

[54] **BATHTUB HOIST AND TRANSFER DEVICE**

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[22] Filed: **June 29, 1973**

[21] Appl. No.: **375,150**

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[52] U.S. Cl. 4/185 L, 5/87, 214/130 R,
214/151

[51] Int. Cl. A47k 3/12

[58] Field of Search 4/185 L, 185 R, 185 AB;
5/81 R, 81 B, 83, 84, 86, 87, 88; 214/1 BC,
38 CC, 38 C, 38 CA, 75 G, 75 H, 77 R, 151,
130 R; 9/40

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[57] **ABSTRACT**

A device for transferring an invalid from a wheelchair into a bathtub and back from the bathtub into the wheelchair, consisting of a vertically pivoted frame adjacent the bathtub with a hoist assembly on the frame including a pair of parallel horizontally pivoted arms which can be attached by the invalid to a removable wheelchair seat portion. The hoist motor can be controlled by depending cables connected to forward and reverse motor switches. Other depending cables are provided for manually swinging the frame from a laterally projecting position relative to the bathtub to a position over the bathtub, and vice versa.

9 Claims, 7 Drawing Figures

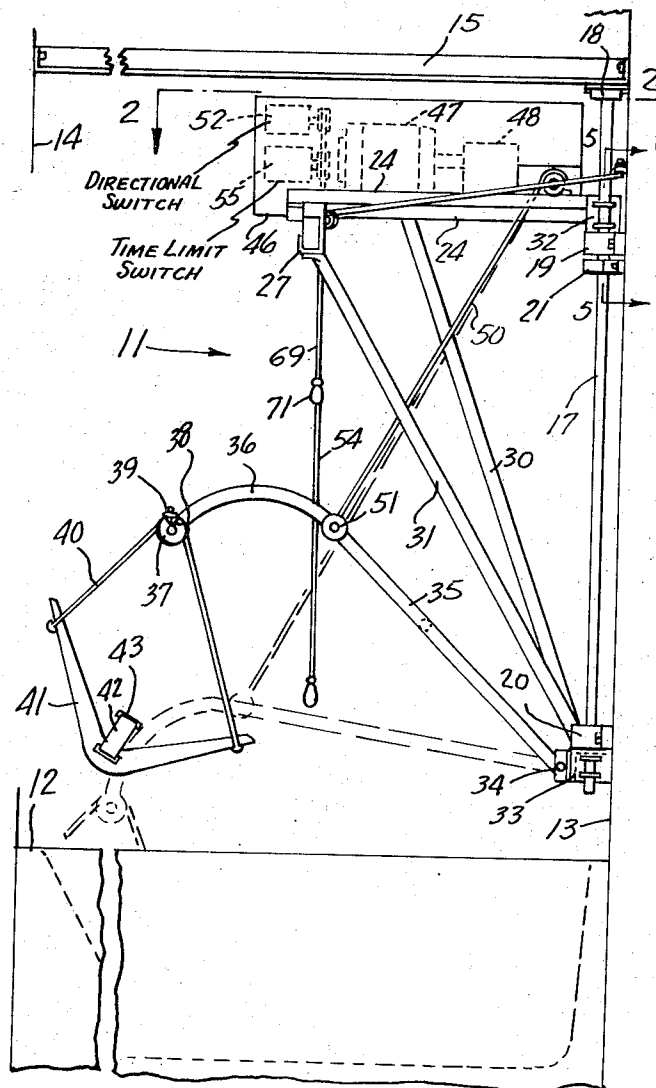


FIG. 2.

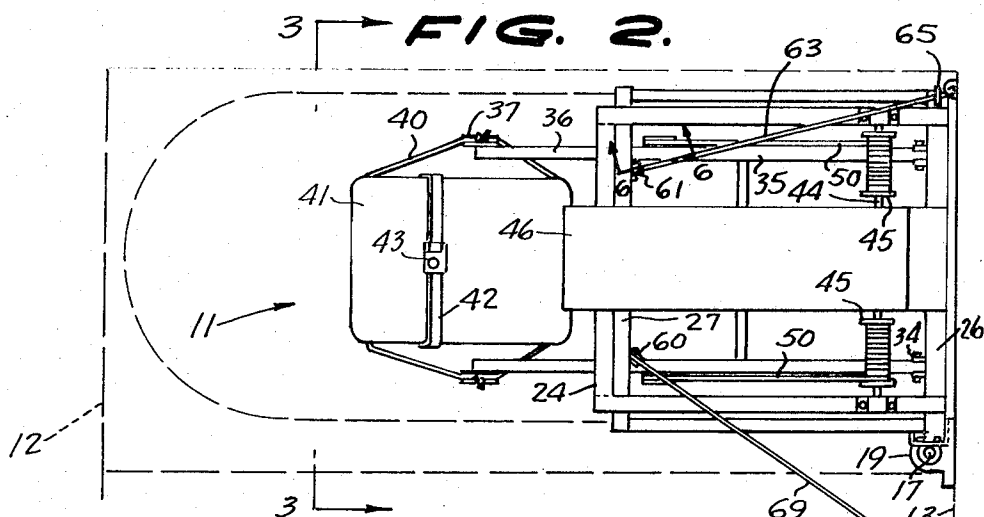


FIG. 3.

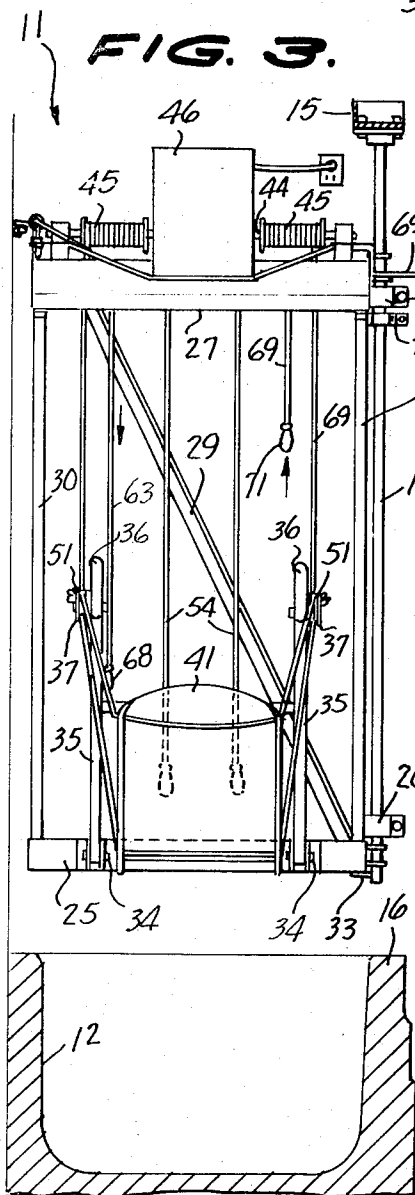


FIG. 1.

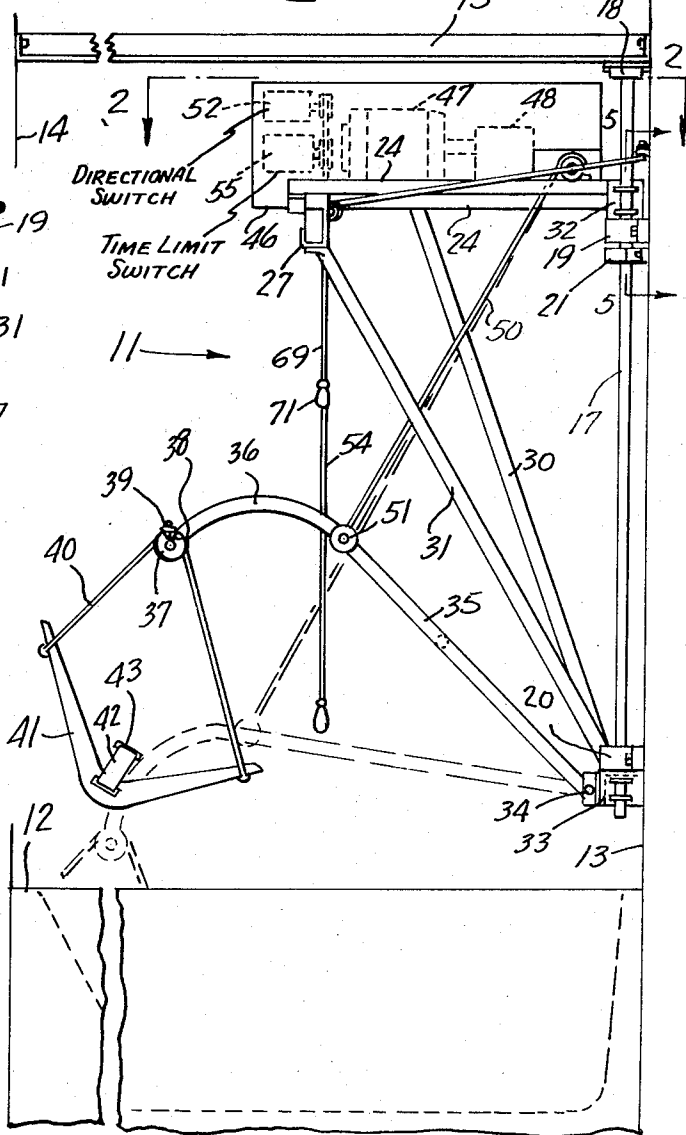
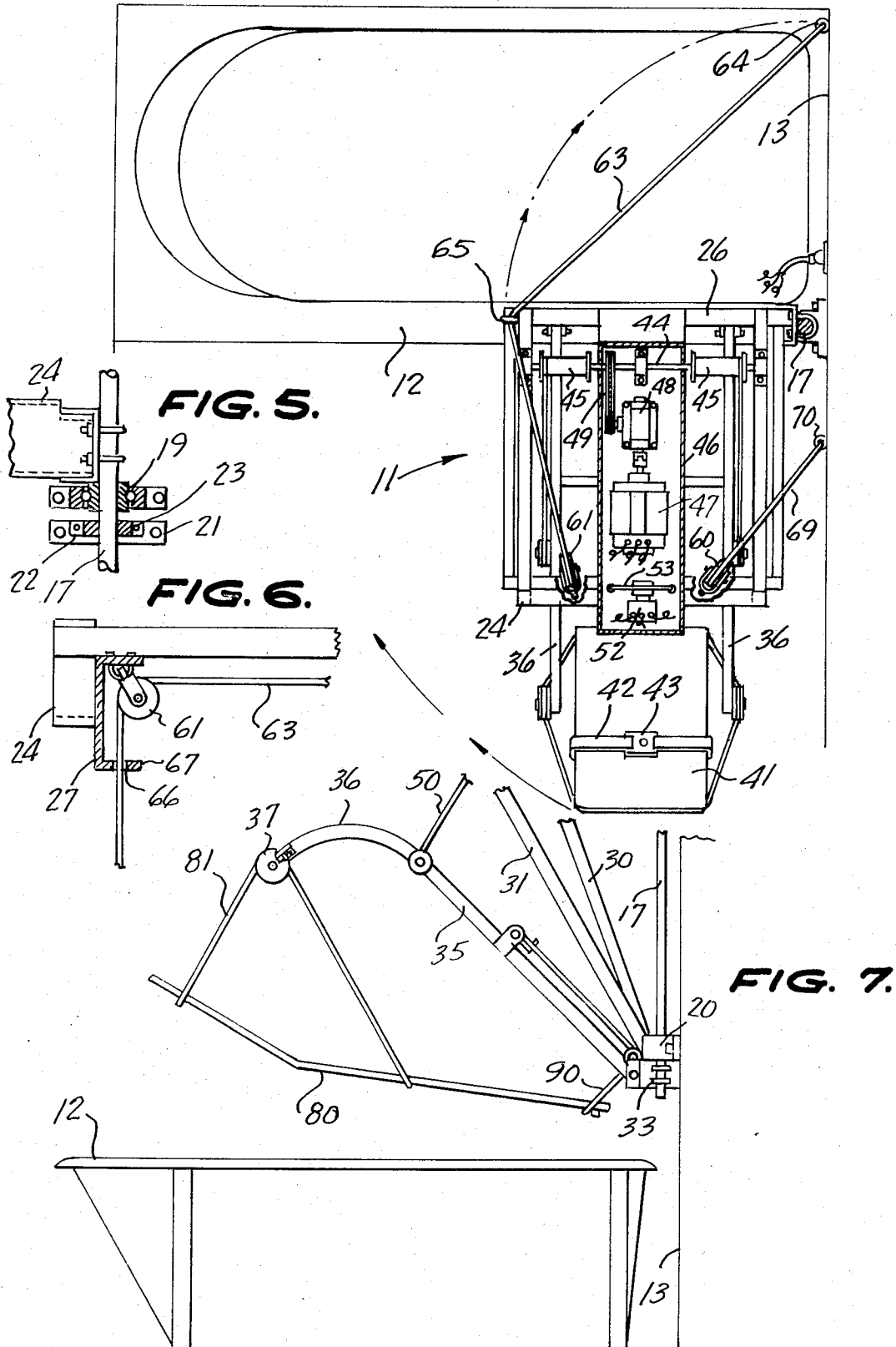


FIG. 4.



BATHTUB HOIST AND TRANSFER DEVICE

The invention relates to hoist devices for invalids, and more particularly to a self-operated lift device for transferring an invalid from a wheelchair into a bathtub and back from the bathtub into the wheelchair.

A main object of the invention is to provide a novel and improved self-operated lift device adjacent a bathtub for transferring an invalid from a wheelchair or similar support into and out of a bathtub, the device being relatively simple in construction, being easy to operate, and being safe to use.

A further object of the invention is to provide an improved invalid transfer device for use adjacent a bathtub for transferring an invalid into and out of the bathtub, the device being particularly useable with an invalid in a wheelchair and being so arranged that it can be operated entirely by the individual to transfer him from the wheelchair into the bathtub and vice versa, the apparatus being relatively compact in size, being neat in appearance, and being suitably swiveled so that it can transfer an invalid in a wheelchair laterally adjacent the bathtub to a position above and in vertically aligned position relative to the bathtub, and vice versa, with a high degree of safety and without requiring the assistance of a nurse or other attendant.

Further objects and advantages of the invention will become apparent from the following description and claims, and from the accompanying drawings, wherein:

FIG. 1 is an elevational view of an improved invalid transfer device constructed in accordance with the present invention, shown with the detachable seat portion thereof in a position overlying and in vertical registry with a bathtub adjacent to which the apparatus is installed.

FIG. 2 is a top plan view taken substantially on the line 2-2 of FIG. 1.

FIG. 3 is a transverse vertical cross-sectional view taken substantially on the line 3-3 of FIG. 2.

FIG. 4 is a horizontal cross-sectional view taken through the top portion of the apparatus of FIG. 1, but showing the frame portion thereof swung to a laterally projecting position relative to the associated bathtub.

FIG. 5 is an enlarged vertical cross-sectional detail view taken substantially on the line 5-5 of FIG. 1.

FIG. 6 is an enlarged vertical cross-sectional detail view taken substantially on the line 6-6 of FIG. 2.

FIG. 7 is a fragmentary generally schematic elevational view of a modified form of invalid lift apparatus according to the present invention employing a reclining support for an invalid instead of a wheelchair seat portion.

Referring to the drawings, and more particularly to FIGS. 1 through 6, inclusive, 11 generally designates an improved transfer device constructed in accordance with the present invention. The device 11 is adapted to transfer an invalid from a wheelchair, or the like, into a conventional bathtub 12 and to return the invalid from the bathtub into the wheelchair, as will be presently described.

The bathtub 12 is located with one end thereof adjacent to a vertical wall 13, which is a fairly common arrangement for such a bathtub. Thus, the bathtub 12 may be installed in an alcove having the vertical wall 13 at one end and another vertical wall 14 at its opposite

end, as in the typical arrangement shown in the drawings. Obviously, where the bathtub is not installed in such an alcove, a suitable vertical supporting element may be substituted for the wall 14.

In the typical installation shown in the drawings, the transfer device 11 comprises a top longitudinal beam 15 which may be of any suitable cross-sectional shape, for example, which may be of right angled cross-sectional shape, which is rigidly secured horizontally between the vertical wall 13 and the opposite vertical wall or vertical support member 14, arranged above and parallel to the bathtub 12, for example, in a longitudinal vertical plane inwardly adjacent the outer longitudinal vertical wall 16 of the bathtub, as shown in FIG. 3. A vertical shaft member 17 is journaled to the end portion of beam 15 adjacent wall 13, as shown at 18, the shaft member 17 being rotatably supported by suitable vertically spaced bearing block assemblies 19 and 20 secured to wall 13, as shown in FIG. 1. Suitable bearing means may be provided for suspending the shaft 17 from the beam 15 while rotatably supporting same, for example, the top bearing assembly 18 may include a suitable flange or collar secured to the shaft 17 which is supported on ball bearings, or the like, including the bearing assembly 18. The bearing units 19 and 20 may also include ball bearings, as shown in FIG. 5.

Free rotation of the shaft 17 is limited or retarded by the provision of a frictional braking unit 21 located below the upper bearing assembly 19, as shown in FIG. 5, and comprising an apertured block 22 having a friction collar 23 secured therein, the shaft 17 extending through the friction collar 23 and being frictionally engaged thereby to retard rotation of the shaft member 17. The collar 23 may be of any suitable friction material, such as felt, rubber, or the like, and closely receives the shaft 17 with a snug frictional fit.

Clampingly secured to the shaft 17 immediately above and below the bearing units 19 and 20 is a frame structure comprising a top platform assembly 24 and a bottom horizontal bar 25. The platform structure 24 is generally rectangular in shape and is connected to shaft 17 at one corner thereof, as shown in FIG. 2. The bottom bar 25 is substantially vertically aligned with and parallel to the transverse bar element 26 of platform structure 24 adjacent the swiveled connection of the swingable frame structure at the shaft 17. The top platform structure includes an outer transverse bar element 27 as well as the inner transverse bar element 26 substantially in vertical alignment with the bottom transverse bar element 27. The bottom transverse bar element 25 is rigidly braced to the top transverse bar element 26 by an inclined strut bar 29, as shown in FIG. 3, and the end portions of said bottom bar element 25 are firmly braced to the top platform structure 24 and the cross bar member 27 by additional respective strut bars 30 and 31, as shown in FIG. 1.

As shown in FIG. 1, the frame structure is clamped to the shaft 17 by an upper bracket 32 immediately above the upper bearing assembly 19 and by a lower bracket 33 immediately below the lower bearing assembly 20. The lower bracket 33 is secured rigidly to the end of the bottom cross bar 25. Pivoted to the bottom cross bar 25 at 34, 34 are respective arms 35, 35 which extend parallel to each other and which are spaced inwardly from the ends of the cross bar 25, as shown in FIG. 3. The arms 35 are provided with arcu-

ately curved upwardly convex outer end portions 36,36. Journaled to the ends of the arcuate portions 36 are respective peripherally grooved pulleys 37,37 whose flanges are notched at 38 to receive knots 39 formed in supporting slings 40 attached to the ends of opposite side portions of a seat 41 for supporting the invalid to be transferred to and from the bathtub 12 in a manner presently to be described. The seat 41 may be of suitably rigid construction, for example, may be formed of molded plastic material, and may be of a type adapted to fit on a wheelchair. The seat 41 is provided with a conventional adjustable seat belt assembly 42 provided with a conventional detachable buckle assembly 43, as shown in FIG. 4.

Transversely journaled on the top platform assembly 24 is a winch shaft 44 carrying respective cable reels 45,45 spaced on opposite sides of a longitudinally extending housing 46 mounted on the platform structure 24. Mounted in the housing 46 is a driving motor 47 connected through a conventional speed reducing gear set 48 and a further speed reducing sprocket and chain assembly 49 to the winch shaft 44, as shown in FIG. 4.

The reels 45,45 carry respective cables 50,50 which are connected to the arms 35,35 at 51,51, namely, at the inner ends of the arcuate portions 36, as shown in FIG. 1. The motor 47 is of the reversible type and is energized from a conventional power source, such as a conventional house current supply receptacle, through a reversing switch 52 having an operating disc element 53 to which are oppositely connected a pair of depending cables 54, 54 depending in front of the seat 41, as shown in FIG. 1. Also include in the energizing circuit for the motor 47 is a time limit switch 55 likewise operatively connected to the cables 54 to be simultaneously operated with the directional switch 52 and which operates to turn off the motor 47 at a predetermined period of time after energization thereof. The timed operation provided by the time limit switch 55 is such as to cause the seat 41 carrying an occupant to rise enough to clear the tub 12 and to allow the seat and occupant to be swung over the tub. Similarly, when the seat 41 is lowered, the time limit switch 55 will provide a sufficient time period of operation of motor 47 to lower the seat 41 and its occupant into the bottom of the tub, after which the motor 47 will be automatically turned off. Thus, time limit switch 55 is of a conventional type which remains closed after actuation thereof for a settable small period of time, after which it opens. The time limit switch 55 is of a type which will operate in the same manner as the directional switch 52, namely, by means of a disc element connected to its operating shaft, the disc element being suitably connected to the manually operated cables 54,54.

Connected to spaced portions of the upper cross bar member 27 are respective pulley assemblies 60 and 61, spaced on opposite sides of the longitudinally extending central housing 46, as shown in FIG. 2. A first swinging control cable 63 has one end thereof connected to an eye bolt 64 secured to the wall 13 adjacent the inner corner of the recess containing the bathtub 12, as shown in FIG. 4. The cable 63 passes through a guiding eye bolt 65 secured on the corner portion of the platform structure 24 adjacent the end of bar 26 opposite shaft 17, namely, adjacent the left end of bar 26, as viewed in FIG. 4, the cable 63 passing over the pulley 61 and extending downwardly through an aperture 66 in the bottom flange 67 of cross bar 27, as

shown in FIG. 6. The bottom end of cable 63 is provided with a gripping handle 68 located within reach of the occupant of the seat 41. Another cable 69 has one end thereof secured to wall 13 at an eye bolt 70 spaced outwardly from the swivel shaft 17, as shown in FIG. 4, the cable 69 passing over the pulley 60 and extending downwardly in the same manner as the cable 63, being provided at its bottom end with a gripping handle 71 located within reach of the occupant of the seat 41.

As shown in FIG. 1, the cables 54,54, 63 and 69 have their depending end portions preferably located in a common transverse vertical plane spaced forwardly relative to the seat 41, said plane being sufficiently close to the seat 41 so that the occupant of the seat may readily grasp the ends of the cables for operating the device, as will be presently described.

The apparatus is initially positioned in the manner shown in FIG. 4, namely, with the frame structure 24 swung outwardly to a transversely projecting position relative to the bathtub 12. The seat 41 normally is disposed as a part of the wheelchair containing the invalid to be transferred. The pivoted arms 35,35 are in lowered positions, and the flexible sling portions 40 are first engaged over the pulleys 37 with the knots 39 of the flexible sling elements 40 engaged in the notches 38. The occupant of the seat 41 may then energize the motor 47 to elevate the seat 41, for example, to the position thereof shown in FIG. 1, by pulling the appropriate cable 54 to energize motor 47 in a direction to raise the seat. The time limit switch 55 stops the motor when the seat 41 has been elevated to the proper height. The occupant then swings the frame structure 24 inwardly over the bathtub to the position thereof shown in FIG. 2 by pulling on the cable 63, which causes the frame structure 24 to be rotated in a clockwise direction, as viewed in FIG. 4, around the swivel axis defined by vertical shaft 17. When the frame structure 24 has been brought to the position thereof shown in FIG. 2, namely, overlying the bathtub 12, the seat 41 may be lowered by energizing the motor 47 to lower the seat by pulling on the appropriate cable 54, causing the motor to be energized in the reverse direction from its initial stage of energization. Again, the time limit switch 55 cuts off the motor after the seat 41 has been lowered sufficiently to place the seat at the bottom of the bathtub with the occupant thereof in the desired bathing position.

After bathing, the above-described procedure may be reversed, namely, the seat 41 may be first elevated by pulling the appropriate cable 54 to energize motor 47 in a direction to raise the seat 41 to the position thereof substantially shown in FIG. 1. The frame structure 24 may then be swung outwardly by pulling on the cable 69, causing the frame structure 24 to be swung to the outwardly extending position shown in FIG. 4. The seat 41 may then be lowered on to the wheelchair by pulling on the appropriate switch cable 54 to cause the motor 47 to be energized in a direction to lower the seat on to the wheelchair, the motor being automatically deenergized after sufficient lowering of the seat by the action of the time limit switch 55. The side sling cables 40 may then be disengaged from the notched pulleys 37, allowing the occupant to leave the area in the wheelchair.

In the modification shown in FIG. 7, a suitably shaped reclining support 80 is substituted for the seat 41 in the previously described embodiment of the in-

vention, so that a patient may be transferred in a reclining position rather than a sitting position. Thus, the reclining support 80 is provided with flexible side cable sling members 81, similar to the previously described flexible cable side sling members 40, the cables 81 being similarly provided with safety knots to engage in the slots 38 of the pulleys 37 in the same manner as in the previously described embodiment of the invention, and the arms 35, 35 are provided with an end sling 90, to stabilize the support 80 relative to the rotatable arms 35 while said arms are being raised or lowered by their supporting cables 50,50. The control cables 54,54, 63 and 69 may be operated either by the occupant of the reclining support 80 or by an attendant, depending upon the physical ability of the patient being transferred.

As shown in FIG. 3, the motor operating cables 54,54 are preferably located centrally between the frame-swinging cables 63 and 69, for convenience to the occupant in controlling the operation of motor 47. While the frame-swinging cables 63 and 69 are located outwardly of the motor control cables 54,54 the cables 63,69 are still well within reach of the occupant of the seat 41 or the reclining support 80.

It will be further noted that since the swingable frame structure 24 is generally rectangular and is pivoted vertically at a corner thereof adjacent to a corner of the bathtub and is of the same order of width of the bathtub, it can be swung into a position substantially nesting within the recess containing the bathtub, namely, to a position such as that shown in FIG. 2, wherein the seat 41 is disposed over the portion of the bathtub in which it is usually desired to position the occupant. Also, the location of the swivel shaft 17 is such that the swingable frame structure can be swung readily to the outwardly extending transverse position thereof shown in FIG. 4 providing easy access to a wheelchair located adjacent to the bathtub. Thus, the occupant of the seat 41 may swing himself over the bathtub by pulling on the cable 63 with his left hand, whereas he may swing himself outwardly away from the bathtub to the position of FIG. 4 by pulling on the cable 69 with his right hand. Similarly, one hand can be used to energize motor 47 by pulling on one of the cables 54 to raise the seat 41 while the other hand may be used to lower the seat by pulling on the other cable 54.

While a specific embodiment of an improved device for transferring an invalid from a wheelchair into a bathtub and vice-versa has been disclosed in the foregoing description, it will be understood that various modifications within the spirit of the invention may occur to those skilled in the art. Therefore, it is intended that no limitations be placed on the invention except as defined by the scope of the appended claims.

What is claimed is:

1. In combination, a bathtub, a horizontally extending frame structure, means pivotally supporting said frame structure in an elevated position at a fixed height relative to the bathtub for horizontal rotation around a vertical axis located so that said frame structure may be swung from a position projecting laterally from the

bathtub to a position overlying the bathtub, and vice versa, a hoist means on the frame structure, a body-supporting member connected to said hoist means, and means for rotating said frame structure in opposite directions comprising respective externally connected control cables extending over opposite side portions of the frame structure and depending from said frame structure adjacent said body supporting member, whereby a person occupying said body-supporting member may be elevated by said hoist means, may be swung over the bathtub, and may be then lowered into the bathtub by said hoist means.

2. The structural combination of claim 1, and wherein said hoist means comprises a hoist mechanism including a cable reel and an electric motor operatively connected to said cable reel mounted on said frame structure, and control means for said electric motor depending from said frame structure and extending adjacent said body-supporting member.

3. The structural combination of claim 1, and wherein the vertical axis of rotation of said frame structure is located adjacent an outer end corner portion of the bathtub.

4. The structural combination of claim 3, and wherein said bathtub is located adjacent a vertical wall and the means pivotally supporting said frame structure comprises a vertical shaft member journaled to said vertical wall.

5. The structural combination of claim 4, and wherein said control cables are respectively secured to said vertical wall on opposite sides of said vertical shaft member.

6. The structural combination of claim 5, and wherein the frame structure is provided with respective rotatable guide pulleys located on opposite sides of said frame structure and spaced longitudinally from said vertical wall, said control cables extending over said guide pulleys.

7. The structural combination of claim 6, and wherein said frame structure is provided with a bottom cross bar portion rigidly secured to the lower end portion of said vertical shaft member, and said hoist means comprises a pair of arms pivoted to said cross bar portion, means supportingly connecting said body-supporting member to the free end portions of said arms, and a cable hoist mechanism on the frame structure having cables connected to the intermediate portions of said arms.

8. The structural combination of claim 7, and wherein said hoist means further comprises an electric motor mounted on the frame structure and drivingly connected to said cable hoist mechanisms, control switch means operatively connected to said electric motor, and control cables operatively connected to said control switch means and extending adjacent the body-supporting member.

9. The structural combination of claim 8, and wherein the respective control cables are located substantially in a common transverse vertical plane located adjacent to the body-supporting member.

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