

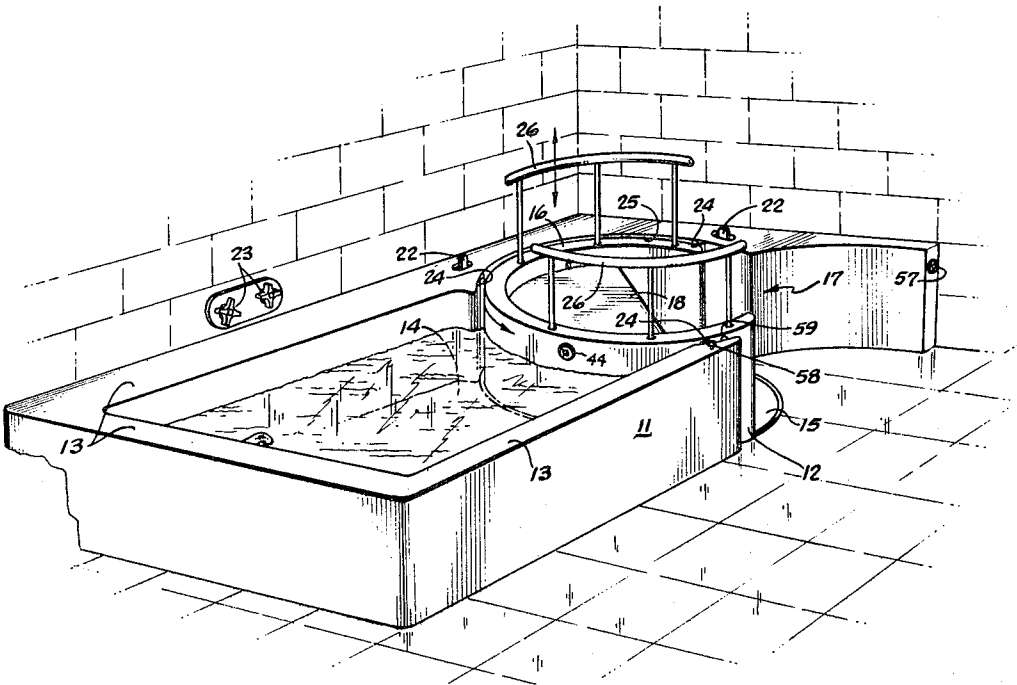
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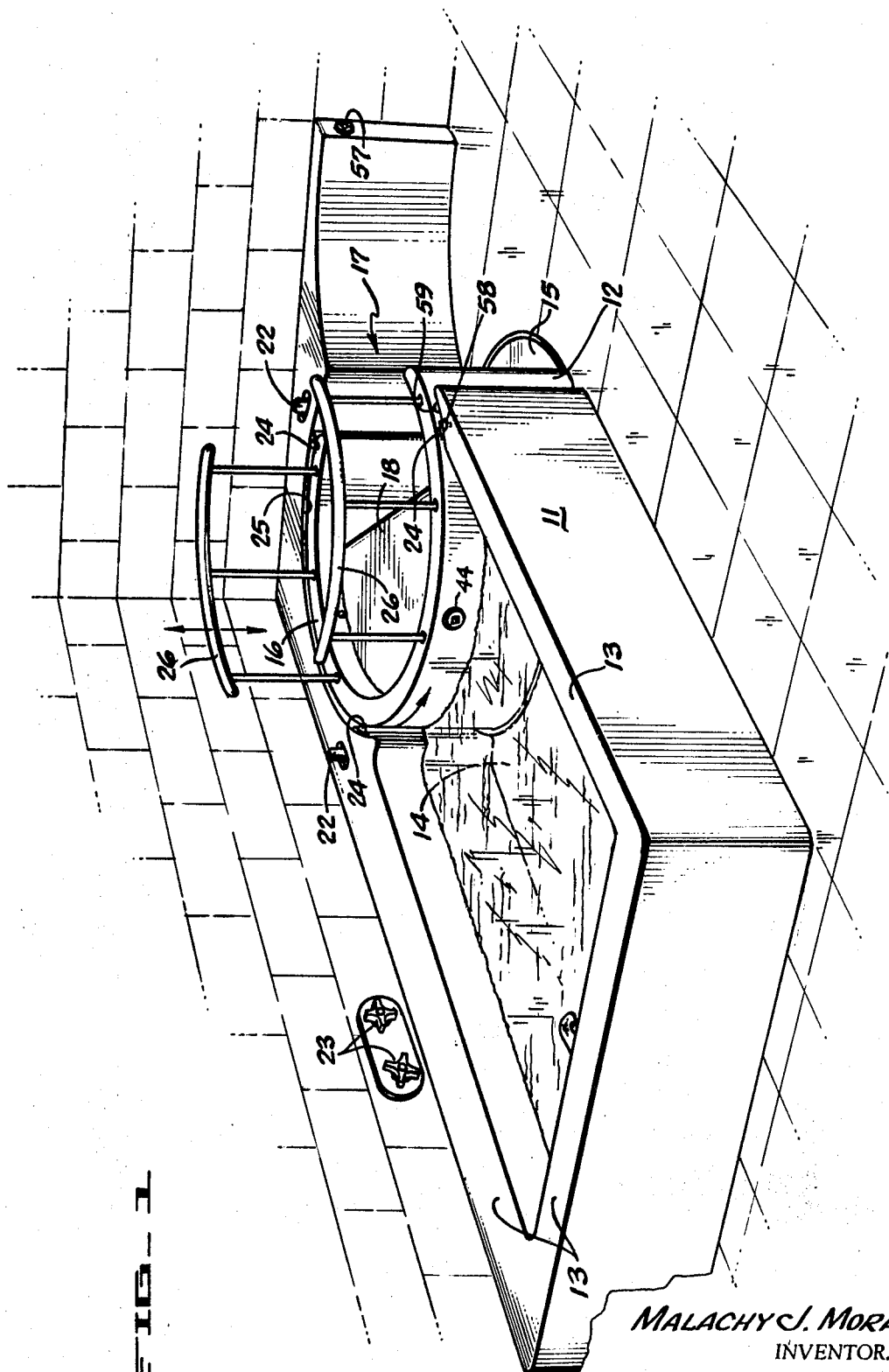
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[54] **BATHTUB**
6 Claims, 6 Drawing Figs.
[52] U.S. Cl. **4/173**
[51] Int. Cl. **A47k 3/00**
[50] Field of Search. **4/173, 175,**
176, 178, 185

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ABSTRACT: A bathtub for invalids includes a fixed part and a rotatable drum or cylindrical part. The fixed part includes sidewalls on three sides with the other side abutted against the rotatable part. The rotatable part has cylindrical sidewalls with a segment open to provide an entrance into the bathtub. With drum part rotatably positioned such that the open segment faces away from the fixed part of the tub, the cylindrical walls abut against and span across the open side of the fixed part of the bathtub to retain water therein. An invalid may sit on a seat within the drum part and the drum may be rotated until the open segment faces the open side of the fixed part of the bathtub. The seat may then be lowered to the bottom of the tub or to any desired intermediate level. To get out of the tub, the seat is raised and then the drum is rotated until the open segment faces away from the remainder of the bathtub. Alternatively, an invalid may enter and stand in the drum part with the seat in a lowered position recessed in the bottom of the drum. A hand rail may be raised from a recessed position in the cylindrical wall for the invalid to grasp while standing and while the drum is rotating for either entrance into or departure from the bathtub.

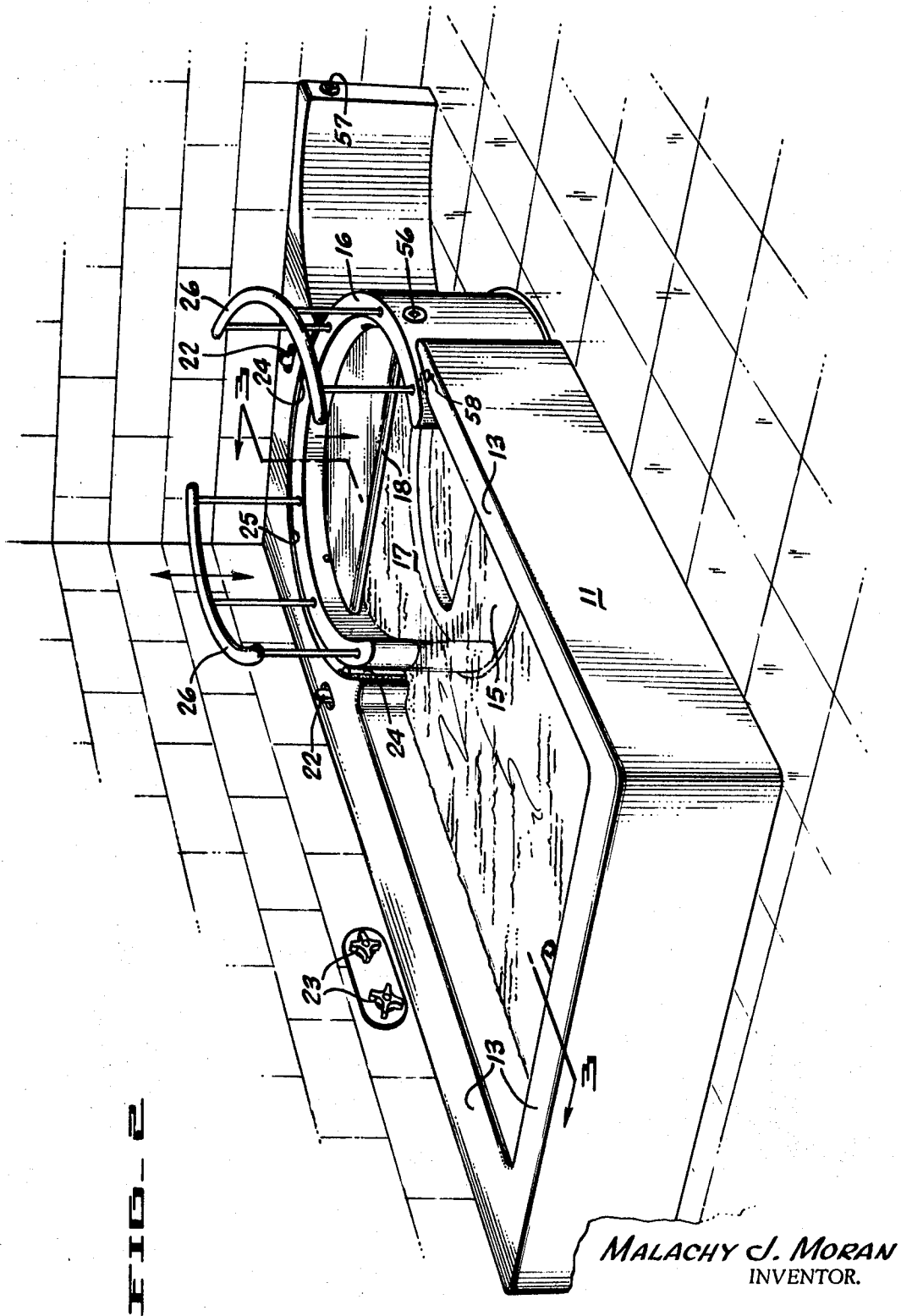




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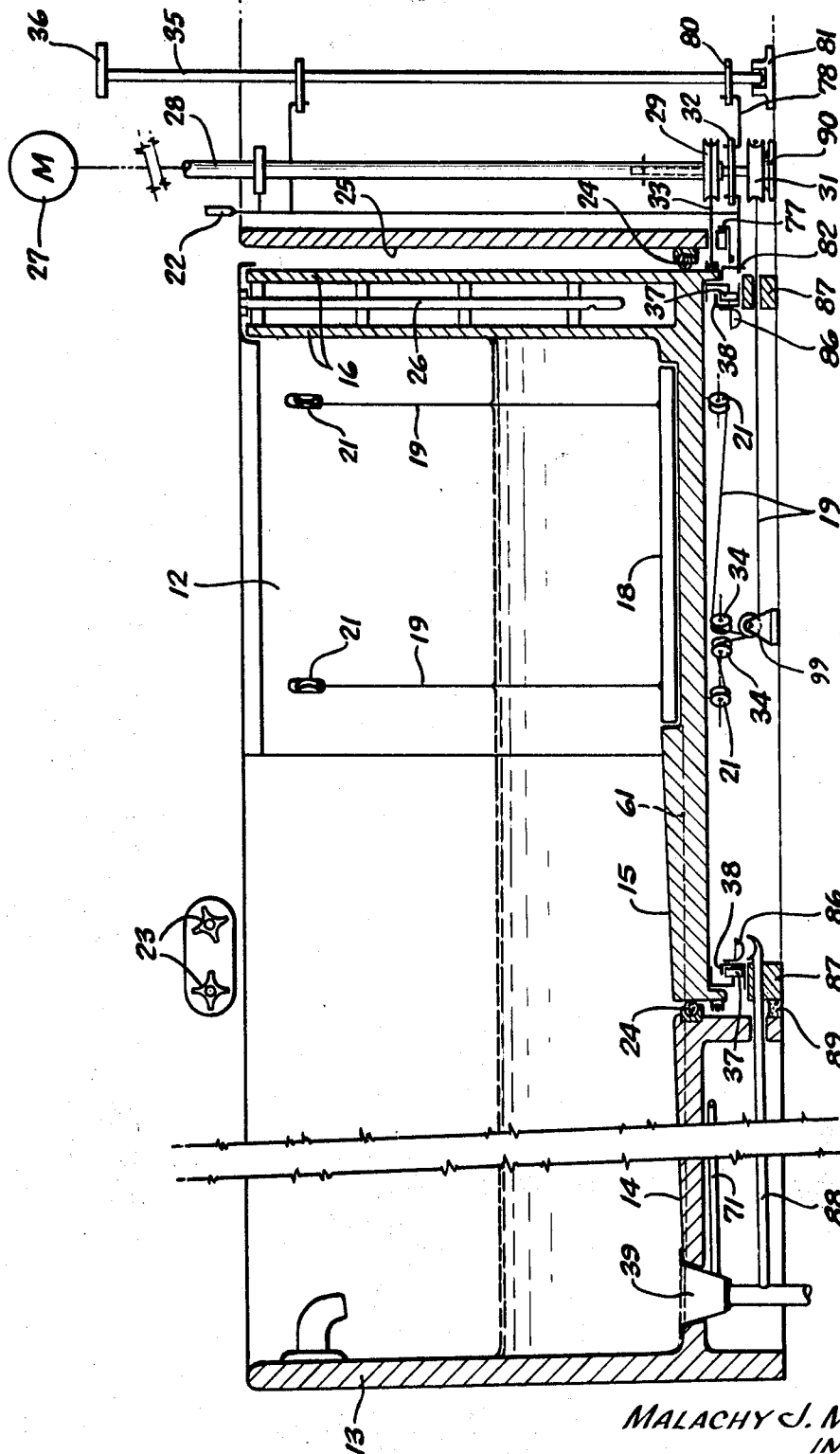


FIG. 3

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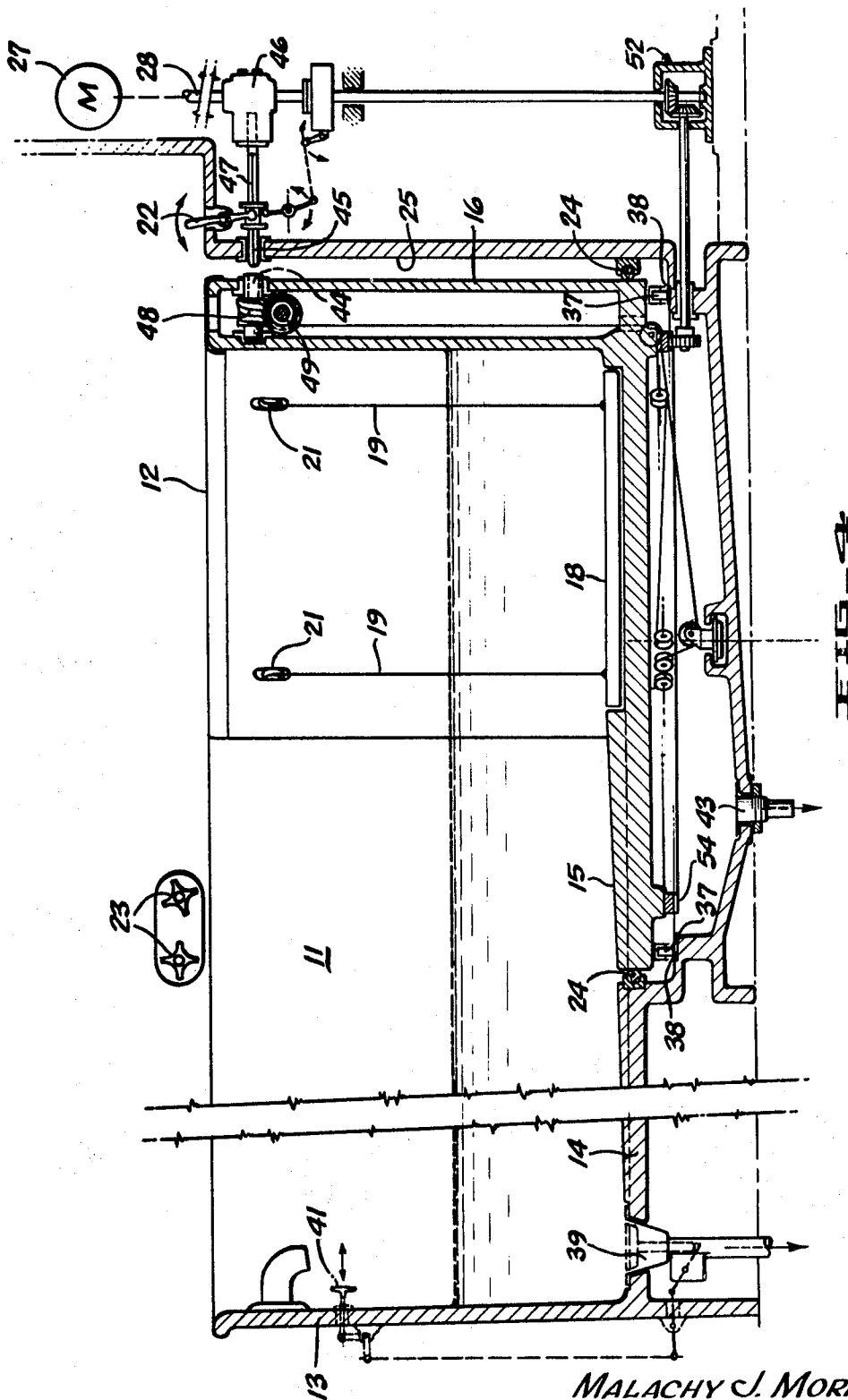


FIG. 4

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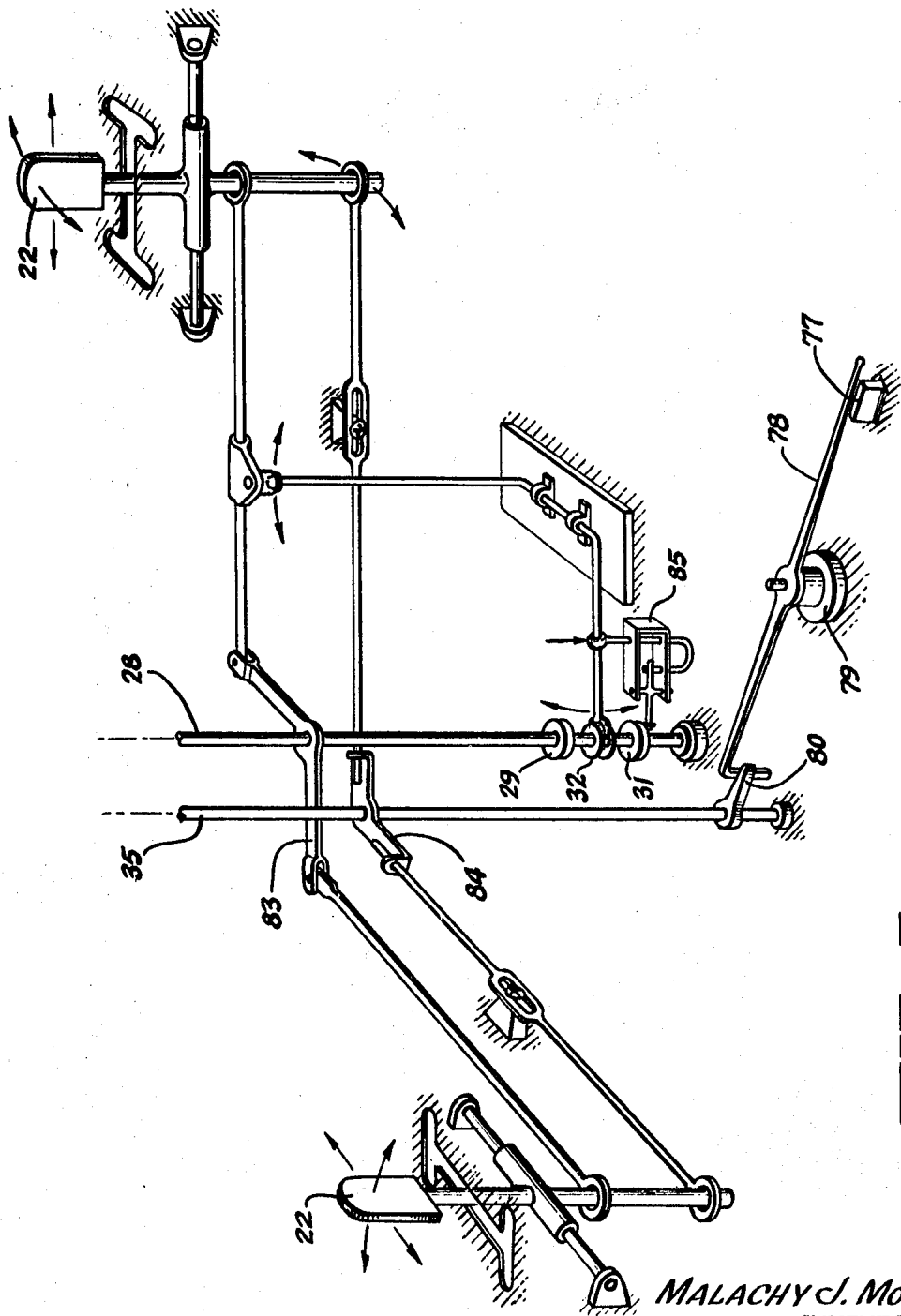
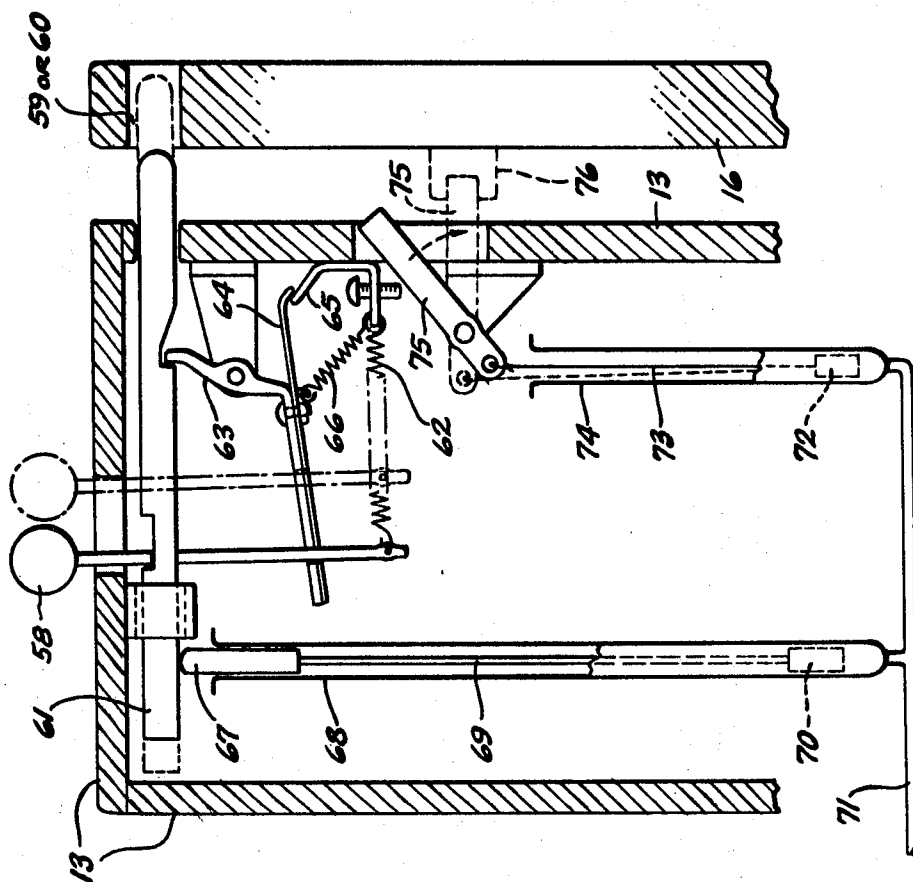


FIG. 5

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BATHTUB

BACKGROUND OF THE INVENTION

The present invention relates to special bathtubs which would be useful for invalids or other persons who cannot safely step over the sidewall of a conventional bathtub to enter into or to exit from the tub. More particularly, this invention relates to a bathtub wherein an invalid may approach and (1) sit upon a seat in an accessible position, may then be rotated into the tub without changing levels or raising his feet, and may then be lowered into the water, or (2) walk into an open portion of the tub, and then standing and holding onto a railing may be rotated into the tub without changing levels. In either case (1) or (2) the water may be drawn for the invalid's bath prior to his entry into the tub.

Heretofore, bathtubs have been provided with doors or such in the sidewalls whereby an invalid may enter or walk into the tub without changing levels or stepping over the sidewall. Obviously with such an arrangement, the bathtub must be empty when the invalid enters through the opened door, and must be subsequently filled with water after the invalid is inside and the door has been closed. The invalid person may not enter into a bath where the water has already been drawn into the tub.

Another prior arrangement has been the use of a movable seat installed over a conventional bathtub. In this case, the invalid or infirm person may sit on the seat in a position over a sidewall of the bathtub. Thence, with his feet held in a raised position, the invalid swings or pivots with the seat to a position over the tub itself. And finally the seat is lowered into the tub. This procedure may be difficult and hazardous for an infirm person to accomplish without assistance, particularly since the person's legs and feet must be raised and held in an elevated position while the seat is swung around or pivoted with respect to the sidewall of the bathtub.

SUMMARY OF THE INVENTION

According to this invention, an invalid or other person may walk or move directly into a rotatable end part of a bathtub through an open segment in cylindrical sidewalls without changing levels or stepping over a sidewall. The person may either stand or sit while the end part of the bathtub rotates such that the open segment faces a fixed part of the bathtub which may have been previously filled with water. With the two parts of the tub aligned, the person may lower himself to any desired level by a seat which is mounted to move vertically within the rotatable end part of the bathtub. The infirm person may enter and leave the bathtub without assistance from a nurse or other attendant since the controls for the rotation of the end part and for the vertical movement of the seat are easily accessible and operable, and no difficult maneuvering is required. The bathtub may be prefilled with water if desired, and there is no need for high stepping or for raising a person's legs and feet into an elevated position.

DESCRIPTION OF THE DRAWINGS

Various features and advantages of this will become apparent upon a consideration of the following description taken in conjunction with the accompanying drawings which illustrate a preferred embodiment of this invention. The views of the drawings are as follows:

FIG. 1 is a perspective view of a bathtub in accordance with this invention, showing the rotatable end part in a position for entrance or exit of a person to or from the bathtub;

FIG. 2 is a similar perspective view, but with the rotatable part positioned in alignment with the fixed part;

FIG. 3 is vertical sectional view along the broken line 3—3 of FIG. 2 illustrating a drive arrangement for rotation of the cylindrical end part of the bathtub and for vertical movement of the seat; and

FIG. 4 is a similar vertical sectional view illustrating alternative drive arrangement.

FIG. 5 illustrates the drum operating linkage system.

FIG. 6 shows a latch mechanism for locking the drum to prevent inadvertent movement thereof.

DESCRIPTION OF THE PREFERRED EMBODIMENT

As shown in FIGS. 1 and 2, the bathtub of this invention includes a fixed or stationary part 11 and a cylindrically shaped rotatable end part 12. The fixed part 11 comprises sidewalls 13 extending upwardly from a bottom closure 14 on three sides while a fourth side abuts against the rotatable end part 12. The rotatable end part 12 is generally cylindrical or drum shaped and comprises a bottom closure 15 and cylindrical sidewalls 16 extending upwardly from the bottom closure 15. The cylindrical sidewalls 16 have an open segment 17 to provide an opening or passage way for entrance into and exit from the bathtub. A seat 18 is mounted to move vertically inside of the rotatable end part A2 of the bathtub. As shown in FIGS. 3 and 4, the seat 18 is suspended on cables 19 which pass over pulleys 21 to a drive arrangement to be discussed subsequently.

A person may enter the bathtub through the open segment 17 of the rotatable end part 12 of the bathtub as shown in FIG. 1. The person may either stand in the rotatable part 12, or he may sit on the seat 18. By operation of control levers 22, the person may cause the end part 12 to rotate about its vertical axis to a position shown in FIG. 2 wherein the open segment of the rotatable part 12 faces into the remainder of the bathtub 11. The person may bathe himself with the seat in the raised position as shown in FIG. 2, or he may operate a control lever 22 and cause the seat to lower to any desired level. As shown in FIGS. 3 and 4, the seat may be lowered to an extreme position wherein the seat moves into a recess in the bottom closure 15, and the seat is flush with the bottom of the bathtub. The control levers 22 may be duplicated as shown in FIGS. 1 and 2, such that one of the other control lever will be in a convenient location regardless of which direction the person is facing. Since the control levers are dual in nature, the person may operate either one to rotate the end part 12 or to adjust the height of the seat 18. When the person wishes to get out of the bathtub, he causes the drum to rotate to the open position of FIG. 1, whereupon the person may stand and walk away from the bathtub without stepping over any obstruction and without the need for raising his feet in any manner.

As shown in FIG. 1, the rotatable part 12 is in the open position for the entrance of a person. Since the main part 11 of the bathtub is closed by the cylindrical sidewalls 16 of the rotatable part 12, appropriate valves 23 may be opened to draw the bath water. Liquid seals 24 affixed to the main part 11 are provided between abutting portions of the sidewalls between the parts 11 and 12, as shown in FIGS. 1 and 2, and around the arc of the bottom closure 14 abutting the bottom closure 15 of the rotatable drum part 12 as shown in FIGS. 3 and 4. These liquid seals may be of conventional rubber materials or low friction Teflon to prevent water seepage between abutting parts which are intended to hold water.

When a person enters the bathtub which has been prefilled with water, the rotatable end part 12 must be rotated through a major arc of travel from the position shown in FIG. 1 to the position shown in FIG. 2. Thus, as shown in the drawing the drum part 12 must be rotated counterclockwise from the position of FIG. 1 to the position of FIG. 2. The person entering the prefilled bathtub must turn past a position facing the corner such that the open segment of the rotatable end 12 is closed against a circular part of the stationary sidewall 25 prior to being opened into the stationary bathtub part 11. As the rotatable part 12 opens into the main part 11 of the bathtub, water will run from the main part 11 to fill the rotatable part 12. Since the volume capacity of the rotatable part 12 less the volume of bather is small as compared to the larger volume of the main tub 11, the water level will drop but a small amount in the main tub 11.

As indicated above, the drum end 12 must rotate through the long or major arc from the open position of FIG. 1 to the

position of FIG. 2 when a person enters a prefilled bathtub. Obviously, if the bathtub is empty when the person enters, the end part 12 may be rotated in either direction to move to the position of FIG. 2. When the person enters the bathtub he may first sit on the seat 18, or he may remain standing. In the latter event the person may grasp extended rails 26 for stability when walking into the end part 12 and while the end part is rotating.

FIG. 3 shows one arrangement for driving the rotatable drum end 12 and the elevator seat 18 therein. A motor 27 is coupled to rotate a vertical shaft 28. Two drive pulleys 29 and 31 are mounted to rotate freely—the pulley 29 may rotate on the shaft 28 and the pulley 31 may rotate on the fixed hub 90. A clutch 32 may be (1) raised to engage the pulley 29 for rotation of the drum part, 12, (2) positioned in neutral with neither pulley engaged, or (3) lowered to engage the pulley 31 for moving the elevator seat 18. A belt or drive cable 33 encircles a large pulley around the circumference of the drum and provides a mechanical drive between the pulley 29 and the drum 12. The pulley 31 is coupled to multiple drive cables 19 which extend together from the pulley 31 to pulley 99 and thence to pulleys 34 which are mounted on and at the center of the bottom closure 15 of the rotatable drum part 12. Each of these cables 19 diverges radially from the pulleys 34 to its corresponding pulley mounted on the bottom of the drum closure 15 and thence vertically upwards within the drum cylindrical walls 16 to pulleys 21 to support and move the elevator seat 18. As shown in FIG. 3 the handles 22 are linked to a motor control shaft 35. The handle may be moved laterally to shift the clutch 32 from one position of engagement to the other with a neutral midposition. With the clutch engaged, the handle may be turned or moved axially to cause rotation of the shaft 35 in either direction. This shaft is coupled to a rotary reversing switch 36 such that power may be applied to run the motor in either direction. Therefore, it will be appreciated that the lever 22 may be moved laterally in one direction or the other to select either the drum end 12 or the elevator seat 18 and then the lever handle 22 may be turned or pressed axially in one direction or the other to move the selected element in either direction as desired.

FIG. 5 illustrates the linkage arrangement where lateral movement of the lever 22 actuates a bellcrank 83 which causes the clutch 32 to engage either pulley 29 or 31, and axial movement of lever 22 causes bellcrank 84 to rotate the motor control shaft 35. Assembly 85 employs a ratchet mechanism which locks pulley 31 whenever it is not engaged with the clutch 32; this action secures the cables 19 which in turn arrests the elevator seat 18 at the desired elevation.

As shown in FIGS. 3 and 4 the cylindrical end part 12 of the bathtub is supported on wheels 37 which may move upon a circular supporting rail 38. This track or rail 38 supports the drum 12 vertically while restraining it from lateral movement or tipping due to water pressure when the tub is filled. A circular gutter 86 attached to the inside face of the rail 38 lies directly below the set of pulleys 21 at the bottom of the drum walls 16 and collects any moisture carried by the cables 19 and dropped at the low point at the pulleys; the water from the gutter 86 is drained to a pipeline 88 which carries it to the tub drain 39. Any seepage of water past the circular seal 24 collects on the filler seal 89 between the circular leg of the tub closure 14 and the rail support base 87 and also drains into pipeline 88.

In FIG. 6 is shown a latch mechanism which may serve to lock the drum 12 to fixed tub 11 when the drum is oriented for invalid (1) entrance or exit as depicted in FIG. 1, and (2) bathing as illustrated in FIG. 2; the said mechanism may also serve to prevent inadvertent rotation of the drum from the bathing orientation to the exit orientation before the water in the tub is drained. The latch mechanism is located in the wall 13 of the fixed tub 11 and the latch receptacles are recessed in the cylindrical walls 16 of the rotatable drum 12. FIG. 1 shows the latch handle 58 and the receptacle 59 and FIG. 2 shows the latch handle 58 and the other receptacle 60. The latch 61

is preloaded by a spring 62 to bear against the drum wall 16. When the drum is rotated to the entrance or exit position the latch 61 snaps into the receptacle 59 to secure the drum while the invalid enters or exits; similarly, when the drum is rotated to the bathing position the latch 61 snaps into the receptacle 60 and thus secures the drum 12 to the fixed tub 11. Before rotating the drum the latch handle is moved outward to disengage the latch from the receptacle, and hold it clear of the drum wall 16 by a pawl 63. As the drum rotates and the receptacle moves past the latch 61 a ramp on wall 16 and circumferentially adjacent to the receptacle moves the latch further outward causing the pawl to rotate out of the notch in the latch and to be held out by the pawl retention flat spring 64 overriding the leg of channel 65. As the ramp on the drum wall 16 rotates past the latch, the spring-loaded latch again bears against the drum wall 16 until it engages the particular receptacle 59 or 60 when the drum 12 rotates to the next entry/exit or bathing position. As the latch snaps into the receptacle it forces the retention flat spring 64 to override the leg of the channel 65 and thus allow spring 66 to press the pawl 63 against the latch 61. Hence, when the latch is again disengaged from the receptacle 59 or 60 the pawl will engage the latch notch and thus hold the latch clear of the drum wall 16 to allow the drum to be rotated.

When the drum is in the entrance position latch 61 is engaged in receptacle 59. As water is drawn into the tub some of the water flows into pipeline 71 and then to tube 74 and causes float 72 to rise and allow stop 75 to rotate to a position adjacent to and clockwise of stop 76 on the drum cylindrical wall 16. Upon disengaging the latch the drum can only rotate in the counterclockwise rotation. This action prevents inadvertent clockwise rotation which would result in water flowing onto the bathroom floor.

When the drum is in the bathing position latch 61 is engaged in receptacle 60 which is deeper recessed than receptacle 59. The deeper recess permits the latch to move past the stop 67 so that the water from pipeline 71 causes the float 70 in tube 68 to rise and push rod 69 to cause stop 67 to be placed directly behind the latch and thus prevent disengagement of the latch until the water is drained at which time the float 70 sinks and draws the stop 67 downward from the latch.

When the drum is in the entrance position and no water is drawn it may be rotated in either direction. After it rotates in either direction and reaches the bathing position the latch 61 will engage the receptacle 60, and as shown in FIGS. 3 and 5 a stop 82 on the drum wall 16 will pivot arm 78 about fulcrum 79 to cause fitting 80 to rotate control shaft 35 and actuate the rotary switch 36 and stop the drive motor 27; at this same time stop 82 will strike bumper 77 mounted at the bottom of wall 25. Bumper 77 serves as a backup for latch 61 in case it fails to engage the receptacles 59 or 60; in addition, bumper 77 necessitates that the drum be rotated from the bathing position to the exit position in a direction opposite to the direction chosen from entrance to the bathing position and in so doing the twist on the cables 19 is limited to less than one complete turn.

FIG. 4 shows an alternative drive arrangement which may be useful with the bathtub elements of this invention. In this case, it is recognized that the elevator seat 18 need not be moved except when the rotatable drum end 12 of the bathtub is in the position shown in FIG. 2. In this position a person is ready to be lowered into or raised from the bath water. In all other positions and while the drum end is rotating, the elevator seat 18 may be locked and immovable in the raised position. As shown in FIG. 1 a square hole appears in a rotatable bearing assembly 44. The assembly 44 is flush with the cylindrical surface of rotatable end 12. When the drum end 12 is rotated to the position of FIG. 2 the bearing assembly moves around to the circular side wall 25 and becomes aligned with a square-shaped detent probe 45 (see FIG. 4). When lever 22 is moved laterally, the detent probe is moved axially into engagement with the square opening of the bearing assembly 44. The detent probe will serve to lock the drum end 12 of the

bathtub in the position aligned with the main part 11, and may be rotated to impart rotary power to the bearing assembly 44. The rotary power is coupled to the detent probe from the motor shaft 28 by a mechanical linkage 46 which may include a splined shaft 47 such that the detent probe will transmit rotary power in any axial position. Therefore, when the drum end of the bathtub is positioned as shown in FIG. 2 the bearing assembly 44 becomes aligned for engagement with the detent probe 45, which can then transmit rotary power for operation of the elevator seat 18. As shown in FIG. 4, the detent probe 45 may transmit rotary motion to a worm gear 48 which will turn a pinion 49. The pinion 49 may be coupled to turn a drive pulley which in turn is coupled to the cables 19 for supporting and moving the elevator seat 18. When the worm gear 48 is disengaged from the detent probe 45, the elevator seat becomes locked in place since no movement may be imparted to the worm gear 48 and the pinion 49 becomes locked.

When the lever handle 22 is moved laterally in one direction the detent probe is inserted into the bearing assembly 44 to rotate the worm gear 48. When the lever handle 22 is moved in the other direction, the detent probe 45 is disengaged from the bearing assembly 44, and a clutch 51 engages further mechanical linkage 52 for rotating the drum end 12 of the bathtub. In this case, a simple gear train is indicated with a pinion 53 engaging a rack gear 54 mounted circumferentially beneath the bottom closure 15 of the rotatable end part 12 of the bathtub. This arrangement provides an advantage that the rotatable cylinder end of the bathtub may be easily removed from maintenance and cleaning purposes.

Another alternative drive arrangement may be provided in the form of rotary bearing assemblies adapted for use with a handcrank. This adaptation might be useful in hospitals and nursing homes, or it may be useful as a supplement for the motor drive arrangement discussed previously. In this case, a first bearing assembly 56 (see FIG. 2) is provided in an accessible part of the rotatable drum 12. Although this bearing assembly 56 is adapted for the insertion of a handcrank, the internal mechanical linkage may be similar to that discussed in connection with FIG. 4. In this case, the rotation of the handcrank will function in the same manner as the rotation of the detent probe 45. Similarly, a further rotary bearing assembly 57 (see FIG. 2) may be provided with appropriate mechanical linkage for rotating the drum part 12 of the bathtub.

FIG. 4 illustrates an arrangement for draining the bathtub via two drains. A conventional drain 39 is positioned to drain the fixed end 11 of the tub and a second drain 43 is positioned at a low point beneath the rotatable part of the tub. The arrangement of FIG. 3 provides a single drain 39 which is intended to drain the entire bathtub. A shallow groove or channel 61 is provided to conduct water from the recess beneath the seat 18 to the forward or fixed end 11 of the bathtub such that the water will all pass to the drain 39.

The handrails 26 are optional. Indeed, it is contemplated that rails 26 may be provided which are normally recessed within the sidewalls 16 of the drum or rotatable part 12 of the

bathtub. If a person wishes to enter or leave the bathtub by standing upon the bottom closure 15 of the rotatable end part 12, the handrails 26 may be raised and locked at a convenient height such that the person may grasp and hold the rails for stability while the end part 12 rotates.

Heretofore, bathtubs have been manufactured from cast iron or steel with an enameled exterior finish. Currently, modern bathtubs are now being formed of molded plastic rather than metal. It is contemplated that most of the bathtubs produced in the future will be of molded plastic; and the major parts of the bathtub of this invention will similarly be molded from plastic. This form of manufacture will effect an economy in manufacture.

What is claimed is:

1. A bathtub comprising a fixed part and a cylindrically shaped rotatable part situated with its axis vertical; said fixed part including a bottom closure and sidewalls extending upwardly therefrom, said sidewalls having one side open and abutting against the cylindrically shaped rotatable part; said rotatable part having a bottom closure and a cylindrically curved sidewall extending upwardly therefrom, said cylindrically curved sidewall having an open segment providing an entrance into the interior of said cylindrical rotatable part and an exit therefrom; said rotatable part being operable to rotate between a first position wherein the curved sidewall of the rotatable part spans and closes the open side of the fixed part and wherein the open segment faces away from the fixed part, and a second position wherein the open segment of the rotatable part faces into the open side of the fixed part of the bathtub.
2. A bathtub in accordance with claim 1 further comprising a seat inside said rotatable part and movable vertically within the rotatable part of the bathtub; means for moving the seat between a fully raised position and a lowered position substantially flush with the bottom closure of the fixed part of the bathtub; and means for locking the seat in any desired vertical position.
3. A bathtub in accordance with claim 2 further comprising a motor for rotating the cylindrical part of the bathtub and for moving the seat vertically; and clutch means for selectively coupling the motor to raise or lower the seat vertically and to rotate the cylindrical part of the bathtub.
4. A bathtub in accordance with claim 1 further comprising liquid seals positioned between the abutting portions of the fixed part and the rotatable part of the bathtub.
5. A bathtub in accordance with claim 4 wherein liquid seals attached to the fixed tub extend vertically between the sidewalls of the fixed part of the bathtub cylindrical sidewalls and the rotatable part and wherein a liquid seal extends circumferentially around a segment of the bottom closure of the fixed part of the bathtub.
6. A bathtub in accordance with claim 4 comprising a latching means for holding the rotatable part stationary; and a liquid level sensing means coupling to release the latching means when the water has drained from the bathtub.