

IMPROVED WALKING FRAME

TECHNICAL FIELD

This invention relates to an improved walking frame, more particularly to a walking frame for invalids, disabled people or post-operative patients.

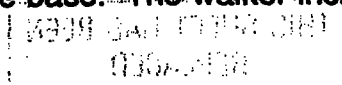
5 BACKGROUND ART

Units which assist a person having a limited mobility to walk are commonly known as "walkers", and various types of such walkers are known. United States Patent No's 4,187,169, 5,151,813, and AU55439/86 show examples of walkers which have adjustment for height of the handles, armrests or shoulder
10 support members. It is also known to incorporate a seat on various of such units.

However, many patients have difficulty in raising from a seating position to a standing position and vice versa, and it is often necessary for a helper to assist the patient to rise or sit down. United States Patent No 4,443,902 illustrates a
15 walker in which the supporting arms can be power lifted and lowered so that the patient can, by the use of appropriate controls, raise and lower themselves from sitting to standing positions as desired. The arms are pivoted to a single vertical post and an upwardly extending screw jack engages the arms intermediate their length to raise and lower the arms in an arcuate manner.
20 While this walker would be satisfactory in some respects, the degree of lift appears to be limited, and also all the forces applied to the arms are transmitted to the central supports, and if in the event that all these lifting forces are applied to one arm, severe stresses are applied to the central supports.

United States Patent No 4,968,050 describes a mobile stander in the form of a
25 wheel chair having power means whereby a patient can be raised from a reclining position to a standing position. However this unit is not adapted to be used as a walker.

Also there is described in my earlier application No AU 61852/94 a mobile walker having a base supported on wheels with a central column extending
30 upwardly from the base. The walker includes a pair of spaced channel



members, a carriage movable in the spaced channel members and carrying at its upper end support arms. Power means are provided for moving said carriage in the central column, whereby a person by being supported on the arms may be raised from a seating position to a walking position, and be able to use the walker as an aid to walking and then be lowered to a seating position.

It is an object of this invention to provide a mobile walker which has advantages over the prior art while being able to assist the patient being raised and lowered from a seating position to a standing position or vice versa.

10 A further object of the invention is to provide a mobile walker which provides a more desirable lifting action to the patient by moving the patient in the desired movement from sitting to a standing position and vice versa.

A still further object of the invention is to provide a walker in which the patient has greater control over the movement of the lifting and lowering motions of the walker.

DISCLOSURE OF THE INVENTION

There is provided according to the invention a mobile walker comprising a generally upwardly extending column supported on wheels, a pair of arms extending from the upper end of the column, power means for rotating said arms in an arc to and from a lower position to upper position, each said arm having a lifting portion for lifting a user of the walker, and each said arm being so constructed whereby the lifting portion maintains its same orientation during the raising and lowering action.

It is preferred that the arms be of linkage construction such as a pantograph or parallel linkage

Preferably the arms are connected to a sleeve rotatable in a mounting member in the column, each sleeve being interconnected with drive means whereby the sleeves are displaced along their axes so that the spacing between the arms can be varied.

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It is preferred also that the wheels are supported on legs which are adjustable so that the distance between the legs can be varied.

BRIEF DESCRIPTION OF THE DRAWINGS

In order to more fully describe the invention reference will now be made to the
5 accompanying drawings in which:

FIGURE 1 is a side view of the walker, portions being omitted in the sake of clarity,

FIGURE 2 is an end view of the walker,

FIGURE 3 is a plan view of the leg adjustment mechanism, and

10 FIGURE 4 is an illustration of one form of arm width adjustment mechanism.

BEST MODE FOR CARRYING OUT THE INVENTION

The walker 1 has a generally vertical column 2 supported by a pair of front castor wheels 3 and at the rear by wheels 4 on legs 5 pivoted on pivots 6 on the base 7 of the column 2.

15 The column supports at its upper end arms 8 having lifting portions or handles 9 at their outer ends. Each arm 8 comprises a pair of parallel links 10 joined at their outer ends by a link 11 connected to pivots 12. The handle 9 is shown connected to the upper portion of the link 11, but it will be realised that the handle may be connected at other positions along the link 11. Thus it will be
20 seen that by the provision of the parallel linkage, the handle or lifting portion to be grasped by the user remains horizontal or remains at the same orientation relative to the user if the handle is adjusted to be at an angle to the horizontal, during the upward and downward movement of the arms.

Each parallel link 10 is connected to the outer end of a respective slide tube
25 13 mounted in bores 14 in mounting plate 15. The inner ends of the slide tubes are closed by a bung 16 to each of which is connected a lever 17, which levers are interconnected by a connecting link 18 by pivots 19 thus completing

the parallel linkage arrangement. The lower levers 17 are extended to provide universal pivots 20.

5 The drive for the operation of the lifting arms comprises an electric motor 21 mounted on the end of a linear actuator 22, the other end of the linear actuator being pivoted to the upper end of the column by pivot 23. The motor end of the liner actuator is attached to a bridging member 24 in turn pivoted by links 25 to the frame of the column 2.

10 The links 25 have universal pivots 26 to which are pivoted connecting links 27 connected at their upper ends to the universal pivots 20 on the lower levers 17. FIG 1 shows the two extreme positions of the operation of the linear actuator and the position of the lifting arms.

15 The slide tubes 13 are movable to position the arms 10 in two positions 10(a) and 10(b) as shown in FIG 2. As noted above each slide tube is closed at its inner end with the bung 16. The bung 16 on the right hand slide tube has a central threaded hole with a thread of one hand, and the bung on the left hand side has a corresponding aperture threaded with a thread of opposite hand. Connecting the two slide tubes through the respective bungs 16 is a screw 28 divided into two threaded portions, the two portions having threads of opposite hand corresponding to the hands of the threads of the bungs 16. Thus the two 20 upper slide tubes 13 have a screw 28 interconnecting the two slides and the lower slide tubes 13 have a second screw interconnecting the respective slides.

25 On the upper screw 28 there is a double sprocket or pulley 29 with a first pulley 30 and a second pulley 31. On the lower screw 28 there is fitted single pulley 32, this single pulley 32 being in line with the pulley 31 and connected thereto by a drive belt 33. Pulley 30 is connected by a drive belt 34 to a pulley 35 driven by a reversible electric motor 36, preferably a reversible stepper motor. Thus as the electric motor drives the two screws 28 in one direction both slide tubes will be moved outwardly thus spreading the arms 10, and in 30 the other direction of rotation of the electric motor, the slide tubes will be drawn inwardly and the arms will be drawn closer together. In this way the spacing between the arms can be adjusted to suit the individual user. The drive means can be by belt or chain and sprocket, ensuring that both screws are simultaneously driven.

Thus as the arms are adjusted in spacing, the links 25 by virtue of the universal pivots, which are preferably ball joints, are able at the upper ends to move with the sleeves as shown in the drawings.

5 The electric motors 21 and 36 are supplied with power from a battery 37, suitable controls being conveniently located on the walker, preferably on the upper portion thereof.

10 The legs 5 can be adjusted in spacing there between. As noted previously the legs 5 are pivoted to the base of the column by pivots 6. To each leg there is attached a lever 38 to which are pivoted links 39 each connected to the opposite ends of a lever 40 pivoted to the base of the column.

15 The linkage thus formed is termed a Watts linkage and ensures that the two legs simultaneously move towards or away from each other. A reversible electric motor and actuator 41 is positioned between the levers 38, the electric motor being connected to one lever 38 and the actuator connected to the other lever 38 so that operation of the electric motor 41 will move the legs either toward or away from each other to allow the legs to be positioned as desired for stability or to straddle a wheel chair or the like. When the walker is being used as a walker the legs can be positioned close to each other so that the walker can easily pass through doorways and other narrow openings.

20 Preferably all the electric motors are 12 volt D.C. motors and controlled by a 12 volt D.C. system. It is preferred that a micro-processor monitors all control logic, battery levels and the optimum recharging of two maintenance free lead-acid batteries. The whole unit can be constructed for reliable and safe operation in wet areas and shower rooms. Also there is preferably provided
25 an audible alarm for low battery conditions (eg below 50%) as well as LED battery status indicators. The power supply has master on/off switches and also switches itself off, should it be left unused for a preset period of time. Preferably there is provided a main circuit board and membrane switches positioned at the top of the column for ease of operation of the user or handler.

30 There may be provided in the column a battery charger and connection plug to receive the socket of a power lead connected to the reticulated 240 volt supply so that the batteries can be charged when the walker is not in use, preferably during the night time. Thus the control panel preferably has controls and an

indicator of the charging rate. However it is preferred that there be a plug-pack type of charger, not kept in the walker.

5 In use, the lifting portions of the arms can be positioned under the arm pits of the user or alternatively a sling fibreglass chain or other attachment can be attached to and lifted by the arms. A handle can be provided to be grasped by the user when in the walking mode.

10 The controls can be conveniently located on the top of the column for convenient operation. Also a braking system is provided so that the walker can be braked so that it does not move particularly during the lifting and lowering actions. The wheels on the base of the column are preferably braked, the control or brake level being provided on the top of the walker and positioned as desired.

15 Thus there is provided a robust, light weight walking frame/hoist capable of lifting a 160 kg person from as low as 350 mm above floor height up to a full 21.85 metre standing height, or any point in between. The unit can be used alone by the patient or with the assistance of a handler, carer or nurse, this being used in combination with a fabric sling or fibreglass toilet/shower seat attachment which can be attached to the arms.

20 Operation of the machine is controlled by either UP/DOWN buttons on the top of the device, or by a remote ergonomically shaped hand control. Also the controls or some of the controls can be positioned on or adjacent the handles. Upon release of either the UP or DOWN buttons the machine stops promptly and remains rigid at the required height. At extreme low battery levels, UP operation may not be available and only DOWN may be available.

25 Thus it will be seen that there is provided a walker having definite advantages. The use of the parallel action style arms as they scribe an arc whilst lifting the user, naturally move the body weight forward from over the hips in the sitting position to over the feet in the standing position. A further advantage is that as the arms reach the upper and lower regions of their arc, the vertical velocity
30 component reduces, allowing a noticeably greater reaction time to control the accurate stopping height of the arms. Also there are provided in the controls micro switch limiters to prevent the accidental overrun of the machine in either direction.

Although there has been described in some detail an embodiment of the invention it is to be realised that the invention is not to be limited thereto but is to include variations and modifications falling within the spirit and scope of the invention.





THE CLAIMS DEFINING THE INVENTION ARE AS FOLLOWS:

1. A mobile walker comprising a generally upwardly extending column supported on wheels, a pair of arms extending from the upper end of the column, power means for rotating said arms in an arc to and from a lower position to upper position, each said arm having a lifting portion for lifting a user of the walker, and each said arm being so constructed whereby the lifting portion maintains its same orientation during the raising and lowering action.
2. A mobile walker as defined in claim 1 wherein each arm is of parallel linkage construction.
3. A mobile walker as defined in claim 1 wherein each arm comprises an upper and lower arm member connected by a link at one end, said lifting portion being attached to said link, said upper and lower arm members at their other ends each being connected to a sleeve having a lever attached thereto, a connecting link connecting said levers to complete the parallel linkage, one of said levers being connected to a power link.
4. A mobile walker as defined in claim 3 wherein each of said power links is universally connected to a bridge pivoted to the casing of the walker, a linear actuator driven by an electric motor connected to the bridge.
5. A mobile walker as defined in claim 3 wherein each sleeve is rotatable in a mounting member in the column, each sleeve being interconnected with drive means whereby the sleeves are displaced along their axes so that the spacing between the arms can be varied.
6. A mobile walker as defined in claim 5 wherein the each sleeve connected to each upper arm member on opposite sides of the walker are interconnected by a first threaded rod having right and left hand threads at opposite ends engaging said respective sleeves, and each sleeve connected to each lower arm member on opposite sides of the walker are interconnected by a second threaded rod having right and left hand threads at opposite ends engaging said respective sleeves, and drive means for simultaneously rotating said threaded rods whereby the respective sleeves are displaced along their axes to vary the spacing between the lifting portions of the arms.

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7. A mobile walker as defined in claim 1 wherein the wheels include a pair of castor wheels attached to the forward end of the column, and a pair of wheels on the ends of a pair of spaced legs extending from the rear of the column beneath said arms, said legs being adjustable whereby the spacing
5 between the legs can be varied.
8. A mobile walker as defined in claim 7 wherein each leg is pivoted to the base of the column by a vertical pivot, levers connected to the legs and interconnected by linkage, an electric actuator connected to one of said levers whereby on actuation of the actuator the legs are displaced to and from each
10 other.
9. A mobile walker comprising a generally upwardly extending column supported on wheels, a pair of spaced arms extending from opposite sides of the upper end of the column, power means for rotating said arms in an arc to and from a lower position to upper position, each said arm having at its outer
15 end a lifting portion for lifting a user of the walker, each arm being of parallel linkage construction and connected at their inner ends to rotatable sleeves mounted in a member, said power means being connected to said rotatable sleeves, drive means to displace said rotatable sleeves along their axes to vary the spacing between the arms, said parallel linkage construction ensuring
20 that the lifting portion maintains its same orientation during the raising and lowering action.

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