July 24, 1962 I. PIRTLE ETAL 3,045,255

DEVICE AND MECHANISM FOR RAISING AND LOWERING INVALIDS

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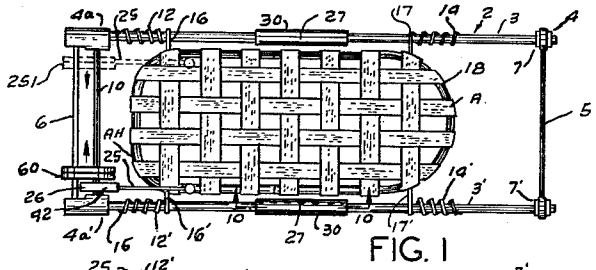


FIG. 1

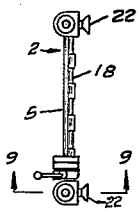


FIG. 3

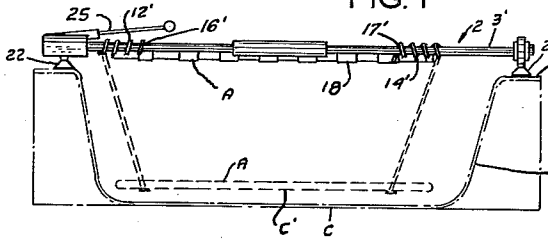


FIG. 2

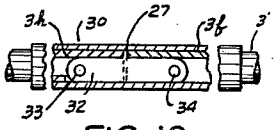
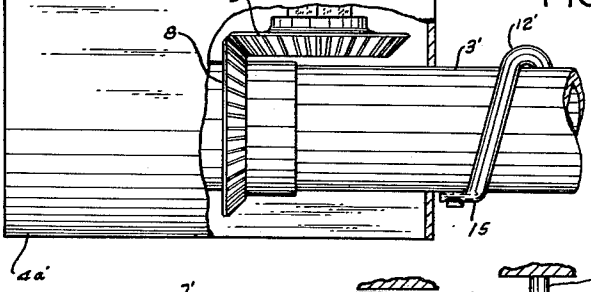


FIG. 10

FIG. 4



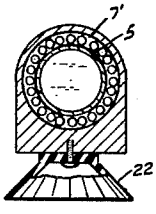


FIG. 9

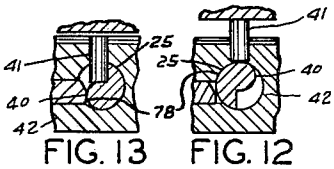


FIG. 13 FIG. 12

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DEVICE AND MECHANISM FOR RAISING AND LOWERING INVALIDS

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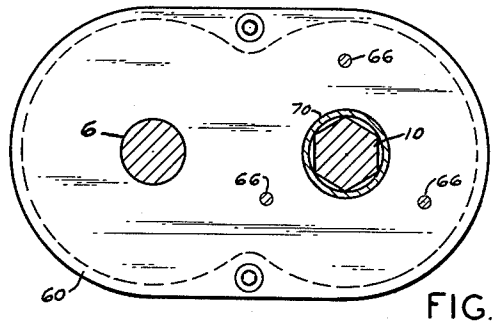


FIG. 5

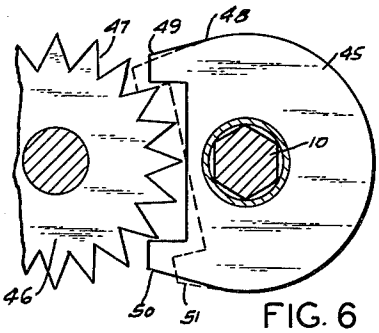


FIG. 6

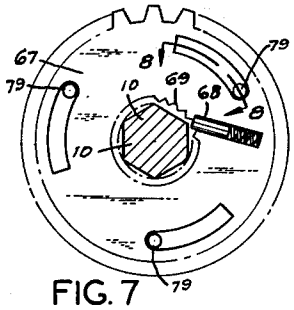


FIG. 7

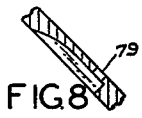


FIG. 8

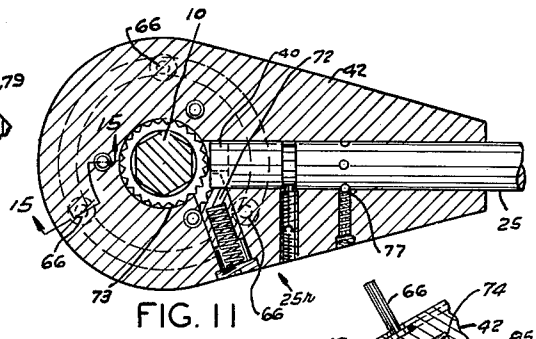


FIG. 11

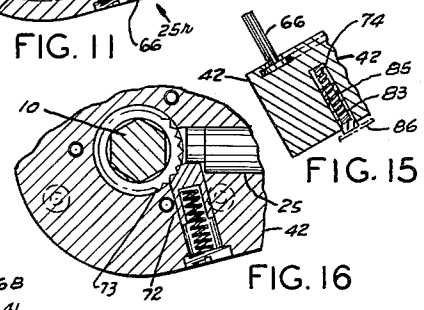


FIG. 15

FIG. 16

FIG. 14

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DEVICE AND MECHANISM FOR RAISING AND LOWERING INVALIDS

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1 Claim. (Cl. 4—185)

This invention concerns a device and mechanism for raising and lowering invalids or those persons who have lost the use of their limbs from and into a bathtub or similar utensil.

More particularly, the device concerns mechanism which is easily applied to the top of the conventional standard bathtub and when so applied can be used to lower and raise a platform basket into and from the tub to which the mechanism is applied.

One of the objects of the invention is to provide a device which has a frame at the top which will rest on the rim of the bathtub and mechanism associated with the frame which will raise and lower a platform on which an invalid person is positioned and will enable him to raise the platform from the bottom of the tub when desired by a lever which has a ratcheting motion or to lower the platform into the tub when desired at a predetermined controlled speed.

Another object is to provide mechanism which will rest on the top of a standard bathtub and support a platform or basket on which a patient may rest and lower it at will into the bathtub at a controlled speed and will, when desired, provide a lever which can be ratcheted back and forth and will raise the platform with the occupant thereon from the bottom of the tub to the level of the top edges of the tub.

Still another object is to provide mechanism, as above described, wherein the mechanical devices for raising and lowering the basket are positioned within cases attached to part of the mechanism and movable from side to side so that the ratcheting lever may be shifted from one side to the other to enable the user to operate it with either arm.

Still another object is to provide mechanism within the case which is slidable on the lifting mechanism, as above stated, which will contain ratcheting mechanism and gearing so that the ratchet mechanism may be disconnected when desired by manipulation of the ratchet lever and escapement mechanism may be connected and rendered operative by the same lever.

Still another object is to provide means for folding the framing which rests on the top of the tub to make it more convenient and mobile.

Other objects will appear hereinafter.

We attain the foregoing objects by means of the mechanism, devices and parts illustrated in the accompanying drawings, in which—

FIGURE 1 is a plan view of the whole device showing the framework which is adapted to rest on the top edges of a bathtub, the platform for the operator and user, and the operative mechanism generally;

FIGURE 2 is a side elevational view of the device shown in FIGURE 1 with the lowered position of the platform shown in dotted lines and the outline of the tub on which the frame rests shown in dashed lines;

FIGURE 3 is an end view of the device as shown in FIGURE 1;

FIGURE 4 is a view of the mechanism in the lower left hand corner of FIGURE 1, drawn on an enlarged scale and with portions broken away to show interior mechanism.

FIGURE 5 is a section taken on line 5—5 of FIGURE

4 showing the gear case and the operative lifting shafts, drawn on an enlarged scale;

FIGURE 6 is a side elevational view of the escapement mechanism together with the shafts on which it operates, drawn on an enlarged scale;

FIGURE 7 is a side elevation of a portion of the ratcheting mechanism contained within the gear case and showing means for disconnecting the ratcheting mechanism from the escapement mechanism;

FIGURE 8 is a fragmentary view of the gear and drive means, shown in section on line 8—8 of FIGURE 7;

FIGURE 9 is a view of one corner end of the frame adapted to rest on the tub, drawn on a somewhat enlarged scale and showing the holding cups and bearings for the side rails of the frame;

FIGURE 10 is a section taken on line 10—10 of FIGURE 1 showing a fragment of one of the side rails, showing the mechanism for folding the side rails to shorten their length when the device is rendered inoperative;

FIGURE 11 is a sectional elevation taken on line 11—11 of FIGURE 4, showing the case containing the ratcheting mechanism and the operating lever for the ratchet and showing details of the movement of this lever to disconnect the ratchet and render the escapement mechanism operative;

FIGURE 12 is a fragmentary section taken on line 12—12 of FIGURE 4 showing a portion of the ratchet case, the operating lever, and disconnecting means in disconnected position;

FIGURE 13 is a similar view showing a section taken on line 13—13 of FIGURE 14 with the operating lever and attached parts in ratcheting position;

FIGURE 14 is a plan view of a corner of the frame showing the lifting and lowering mechanism, drawn on an enlarged scale and with portions thereof broken away to show the interior;

FIGURE 15 is a fragmentary section taken on line 15—15 of FIGURE 11, showing the disconnecting pins;

FIGURE 16 is a fragmentary view of the ratchet case showing operation of the ratchet lever as rotated to disconnect the ratchet pawl.

Similar numerals refer to similar parts in the several views.

As shown in FIGURES 1, 2 and 3, the device consists mainly of a frame 2 which has side rails 3 connected at its corners 4 to end members 5 and 6. The corners which connect the right hand ends of the frame side members, marked 3', to the end member 5 include bearings 7 and 7'. These bearings are of a type which will align themselves without binding. The corners, marked 4*a* and 4*a'*, contain bearings of the self-aligning type and miter gears 8 and 9 communicate motion from the driving shaft 10 to the side members 3 and 3'.

The side members are each provided with head lifting cords 12 and 12' and foot lifting cords 14 and 14'. These cords are wound around the members 3 and 3', respectively, with the starting end 15 attached to the side member. The cords 12 and 12' are wound in opposite directions for the reason that the side members rotate in the opposite direction. The unattached ends of the cords are attached at 16 and 16' to the respective sides of the basket platform A near the head end AH, as indicated. The cords 14 and 14' and their loose ends are attached to the frame 18 near the foot of the platform A at points marked 17 and 17'.

The frame of the device is placed upon the rim 20 of the top edge of the tub, indicated at 21. In this position the frame rests on the rubber feet 22 which are positioned on the bottom of each corner. With these feet 22 resting on the tub the side members 3 and 3' are parallel with the sides of the tub and the platform A is positioned over

the central portion C of the tub. The user then seats himself on the platform A and manipulates the operating lever 25 of the mechanism generally indicated by numeral 26 so that the platform will descend to the bottom of the tub as indicated by dotted outline C'.

Each side member 3 and 3' is broken at 27 so that it may be folded to enable the side members to be shortened. As shown in FIGURE 10, the break 27 is covered by a sleeve 30 which will hold the ends of the broken portions together and maintain each of the side pieces in rigid alignment. To enable the side pieces to transmit rotation from the portion near the head end to the portion near the foot end, a link 32 is positioned on the interior of each of the side pieces 3, as shown particularly in FIGURE 10. The link is connected to the side piece portion next to the head end, marked 3*h* by a pin 33 and by a pin 34 to the side piece portion 3*f*. The portion 3*f* indicates the portion of each side piece 3 and 3' nearest the foot portion of the frame.

With the entire device placed on the tub, as above explained, and the user resting on the platform A, the ratchet arm 25 may be ratcheted to raise the platform by a to and fro motion and may rotated with the hand of the user contacting the radial pin 35 to disconnect the ratcheting mechanism and render the escapement mechanism operative so that the platform will descend to the bottom of the tub to the position C' at a controlled speed.

The ratcheting mechanism is generally indicated by numeral 25*r* and the escapement mechanism, by numeral 25*e*.

The side members 3 and 3' rotate to wind up the cords 12 and 12', and 14 and 14'. Miter gears, such as indicated at 8 and 9, in the corner marked 4*a*', are used to communicate motion from the driving shaft 10 to the tubular side member 3'. In the same way gearing within the corner case 4*a* is used to communicate rotary motion from shaft 10 to the tubular side member 3.

Shaft 10 may be driven in a clockwise direction, as viewed in FIGURE 11, by ratcheting mechanism 25*r*. This rotation of this shaft winds up all cords supporting the frame 18. When ratchet lever shaft 25 is rotated and eccentrically disposed cam 40 presses pin 41 outward from ratchet case 42 and disconnects the ratchet mechanism by withdrawing pins 66 from holes 79 in gear 67 so that gear 67 and shaft 10 are free to rotate. When so disconnected both side members 3 and 3' tend to rotate due to the windings of the various supporting cords. When the side members 3 and 3' rotate and consequently rotate shaft 10 its rotative movement is slowed by the escapement mechanism 25*e*. This escapement mechanism consists of gearing 45 and 46 which communicates rotative motion to escapement wheel 47. The motion of escapement wheel 47 is limited by the escapement spanner 48 which moves from a position detained by prong 49 to the position held by prong 50, as it oscillates from the position shown in solid lines 46 to the position shown in dotted lines 51 in FIGURE 6. Due to the fact that the gear 45 and 46 increases its speed of rotation of the ratchet wheel 47 it may rotate rather rapidly but the step-down or slowed relation of this wheel to shaft 10 slows the speed of shaft 10 and consequently the rotation speed of side members 3 and 3' to a point where they unwind the cords 12 and 12' and 14 and 14' at a comparatively slow speed and thereby lower platform A gently and slowly to the bottom of the tub at position C'.

The shift from the ratcheting mechanism to the escapement mechanism is accomplished by moving case 42 containing ratchet mechanism from the case 60 containing the escapement gearing and mechanism. When pin 41 forces case 42 away from the face 62 of case 60 three pins 66 are moved outward from their engaging positions in holes 79 on the face of ratchet holding gear 67. When they disengage from this holding position the gear 67 is free to rotate and since it is connected through gearing to the escapement mechanism 47 and 48 the entire escapement mechanism is released and operative. Conversely, when pin 41 is withdrawn into case 42, as shown in FIGURE 13, then the pins 66 engage in holes 79 and wheel 67 will not rotate except in a counterclockwise direction (FIGURE 7) whereupon ratchet holding pawl 68 engages teeth 69 on the thimble 70 which is slidably held on shaft 10 so that the shaft 10 is restrained from rotation which would unwind the cords which hold platform A. In this way partial rotation of shaft 10 made by the operation of the ratchet pawl 72 on the ratchet teeth 73 when the ratchet lever 25 is rocked is retained. A spring loaded ball 77 holds shaft 25 in the rotative positions desired. Note that in FIGURE 12 the rotative position of shaft 25 places the eccentric cam 78 in a position to force pin 41 outward and therefore force case 42 away form case 60. Whereas, in FIGURE 13, the eccentric 78 on shaft 25 is rotated to permit pin 41 to be withdrawn into case 42 and thereby permit the pins 66 to be pushed into case 60 and consequently into engagement with the holes 79 in gear 67. A pin 83 in a hole 85 in case 42 is normally urged by spring 74 outward against flange 86 on thimble 70, to urge case 42 toward case part 62 and pins 66 into engaging position with gear 67.

In addition to the shifting motion of the ratchet case 42 for the positions above stated, the entire ratcheting and escapement mechanism is slidable on thimble 70 which slides on shaft 10. Thus, the entire operating mechanism may be shifted from the right hand side, as shown at 25 in FIGURE 1 to a left hand position 251 indicated in dotted lines in FIGURE 1.

We claim:

A machine for raising and lowering invalids from and into a bathtub comprising a frame having a head end and a foot end, and adapted to rest on the top edge of a bathtub, including two parallel longitudinal rotating side rails, held in spaced relation by transverse end members, a transverse shaft at the head end of said frame operatively geared to said side rails, a basket platform centrally disposed within said frame, having straight side members and rounded ends, centrally disposed within said frame, cords attached to and suspending the end portions of the side members of said platform and extending to and wound around the side rails of said frame so that rotation of said side rails will raise and lower said platform, mechanism on said transverse frame shaft for rotating said shaft and said side rails to wind up and raise said cords suspending said basket platform and to unwind said cords and lower said platform, comprising a case supported on said shaft and the transverse head frame member, gearing within said case including an oscillating escapement mechanism, and a gear on said transverse shaft meshing with a train of gears, arranged in increased speed relation, driving said escapement mechanism, and a ratchet shaft journalled on said transverse shaft, a ratchet case enclosing said ratchet shaft having a radially extending ratchet lever adapted to oscillate said case, pawl mechanism within said case to rotate said ratchet mechanism so as to turn said transverse shaft and said side rails to wind up the cords suspending said platform and raise said platform, a holding pawl in said gear case operative on said ratchet shaft to hold said shaft against reverse rotation when said ratchet and pawl mechanism are operated to lift said basket platform, and means operated by said ratchet lever for operatively disconnecting said ratchet mechanism from said transverse shaft to permit said shaft to lower while the rotation of said shaft and side rails is restrained by said escapement mechanism.

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