwards through the liquid in said compartment and means for admitting air under pressure into the circulation compartment below the normal liquid level therein causing the liquid to circulate upwardly in the circulation compartment and downwardly in the treatment compartment in opposition to the movement of said streams of air.

7. A bath for medical treatment including an outer container with an open top, an inner sleeve within said container defining a treatment compartment within said sleeve and a circulation compartment between the exterior of said sleeve and the interior of said container, means establishing communication between said compartments to permit circulation of liquid therebetween, a diffuser in the lower part of said treatment compartment, means for supplying air under pressure to said diffuser, said diffuser being adapted to discharge said air into the liquid in a plurality of relatively fine streams flowing normally upwards through the liquid in said compartment, a diffuser in said circulation com-

partment below the normal liquid level therein and means for supplying air under pressure to said diffuser, said diffuser being adapted to discharge said air into the liquid in a plurality of

5 relatively fine streams causing the liquid to circulate upwardly in the circulation compartment and downwardly in the treatment compartment in opposition to the movement of said streams of air in the treatment compartment.

10 8. A bath for medical treatment including an outer container with an open top, an inner sleeve within said container defining a treatment compartment within said sleeve and a circulation compartment between the exterior of said sleeve and the interior of said container, means estab-

15 lishing communication between said compartments to permit circulation of liquid therebetween, a perforated floor to said treatment compartment, a diffuser below said floor, means for

20 supplying air under pressure to said diffuser, said diffuser being adapted to discharge said air into the liquid in a plurality of relatively fine streams flowing normally upwards through the liquid in

25 said compartment and distributed throughout the volume of liquid in said compartment, a diffuser in said circulation compartment below the normal liquid level therein and means for supplying air under pressure to said last-mentioned

30 diffuser which is adapted to discharge said air into the liquid in a plurality of relatively fine streams causing the liquid to circulate upwardly in the circulation compartment and downwardly in the treatment compartment in opposition to the movement of said streams of air in the treat-

35 ment compartment.

9. A bath for medical treatment including an outer container with an open top, an inner sleeve within said container defining a treatment compartment within said sleeve and a circulation

40 compartment between the exterior of said sleeve and the interior of said container, means establishing communication between said compartments to permit circulation of liquid therebetween, a perforated floor to said treatment compartment, a diffuser below said floor, means for

45 supplying air under pressure to said diffuser, said diffuser comprising a shallow compartment with a top plate extending over a substantial part of the cross section of the treatment compartment and having fine perforations through which the

50 air can be discharged in a plurality of fine streams distributed throughout the volume of liquid in said compartment and flowing normally upwards through the liquid in said compartment, an annular air diffuser pipe in said circulation

55 compartment below the normal liquid level therein, means for supplying air under pressure to said diffuser pipe, and said diffuser pipe having fine perforations through which the air can be discharged in fine streams causing the liquid to circulate upwardly

60 in the circulation compartment and downwardly in the treatment compartment in opposition to the movement of said streams of air in the treatment compartment.

65 10. A bath for medical treatment including an outer container with an open top, an inner sleeve within said container defining a treatment compartment within said sleeve and a circulation compartment between the exterior of said sleeve

70 and the interior of said container, means estab-

lishing communication between said compartments to permit circulation of liquid therebetween, a perforated floor to said treatment compartment, a diffuser below said floor, means for supplying air under pressure to said diffuser, said

5 diffuser comprising a shallow compartment with a top plate extending over a substantial part of the cross section of the treatment compartment and having fine perforations through which the air can be discharged in a plurality of fine

10 streams distributed throughout the volume of liquid in said compartment and flowing normally upwards through the liquid in said compartment, an annular air diffuser pipe in said circulation compartment below the normal liquid level there-

15 in, means for supplying air under pressure to said diffuser pipe, said diffuser pipe having fine perforations through which the air can be discharged in fine streams causing the liquid to circulate upwardly in the circulation compartment and downwardly in the treatment compartment in opposition to the movement of said streams of air in the treatment compartment, an annular perforated water pipe in said circulation

20 compartment and means for controlling the volume and temperature of water supplied to said water pipe.

11. A bath according to claim 10 including a by-pass pipe adapted to supply a heating fluid to the bath through a thermostatically controlled

30 valve associated with a thermostat dipping into the liquid in the bath.

12. A bath for medical treatment including an outer container with an open top, an inner sleeve within said container defining a treatment compartment within said sleeve and a circulation

35 compartment between the exterior of said sleeve and the interior of said container, the walls of the outer container extending above the level of the top of the inner sleeve which latter has in its lower portion holes establishing communication between the lower parts of the two compartments, a perforated floor to said treatment compartment, a diffuser below said floor, means for

40 supplying air under pressure to said diffuser, said diffuser comprising a shallow compartment with a top plate extending over a substantial part of the cross section of the treatment compartment and having fine perforations through which the air can be discharged in a plurality of fine

45 streams distributed throughout the volume of liquid in said compartment and flowing normally upwards through the liquid in said compartment, an annular air diffuser pipe in said circulation compartment below the normal liquid level

50 therein, means for supplying air under pressure to said diffuser pipe, said diffuser pipe having fine perforations through which the air can be discharged in fine streams causing the liquid to circulate upwardly in the circulation compartment, over the top edge of said sleeve and downwardly in the treatment compartment in opposition to the movement of said streams of air in the treatment compartment, an annular perforated water pipe in said circulation compartment, means for controlling the volume and temperature of water supplied to said water pipe and an automatic overflow valve adapted to maintain

60 a predetermined liquid level in the bath.

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