PATIENT LIFT AND EXERCISE APPARATUS

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ABSTRACT

A lifting apparatus employed to position lift or transport invalids or other bed-ridden patients. The apparatus comprises an adjustable-width base assembly supporting a mast assembly which in turn supports a boom assembly from which a sling is adjustably suspended. The base assembly is provided with casters so that it may be maneuvered about easily and the free end of the boom may be elevated or lowered to raise or lower a patient carried in the sling. Also included with the lift apparatus is an exercising mechanism employed to exercise the lower limbs of a patient carried in the sling.

7 Claims, 10 Drawing Figures
PATIENT LIFT AND EXERCISE APPARATUS

BACKGROUND OF THE INVENTION

1. Field of the Invention

Broadly, the present invention relates to devices for lifting and transporting objects. In a specific application, the present invention relates to a device that can be employed in nursing homes and hospitals to lift, transport and provide exercise for invalids or bedridden patients with a minimum amount of effort on the part of a nurse or attendant.

2. Description of the Prior Art

In hospitals and nursing homes, it is often necessary to move or transport invalids or other bedridden patients from one area of the hospital or home to another area, such as when a patient is to receive physical therapy. Common vehicles used for this purpose are wheelchairs and wheel mounted stretchers. One problem encountered with conventional wheelchairs or stretchers is that it is difficult for the nurse or attendant to safely transfer the patient from the bed to the wheelchair or stretcher.

A variety of patient lifters have been employed to lift and transport patients. Such lifters vary from stationary mounted lifters used on ear tops and bath tubs, to lifters which are capable of being wheeled from one location to another. While conventional lifters are capable of being moved about, they generally provide no means for slightly repositioning or moving the patient without moving the entire lifter which may provide difficulties in confined areas. Moreover, movement of the entire assembly for effecting small movements of the patient may cause unnecessary jostling.

Another problem associated with known prior art lift construction is that the devices are relatively fragile and, because of their narrow bases, are subject to tipping. Larger lifts, while being stronger and more stable, are undesirable to the extent that they are difficult to move and maneuver in tight places. Because of the design and relative positioning of the various elements employed in many conventional lifts, relatively large, heavy construction members employing relatively complex mechanisms are required for their safe operation.

SUMMARY OF THE INVENTION

The present invention provides a combination patient lift and exercise apparatus which can be used in hospitals and nursing homes as well as other places to lift, position and transport invalids or bed-ridden patients as well as to exercise the lower limbs of such individuals. The apparatus of the prevent invention comprises an adjustable-width base assembly mounted on casters. A vertical mast assembly housing a height adjusting mechanism is supported by the base assembly and an exercise mechanism, comprising a drive motor connected to foot pedals through a chain and sprocket arrangement, is attached to the lower portion of the mast assembly. A boom assembly having a lateral patient positioning mechanism and an upper limb support bar extends horizontally from the mast. In operation, a sling carried by the boom may be adjusted along the boom and the boom may be raised or lowered to properly position the patient for use of the exercise mechanism.

Manual adjusting means are provided for changing the width of the base so that the assembly may be moved from place to place through confined or narrow passages. The base may be expanded when the assembly is to be used for exercising purposes or to provide increased stability during movement through relatively unconfined spaces. Manual adjustment of the sling position is also permitted whereby the patient may be moved small amounts without moving the lift structure on its casters. By this means, relatively small movements as may be required for X-rays and other procedures may be made with a minimum of discomfort to the patient.

The free end of the boom is raised or lowered by operation of a drive mechanism carried in the vertical mast assembly. Using this design, a heavy duty, although relatively light, mechanism can be employed to effect boom movement without increasing the external dimensions of the device and unduly limiting its utility.

The stability and strength of the apparatus of the present invention permit it to be combined with the exercise means so that the lift device may serve a dual function. By use of the present apparatus, it is also unnecessary to go through the multiple step process conventionally employed when a patient is to be removed from a bed by a lift apparatus and then removed from the lift apparatus to be positioned in an exercise apparatus.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a side elevational view of the patient lift and exercise apparatus of the present invention;
FIG. 2 is a plan view of the apparatus of FIG. 1;
FIG. 3 is a partial view, partially in section, taken along the line 3-3 of FIG. 1;
FIG. 4 is a vertical cross-sectional view taken along the line 4-4 of FIG. 3;
FIG. 5 is a partial view, partially in section, taken along the line 5-5 of FIG. 2;
FIG. 6 is a view similar to FIG. 5 showing the mast assembly of the present invention in a raised position;
FIG. 7 is a horizontal cross-sectional view taken along the line 7-7 of FIG. 5;
FIG. 8 is a horizontal cross-sectional view taken along the line 8-8 of FIG. 5;
FIG. 9 is a partial view, partially in vertical cross section, taken along the line 9-9 of FIG. 2; and
FIG. 10 is a view similar to FIG. 9 illustrating the base assembly of the present invention in an extended position.

DESCRIPTION OF THE ILLUSTRATED EMBODIMENT

Referring to the drawings, and more specifically to FIGS. 1 and 2, the patient lift and exercise apparatus of the present invention is indicated generally at 10. The apparatus 10 comprises an adjustable-width, base assembly indicated generally at 11, a vertical standard or mast assembly indicated generally at 12, a height adjusting mechanism indicated generally at 13, a lift arm or boom assembly indicated generally at 14, a lateral patient positioning and support mechanism indicated generally at 15, and a height adjusting brace 16 connected between the mast assembly 12 and the boom assembly 14. Attached to the lower portion of the mast assembly 12 is an exercising mechanism indicated generally at 17 employed to exercise the lower limbs of a patient. The mechanism 17 includes an electric drive motor 18, a crank assembly, indicated generally at 19, having crank arms 20a and 20b and pedals 21 con-
connected respectively to arms 20a and 20b. The output shaft of the motor 18 is connected in a conventional manner to the crank assembly 19 through a suitable, conventional drive mechanism enclosed in a housing 22. The drive mechanism may be a typical chain and sprocket arrangement like that employed on a bicycle. The pedals 21 are provided with straps 23 to hold the patient's feet in contact with the pedals.

The base assembly 11 includes parallel rail members 24 connected by a cross member 25 which forms a housing for extendable members 26a and 26b, illustrated in FIGS. 9 and 10. Extension of the members 26a and 26b is effected by rotation of a hand crank 28. To allow the apparatus 10 to be more easily maneuvered about, casters 27 are employed, being suitably fastened to the rails 24. Details in the construction and operation of the base assembly 11 will be described hereinafter.

Referring further to FIGS. 1 and 2, the mast assembly 12 includes a housing 29 attached to the cross member 25 and a vertically movable traveling nut 30. The nut 30 has an integrally formed mounting bracket or flange 32 having an eye 33 for pivotally securing the brace 16. A removable end cap 34 attached to the upper end of the housing 29 provides a pivotable mounting means for the boom assembly 14. Further details in the construction and operation of the mast assembly 12 and height adjusting mechanism 13 will be described more fully hereinafter.

The boom assembly 14 is shown comprising a housing arm 35 having a fixed mounting bracket 36 with an eye 37 provided for pivotial connection of the upper end of brace 16, an adjustable upper limb support bar 38 secured to the arm 35 by a bracket 39, and the patient positioning and support mechanism 15 which includes a non-rotatable traveling nut 40 having an integrally formed flange 41 with an eye 42 to attach a suitable sling, indicated at S, that may be employed to lift a patient. The support bar 38 is provided with a plurality of holes 38a for achieving the desired position of a patient's upper limbs when the exercising mechanism 17 is being used.

With reference now to FIGS. 3 and 4, the mechanism 15 includes the traveling nut 40 previously described having internal threads 44 which engage external threads 45 formed on an elongate shaft 46. The shaft 46 is rigidly secured to a crank handle 43 and rotation of the crank handle and attached shaft 46 causes the traveling nut 40 to move within the housing 35. It will be appreciated that the housing arm 35 surrounds the nut 40 in a manner to prevent rotation of the nut while permitting longitudinal nut movement. To this end, a longitudinal slot 51 formed along the bottom of the housing 35 receives the flange 41 and permits the flange to advance while preventing nut rotation. The shaft 46 is supported in the housing 35 by a support bushing 47 which is secured to the housing 35 by suitable fasteners 48. Rotatable movement of the shaft 46 in the bushing 47 is assisted by thrust plates 49 and 50 of brass or other suitable material.

Details in the construction and operation of the adjustable width base assembly 11 may best be described by reference to FIGS. 9 and 10. Extension of the base assembly 11 is effected by rotating a shaft 80 having external left hand threads 80a on one end portion and external right hand thread threads 80b on the opposite end portion. The threads 80a engage integrally formed internal threads 81a on member 26a and threads 80b engage internal threads 81b on member 26b. The shaft 80 is held in position by an integrally formed stop 82 in cross member 25. The width of the base assembly 11 is varied by turning the crank handle 28 attached to the shaft 80.

In operation, when it is desired to lift, reposition or transport a patient, the apparatus is moved up to the bed. The attendant makes the proper width adjustments of the base assembly 11 by rotating the handle 28 so that the base will fit between the legs of the bed. Having correctly positioned the apparatus 10, the attendant positions the sling suspended by the arm 35 by turning the crank handle 31 in the appropriate direction for raising or lowering the sling as required. Any conventional sling or stretcher, indicated at S, having suitable support straps or chains which may connect to the eye 42 in the patient positioning and support mechanism 15 may be employed.
If it is desired to move or reposition the patient on the bed, it is not necessary to move the apparatus. Lateral movement of the patient can be effected by rotating the crank handle on the mechanism. In this situation, the attendant first lifts the patient from the bed by rotating the crank handle on the height adjusting mechanism. After the patient has been raised, lateral movement is effected by rotating the crank which causes the sling to travel along the boom as previously explained.

The same general procedure is followed by the attendant when transporting a patient from one area to another. The apparatus is rolled up to the bed, the patient placed in the sling and lifted from the bed. The casters then allow the apparatus and supported patient to be moved easily from one area to another.

When it is desired that the apparatus be used for exercising, the patient is placed in any suitable exercise sling, indicated at S, supported from the eye. The patient is then positioned, by turning the crank handle on the patient positioning mechanism, so that his feet are in contact with the pedals of the exercising mechanism. The patient’s feet are held in contact with the pedals by the straps. The upper limbs of the patient are supported by any suitable second sling (not illustrated) suspended from the support bar. The position of the second sling may be adjusted laterally relative to the boom by properly positioning the sling supports in the holes of the bar. It may be necessary to increase the width of the base assembly to provide greater stability to the apparatus when being used as an exerciser. The motor is a variable speed motor to provide the necessary exercise for a patient's lower limbs.

The foregoing disclosure and description of the invention is illustrative and explanatory thereof, and various changes in the size, shape and materials as well as in the details of the illustrated construction may be made within the scope of the appended claims without departing from the spirit of the invention.

1. A movable lift and exercise apparatus comprising:
   a. movable base assembly means, said base assembly being supported on wheel means whereby said base assembly may be rolled from one location to another;
   b. support means carried by said base assembly, said support means including an elongate, substantially horizontal boom assembly connected to a substantially vertical mast assembly;
   c. holding means carried by said boom assembly for holding a human body;
   d. exercise means included in said apparatus and carried by said base assembly;
   e. adjustment means for changing the relative position of said holding means and said exercise means whereby different human bodies may be carried in said holding means for use of said exercise means, said adjustment means including horizontal adjustment means for changing the location of said holding means relative to said base assembly and vertical adjustment means for changing the vertical position of said holding means; and
   f. base width adjusting means included in said base assembly for changing the width of said base assembly whereby said base assembly may be made relatively wide for stability when said exercise means is being employed and may be made narrow when said assembly is to be moved or maneuvered in confined areas.

2. A movable lift and exercise apparatus as defined in claim 1 wherein said vertical adjustment means includes mechanical drive means disposed in said mast assembly and connected to the lower end of a drive arm means extending from said mast assembly to said boom assembly whereby operation of said mechanical drive means moves the lower end of said drive arm means along said mast assembly to change the inclination of said boom assembly and thereby change the vertical position of said holding means.

3. A movable lift and exercise apparatus as defined in claim 2 wherein said horizontal adjustment means includes mechanical drive means disposed in said boom assembly and operable to change the horizontal position of said holding means along the length of said boom assembly.

4. A movable lift and exercise apparatus as defined in claim 3 wherein said exercise means includes pedal means for exercising the lower limbs of a human user carried in said holding means.

5. A movable lift and exercise apparatus as defined in claim 4 wherein said exercise means includes motor drive means for rotating said pedal means.

6. A movable lift and exercise apparatus as defined in claim 5 further including upper limb support means carried by said boom means for holding the upper limbs of a human user carried in said holding means.

7. A movable lift and exercise apparatus as defined in claim 6 further including adjustment means for changing the lateral position of said holding means relative to said boom assembly.