

Aug. 11, 1942.

R. E. SCHURTZ

2,292,666

THERAPEUTIC BATH APPARATUS

Filed Sept. 26, 1940

4 Sheets-Sheet 1

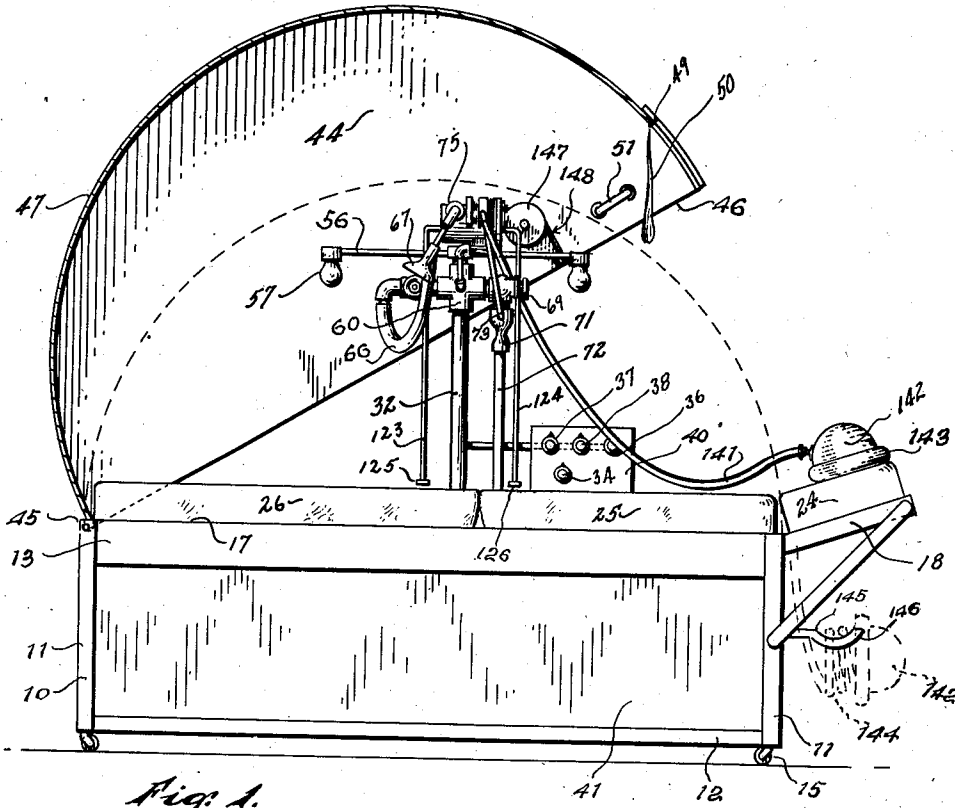


Fig. 1.

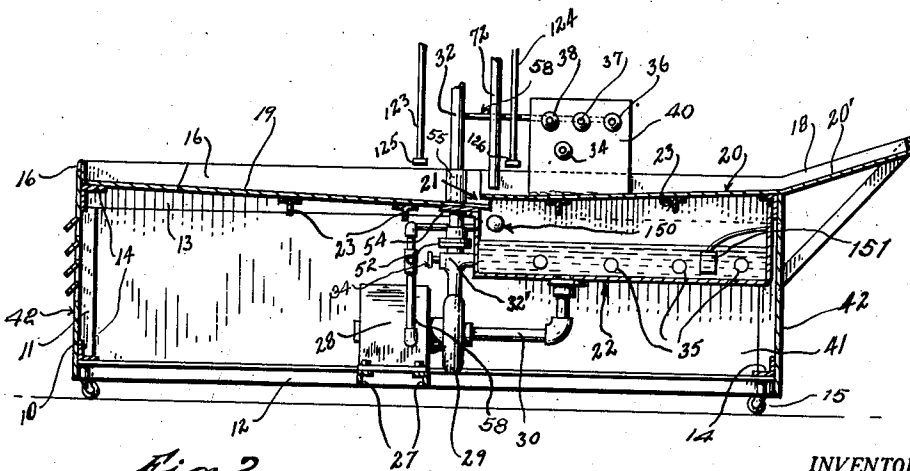


Fig. 2.

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4 Sheets-Sheet 2

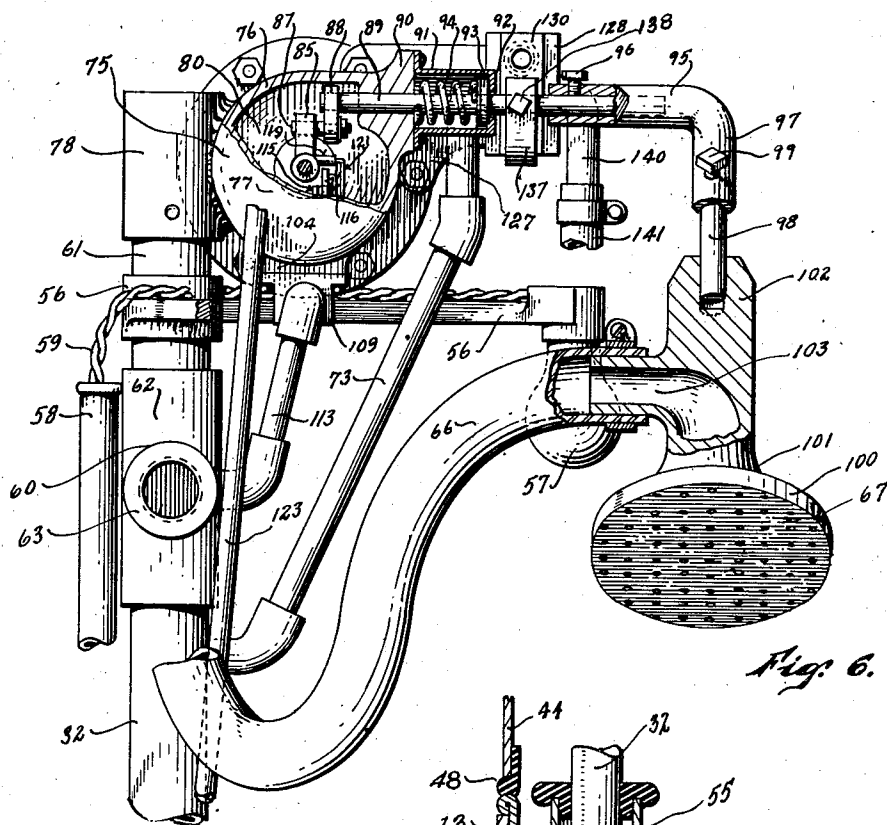


Fig. 6.

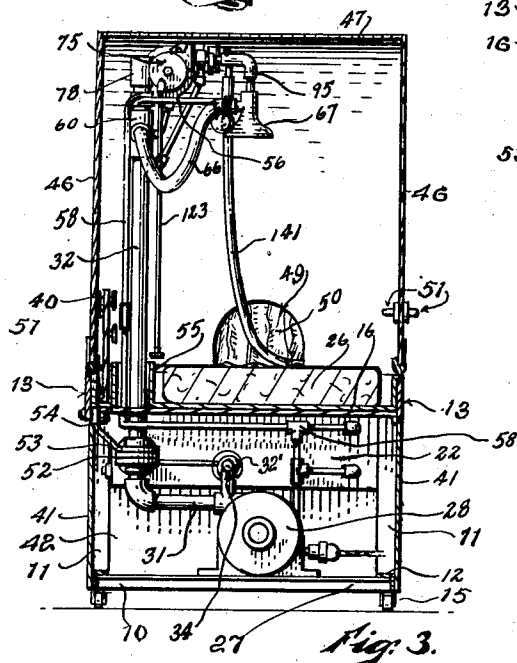


Fig. 3.

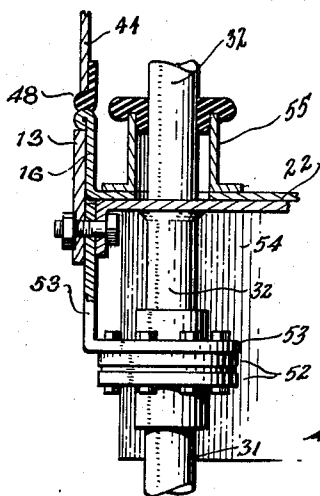


Fig. 11.

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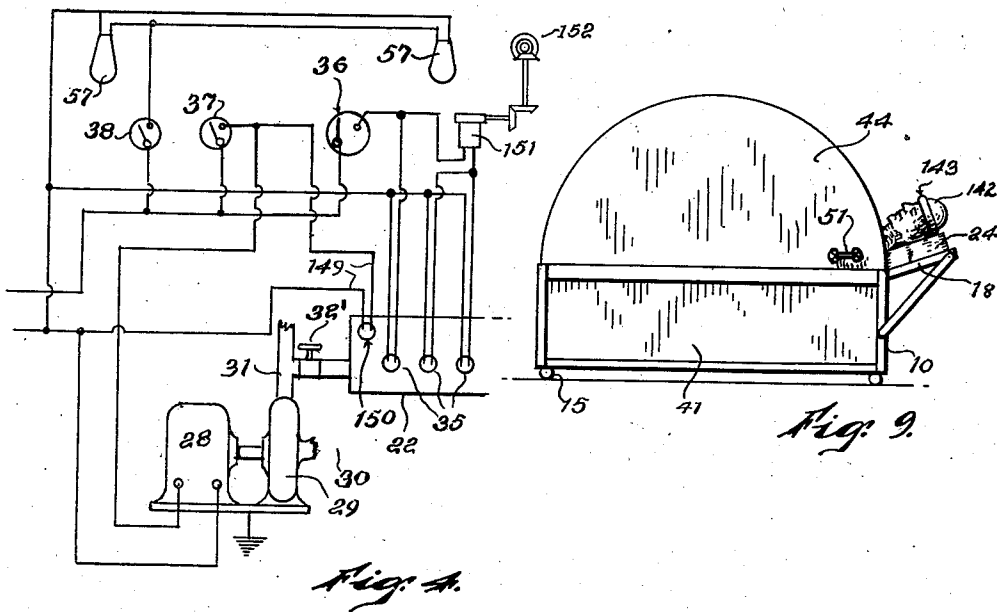
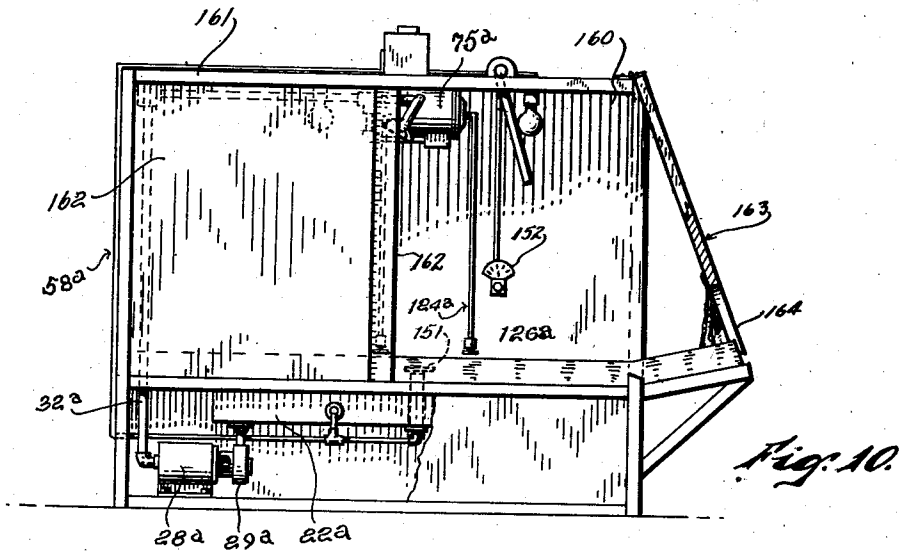
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4 Sheets-Sheet 3



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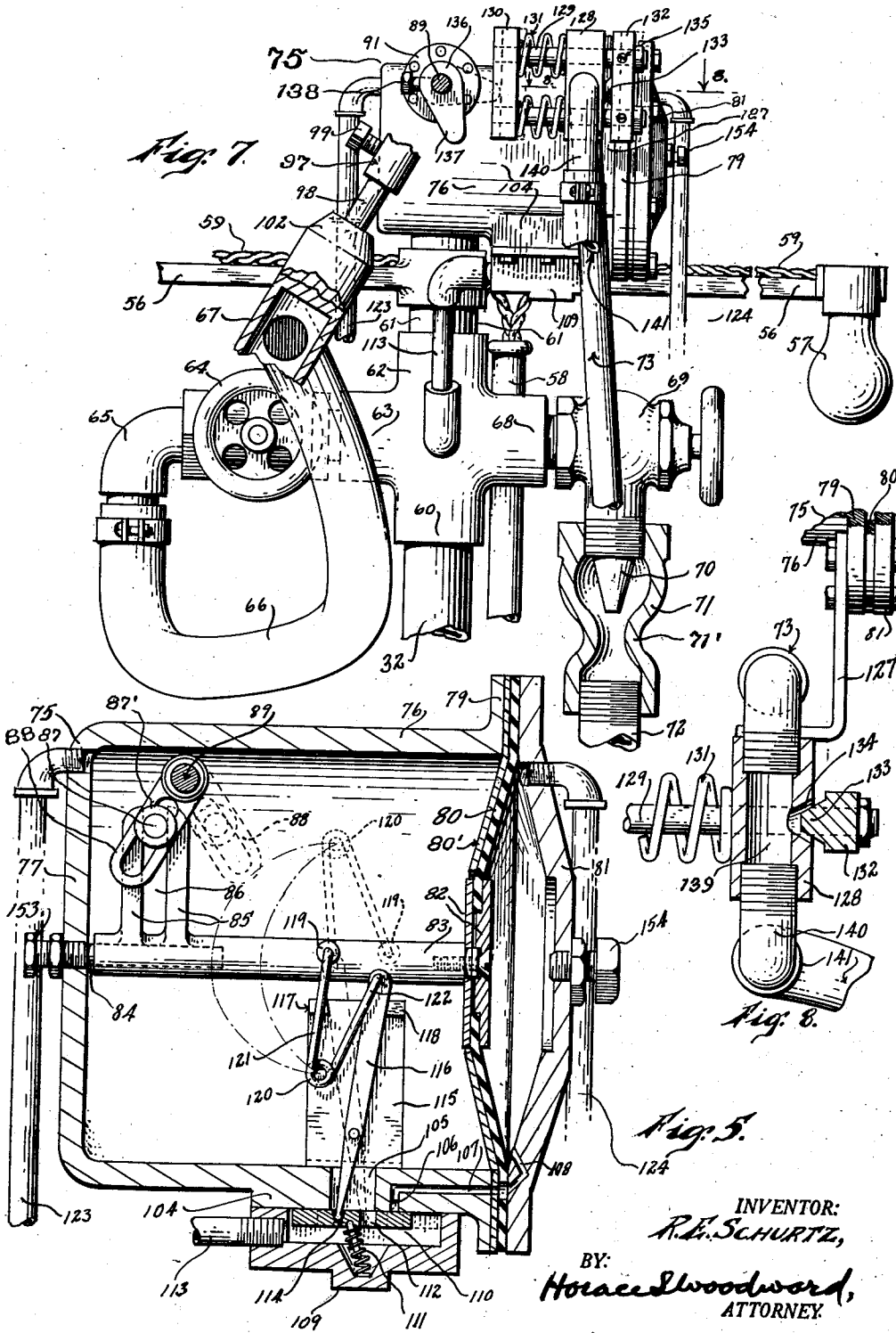
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THERAPEUTIC BATH APPARATUS

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4 Sheets-Sheet 4



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UNITED STATES PATENT OFFICE

2,292,666

THERAPEUTIC BATH APPARATUS

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Application September 26, 1940, Serial No. 358,557

11 Claims. (Cl. 128-366)

The invention has for an object to present an improved construction in therapeutic bath devices, to the end that the benefits of water, heat and massage, as well as light-ray treatments may be effected economically and efficiently. It is an important object of the invention to present such a device which may be constructed at a reasonable cost, and will have peculiar advantages for facilitating installation and conducting its operation. It is an especial aim of the invention to present such apparatus which may be readily and promptly controlled by a patient while receiving treatments in the apparatus, as well as enabling the apparatus to be controlled by an attendant. It is a further aim to present such apparatus which will function simultaneously or independently, to permit scalp treatments by the intermittent vacuum method, utilizing the same fluid operating treatment medium for the operation of the scalp treating device. It is a special object of the invention to present a therapeutic bath device which will operate in an extremely simple way to effect treatment having characteristics which have been recognized as valuable in such treatments, such as, the projection of a water spray against the person of a patient and the movement thereof longitudinally of the body or limbs of the patient, and it is a further special aim of the invention to enable the ready control of the rate of longitudinal movement of the sprays in each direction independently, so that peculiar variations of treatment suited to various cases may be effected readily, and with great safety.

It is an object of the invention to enable treatments to raise the temperature of the body above normal, corresponding to the production of "artificial fever." At the same time, it is an object to enable this character of heat treatment to be accompanied by stimulating effects which will avoid dangerous results sometimes manifest in heat or diathermic treatment under prior practice. In addition, it is an aim to enhance the benefits of the high temperature treatment by the functioning of my invention so that greater cellular activity in the body of the patient is set up, increasing the effectiveness of, and accelerating the eliminative results sought in "artificial fever," and consequently enabling a shortening of the time required for such treatment, which is a factor of material advantage.

Also it is an aim of the invention to enable the attainment of similar benefits by heat treatments of more moderate kind extended over longer periods of time, if desired.

It is an important aim of the invention to present a novel method and apparatus for producing effects from radio-active materials, with a minimizing of liability of burning, or other injury of human tissue by such radiations.

Further, it is an object of the invention to introduce a novel action result in heat treatments corresponding to the "artificial fever" treatments. Thus in the usual practice heretofore carried out the enhancing of the destruction of bacteria in the blood and tissues of the patient leaves much of the toxic materials still present in the body of the patient, the effect of which is often serious if not fatal. It is an important attainment of my invention that these toxic materials are almost immediately removed in large part, relieving the bodily functions of the patient of these processes to a large extent, but most important, in addition hastening such elimination so that the conditions incident to a crisis in illness are made less severe, and convalescence hastened and shortened.

Another important aim of the invention is to provide a novel construction of support for a mattress or the like, upon which a patient may recline while receiving treatment in the apparatus, and to present a novel circulatory heating system for the liquid employed in the treatment.

It is a further desideratum to enable the ready medication of the liquid used in the treatment with this invention, and to enable the automatic control of the temperature of the liquid medium in an efficient manner.

Another aim is to enable the ready control of the force of the spray at the will of the patient, or the attendant.

An important aim of the invention is to present a unitary apparatus and cabinet which may be set up in any ordinary room or ward, without requiring water service connection and enabling the placing of the apparatus in operation by simply connecting electrical circuit leads.

It is a further object of the invention to present a novel form of cabinet structure by which the entrance of a patient to an enclosed chamber will be greatly facilitated, and in which the construction of the cabinet serves to conserve heat; which will be made extremely simple and adapted to production in a light weight construction, and which will also occupy a minimum of space.

Additional objects, advantages and features of the invention reside in the construction, arrangement and combination of parts involved in the embodiment of the invention, as will be under-

stood from the following description and accompanying drawings, wherein

Figure 1 is an elevation of a cabinet constructed in accordance with the invention, with the top in section and partly raised.

Figure 2 is a longitudinal vertical sectional view of the lower section of the cabinet.

Figure 3 is a cross section of the cabinet while closed.

Figure 4 is a diagram of the electrical circuits.

Figure 5 is a longitudinal sectional view of the servo motor.

Figure 6 is an elevation partly in cross section thereof and showing the operating and other devices mounted in the upper part of the cabinet.

Figure 7 is a front elevation partly in section, of the parts in Figure 6.

Figure 8 is a detail horizontal section of the vacuum valve and mounting.

Figure 9 is a view similar to Figure 1 showing the cabinet closed.

Figure 10 is an elevation of a modified form of cabinet, open.

Figure 11 is an enlarged cross sectional detail of a possible mounting of the stand pipe, the trough construction, and the meeting edges of the top and trough.

There is illustrated a bath cabinet unit adapted to be transported and set up in whatever location desired, convenient to some electrical outlet, although the features of the invention are also adapted, in case of need, to be embodied in permanent building structures, as will readily appear.

The cabinet includes a frame structure 10, including corner uprights 11, longitudinal lower stringers 12, and upper longitudinal side members 13, with suitable transverse connections as required, this frame work being adapted to be mounted on casters 15, if desired. The side members 13 at the upper part of the frame are made sufficiently strong to sustain a trough and bed structure with the weight of a person thereon, and in the present instance, are shown as simple planiform webs, secured at their ends to the adjacent corner pieces 11, extending horizontally throughout the length of the frame 10. Between these side members 13 and resting on the upper cross members 14 at the ends of the frame 10, there is a trough device 16, preferably made of heavy galvanized metal, or other strong material resistant or impervious to corrosion by saline solutions or other solutions which it is contemplated to use in the apparatus, as will be explained. As a formal showing in the present instance, the trough is represented as it might be formed of sheet metal, with a rolled rim (Fig. 11) extending horizontally, one end of the trough being flush with the end of the frame 11 (Fig. 8), which is at the foot end of the apparatus, while the other end may extend beyond, as will be explained.

The sides of the trough are continuous and have a horizontal upper edge throughout its length over the frame 10, but at the head end, are inclined upwardly, as at 18. A bottom portion 19 is formed in the trough at the foot end, and a corresponding bottom portion 20 at the head end, the former sloping downwardly from the foot end of the trough to a point toward the head end of the frame, preferably nearer the head end than the middle of the frame, while the bottom 20 has a sharply inclined portion 20' projected beyond the frame 10 and inclined sharply downwardly, while the inner portion 20 over the frame is inclined more gradually down-

wardly, its inner end stopping in close spaced relation to and over the forward end of the bottom section 19, forming a slot 21 between the two bottom sections through which liquid may flow from the trough into a reservoir 22, which is mounted on the frame-work below the trough. The trough bottoms 19 and 20 may be supported at proper intervals by cross-members 23. The bottom portions 19 and 20 are substantially planiform, and their proximal edges terminate on a transverse rectilinear line, and in slightly lapped relation, if desired. The slot 21 may be from one-quarter to half an inch in vertical dimensions, more or less, as may be found necessary. A pillow cushion 24 with appropriate water-proofed covering is laid upon the trough extension 20', while mattress sections 25 and 26 respectively are laid upon the trough bottoms 20 and 19, as shown, these mattress sections being suitably shaped to form as far as practicable, a continuous body support for a patient. Mounted upon suitable cross-members 27 between the stringers 12, there is an electric motor 28 shown as direct connected to a centrifugal pump 29, the intake 30 of which opens through the bottom of the reservoir 22. The discharge conduit 31 from the pump leads to a stand pipe 32, through which water is conveyed to a nozzle head and servo motor and vacuum device, as will be more particularly described hereinafter. At a suitable location, a bi-pass valve 32' is connected into the conduit 31, arranged to intercept and discharge directly into the reservoir 22 a portion of or all of the liquid delivered from the pump 29, this valve having a control 34, such as a hand-wheel, located conveniently to the mattress section 25, so as to be readily manipulated by a patient reclining on a mattress. On the reservoir 22 there are provided a series of electric heater elements 35, adapted to be controlled by means of a conventional circuit arrangement including a control 36, by which the degree of heat communicated to the water may be regulated. A switch 37 is also provided by which the motor 28 may be started or stopped, and a switch 38 by which lamps 57 in the upper part of the apparatus, and used for light ray treatment, may be operated or controlled. For convenience, the switches and valve controls 34 are shown as mounted on a panel 40 supported on the side member 13 of the frame thereadjacent, this panel being of comparatively small size, so that it will interfere in a minimum degree with access to the mattress or to the body of a patient lying thereon.

A housing is mounted on the frame, including a lower permanent portion which may include side and end plates 41 and 42, enclosing the frame 10 completely at the sides; an upper housing 44 is provided, in a single unitary element, having a lower edge portion conforming generally to the plan and dimensions of the frame 10. This housing is hinged suitably at the foot of the frame 10, as shown at 45. The housing 44 consists, in the present instance, of two planiform, parallel side walls 46, each semi-circular in form, upon the curved edges of which there is bent a continuous outer wall 47, united or secured to the walls 46 in a suitable manner. The walls 46 and 47 may be formed of one of the commercially available ply-boards, or insulating board, suitably faced, or other materials, preferably one which has a low coefficient of heat conduction. The lower edge portion of the housing 44 is thus of rectangular form, and is provided with a cushioned edge material 48 (Figure 11) of resilient rubber or other suitable

material, adapted to rest against the upper edges of the trough portion so as to form a continuous seal at the sides and foot of the trough. Across the ends of the housing 44 next the head of the apparatus, however, a semicircular arched opening 49 is formed, from above which a suitable apron or other means 50 is provided, adapted to be let down upon or be fitted to the neck of a patient lying upon the mattress, with the patient's head resting upon the pillow portion 24 without the housing 44. The end wall 47 adjacent the opening 49 may fit down closely beyond the end of the mattress section 25, between the latter and the pillow section 24, if desired.

The upper casing element 46—47 or cover, may be counterbalanced in any approved manner, so that when lowered, it will remain in closed position, with its edge portion 48 in sealed relation to the edges of the trough, but will require only a slight effort to effect the raising thereof. For this purpose, handles 51 may be fixed to the inner sides near the opening 49, and also applied to the outside of the cover. The pipe 31 from the pump is shown as connected to the stand pipe 32 by means of a conventional union 52, and located below the adjacent housing member 13 of the frame 10. The pipe 32 is supported by being welded or otherwise secured to a cross plate 54, the latter supporting the forward edge of the bottom 19. If desired, a bracket 53 may be used, attached to the side member 13 and connected to the upper member of the union 52 by the usual bolts securing the flanges of the union together, and by this means the pipe 32 is supported against lateral movement. In the present instance, the pipe 32 may extend through a sleeve 55 joined to the bottom of the trough, located close to the side of the trough and outwardly of the mattress section 26.

The pipe 32 is utilized as a support for a massage jet device and servomotor for moving the same, as well as carrying a bracket 56 carrying a plurality of electric lamps 57 or other devices to produce desired forms of rays, these lamps being adapted to be controlled by the switch 38, before referred to, through any usual electrical circuit for the purpose.

In the present instance a conduit 58 is shown for conducting the wires 59 from the lower part of the apparatus to a part closely adjacent the bracket 56, although these wires may be completely enclosed to the lamps 57 in any approved manner, if desired. Engaged on the upper end of the pipe 32 there is a four-way T 60, the upper arm of which is sealed and has a nipple 61 set therein and extending a distance thereabove, the bracket 56 having a sleeve portion engaged on this nipple and secured in any suitable way. The left arm 63 of the T 60 as viewed in Figure 7, has a valve 64 connected thereto, from which an L 65 extends downwardly, and has connected thereto a flexible hose 66 with a loop of suitable length therein, its outer end being attached to a jet head 67, to be subsequently described. The right hand arm 68 of the T 60 (see Fig. 7) has connected thereto a stop valve 69, having a discharge directed downwardly, in which there is fitted a jet plug 70 engaged in a Venturi element 71, a pipe 72 leading from the opposite end of the device downwardly. An inlet port is formed at the front side of the Venturi element 71, above the waist 71' of the latter, to which a pipe 73 is connected, leading upwardly

to a portion of a vacuum scalp treating device, to be subsequently described in detail.

Mounted on the upper end of the nipple 61, there is a servomotor 75 (see Fig. 5), which in the present instance is shown as including a cylindrical drum body 76, having an integral closing head 77 at one end, and adjacent this end at the rear there is formed on the drum a socket 78 receiving snugly the upper end of the nipple 61, to which it is pinned. The opposite end of the drum is open and flanged as at 79, and closed by a diaphragm 80, which is secured thereto by a cap plate 81 which is slightly dome shaped to permit outward flexure of the diaphragm at times. The diaphragm 80 has secured thereto the head portion 82 of a reciprocating plunger 83, which is bored at its opposite end toward the head 77 and receives slidably therein a stud 84 by which the plunger 83 is supported at that end. Two arms 85 are projected upwardly from the plunger 83, having therebetween a slot 86, in which there is set a crank pin 87 which is adjustable longitudinally of an arm 88 projected radially from a transverse rock shaft 89 extended through the wall of the drum. For this purpose the arm 88 is longitudinally slotted, and the pin 87 has a reduced tenon extended through the slot and secured by a nut 87'. The wall of the drum 76 is thickened and formed with a boss 90 to afford a good bearing for the shaft 89, and finished with a planiform outer face around the shaft to which there is secured a cap 91 suitably flanged and attached by screws engaged therethrough, the cap being considerably larger than the shaft and having a flange 92 at its outer part engaged closely around the shaft spaced a substantial distance from the boss 90, and a collar 93 sealed to the shaft is pressed against the flange 92 by means of a spring 94 seated against the boss 90 within the cup 91, forming a water tight joint.

The shaft 89 is extended a substantial distance beyond the cup 91 and has longitudinally adjustable thereon a sleeve 95 held by means of a set screw 96 impinging on the shaft and provided with a right angle extension 97 at its outer end also of tubular form in which there is flexibly engaged a stem piece 98 secured by a set screw 99. On the outer end of this stem the jet head 67 before mentioned is fixed. In the present instance, the jet head 67 comprises a multi-jet circular plate portion 100, and a bell shaped case or body 101, the upper end of which is formed with a socket 102 in which the stem 98 is secured.

The drum 76 is formed with a boss 104 at the lower side, finished with a planiform bottom face exterior of the drum and through this face a port 105 opens directly into the drum, while spaced longitudinally therefrom, toward the diaphragm, a second port 106 opens on this face, but not communicating directly with the drum, a passage 107 extending longitudinally from this jet within the wall of the drum and communicating with a passage or slot 108 in the cap plate 81, the diaphragm 80 being apertured to form a continuation of this duct, so that it communicates with the space between the cap plate 81 and the diaphragm. A valve box 109 is secured with a good seal joint against the face of the boss 104, and having therewithin a chamber in which a valve 110 is reciprocable against the face of the boss, being held against the boss by a tapered helical spring 111. The box is shaped so as to hold the valve 110 slidable longitudinally

upon the drum. The valve is formed with a port 112 therethrough, adapted to register alternately with the port 105 and port 106, the latter being so spaced and the port 112 being of such width that when one of the first named ports is opened, the other will be closed, the valve being sufficiently extended beyond the port 112 for this purpose. A pipe 113 is engaged through one end of the box 109, and leads to and is connected into the T 60 at the front side, so that water pressure from the pipe 32 will be communicated to the box 109 so as to be admitted to one side or the other of the drum of the diaphragm 80, according to the position of the valve 110. No valve is shown in the pipe 113, but the omission or provision of such valve is discretionary.

For the operation of the valve 110, it is formed with a recess next to the drum, and the port 105 is enlarged in one direction to register with this recess at all times. A vertical plate 115 is mounted on the lower side of the drum adjacent the port 105, and on this plate a lever 116 is pivoted, having one arm extended downwardly through the port 105 and set in the recess 114 while an opposite arm of the lever is extended upwardly beside the plunger 83. The plate 115 is provided with stops 117 and 118 at the left and right of the upper lever arm, so spaced as to limit its movement to the respective positions of the valve, with its port 112 registered with either the port 105 or the port 106. The plate 115 is located just below the plunger 83, and the lever 116 oscillates closely beside the plunger, but stopping adjacent the lower part thereof. Formed on the plunger there is a lateral boss 119 projected laterally toward the side at which the lever is located, and arranged to pass over the lever in reciprocation of the plunger. A helical spring 120 is provided, having a long arm and a short arm 121 and 122 respectively, the long arm having an end pivoted at the extremity of the boss 119, while the short arm is correspondingly pivoted on the lever 116, the short arm 122 being located at the end of the helix 120 next to the lever. In this manner, with the parts in the position shown in Figure 5, the spring is under tension between the boss 119 and the lever, tending to thrust the lever toward the right. But when the plunger is moved to the right and beyond the lever, it will in this movement gradually swing the helix 120 upwardly, so that the latter will move in an arc with the extremity of the arm 122 as a center, until, when the boss 119 passes beyond the lever sufficiently, the spring device will be completely inverted, and by the inherent force of the spring tending to separate the arms, the lever 116 will be then thrust toward the left, shifting the valve 110 toward the right. In the position shown in Figure 5, with the valve in the left-hand position, when the pump 29 is in operation, water pressure will be admitted through the pipe 113 passing through the valve and port 105 into the drum, where it will gradually thrust the diaphragm toward the right. This will effect the movement of the spring described, and when the valve is shifted to the right, water pressure will be admitted through the port 106 to the opposite side of the diaphragm so that the latter will tend to be thrust toward the left again. In order to permit these movements of the diaphragm while the drum is full of water, or the space between the diaphragm and the cap plate 81, waste pipes 123 and 124 are connected through the head 77 and cap plate 81, respectively, so that as the diaphragm is moved in one

direction by the water pressure, water at the opposite side of the diaphragm may be vented through the corresponding waste pipe. These pipes are extended downwardly to a space beside the mattress and over the trough between the mattress and the sides of the trough, and are provided with bleed valves 125 and 126 respectively, by which the rate of flow of water from the respective sides of the diaphragm may be regulated, and so the speed of operation of the plunger controlled. These valves are thus convenient to the hand of the patient, so that the latter may adjust the operation of the device to the best effect, as will be subsequently explained. It will be seen that in the operation of the plunger, movement of the crank pin 87 in opposite directions by the fingers 85 on the plunger will cause the jet head 67 to be swung in respective directions, due to the rocking of the shaft 89 thus produced.

By means of a bracket 127 secured to the flange 79, a guide block 128 is mounted to the right of the drum, in a plane substantially at right angles to the shaft 89 between the packing cap 91 and the sleeve 95 of the nozzle head mounting. This block 128 is elongated vertically, and adjacent its upper and lower ends is formed with guide bores in which there are slidable respective horizontal rods 129. Secured to the ends of these rods next the shaft 89 there is a vertical wiper block 130, and confined between this wiper block and the guide block 128 there are helical springs 131 engaged around respective rods 129 tending to hold the block 130 toward the shaft 89. At their opposite ends the rods 129 have fixed thereon a valve block 132, and on the side next the block 128 a valve 133 is formed, adapted to seat in a port 134 formed in the side of the block 128 adjacent and opposed to the block 132, and the springs 131 function to press the rods toward the left until the valve 133 is seated in the port, whereby sliding movement in that direction is checked. The block 132 is adjustable on the rods 129 by means of set screws 135 engaged in the block 132 and impinging upon the respective rods, the block being otherwise slidable on the rods. Fixed on the shaft 89 adjustably, there is a small hub 136 having a wiper arm 137 aligned with the block 130. A set screw 138 is engaged through the hub to impinge upon the shaft 89 and hold the arm 137 in adjusted positions. Thus the preferred adjustment is shown in Figure 7, where, when the nozzle device 67 is swung to the extreme left, the arm 137 clears the block 130, thus allowing the valve 133 to seat and close its port, and when the arm 97 and jet head 67 swing to the opposite limit of movement, the wiper 137 will have engaged the block 130 and moved it toward the right, so as to unseat the valve 133 against the action of the springs 131. The block 128 is formed with a passage 139 therethrough, extending horizontally transverse to the plane of the rods 129, and located intermediately of these rods, the port 134 communicating with this passage. The pipe 73 at the front side of the Venturi element 71 is connected to one end of this passage, while at the opposite end, a nipple 140 is engaged therewith, to which a hose 141 is connected of suitable length to extend therefrom to the exterior of the upper cabinet housing 44, the outer end of this hose being connected to a conventional type of metal helmet or hood, 142, having a large pneumatic or otherwise elastic edging 143, adapted to ac-

commodate itself to heads of various sizes, to fit around the base of the scalp and prevent ingress of air at the junction of the cap and the head of the user. The hose 141 may be led from the cabinet in various ways, but in the present instance is shown as extended downwardly beside the pipe 32, into the lower part of the structure or frame 10, being extended longitudinally through the head end of the frame, and coils of slack hose at 144 hung upon a suitable hook or rack 145. Suitable brackets or hangers 146 may be provided under the pillow portion of the device to support the hood when not in use, and one of these brackets may be the device 145 by which the slack hose is supported, if desired.

The counter balance for the cabinet top may consist of a counter balance unit 147 mounted on the pipe 32 below the T 60, and having an extensible and retractable cable or the like, 148 extended to a point near the lower edge of the top 44, and attached to the sides of the wall thereof, the counterbalance being adjusted so that the top will remain in any position to which it is moved manually.

Mounted transversely in the reservoir 22, directly under the slot 21, there is an ultra-violet light tube 150, the length of this tube preferably being equal to the full width of the reservoir, and the latter being also the total width of the trough 16. The electrical leads 149 from this tube may be connected to the motor lead wires, so that when the switch 37 is operated to close the circuit to the motor, it will also close the circuit to the tube 150, although the device may be separately connected, if desired, these practices being well understood and no details thereof are shown. It will be noted that the tube 150 is so located that water passing through the slot 21 will fall especially upon the upper side of the tube, so that water will flow over the sides of the tube in each direction, exposing the water to the action of the rays emitted in a most effective manner. By reason of adhesion of water to the tube, water will pass to the extreme under side of the tube before leaving it, as will be readily understood.

In the operation of the apparatus, in order to enable the patient or attendant to insure proper temperature in the water circulated by the pump, or in the space within the cabinet, a thermostat 151 may be mounted in the cabinet or associated with the pipe 32 or the reservoir 22, and may include an adjustment device 152 by which it will respond to various degrees of heat to interrupt the current to the heater unit 35. It may be incorporated in the cabinet, and properly connected in a circuit to the heaters. Preferably, this device will control the heat circuit independently of the switch 36. A proper volume of water or other liquid for use in the operation of the device being supplied to the reservoir 22, if the treatment is to include thermal effects, the switch 36 is operated to bring the water to a proper temperature, after which the motor is set in operation to circulate the water for a time until the pipes and jet heads have become warmed. The patient may then assume position upon the mattress after raising of the top 44, and the latter is then lowered while the patient's head is resting upon the pillow section 24, after which the apron or other closure 50 is adjusted to the opening around the neck of the patient. The pump being set in operation, and the valve 64 being open, the by-pass valve 32' is adjusted so as to produce the proper force

of water ejected from the jets of the head 67. The patient or the attendant may then adjust the valves 125 and 126 to regulate the rate of movement of the head 67 in its oscillation. This may include a rapid return movement of the head 67 toward the head of the patient, and a slow movement of the head 67 in its travel in the opposite direction, or both movements may be otherwise adjusted relatively, so that both are the same, or may differ in varying degrees in either direction.

If desired, the stud 84 upon which the plunger 83 slides may be the inner portion of a screw device 153, by which movement of the plunger in one direction may be limited, and its movement in the opposite direction may be controlled by a screw 154 engaged in the cap plate 81.

In the use of pure water or aqueous solutions for circulating in the device, the repeated action of the ultra-violet light on the water will serve to sterilize it and so kill all germs and bacteria removed from the body of a patient by the liquid. Other irradiating means may be employed alternatively or additionally if desired.

It is contemplated to use various chemicals in solution and water as well as other liquids, for their beneficial effects, and these may conform to familiar practices or to new and approved methods yet to be perfected. If it is desired that the sweep of the head 67 shall be rapid when moving in the direction from the feet of a patient toward the head, the bleed valve 126 is opened correspondingly, and if it is desired that the movement of the water jet from the head toward the feet shall be slow, the valve 125 is restricted accordingly. If local treatments of any part of the body is desired without application of the spray or jet to other parts of the body, the device may be entirely stopped by closing either of the bleed valves 125 or 126, and by closing these at the right time in the movement of the servo motor, the liquid projected from the head 67 will engage the body at the desired area.

In order to treat the scalp of a patient with a vacuum device, the cap or hood 142 is adjusted on the head of the patient, with the edging 143 engaging the skin just beyond the edges of the hair of the scalp. The valve 69 then being opened, the jet of liquid projected from the member 70 through the throat of the Venturi element 71, will eject air from the part 71 into the pipe 72, the water and the air in pipe 72 discharging into the trough, while the air is permitted to escape to the atmosphere within the cabinet. This produces powerful suction, which is communicated through pipe 73 to the passage 139. As long as the valve 133 is closed, this will also produce a vacuous condition in the hose 141 and will exhaust air from the hood 142, thus drawing blood into the scalp of the patient by the vacuous condition produced in the hood. Another swing of the wiper 137 engages the block 130 and unseats the valve 133; there will then be an inrush of air through the port 134, which will relieve the vacuous condition in the hood 142, and as soon as the wiper 137 disengages the block 130, air will again be drawn from the hood 142, producing a repeated vacuous condition therein. These alternations of vacuous condition and atmospheric pressure are recognized as highly beneficial in scalp treatments for promoting growth of the hair, and generally healthy condition of the scalp.

Owing to the effect on the brain, the promotion of circulation of blood in the scalp in excess of ordinary circulation will contribute to the

therapeutic benefits incident to baths and massage administered through the liquid circulating system of the apparatus, including the head 67. If desired, however, the projection of liquid from the head 67 may be stopped while the vacuous pulsations in the hood 142 are produced, and these may be accompanied by treatments from the lamps 57, either by thermal effects, or benefits of light ray action.

It will be recognized that benefits may be obtained by the use of this apparatus without the heating of the liquid, and it may be found desirable to use a heat absorbing means at 35, these devices being essentially heat transfer elements.

It will be understood that while I have described a specific embodiment of the invention with great particularity, nevertheless, this is purely exemplary, and various changes in construction, arrangement and by substitution of parts, may be made without departing from the spirit of the invention, as set forth in the appended claims.

Thus, in Figure 10 there is illustrated a modification of the cabinet, in which a substantially rectangular chamber 160 is provided, which includes a lower portion substantially the same as that first described, including the trough and mattress elements. The liquid circulating means and other appliances may also be the same as first described, only the upper cabinet structure being different. This structure includes a top frame 161 permanently closed at the far side as viewed in Figure 10, at the foot, and at the left half of the near side, the top frame 161 being without any support at the right hand near corner, but only supported at the back. A sliding door 162 is provided, which may be drawn forwardly to close the open side of the cabinet for one-half the distance from the head toward the foot, the remainder being closed by the portion 160, which may also be slidable, if desired, and the opening across the head end of the cabinet over the patient is closed by a swinging end piece 163, hinged on the frame 161 at the top, this end piece having a lower portion formed of soft fabric, stopping sufficiently above the level of the mattress to clear the head of the patient when the panel 163 is swung to closed position. It includes side portions 164 adapted to swing beside the mattress or pillow section 24. By the omission of any corner post whatever at the one side and head end of the device, movement of the patient to and from the cabinet is greatly facilitated, with a minimum liability of injury or discomfort.

The diaphragm 88 may be termed a piston and the term piston may include the plunger 83.

The by-pass valve 32' may be opened partly or entirely to relieve pressure in the liquid passing through the pipe 32 as much as may be required. It is most expedient and economical to operate the motor 28 without rheostat or other speed control, so that it will tend to run at maximum speed at all times. This, with the valve 32' closed, will produce a high pressure in the liquid delivered to the jet head 67 and the jets therefrom will impinge upon the person of the patient with considerable force, even when the air ejector of the vacuum device is in operation.

By opening the by-pass valve 32' the pressure in the pipe 32 is relieved to an extent proportional to the part of the total output of the pump that is permitted to flow directly back to the reservoir through the valve 32'.

In case a solution is used in the reservoir which

is capable of radioactivity after excitation or irradiation by an appropriate light or other wave emitting means at the tube 150 the germicidal effects of the treatments with the apparatus are much enhanced, and also some effects obtained which are not possible otherwise, notably intratissue germicidal action, and stimulation of corpuscular activity independently of and conjointly or simultaneously with the effects of heat and massage.

In case the cabinet is completely sealed against ingress of air (the reservoir 22 being sealed to the trough bottom 20), and the patient entirely enclosed by the cabinet top, the hose from the hood 142, or the hood itself, may be introduced into the cabinet, so that a vacuous condition is produced therein. This will have the effect of expanding gases in the blood, lymph and other fluids of the body, so that these will escape from, or be absorbed from the skin by the treatment liquid so that they may be purified; and by discontinuing operation of the ejector 71, while the jet heat 67 is continued in action, a re-absorption of purified air by the body liquids will be effected, with a corresponding pathogenic benefit. Various chemicals may be introduced into the liquid in the reservoir, the practice of which is well understood, and it will be appreciated that the liquid introduced into the reservoir may consist of pure water, or various solutions in water, or it may comprise oils or mixtures thereof with water, or gelatinous substances, soaps, saponifiers, etc., singly or in mixtures.

The advantages of having the end wall of the cover 44 pass between the pillow element 24 and mattress section 25 are numerous. Thus, liability of wetting the pillow is minimized as well as wetting or soiling of the hair, and noise of impact of water against the patient, mattress, and other surfaces is better confined.

By providing a proper closure at the opening 49 to seal the cabinet around the neck of the patient, and by proper timing of the movements of the motor 75, the benefits of pulmotor action combined with the additional treatments indicated may be obtained, which may be found advantageous in cases of excessive debility, as distinct from total pulmonary paralysis. The adaptation of the invention may also be carried further for use in sustaining breathing in pulmonary paralysis.

While I have disclosed a foraminate nozzle head, it will be understood that the invention is not limited to the form of spray produced by such a head, and other forms of nozzles may be employed conforming to conventional practices for producing jets or sprays, whether including a foraminate head or single opening devices.

The pipe elements 30 and 31 to and from the pump or portions thereof may be rubber or other non-rigid or vibration and noise-absorbing material, so as to lessen vibration and noise transmitted from the motor and resonated by the structural and operating elements. This might eliminate the need for the union 52.

I claim:

1. In a bath apparatus, a reservoir, a tray device having drain communication with the reservoir, a liquid pump having intake connection with the reservoir, a bath jet device above the tray, duct connections between the pump and jet device, means to operate the pump, and an irradiating device for liquids comprising a transparent tube arranged in receiving relation to said drain communication and in alignment therewith in

position to receive liquid flowing in said drain communication in such relation that the liquid will divide and flow downwardly around both sides of the tube for the purposes described.

2. A bath apparatus consisting of a reservoir, 5 a tray device thereabove having a drain communication with the reservoir, a pump having an intake in communication with the reservoir, and a discharge pipe from the pump extending above the reservoir, a chamber having an intermediate 10 piston reciprocable therein and closed at opposite sides of the piston, a conduit having branched communications with the ends of the chamber, valve means to close and open said communications alternately, vent means for each end of the 15 cylinder more restricted than the conduit communication through the valve, operative connections between the piston and valve means, a rock shaft above the tray on an axis transverse the 20 medial longitudinal vertical plane of the piston, an eccentric thereon, operative connection between the piston and eccentric, and a jet head over the tray extended radially from the shaft for sweep movement longitudinally of said tray, 25 and duct connections between the jet head and said discharge pipe.

3. The structure of claim 2 in which said vent means consists of two conduits opening from respective ends of the chamber and discharging 30 close to the tray and respective manually adjustable bleed valves in the conduit beside the tray.

4. A system of the character described consisting of a reservoir, a tray having drain communication with the reservoir, a pump having an intake connected to the reservoir and a discharge 35 conduit therefrom having a movable jet head above the tray and arranged to discharge liquid toward the tray, a servomotor operatively connected with the discharge conduit and said jet head, a by-pass conduit between the discharge 40 conduit and the reservoir, and a graduating valve therein.

5. The structure of claim 4 including means to irradiate liquids returning to the reservoir.

6. A jet head operating device for bath apparatus of the character described, comprising a 45 chamber device, a piston reciprocable therein, a rock shaft mounted thereon having a crank element, a slotted member connected to the piston and reciprocable thereby transversely of the shaft 50 and having said crank engaged therein for oscillation by reciprocation of the slotted member, said shaft having a jet head mounting thereon projected from the direction of the axis of the shaft, a water supply duct connected with the head and 55 having respective branch duct communication with opposite ends of the piston, valve means operatively connected with the piston to close said branch ducts alternately and open them alternately, and means to vent the ends of the cylinder while the respective branch ducts are closed. 60

7. The structure of claim 6 including respective drain ducts from the ends of the cylinder and respective manually adjustable bleed valves in 65 said ducts, whereby speed of movement of the piston in respective directions may be regulated.

8. The structure of claim 6 in which a wiper arm is fixed on said shaft, a spring-loaded valve-operating member having a wiper block in the 70 path of said arm for movement thereby at and adjacent one limit of arm movement, an air injector device, including a liquid jet member, a

duct connection between the said jet member and said water supply duct, an air duct to the ejector device, a port in the air duct for communication with the atmosphere, said valve being mounted to seat in said port when said wiper arm is disengaged from said block.

9. A jet operating device for bath apparatus of the character described consisting of a chamber, a piston reciprocable therein, a rock shaft 5 mounted on the chamber having a crank, a slotted member fixed with the piston and receiving said crank therein whereby the latter will be oscillated by reciprocation of the piston, said 10 shaft having a laterally projected jet head thereon, means to supply liquid under pressure including a delivery duct connected to the jet head and having an operating branch to the chamber, 15 said chamber having a port opening through the wall thereof at one end and having a second port spaced therefrom and opening through the same external surface but communicating with the opposite end of the chamber, a valve secured 20 over both ports, said duct branch opening into said box, a valve reciprocable in the box ported to uncover the first named two ports alternately and having portions to lap those ports at other 25 times, the first named port being enlarged in the general direction of reciprocation of the piston, a step joint recess in the valve registered at all positions of the valve with said port enlargement, 30 a lever pivoted in the cylinder having an arm extended through said enlargement and engaged in said recess for movement of the valve by the lever, an opposite arm being extended and movable in the general direction of reciprocation 35 of the piston, means to limit oscillation of the lever, a helical spring having a long arm and a short arm, one connected to the lever and the other to an element of the piston at a point close to the path of the other on the lever and having 40 movement with the piston beyond the limits of the lever and arranged so that the one may pass the other, said spring being under stress tending to thrust the arms apart.

10. In bath apparatus including a tray, a support for a reclining body therein, a cabinet to 45 enclose the tray and form a chamber thereover, including a closure movable for entry and exit of a patient to and from the tray, and a liquid jet device constructed to project liquid 50 upon a patient upon the body support; a jet device consisting of a stand pipe mounted independently of the closure, means to force liquid therethrough, a liquid-operated servo-motor 55 mounted on the upper end of the pipe, fluid supply connections from the pipe to the servo-motor, a jet head carried by the pipe and mounted for movement to project liquid jets therefrom with 60 movement longitudinally of the body support, operative connections between the jet head and the servo-motor, and liquid supply connections between said pipe and jet head.

11. The structure of claim 10 including an hydraulic air ejector device operatively connected 65 with the stand pipe, an air duct connected thereto to be exhausted and having a lateral port to the atmosphere, and means including an air valve at the port and operative connections with the servo-motor for intermittent closing and opening 70 of the valve.

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