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Patient hoists.

Mobile hoist for lifting, transporting and lowering patients or other subjects with impaired mobility includes a wheeled chassis (10) mounting a rigid vertical mast (16) at one end having a slider formation (22) guided for vertical movement thereof in a controlled self-braking manner by jacking mechanism actuated by a crank handle (42). A cantilever arm or jib (20) extends from said formation cranked both in the vertical aspect so that it can reach over the side of e.g. a bath and in plan somewhat to one side of the centre line of the hoist, its outer end carrying a seat support ring (26). A seat (28) having an open centre so that it can be used for toilet purposes is rotatable on the ring relative to the remainder of the hoist so that a subject seated thereon can be turned to face at least to the front or rear of the hoist.

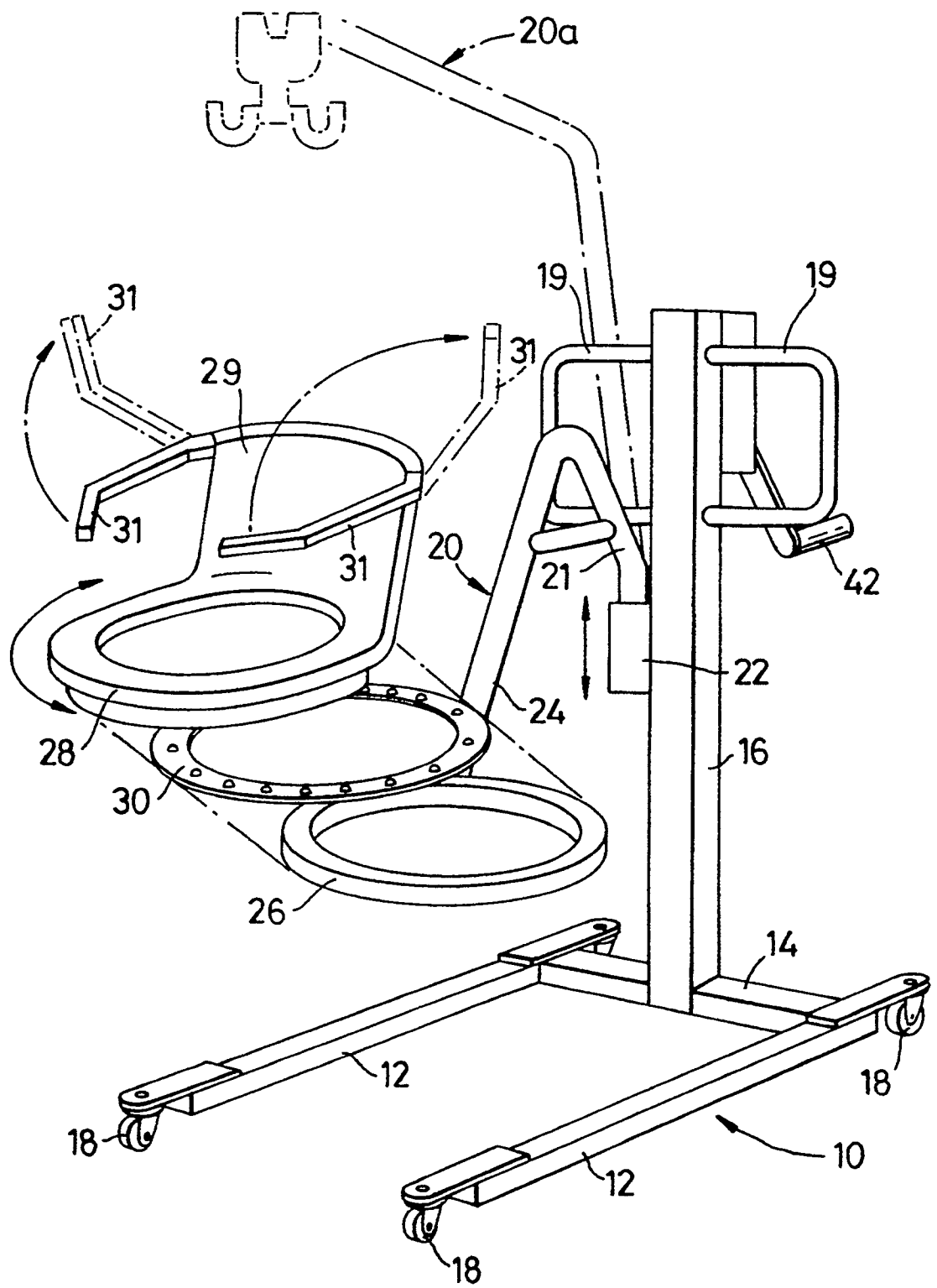


Fig. 1

This invention relates to mobile hoists for lifting, transporting and lowering patients or other subjects having impaired or restricted mobility as in hospitals, homes for the elderly or disabled, and other similar situations.

The difficulties and dangers in moving bedridden patients are well known and various forms of mobile hoists have been proposed for assisting the process e.g. transferring a non-mobile patient from bed to chair, to a toilet, or into and out of a bath or shower, however some of the hoists in use have limited adaptability and are not always convenient or acceptable to patients or helpers particularly where space is limited.

The object of the invention is to provide a mobile hoist for patients which is of durable and reliable construction, simple, safe and adaptable in uses comfortable for the patient or other subjects and which can be fully operated in confined spaces.

According to the invention there is provided a mobile patient hoist comprising a seat operatively positively located on a seat support element of the hoist which element can be selectively raised and lowered by jacking mechanism thereof characterised in that the seat is rotatable relative to the support element about an operatively vertical axis within the area of the seat.

Preferably but not essentially the seat is of generally toroidal form in plan and is mounted for rotation on said support element by annular bearing means so as to leave an unobstructed central opening whereby a patient carried thereon can be positioned to use a toilet without transfer from the hoist.

It is also preferred that the seat support element is so disposed that a subject sitting on the seat can be rotated at least between positions at which he or she faces to the front and to the rear of the hoist.

The jacking mechanism for raising and lowering the support element conveniently comprises rotary drive means operable in forward and reverse directions for positive controlled raising and lowering motion of the seat with automatic braking thereof positively preventing at least any said lowering movement when no said rotary drive is being applied.

Some embodiments of the invention together with certain variations and modifications therein are now more particularly described with reference to the accompanying diagrammatic drawings, wherein:-

Figure 1 is a part-exploded perspective view of a first form of patient hoist;

Figure 2 is a diagrammatic side elevation thereof;

Figure 3 is a diagrammatic plan view thereof;

Figure 4 is a diagram of jacking mechanism of said hoist;

Figure 5 is a sectional view of a manual drive of said mechanism;

Figure 6 is a sectional view of an alternative form of said manual drive;

Figure 7 is a side elevation of a second form of patient hoist;

Figure 8 is a plan view of the latter hoist; and

Figures 9, 10 and 11 are respectively a side elevation, plan view and end elevation of a third form of patient hoist.

Referring firstly to Figures 1, 2 and 3, a patient hoist includes a chassis 10 of generally conventional construction comprising a pair of parallel spaced side members 12 at near ground level connected by a cross member 14 adjacent one end. A vertical mast 16 is mounted rigidly at the centre of cross member 14 and the side members 12 are provided with ground engaging castor action wheels 18 so that the entire hoist, with or without a patient thereon, can be manually propelled to the required location. Brakes (not shown) will be provided acting on one or more of the wheels 18. The cross member 14 may be telescopic or otherwise adjustable in effective length for varying the track to provide added stability if the hoist is operable to raise a patient to a high level or off-centre, but allowing the track to be reduced to a minimum for manoeuvring through narrow doors or into and out of restricted locations such as a toilet cubicle.

Handlebars 19 are provided near the top of mast 16 for propelling and manoeuvring the hoist.

A patient support element in the form of a rigid cantilever jib seat support arm 20 is guided for vertical movement up and down mast 16. As best seen in Figure 1 arm 20 is generally of inverted V shape with a shorter proximal limb 21 cranked downwardly parallel to a side face of mast 16 and the end of that limb engaged in a socket of a slider formation 22 running in a vertical slot in the side of mast 16 for guidance and for operation by jacking mechanism of the hoist referred to hereafter. A median portion of arm 20 thus extends forward of mast 16 and to one side thereof angled as best seen in Figure 1 with a longer distal limb 24 extending downwardly and somewhat away from the centre line of the hoist.

An annular seat support ring 26 is rigidly attached to the lower end of limb 24 to lie in a horizontal plane somewhat below the level of formation 22 and substantially centered in the horizontal plane with respect to the hoist as a whole. A seat 28 is mounted on support ring 26 by means of a large diameter ring bearing 30 (shown in exploded relationship in Figure 1) so that the seat is captive thereon but can rotate about the axis of ring 26 with respect to the remainder of the hoist.

The seat may be provided with fixed, adjustable and/or removable arms and backrest and/or various forms and shapes of seat may be provided which can be interchangeably mounted on the ring 26.

The form of seat shown in the drawings has a central through aperture so that it can itself serve as a toilet seat. In the form shown in Figures 1 to 4 the seat has an integral backrest 29 and a pair of seat

arms 31 whose inner ends are pivotal to the backrest. Arms 31 are cranked so that they extend round towards the front of a patient's waist as shown in full lines in Figure 1 for added security, but can be swung clear upwardly and outwardly to the positions shown in broken lines to facilitate manoeuvre of the patient onto or off the seat.

The facility for rotating the seat with a patient thereon and the cranked and offset shaping of the jib arm 20 renders the hoist particularly adaptable and convenient in use.

The hoist can be positioned at the side or end of a bed or bath. Seat 28 can be angularly positioned by rotation for the most convenient transfer of the patient from or to a bed e.g. either from a sideways sitting position on the bed or from a position sitting or lying longitudinally of the bed; the patient can be lowered into a bath, again from the side or end by rotating the seat to the appropriate alignment, the shape of arm 20 allowing the seat to be fully lowered into the bath by spanning its side indicated in broken lines at 32 in Figure 2. A particular advantage of the above arrangement is that a patient may be taken to the toilet and may use it while remaining seated on the hoist, the rotation of seat 28 enabling him or her to be positioned facing mast 16 so that the hoist can be positioned in even a narrow toilet cubicle, i.e. sideways access to the toilet itself is not necessary.

Preferably an indexing catch or detent is provided enabling the rotating seat to be selectively locked against rotation at predetermined angular locations. Typically said locations will include the forward and rearward facing positions and positions facing to either side, i.e. at intervals of 90 deg. about the axis of rotation.

If other forms of patient support element are needed jib arm 20 with the seat thereon is simply freed from the socket of formation 22 by releasing a safety catch (not shown) and lifting it clear. Other elements and associated lifting or carrying tackle can then be mounted to formation 22. Thus a longer and taller sling jib arm 20 as shown in broken lines in Figure 1 may be substituted, having hooks for a hammock type seat or other sling.

The hoist further includes jacking mechanism for the controlled raising and lowering of the patient support, a preferred arrangement being shown diagrammatically in Figure 4. An endless loop of sprocket chain 34 extends within mast 16 passing round a drive sprocket 36 at the top of the mast and an idler sprocket 38 near the bottom of the mast, one flight of the chain being coupled to the slider formation 22. Thus, by rotation of sprocket 36 in the appropriate direction the load is positively raised and lowered in a controlled manner, in particular, there can be no accumulation of slack if the descent is obstructed which would give the risk of sudden uncontrolled dropping or movement of the load if the hoist is moved

away from the obstruction.

To provide mechanical advantage for reducing the effort needed to raise the patient the drive input to sprocket 36 will preferably be by way of a step-down sprocket and chain or epicyclic or other geared transmission 40 mounted at the top of the mast, operation being by a crank handle 42 to the rear of the mast.

To ensure positive and controlled raising and lowering the drive transmission will preferably include a self-braking device whereby the load is automatically held at the selected height and will not drop unless and until the crank handle 42 is turned in the appropriate direction, and then only in a manner under positive control by operation of the handle. It is preferred that the mechanism does not include conventional click-type ratchet devices as silent operation is desirable e.g. of the hoist should need to be used at night while other patients are asleep.

Two forms of self-braking device are shown in Figures 5 and 6 both operating on the same general principles.

Referring firstly to Figure 5 a shaft 50 journaled in a cylindrical housing 52 has an output sprocket 54 fixed thereon, said sprocket forming part of the transmission 40 referred to above.

The crank handle 42 includes a hub in the form of a nut 56 in screw engagement with a threaded outer end portion of shaft 50.

Sandwiched between an inner radial face of nut 56 and an opposing radial face of sprocket 54 is a freewheel device 58 between a pair of annular clutch discs 60 of high friction material.

Freewheel device 58 is a silent sprag-type one way drive device having radially outer and inner members including ramp formations coacting with balls or rollers to provide a wedging action which will transmit drive in one direction of rotation but allow the members to rotate freely relative to each other in the opposite direction. The radially outer member of the device 58 is secured within housing 52 so that it cannot rotate while the inner member is free to rotate relative to shaft 50 but is acted on axially by the clutch discs 60.

Turning handle clockwise will tighten nut 56 on shaft 50 so clamping the inner member of device 58 between disc 60 to rotate along with the shaft and sprocket 54, the freewheel device permitting free rotation in this direction which will be for raising the hoist seat. As soon as the winding ceases the loading on sprocket 54 exerted by gravity is transmitted from sprocket 54 to the remainder of the mechanism to maintain the braking as the screw remains tightened and the freewheel device prevents anti-clockwise rotation. However, if controlled lowering is to be effected handle 42 will be turned in the opposite direction tending to unscrew the nut 56 so allowing rotation of the shaft and sprocket independently of the freewheel device, though the lowering will be controlled in that any tendency of sprocket 54 to overtake the speed of

rotation of handle 42 will re-apply the brake, thus raising and lowering is always achieved in a smooth and positively controlled manner.

Figure 6 shows an alternative construction of the above mechanism. In this case nut 56a to which handle 42 is attached is fast with shaft 50a and the sprocket 54a is in screw threaded engagement with an inner end part of shaft 50a. The freewheel device 58 and clutch disc 60 are sandwiched between hub 56a and sprocket 54a to act as described above.

Other forms of free wheel device may be used. A form having the desirable property of smooth and silent operation as above utilises a wound helical spring which is tightened onto a drum or shaft in one drive direction but is slackened to allow free rotation in the opposite drive direction.

Figures 7 and 8 show another form of hoist, in this case raising and lowering movement of a rotatable seat 28 is provided by a jib 80 in the form of a parallelogramic linkage, one vertical member of said linkage being the top portion of mast 16 and the other vertical member being an upright portion of the seat support 26. Controlled raising and lowering motion is provided by jacking mechanism in the form of a screw jack 82, e.g. of recirculating ball type, operated by crank handle 42 and acting between the mast and a part of the linkage remote therefrom. A suitable self braking arrangement for safe and controlled angular movement of the linkage by rotation of handle 42 in the appropriate direction operating on the same principles as referred to above will be incorporated. This mechanism may be more expensive to provide and has the disadvantage of being less compact in arrangement, also the movement of the seat or other patient support is arcuate not rectilinear. The jib could be offset at an angle to the centre line of the hoist as seen in Figure 8 to enable the patient to be rotated to sit facing the mast 16 e.g. when using a toilet as described above, the jib being constructed to accommodate the twisting moments arising from this offset arrangement. The jib could be displaced through an arc of approximately 90 deg. giving a range of vertical travel of the seat of around 900mm.

Another form of hoist is illustrated in Figures 9-11. A parallelogramic linkage again forms a jib 90 but in this case it is also cranked so that a proximal portion thereof extends laterally from mast 16 and a distal portion thereof extends forwardly parallel to but spaced from the centre line of the hoist, the forward end carrying a secondary arm 92 including a vertical component of the linkage but also shaped to carry a seat support ring 26 centered on the hoist as described above. The jacking mechanism of this construction could incorporate sprocket and chain transmission with a self braking device as described above and the crank shape of the jib will provide a substantial range of lifting and lowering movement of the seat while reducing the forward overhang from

mast 16.

Claims

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1. A mobile patient hoist comprising a seat operatively positively located on a seat support element of the hoist which element can be selectively raised and lowered by jacking mechanism thereof characterised in that the seat is rotatable relative to the support element about an operatively vertical axis within the area of the seat.
2. A hoist as in Claim 1 wherein the seat is of generally toroidal form in plan and is mounted for rotation on said support elements by annular bearing means so as to leave an unobstructed central opening.
3. A hoist as in Claim 1 or 2 wherein the seat support element is so disposed that a subject sitting on the seat can be rotated at least between the positions at which he or she faces to the front and to the rear of the hoist.
4. A hoist as in any preceding claim wherein the seat support element is selectively dismountable so that alternative forms of patient support element can be substituted therefor to be raised and lowered by said jacking mechanism.
5. A hoist as in any preceding claim wherein the support element is shaped to permit lowering of the seat into a bath or the like with the support element extending above the side wall thereof.
6. A hoist as in Claim 5 wherein the support element is a rigid jib arm cantilevered from a formation guided for vertical movement up and down a mast of the hoist by operation of said jacking mechanism.
7. A hoist as in Claim 5 wherein the support element incorporates a parallelogramic linkage which is angularly displaced by the jacking mechanism for said raising and lowering of the seat.
8. A hoist as in Claim 7 wherein the jacking mechanism includes a rotatably driven screw jack acting between relatively movable parts of said linkage.
9. A hoist as in any one of Claims 1 to 6 wherein the jacking mechanism includes an endless loop of sprocket chain extending vertically between an upper drive sprocket and a lower idler sprocket with one flight of said chain coupled for positive controlled raising and lowering movement of the support element without slack by rotation of the

drive sprocket.

- 10.** A hoist as in Claim 9 wherein the drive sprocket is rotated by a manually operated crank handle through a step-down transmission. 5
- 11.** A hoist as in any preceding claim wherein the jacking mechanism comprises rotary drive means operable in forward and reverse directions for positive controlled raising and lowering motion of the seat with automatic braking thereof positively preventing at least any said lowering movement when no said rotary drive is being applied. 10
- 12.** A hoist as in Claim 11 wherein said rotary drive means includes a silently operating oneway drive and free-wheel device acting in conjunction with a screw clamp braking device whereby input drive rotation in one direction clamps an element of the free-wheel device for rotation therewith for raising movement but loading in the opposite direction engages the free-wheel device to resist lowering unless and until the input member is rotated in the opposite direction so that the screw device is released sufficiently to allow controlled following rotary motion permitting lowering. 15 20 25
- 13.** A hoist as in any preceding claim wherein the seat includes a back and a pair of arms which are angularly displaceable relative to the back between positions at which they partly encircle a subject sitting on the seat and a position at which they are swung clear of the subject. 30

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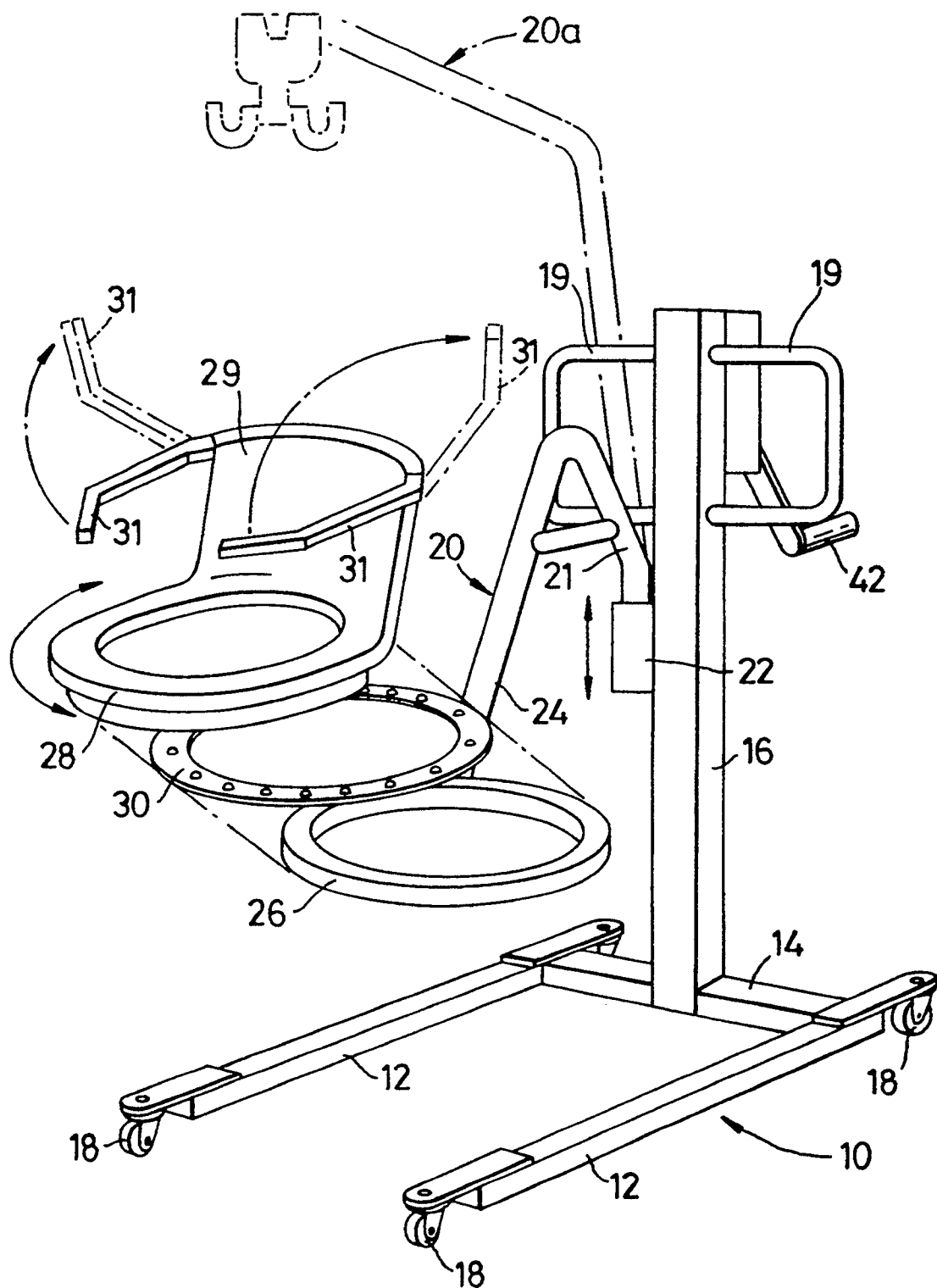
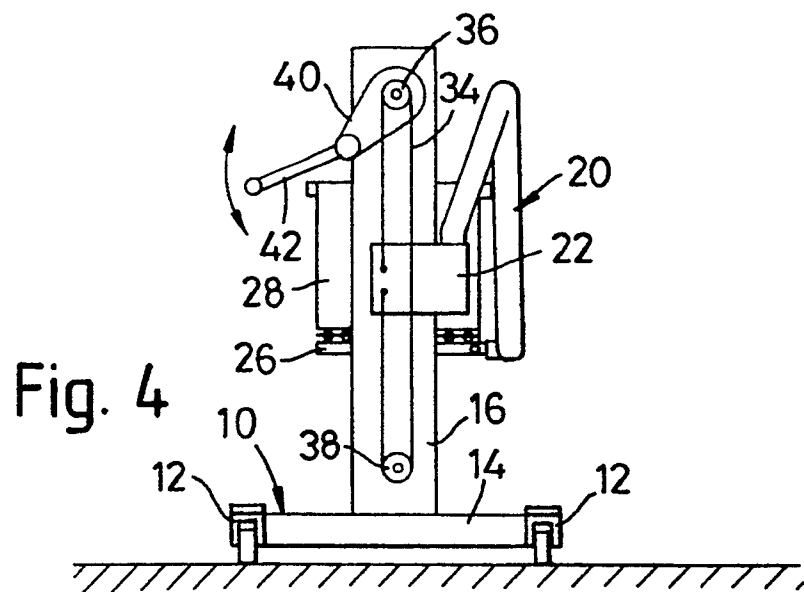
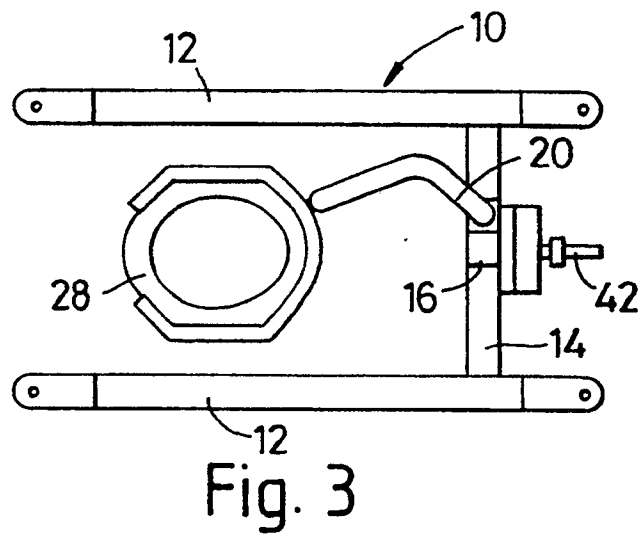
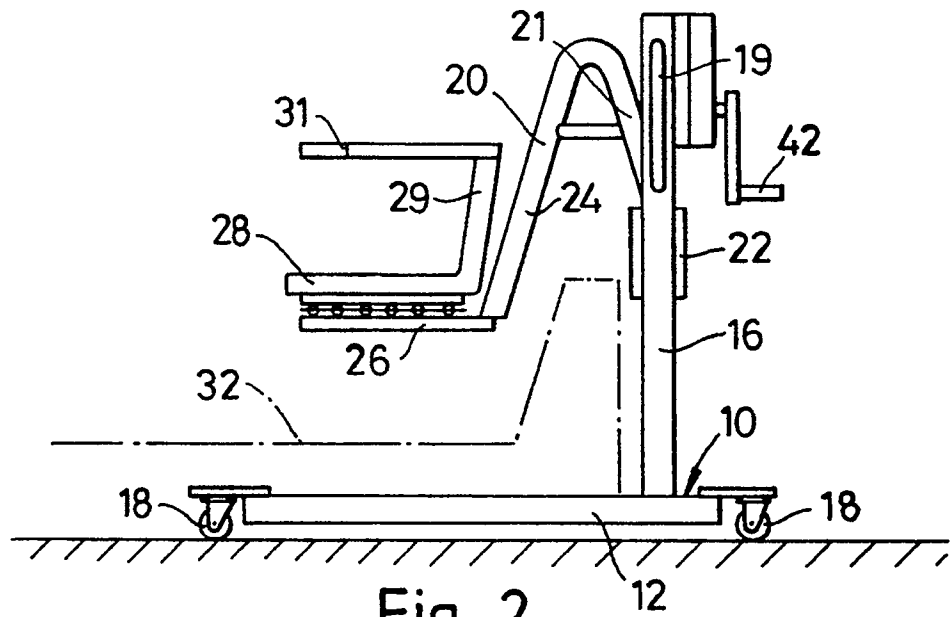


Fig. 1



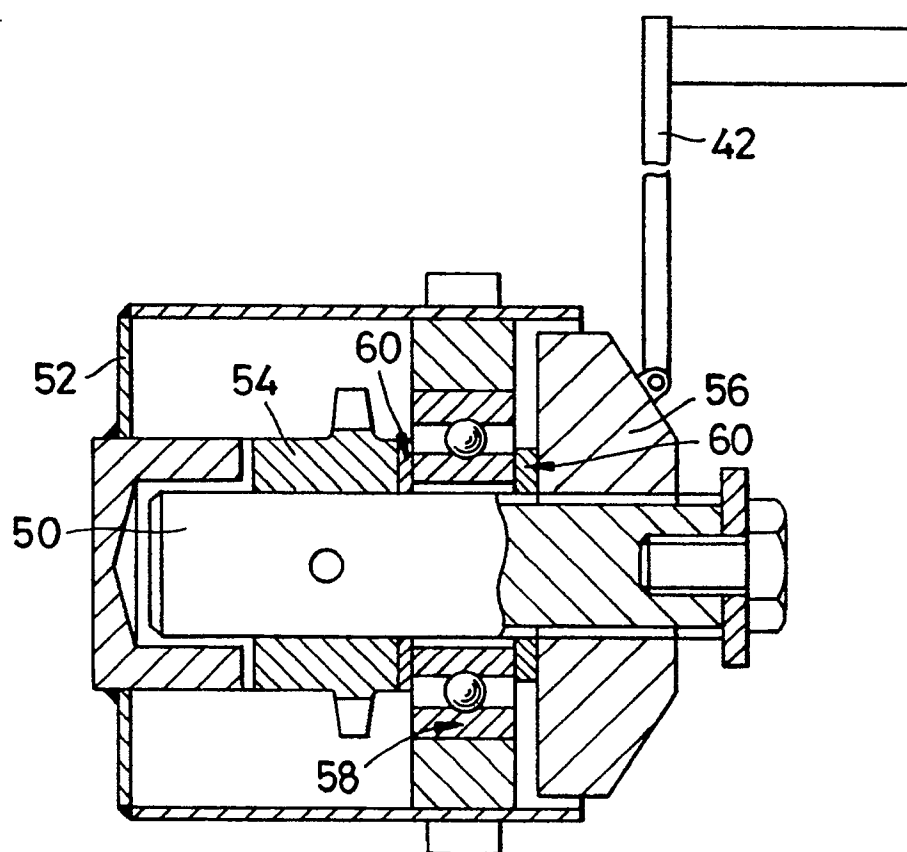


Fig. 5

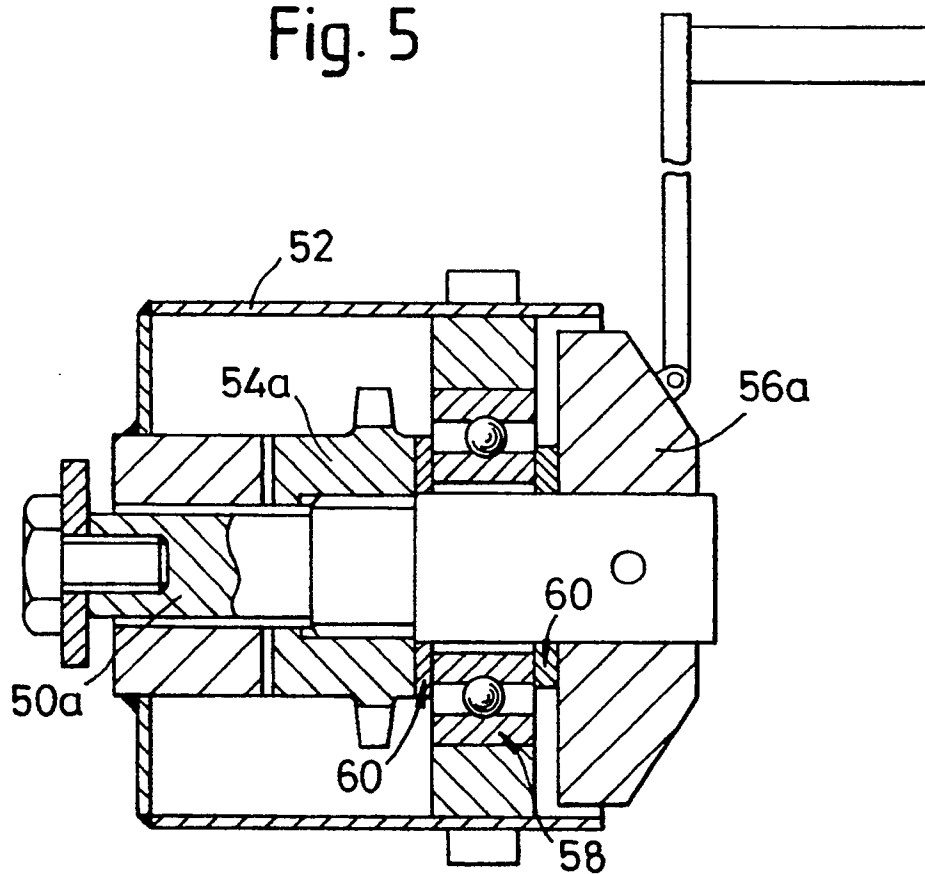


Fig. 6

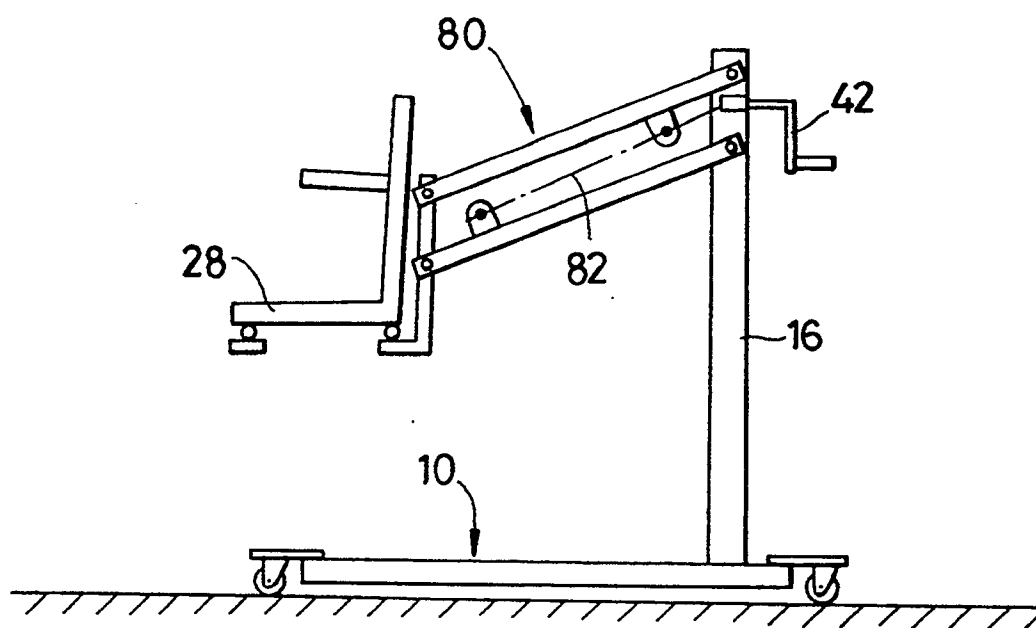


Fig. 7

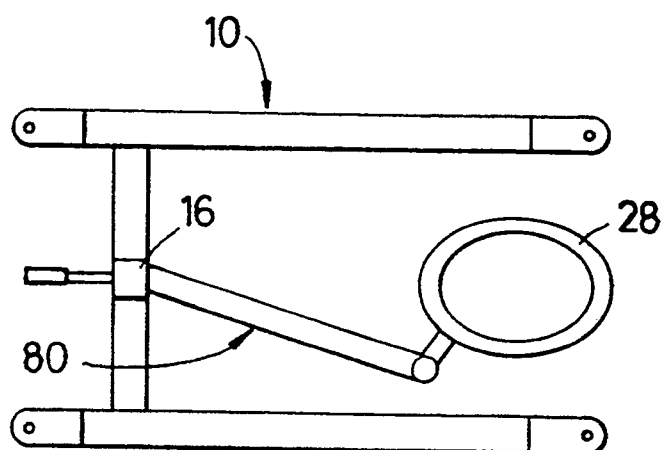


Fig. 8

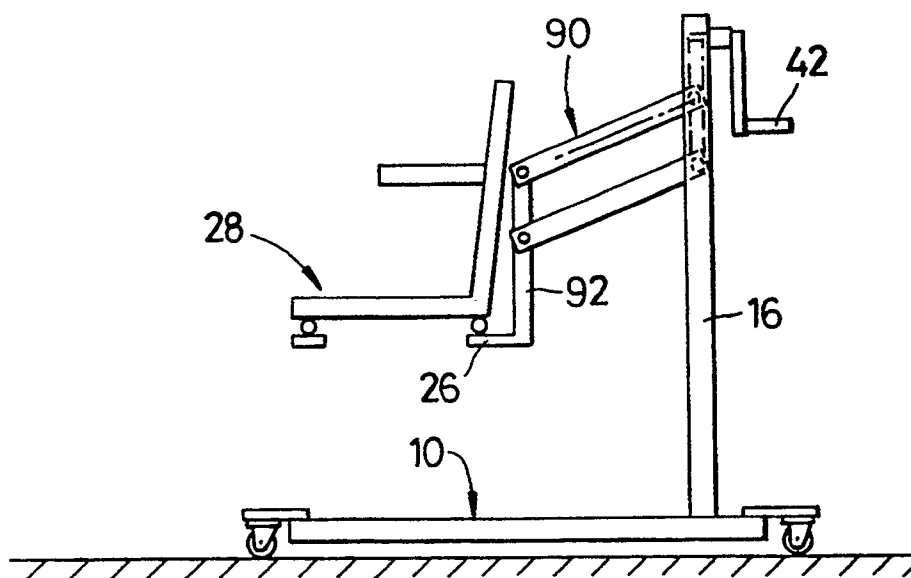


Fig. 9

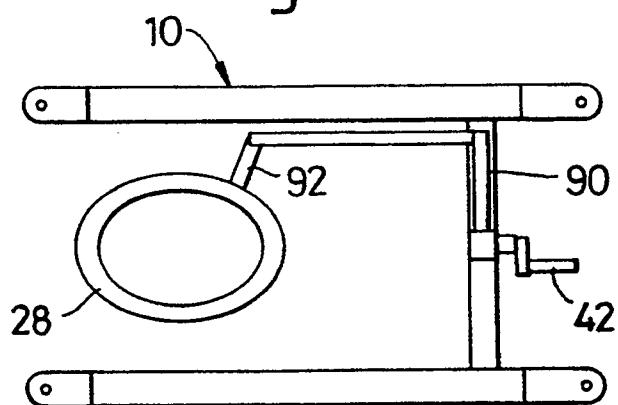


Fig. 10

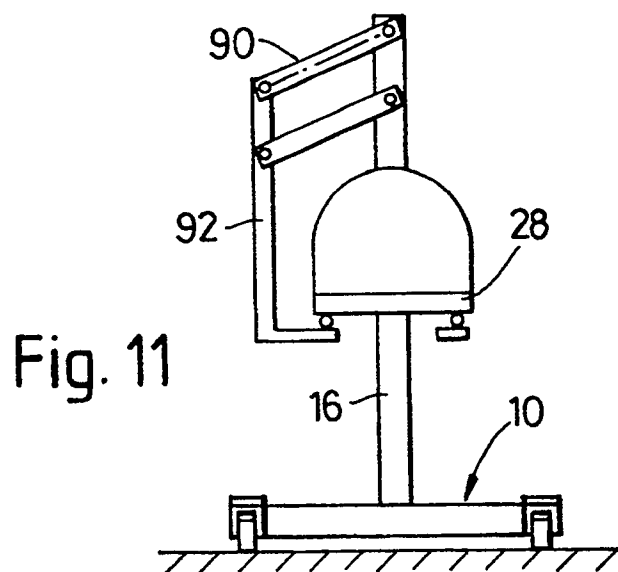


Fig. 11