Apparatus (1) for assisting a person from a substantially standing posture to a seated posture is suitable for assisting a person onto and off of a toilet bowl (3), and comprises a main framework (5), which embraces the toilet bowl (3). A carrier frame (14), having a seat (12) secured thereto, is coupled to the main framework (5) by a pair of first linkage mechanisms (18). First and second link members (24, 25) of each first linkage mechanism (18) are pivotally coupled to a corresponding support member (10) of the main framework (5) and to the carrier frame (14). A pair of linear motors (19) coupled between the main framework (5) and the respective first linkage mechanisms (18) urge the carrier frame (14) between a first orientation and a second orientation for lowering a person onto and raising the person from the toilet bowl (3). A back rest may be coupled to the carrier frame (14) and to the main framework (5) to be moveable with the carrier frame (14) as the carrier frame (14) is being urged between the first and second orientations.
"Apparatus for assisting a person between a substantially standing posture and a seated posture"

The present invention relates to apparatus for assisting a person between a substantially standing posture and a seated posture.

Apparatus for assisting a person between a substantially standing posture and a seated posture is commonly used for assisting a person onto and off of a toilet bowl. Such apparatus is known, and examples of such apparatus are disclosed in U.S. Patent Specifications Nos. 6,598,246 of Shou, 6,553,585 of Lundstrom, 6,035,462 of Bennett and 6,161,229 of Ryan, et al. U.S. published Patent Application Specification No. 2001/0047542 of Luckenbill also discloses such apparatus. However, in general, such apparatus tend to comprise a main framework for embracing a toilet bowl, which may be provided as a rigid fixture secured around the toilet bowl, or may be suitable for selective placing on the ground with the toilet bowl embraced by the main framework. In general, a seat carrying frame which carries a seat is pivotally coupled to the main framework at the front thereof. A drive means, for example, a linear motor, an hydraulic or a pneumatic ram is coupled between the main framework and the seat carrying frame for pivoting the seat carrying framework in a generally upwardly forwardly direction to engage the posterior of a person in a standing posture and then for pivoting the seat carrying frame downwardly rearwardly into a horizontal position with the person seated thereon above the toilet bowl. However, such apparatus tend to suffer from a number of disadvantages. Firstly, in many cases, in particular in the case of the apparatus of U.S. Patent Specifications Nos. 6,598,246 and 6,553,585, the seat which is carried on the seat carrier frame in many instances is too low for engaging the posterior of the person when the person is in a standing posture, and thus, a person using the apparatus must initially commence to squat downwardly in order to engage the seat with his or her posterior, and furthermore the person must then manoeuvre himself or herself on the seat as the seat carrying frame, and in turn the seat, is being pivoted downwardly into a horizontal orientation so that the person is properly positioned on the seat in order to use the toilet bowl. This is undesirable and unsatisfactory.
U.S. Patent Specification No. 6,360,382 of Karash endeavours to overcome this problem by providing an apparatus which includes a linkage mechanism which couples a seat carrier to a main framework within which the toilet bowl is located.

The linkage mechanism urges the seat carrier and in turn the seat in a generally upwardly direction from the toilet bowl, so that the seat is at a level substantially corresponding to the level of the posterior of a person in a standing posture. However, the apparatus of Karash, while it does operate to raise the seat to a level substantially corresponding to that of the posterior of a person in a standing posture, a person is still required to sit onto the seat when the seat is raised. The seat with the person seated thereon is then lowered to a position just above the toilet bowl. The requirement that a person must first sit onto the seat when the seat is raised is unsatisfactory.

Geriatric and other wheelchair bound people in many cases experience difficulty in raising from a seated posture to a standing posture, and vice versa. Indeed, the carers of such people also experience difficulty in assisting such people to raise from a seated posture to a standing posture, and vice versa. In particular, these difficulties are experienced in raising geriatric and other wheelchair bound people from a seated posture in a wheelchair to a standing posture, and vice versa.

There is therefore a need for apparatus for assisting a person between a substantially standing posture and a seated posture which overcomes at least some of the problems of known apparatus. There is also a need for apparatus for assisting a person onto and off of a toilet bowl between a substantially standing posture and a seated posture just above the toilet bowl, which overcomes at least some of the problems of known apparatus. Additionally, there is a need for apparatus which as well as assisting a person between a substantially standing posture and a seated posture also facilitates moving the person while seated in the apparatus from one location to another, which overcomes at least some of the problems of known apparatus.
The present invention is directed towards providing at least some of the above apparatus.

According to the invention there is provided apparatus for assisting a person between a substantially standing posture and a seated posture, the apparatus comprising a main framework, a carrier means for carrying a seat for the person, a first linkage mechanism coupling the carrier means to the main framework, and constraining the carrier means to move relative to the framework between a first orientation with the carrier means positioned and oriented for locating the seat in a raised tilted orientation for abutting the posterior of the person in the substantially standing posture, and a second orientation with the carrier means positioned and oriented for locating the seat in a lowered substantially horizontal orientation with the person in a seated posture thereon, and a drive means for operating the first linkage mechanism for urging the carrier means between the first and the second orientations, wherein the first linkage mechanism comprises a first link member and a second link member, the first and second link members being pivotally coupled to the main framework at spaced apart locations, and being pivotal relative to the main framework about respective spaced apart first and second parallel pivot axes, the first and second link members being pivotally coupled to the carrier means at spaced apart locations and being pivotal relative to the carrier means about respective spaced apart third and fourth pivot axes parallel to the first and second pivot axes, the third pivot axis being spaced apart along the first link member from the first pivot axis, and the fourth pivot axis being spaced apart along the second link member from the second pivot axis, and the first and second link members being simultaneously pivotal about the first and second pivot axes in one sense for urging the carrier means from the first orientation to the second orientation, and in the opposite sense about the first and second pivot axes for urging the carrier means from the second orientation to the first orientation.

In one embodiment of the invention the spacing between the first and third pivot axes is greater than the spacing between the second and the fourth pivot axes. Preferably, the spacing between the third and fourth pivot axes is less than the
spacing between the first and second pivot axes. Advantageously, the first link member is located below the second link member, so that as the first and second link members are being pivoted about the first and second pivot axes in one of a clockwise and anticlockwise sense, the carrier means is urged between the first and second orientations in the other of the clockwise and anticlockwise sense.

In one embodiment of the invention the carrier means is urged from the second orientation to the first orientation by pivoting the first and second link members in a generally upwardly direction about the first and second pivot axes relative to the main framework.

In another embodiment of the invention the first and second pivot axes lie in a common first plane, and the third and fourth pivot axes lie in a common second plane, the first and second planes defining an angle therebetween, and the angle defined between the first and second planes varying as the first and second link members are simultaneously pivoted in either one of the senses for urging the carrier means between the first and second orientations. Preferably, the angle defined between the first and second planes is an acute angle when the carrier means is in the second orientation, and decreases as the first and second pivot members are pivoted simultaneously about the first and second pivot axes for urging the carrier means from the second orientation to the first orientation. Advantageously, the first plane extends substantially vertically. Ideally, the second plane extends substantially parallel to the first plane when the carrier means is in the first orientation.

In another embodiment of the invention the first and second link members extend sidewardly from the first plane, so that as the first and second link members are pivoted about the first and second pivot axes for urging the carrier means from the second orientation to the first orientation, the respective perpendicular distances from the third and fourth pivot axes to the first plane reduces.

In a further embodiment of the invention the locus of movement described by the
third pivot axis as the first and second link members are being pivoted for urging the 
carrier means between the first and second orientations crosses the locus of 
movement of the fourth pivot axis.

Preferably, the carrier means comprises a carrier bracket pivotally coupled about the 
third and fourth pivot axes to the first and second link members, respectively, and 
avantageously, a carrier member for carrying the seat extends sidewardly from the 
carrier bracket.

In one embodiment of the invention a back rest is provided extending upwardly from 
the main framework for engaging and providing support to the back of the person.

Preferably, the back rest is coupled to the carrier means, and is moveable relative to 
the main framework so that as the carrier means is moved between the first and 
second orientations, the back rest is correspondingly moved between a first position 
and a second position. Advantageously, the back rest and the carrier means are 
pivotally coupled together about a fifth pivot axis at a first mounting location on the 
back rest, the fifth pivot axis extending parallel to the first pivot axis.

Ideally, the back rest is coupled to the main framework by a second linkage 
mechanism for constraining movement of the back rest between the first and second 
positions as the carrier means is being urged between the first and second 
orientations, respectively. Preferably, the second linkage mechanism is coupled to 
the back rest at a second mounting location on the back rest.

In one embodiment of the invention the back rest is extendable between the first 
mounting location and the second mounting location. Preferably, the back rest 
comprises an extendable telescoping member located between the first and second 
mounting locations.

Advantageously, the second linkage mechanism comprises spaced apart first and 
second link arms, the first link arm being pivotally coupled to the main framework
about the first pivot axis, and the second link arm being pivotally coupled to the main framework about the second pivot axis, the first and second link arms being pivotally coupled to the back rest at the second mounting location and being pivotal relative to the back rest about respective spaced apart sixth and seventh pivot axes, the sixth and seventh pivot axes being parallel to each other and being parallel to the first and second pivot axes.

Advantageously, the first and second link arms form with the main framework and the second mounting location and the first, second and sixth and seventh pivot axes a parallel linkage.

In another embodiment of the invention the back rest comprises a back rest panel, and a mounting member extending downwardly from the back rest panel, the first and second mounting locations being located on the mounting member.

In one embodiment of the invention the back rest comprises a pair of spaced apart mounting members extending downwardly from the back rest panel on respective opposite sides thereof.

In another embodiment of the invention a pair of spaced apart second linkage mechanisms are provided coupled between the back rest and the main framework on respective opposite sides thereof.

In one embodiment of the invention an arm rest extends from the second link member. Preferably, the arm rest is rigidly secured to the second link member, so that the arm rest moves with the second link member as the second link member is being pivoted for urging the carrier means between the first and second orientations. Advantageously, the arm rest is an elongated arm rest, and is cranked intermediate its ends to form a portion extending forwardly upwardly from the second link member to an arm engaging portion.

Ideally, the arm rest comprises a gripping portion for facilitating gripping by a person
as the carrier means is being urged between the first and second orientations.

Preferably, the gripping portion of the arm rest is located so that as the carrier means is being urged from the first orientation to the second orientation the gripping portion of the arm rest is lowered for accommodating the position of the hand of the person as the carrier means is being urged from the first orientation to the second orientation and the person is being lowered from a substantially standing posture to a seated posture. Advantageously, the gripping portion of the arm rest is located so that as the carrier means is being urged from the second to the first orientation, the gripping portion of the arm rest is raised. Preferably, the gripping portion of the arm rest is located adjacent a forward portion thereof.

In one embodiment of the invention the drive means is coupled between the framework and the first linkage mechanism. Preferably, the drive means is coupled to one of the first and second link members. Advantageously, the drive means is coupled to the first link member. Ideally, the drive means comprises a linear motor, and preferably, the linear motor is an electrically powered linear motor.

In one embodiment of the invention a pair of spaced apart first linkage mechanisms are provided pivotally coupled to the main framework and the carrier means on respective opposite sides thereof, and preferably, a pair of drive means are provided, each drive means being associated with a corresponding one of the first linkage mechanisms.

In one embodiment of the invention a pair of arm rests are provided, each arm rest being associated with a corresponding one of the first linkage mechanisms.

In another embodiment of the invention a manually operated input means is provided on one of the arm rests for controlling the drive means.

In one embodiment of the invention the apparatus is adapted for assisting a person onto and off of a toilet bowl, and the carrier means is adapted for carrying a seat for
supporting the person in a seated posture thereon over the toilet bowl for facilitating urinating and defecating.

Preferably, an opening extends through the carrier means for facilitating urinating and defecating therethrough, and advantageously, an entry slot extends through the carrier means from a front edge thereof to the opening.

In a further embodiment of the invention the main framework comprises a base frame of U-shape construction when viewed in plan for accommodating a toilet bowl therebetween, the base frame comprising a transversely extending forward member and a pair of spaced apart side members extending rearwardly from the forward member for embracing a toilet bowl therebetween.

In one embodiment of the invention the main framework comprises a pair of spaced apart upwardly extending support members located on respective opposite sides of the main framework for pivotally carrying the first and second link members about the respective first and second pivot axes, the support members being spaced apart for accommodating a toilet bowl therebetween.

Advantageously, a locating means is provided on the main framework for engaging a person prior to the person being supported on the seat when the carrier means is in the first orientation for facilitating aligning of the person with the seat. Ideally, the locating means is provided for engaging the rear of the legs of the person.

In one embodiment of the invention the locating means is located on the main framework for engaging the legs of the person behind the angles thereof, and preferably, the forward member of the base frame of the main framework forms the locating means.

In another embodiment of the invention at least one pair of spaced apart ground engaging wheels is provided on the main framework for facilitating wheeling of the apparatus. Preferably, two spaced apart pairs of spaced apart ground engaging
wheels are provided on the main framework.

Advantageously, at least one of the ground engaging wheels comprises a brake for securing the apparatus in a desired location, for example, relative to a toilet bowl.

Preferably, at least one handle extends from the main framework for facilitating wheeling of the apparatus.

The invention also provides apparatus for assisting a person onto and off of a toilet bowl, the apparatus comprising a main framework for locating adjacent the toilet bowl, a carrier means for carrying a seat for facilitating urinating and defecating by a person seated thereon, a first linkage mechanism coupling the carrier means to the main framework, and constraining the carrier means to move relative to the framework between a first orientation with the carrier means positioned and oriented for locating the seat in a raised tilted orientation for abutting the posterior of a standing person, and a second orientation with the carrier means positioned and oriented for locating the seat in a lowered substantially horizontal orientation for supporting the person in a seated posture thereon over the toilet bowl, and a drive means for operating the first linkage mechanism for urging the carrier means between the first and the second orientations, wherein the first linkage mechanism comprises a first link member and a second link member, the first and second link members being pivotally coupled to the main framework at spaced apart locations, and being pivotal relative to the main framework about respective spaced apart first and second parallel pivot axes, the first and second link members being pivotally coupled to the carrier means at spaced apart locations and being pivotal relative to the carrier means about respective spaced apart third and fourth pivot axes parallel to the first and second pivot axes, the third pivot axis being spaced apart along the first link member from the first pivot axis, and the fourth pivot axis being spaced apart along the second link member from the second pivot axis, and the first and second link members being simultaneously pivotal about the first and second pivot axes in one sense for urging the carrier means from the first orientation to the second orientation, and in the opposite sense about the first and second pivot axes.
for urging the carrier means from the second orientation to the first orientation.

Additionally, the invention provides a wheelchair comprising a main framework, a carrier means, a seat carried on the carrier means, and at least one pair of spaced apart ground engaging wheels rotatably coupled to the main framework, wherein a first linkage mechanism couples the carrier means to the main framework, and constrains the carrier means to move relative to the framework between a first orientation with the carrier means positioned and oriented for locating the seat in a raised tilted orientation for abutting the posterior of a standing person, and a second orientation with the carrier means positioned and oriented for locating the seat in a lowered substantially horizontal orientation for supporting the person in a seated posture thereon, and a drive means operates the first linkage mechanism for urging the carrier means between the first and the second orientations.

Preferably, the first linkage mechanism comprises a first link member and a second link member, the first and second link members being pivotally coupled to the main framework at spaced apart locations, and being pivotal relative to the main framework about respective spaced apart first and second parallel pivot axes, the first and second link members being pivotally coupled to the carrier means at spaced apart locations and being pivotal relative to the carrier means about respective spaced apart third and fourth pivot axes parallel to the first and second pivot axes, the third pivot axis being spaced apart along the first link member from the first pivot axis, and the fourth pivot axis being spaced apart along the second link member from the second pivot axis, and the first and second link members being simultaneously pivotal about the first and second pivot axes in one sense for urging the carrier means from the first orientation to the second orientation, and in the opposite sense about the first and second pivot axes for urging the carrier means from the second orientation to the first orientation.

The advantages of the apparatus according to the invention are many. A particularly important advantage provided by the apparatus is that a relatively simple and easily operated apparatus is provided for assisting a person between a substantially
standing posture and a seated posture, and thus the apparatus according to the
invention is particularly suitable for assisting a person onto and off of a toilet bowl.
All that is required is for the person in a standing posture to align themselves with
the apparatus so that when the carrier means is in the first orientation with the seat
of the apparatus in a raised tilted orientation, the person by merely leaning
rearwardly engages the seat with his or her posterior, and then by operating the
drive means, the carrier means is urged from the first to the second orientation with
the seat extending substantially horizontally. With the apparatus aligned with a toilet
bowl, the person can then urinate or defecate, as the case may be, into the toilet
bowl, while sitting on the seat. When the person is ready, the apparatus is operated
for raising the person from the seated posture to a substantially standing posture.
These simple operations of the apparatus are achieved by virtue of the fact that the
carrier means is coupled to the main framework by the first linkage mechanism, and
thus movement of the carrier means is constrained so that as the carrier means is
being urged from the first orientation to the second orientation, the seat is oriented
from the tilted raised orientation to the horizontal orientation, and vice versa, without
causing any discomfort to the person. By virtue of the fact that the apparatus is
suitable for assisting a person between a substantially standing posture and a
seated posture, the apparatus has many applications. As discussed above, the
apparatus is particularly suitable for lowering and raising a person onto and off of a
toilet bowl. Furthermore, the apparatus may be used for assisting a person between
a substantially standing posture and a seated posture where the person is seated or
to be seated on a chair, and in which case, the apparatus would be located adjacent
the chair, and when the carrier means is in the second orientation with the seat in
the substantially horizontal orientation, the person would be slid between the seat of
the apparatus and the seat of the chair onto which or from which the person is to be
seated or raised.

Where the apparatus according to the invention is provided with ground engaging
wheels, the apparatus may be used as a wheelchair for moving a person from one
location to the other.
The provision of at least one arm rest on the apparatus assists in balancing the person as the carrier means is being operated between the first and second orientations, both during lowering the person from a substantially standing posture to a seated posture, and vice versa. A further advantage is achieved by rigidly mounting each arm rest to the second link member, since as the second link member is urged with the first link member for urging the carrier means between the first and second orientations, the movement of the arm rest tends to assist in balancing the person as the person is being effectively carried by the carrier means between the standing and seated postures.

The provision of a back rest on the apparatus provides a particularly important advantage, in that the person is further balanced and stabilised as the carrier means is being urged between the respective first and second orientations with the person’s posterior engaging the seat. The back rest is so positioned as to continuously engage the back of the person while the carrier means is being urged between the first and second orientations, and thus, in general, should remain in engagement with the back of the person as the person is being raised and lowered by the apparatus between the substantially standing posture and the seated posture. Thus, the provision of the back rest significantly enhances the balancing and stabilising effect achieved by the apparatus in balancing and stabilising the person as the person is being raised and lowered between the substantially standing posture and the seated posture.

Coupling the back rest to the carrier means has the added advantage that as the carrier means is oriented between the first and second orientations, with the seat being urged between the raised tilted orientation and horizontal orientation, the back rest essentially follows the seat, thereby further ensuring engagement of the back of the person by the back rest. Coupling the back rest to the main framework through the second linkage mechanism, and in particular coupling the second linkage mechanism to the back rest at a second mounting location, and coupling the carrier means to the back rest at a first mounting location, and providing the portion of the back rest between the first and second mounting locations as being extendable, has
the particularly important advantage that the back rest is constrained to move between the first and second positions in a substantially vertical orientation while the carrier means is being urged between the first and second orientations. This has the added advantage of further ensuring that the back rest remains in engagement with the back of the person as the person is being raised and lowered between the substantially standing posture and the seated posture.

By providing the main framework in the form of a base frame of substantially U-shaped construction when viewed in plan, the apparatus is particularly suitable for locating relative to a toilet bowl with the toilet bowl substantially embraced by the apparatus. The provision of ground engaging wheels has the added advantage in that the apparatus may be used for transferring a person from a bed to the toilet bowl. Additionally, the provision of ground engaging wheels facilitates ease of manoeuvring of the apparatus into alignment with the toilet bowl.

The provision of the drive means in the form of an electrically powered linear motor facilitates ease of operation of the apparatus, and the provision of a manually operated input means located on one of the arm rests facilitates ready and easy control of the drive means by the person using the apparatus.

The invention will be more clearly understood from the following description of some preferred embodiments thereof, which are given by way of example only, with reference to the accompanying drawings, in which:

Fig. 1 is a perspective view of apparatus according to the invention for assisting a person between a substantially standing posture and a seated posture,

Fig. 2 is a side elevational view of the apparatus of Fig. 1 in one position,

Fig. 3 is a side elevational view of the apparatus of Fig. 1 in another position,
Fig. 4 is a side elevational view of the apparatus of Fig. 1 in the position of Fig. 2 illustrated in use,

Fig. 5 is a side elevational view of the apparatus of Fig. 1 in the position of Fig. 3, also illustrated in use,

Fig. 6 is a perspective view of a detail of the apparatus of Fig. 1,

Fig. 7 is a perspective view of apparatus according to another embodiment of the invention for assisting a person between a substantially standing posture and a seated posture,

Fig. 8 is another perspective view of the apparatus of Fig. 7 illustrating the apparatus in a different position,

Fig. 9 is a side elevational view of the apparatus of Fig. 7 illustrating the apparatus in the position of Fig. 7,

Fig. 10 is a side elevational view of the apparatus of Fig. 7 illustrating the apparatus in the position of Fig. 8,

Fig. 11 is a front elevational view of apparatus according to another embodiment of the invention for assisting a person between a substantially standing posture and a seated posture,

Fig. 12 is a front elevational view of the apparatus of Fig. 11 in a different position,

Fig. 13 is a transverse cross-sectional side elevational view of the apparatus of Fig. 11 on the line XIII-XIII of Fig. 11, with the apparatus in the position of Fig. 11,
Fig. 14 is a transverse cross-sectional side elevational view of the apparatus of Fig. 11 on the line XIV-XIV of Fig. 12 with the apparatus in the position of Fig. 12,

Fig. 15 is an enlarged transverse cross-sectional side elevational view of a portion of the apparatus of Fig. 11 on the line XIII-XIII of Fig. 11 illustrated in the position of Fig. 11,

Fig. 16 is an enlarged transverse cross-sectional side elevational view of the portion of the apparatus of Fig. 15 on the line XIV-XIV of Fig. 12 illustrated in the position of Fig. 12,

Fig. 17 is a side elevational view of another portion of the apparatus of Fig. 11,

Fig. 18 is a transverse cross-sectional side elevational view of the portion of Fig. 17 on the line XVIII-XVIII of Fig. 17, and

Fig. 19 is a transverse cross-sectional side elevational view of a detail of the portion of the apparatus of Fig. 17.

Referring to the drawings, and initially to Figs. 1 to 6, there is illustrated apparatus according to the invention, indicated generally by the reference numeral 1, for assisting a person 2 between a substantially standing posture and a seated posture.

In this embodiment of the invention the apparatus 1 is particularly suitable for assisting a person onto and off of a toilet bowl 3, see Figs. 4 and 5. The apparatus 1 comprises a main framework 5 which is carried on a pair of ground engaging wheels, namely, a pair of castors 6 for facilitating moving the apparatus 1 from one toilet bowl 3 to another. The main framework 5 comprises a base frame 8 of U-shaped construction in plan view for embracing the toilet bowl 3 in use. A pair of upstanding support members 10 extend upwardly from the base frame 8 and are joined by an upper transversely extending cross member 11, which is at a height relative to the
base frame 8 for clearing a toilet bowl as the apparatus 1 is being manoeuvred to embrace the toilet bowl 3.

A carrier means comprising a carrier member, which in this embodiment of the invention is provided by a carrier frame 14 carries a seat 12 for supporting a person in a seated posture over the toilet bowl 3. The carrier frame 14 is rigidly connected to and extends between a pair of carrier brackets 16. A pair of spaced apart first linkage mechanisms 18 couple the carrier frame 14 to the main framework 5, and constrain the carrier frame 14 to move between a first orientation illustrated in Figs. 1, 2 and 4 with the seat 12 in a raised tilted orientation at an angle of approximately 60° to the horizontal for engaging the posterior of a person in a substantially standing posture, and a second orientation illustrated in Figs. 3 and 5 with the seat 12 in a horizontal orientation for supporting the person over the toilet bowl 3, for in turn lowering and raising the person 2 onto and from the toilet bowl 3. Each first linkage mechanism 18 is pivotally coupled to a corresponding one of the support members 10 and to a corresponding one of the carrier brackets 16 for carrying the carrier frame 14. A drive means, namely, a pair of electrically powered linear motors 19 coupled between the base frame 8 and the corresponding ones of the first linkage mechanisms 18 urge the carrier frame 14 between the first and second orientations through the first linkage mechanisms 18.

The base frame 8 comprises a pair of spaced apart side members 20 which are joined by a transversely extending forward member 21. The forward member 21 also acts as a locating means for in this embodiment of the invention engaging the heels of a person in a standing posture for aligning the person relative to the seat 12, for in turn assisting the person 2 when in a standing posture to engage the seat 12 with his or her posterior, see Fig. 4. The support members 10 extend upwardly from the corresponding side members 20, and a pair of bracing members 22 extend between the side members 20 and the support members 10 for reinforcing the main framework 5. The castors 6 are located on the side members 20 of the base frame 8 towards the rear thereof, and the main framework 5 is stabilised on the ground in a desired position relative to the toilet bowl 3 by ground engaging pads 23 located on
the underside of the side members 20 towards the forward ends thereof.

Each first linkage mechanism 18 comprises a lower first link member 24 and an upper second link member 25, which are pivotally coupled to the corresponding support member 10 at spaced apart locations by first and second pivot pins 27 and 28, respectively, which in turn define parallel first and second axes 29 and 30. The first and second link members 24 and 25 are pivotally coupled to the corresponding carrier bracket 16 at spaced apart locations by third and fourth pivot pins 32 and 33, which in turn define parallel third and fourth pivot axes 34 and 35, which are parallel to the first and second pivot axes 29 and 30. The respective linear motors 19 are pivotally coupled to the corresponding side members 20 of the base frame 8 and to the corresponding ones of the first link members 24 of the first linkage mechanisms 18 by respective pivot couplings 36 and 37, respectively. The first linkage mechanisms 18 are coupled to the support members 10 and the carrier brackets 16 so that the respective first, second, third and fourth pivot axes 29, 30, 34 and 35 of the first linkage mechanisms 18 are aligned with each other, in other words the first pivot axes 29 of the respective first linkage mechanisms 18 are aligned with each other, the second pivot axes of the respective first linkage mechanisms are aligned with each other, and so on.

The first, second, third and fourth pivot pins 27, 28, 32 and 33 are located along the first and second link members 24 and 25, respectively, of each first linkage mechanism 18, so that the spacing $S_1$ between the first and third pivot axes 29 and 34 along the first link member 24 is greater than the spacing $S_2$ between the second and fourth pivot axes 30 and 35 along the second link member 25. Additionally, the spacing between the first and second pivot axes 29 and 30 along the respective support members 10 is greater than the spacing between the third and fourth pivot axes 34 and 35 along the respective carrier brackets 16. By so arranging the spacing between the first, second, third and fourth pivot axes 29, 30, 34 and 35, respectively, pivoting of the first and second link members 24 and 25 in one of a clockwise and anticlockwise sense about the first and second pivot axes 29 and 30 urges the carrier frame 14 in the other of a clockwise and anticlockwise sense
between the first orientation and the second orientation. In other words, when the first and second link members 24 and 25 are pivoted about the first and second pivot axes 29 and 30 in the direction of the arrows A and B in an anticlockwise sense, see Fig. 2, the carrier frame 14 is urged in the direction of the arrow C in a clockwise sense, see Fig. 2, from the second to the first orientation, and vice versa.

Accordingly, by pivoting the first and second link members 24 and 25 of the respective first linkage mechanisms 18 in a generally upwardly direction in the direction of the arrows A and B, see Fig. 2, about the first and second pivot axes 29 and 30, respectively, the carrier frame 14 is urged from the second orientation to the first orientation, thus urging the seat 12 from the lower horizontal orientation to the raised tilted orientation, and vice versa.

Additionally, in this embodiment of the invention the first and second pivot axes 29 and 30 of the first linkage mechanisms 18 are contained in a first plane illustrated by the chain line 38, which extends vertically, while the third and fourth pivot axes 34 and 35 of the first linkage mechanisms 18 are contained in a second plane illustrated by the chain line 39. When the carrier frame 14 is in the second orientation, the first and second planes 38 and 39 define an acute angle $\alpha$, and as the carrier frame 14 is being urged from the second orientation to the first orientation, the angle $\alpha$ defined by the first and second planes 38 and 39 decreases until the first and second planes 38 and 39 are parallel to each other when the carrier frame 14 is in the first orientation. The angle $\alpha$ through which the second plane 39 moves relative to the first plane 38 corresponds to the angle through which the carrier frame 14 is urged between the first and second orientations. In this embodiment of the invention the angle $\alpha$ through which the second plane 39 is urged relative to the first plane 38 as the carrier frame 14 is being urged between the first and second orientations is approximately 60°, and thus, the carrier frame 14 is also urged through an angle of approximately 60° between the first and second orientations. The configuration of the respective first linkage mechanisms 18 in this way constrains the movement of the carrier frame 14 between the respective first and second orientations for maximising comfort of a person being raised and lowered relative to the toilet bowl 3. The angle $\alpha$ through which the second plane 39 is urged relative to the first plane 38
while the carrier frame 14 is being urged between the first and second orientations may be varied by varying the length of the spacings S₁ and S₂ between the respective first and third pivot axes 29 and 34 and the second and fourth pivot axes 30 and 35, as well as the spacing between the first and second pivot axes and the third and fourth pivot axes.

The first linkage mechanisms 18 are also configured so that as the first and second link members 24 and 25 are being pivoted about the first and second pivot axes 29 and 30 for urging the carrier frame 14 between the first and second orientations, the locus described by the third pivot axis 34 crosses the locus described by the fourth pivot axis 35.

The carrier frame 14 comprises a front plate 40 extending between the carrier brackets 16 and rigidly secured thereto, and a pair of spaced apart side plates 41 which extend rearwardly from the front plate 40 and are joined by a transversely extending rear plate 42. The seat 12 is hingedly coupled to the rear plate 42 by a hinge 43. In this embodiment of the invention the seat 12 is in the form of a toilet seat, and defines an opening 44 extending therethrough for facilitating urinating and defecating by a person seated thereon. The carrier frame 14 defines an opening 45 aligned with the opening 44 in the seat 12, for similarly accommodating urinating and defecating therethrough. A pair of arm rests 46 rigidly secured to the second link members 25 of the corresponding first linkage mechanisms 18 are provided for supporting the arms of a person seated on the seat 12 when the seat 12 is in the lower horizontal orientation, and for gripping by the person and for supporting the person as the person is being raised and lowered relative to the toilet bowl 3 by the apparatus 1. In this embodiment of the invention each arm rest comprises an arm rest portion 47 which extends substantially parallel to the corresponding second link member 25, and which is rigidly secured to the corresponding second link member 25 by a corresponding connecting arm 48. A forward end of each arm rest portion 47 is gripped by a person as the person is raised and lowered relative to the toilet bowl 3, for balancing and stabilising the person during raising and lowering.
In this embodiment of the invention the linear motors 19 comprise electrically powered linear screw drive motors, which are powered by a 24 volt power supply, which is provided by a battery (not shown) mounted in a suitable location on the main framework 5. A manually operated control means comprising electrical control circuitry (not shown) is located in a housing 55, see Fig. 6, mounted on one of the arm rests 46, and is provided with button operated switches 56 and 57. The button switch 56 is provided for operating the linear motors 19 for urging the carrier frame 14 from the first to the second orientations, and the button switch 57 is for operating the linear motors 19 for urging the carrier frame 14 from the second to the first orientations.

In use, with the apparatus 1 manoeuvred relative to a toilet bowl 3, so that the toilet bowl 3 is embraced by the base frame 8, and the opening 44 in the seat 12 when the seat 12 is in the lower horizontal orientation is above and directly aligned with the toilet bowl 3, the apparatus is ready for use. The linear motors 19 are operated by the button switch 57 for urging the carrier frame 14 from the second to the first orientations. A person 2 wishing to use the toilet bowl 3 positions himself or herself with the heels of the feet or shoes abutting the forward member 21 and grips forward ends of the arm rests 46 with the hands, and gradually leans backwardly so that the posterior is engaged on the seat 12. The linear motors 19 are then operated by the button switch 56 for urging the carrier frame 14 from the first to the second orientations, thereby lowering the subject from a substantially standing posture as illustrated in Fig. 4 to the seated posture illustrated in Fig. 5. With the carrier frame 14 in the second orientation, the person sitting on the seat 12 may then use the toilet. When the person is finished using the toilet, the button switch 57 is operated for urging the carrier frame 14 from the second to the first orientation. As the carrier frame 14 is being urged from the second to the first orientation, the person grips the forward ends of the arm rests 46, for assisting in balancing and stabilising the person as the person is being raised from the seated posture illustrated in Fig. 5 to the substantially standing posture illustrated in Fig. 4. Thereafter, the person, while still gripping the forward ends of the arm rests 46, merely straightens himself or herself up, and can then either walk or be assisted away from the apparatus 1.
An advantage of rigidly securing the arm rests 46 to the second link members 25 is that the forward ends of the arm rests 46 are raised as the carrier frame 14 is being urged from the second to the first orientation. Thus, the forward ends of the arm rests 46 substantially follow the movement of the hands of the person as the person is being raised from the seated posture to the substantially standing posture by the apparatus. Similarly, as the carrier frame 14 is being urged from the first orientation to the second orientation, the forward ends of the arm rests 46 substantially follow the movement of the hands of the person as the person is being lowered from the substantially standing posture of Fig. 4 to the seated posture of Fig. 5.

Referring now to Figs. 7 to 10, there is illustrated apparatus according to another embodiment of the invention, indicated generally by the reference numeral 60. The apparatus 60 is substantially similar to the apparatus 1 described with reference to Figs. 1 to 6, and similar components are identified by the same reference numerals. However, in this embodiment of the invention the apparatus 60 is a more refined version of the apparatus 1. The base frame 8 of the main framework 5 is substantially similar to the base frame 8 of the apparatus 1. However, in this embodiment of the invention a pair of upstanding support members 10 extend upwardly from each side member 20 of the base frame 8. A central panel member 61 is secured to each pair of support members 10, and the respective central panel members 61 carry the first and second pivot pins 27 and 28 for pivotally coupling the first and second link members 24 and 25 to the main framework 5. The first link members 24 are substantially similar to the first link members 24 of the apparatus 1, however, the second link members 25 each include a pair of spaced apart downwardly extending side panels 62 for partially overlapping the first link members 24 for safety.

Additionally, the carrier brackets 16 of the carrier means are provided in the form of inverted channel members, which embrace the first and second link members 24 and 25. The carrier frame 14 comprises a pair of side plates 41 which are formed integrally with a rear plate 42, and a pair of mounting brackets 64 secured to the side
plates 41 secure the carrier frame 14 to the respective adjacent carrier brackets 16. In this embodiment of the invention the front plate 40 has been omitted, and the side plates 41 define an entry slot 65 to the opening 45 formed in the carrier frame 14. A corresponding entry slot 66 is formed in the seat 12 to the seat opening 44.

A pair of rear ground engaging wheels 6 are rotatably carried on corresponding shafts 67 extending from the rear of the side members 20 of the base frame 8. Resilient ground engaging pads 68 are located on the forward member 21 of the base frame 8.

Otherwise, the apparatus 60 and its use and operation is similar to that of the apparatus 1 described with reference to Figs. 1 to 6.

Referring now to Figs. 11 to 19, there is illustrated apparatus according to another embodiment of the invention, indicated generally by the reference numeral 70. The apparatus 70 is substantially similar to the apparatus 1 described with reference to Figs. 1 to 6, and similar components are identified by the same reference numerals. Indeed, in this embodiment of the invention the first and second link members 24 and 25, respectively, are of substantially similar construction to that of the first and second link members 24 and 25 of the apparatus 60 described with reference to Figs. 7 to 10, as are the carrier brackets 16 similar to those of the apparatus 60.

In this embodiment of the invention the base frame 8 of the main framework 5 comprises a pair of spaced apart side members 20 joined by a forward member 21. However, a pair of cranked connecting members 71 extending upwardly from the respective side members 20 join the side members 20 to the corresponding pair of support members 10. Each cranked connecting member 71 extends forwardly from the rearward one of the corresponding pair of support members 10, and the forward one of the corresponding pair of support members 10 extends upwardly from the corresponding cranked connecting member 71. A central panel member 72 similar to the central panel member 61 of the apparatus 60 is secured and extends between each pair of support members 10 for carrying the first and second pivot pins 27 and
28 for pivotally coupling the first and second link members 24 and 25 to the main framework 5.

The apparatus 70 is provided with two pairs of ground engaging wheels, namely, a front pair of ground engaging wheels provided by a front pair of castors 73, and a rear pair of ground engaging wheels provided by a rear pair of castors 74. The rearward ends of the side members 20 are shaped for accommodating the forward pair of castors 73, while the arrangement of the connection of the side members 20 to the support members 10 by the corresponding cranked connecting members 71 accommodates the rear pair of castors 74. The rear pair of castors 74 are each provided with a brake (not shown) which is operable by a corresponding foot operated brake lever 75 for securing the apparatus 70 in a desired position relative to a toilet bowl.

The carrier means in this embodiment of the invention comprises a carrier plate 76 which is rigidly secured to the carrier brackets 16, and carries the seat 12. An opening 77 similar to the opening 45 extends through the carrier plate 76, and an entry slot 78 extends through the carrier plate 76 to the opening 77.

The arm rests 46 are substantially similar to the arm rests 46 of the apparatus 1 and are rigidly secured to and extend upwardly forwardly from the second link members 25. However, in this embodiment of the invention a forward hand grip portion 79 of each arm rest 46 is inclined forwardly downwardly from the arm rest portion 47. The forward hand grip portions 79 form hand grips for facilitating gripping of the arm rests 46 by a person using the apparatus 70. By extending the forward hand grip portion 79 of each arm rest 46 forwardly downwardly, the orientation of the forward hand grip portion 79 of each arm rest 46 tends to follow the normal orientation and movement of the hands of a person using the apparatus as the person is being lowered and raised onto and off of the toilet bowl.

A back rest comprising a back rest panel 80 for engaging the back of a person using the apparatus 70 as the carrier plate 76 is being urged between the first and second
orientations is carried on a pair of spaced apart mounting members 81 which are coupled to the main framework 5 and to the carrier plate 76 as will be described below, so that as the carrier plate 76 is urged between the first and second orientations, the back rest panel 80 is urged between respective first and second positions, the first position being illustrated in Figs. 12, 14 and 16, and the second position being illustrated in Figs. 11, 13 and 15. Each mounting member 81 is provided in the form of a telescoping member comprising an outer tubular member 82, an inner member 83 and an intermediate tubular member 84 located between the outer tubular member 82 and the inner member 83. The inner member 83 is slideable within the intermediate tubular member 84, which in turn is slideable within the outer tubular member 82. Stop members 85, 86, 87 and 88 secured by rivets 89 to the inner member 83, the intermediate tubular member 84 and the outer member 82 limit the relative movement between the members 82, 83 and 84, and prevent the members 82, 83 and 84 from being disengaged one from the other, see Figs. 17 to 19.

A first mounting bracket 91 extending from a first mounting location 92 at the lower end of each outer tubular member 82 is pivotally connected to a corresponding first connecting bracket 93 which extends from and is rigidly connected to the carrier plate 76 at the corresponding side thereof, so that as the carrier plate 76 is being urged between the first and second orientations, the back rest panel 80 is urged between the first and second positions, respectively. Fifth pivot pins 94 pivotally couple the first connecting bracket 93 extending from the carrier plate 76 with the corresponding first mounting brackets 91. Each fifth pivot pin 94 defines a fifth pivot axis 95 which extends parallel to the first and second pivot axes 29 and 30, and the respective fifth pivot axes 95 are axially aligned with each other.

A pair of second linkage mechanisms 96 couple the corresponding mounting members 81 to the main framework 5 at respective opposite sides thereof for constraining movement of the back rest panel 80 between the first and second positions, so that as the back rest panel 80 is urged between the first and second positions, the back rest panel 80 remains in a substantially vertical plane. Each
second linkage mechanism 96 comprises first and second link arms 97 and 98, respectively, which are pivotally coupled to the main framework 5 by the corresponding first and second pivot pins 27 and 28, respectively. A pair of spaced apart second mounting brackets 99 extend from the inner member 83 at a second mounting location 100 of each mounting member 81 and carry sixth and seventh pivot pins 102 and 103, respectively, for pivotally engaging the first and second link arms 97 and 98. The sixth and seventh pivot pins 102 and 103 define respective sixth and seventh pivot axes 105 and 106, respectively, which are parallel to each other and parallel to the first and second pivot axes 29 and 30. The respective sixth and seventh pivot axes 105 and 106 of the second linkage mechanisms 96 are axially aligned with each other. The spacing between the sixth and seventh pivot axes 105 and 106 is similar to the spacing between the first and second pivot axes 29 and 30, and the spacing between the first and the sixth pivot axes 29 and 105, respectively, is similar to the spacing between the second and the seventh pivot axes 30 and 106, respectively, and thus the second linkage mechanisms 96 are a parallel linkage, so that as the back rest panel 80 is being urged between the first and second positions, the back rest panel 80 is constrained by the second linkage mechanisms 96 to remain in a substantially vertical plane.

An upstanding member 108 extends upwardly from each rearward one of the corresponding pair of support members 10, and the upstanding members 108 are cranked at 109 to form rearwardly extending handles 110 for facilitating wheeling the apparatus 70 from one location to another.

In use, with the apparatus 70 manoeuvred to embrace a toilet bowl, and with the opening 77 in the carrier plate 76 above and centrally aligned with the toilet bowl 3, the brakes are applied to the rear castors 74 for securing the apparatus 70 in position aligned with the toilet bowl 3. The button switch 57 is operated for operating the linear motors 19 for urging the carrier plate 76 from the second to the first orientation, which simultaneously urges the back rest panel 80 from the second to the first positions. A person wishing to use the apparatus 70 stands in front of the apparatus 70 with the rear of his or her legs just above the ankles abutting the
forward member 21. Since the forward member 21 of the base frame 8 in this
embodiment of the invention is raised to accommodate the forward castors 73, the
back of the legs, rather than the back of the heels of a person, is engaged by the
forward member 21. The person then reaches rearwardly and grips the forward grip
portions 79 of the arm rests 46, and inclines rearwardly until the posterior of the
person abuts the seat 12 and the back of the person abuts the back rest panel 80.
The button switch 56 is operated for operating the linear motors 19 for urging the
carrier plate 76 from the first to the second orientations, which in turn urges the back
rest panel 80 from the first to the second positions, thereby lowering the person from
a standing posture to a seated posture seated on the seat 12 above the toilet bowl.
The person is thus in a position to use the toilet.

On completion of use of the toilet, the person operates the button switch 57 for
urging the carrier plate 76 from the second to the first orientations and in turn the
back rest panel 80 from the second to the first positions, thereby raising the
individual from the seated posture on the seat 12 to a substantially standing posture.
During the raising and lowering of the person between the seated posture and the
standing posture and vice versa as the carrier plate 76 is being urged between the
first and second orientations, the person continuously grips the forward grip portions
79 of the arm rests 46 for balancing and stabilising the person as he or she is being
raised and lowered between the respective standing and seated postures.

The fact that the arm rest 46 pivots about a rearward pivot axis, namely, the second
pivot axis 30, and the carrier plate 76 is pivotal about respective forward pivot axes,
namely, the third and fourth pivot axes 34 and 35, the arm rests 46 and the carrier
plate 76 are pivoted in opposite senses as the carrier plate 76 is being urged
between the first and second orientations. This thus results in the forward grip
portion 79 of the arm rests 46 effectively following the locus of the hands of a person
using the apparatus as the person is being raised and lowered between the standing
and seated postures, thereby balancing and stabilising the person as he or she is
being raised and lowered and also adding to the comfort of the person as he or she
is being raised and lowered between the standing and seated postures, respectively.
Otherwise, the apparatus 70, its use and operation are similar to the apparatus 1 and its use and operation.

It is envisaged that in certain cases a flexible member or members may be coupled to the carrier frame of the apparatus of Figs. 1 to 6 and Figs. 7 to 10 or to the carrier plate of the apparatus of Figs. 11 to 19 for in turn coupling to trousers or pants of the person using the apparatus, which would assist in pulling up or down the trousers or pants of the person, as the carrier frame or carrier plate, as the case may be, is being urged between the respective first and second orientations, as the case may be.

While the apparatus according to the invention for assisting a person between a substantially standing posture and a seated posture has been described for use in assisting a person onto and off of a toilet bowl, it will be readily apparent to those skilled in the art that the apparatus according to the invention may be used in many other applications where it is desired to assist a person between a substantially standing posture and a seated posture. For example, where it is desired to assist a person from a standing posture to a seated posture seated on a chair, the apparatus is located adjacent the chair, and if the person is to be lowered onto the chair, the person in the standing posture is aligned with the apparatus and gradually leans backwardly so that the posterior of the person is engaged on the seat of the apparatus. The apparatus is then operated for lowering the person seated on the seat of the apparatus to the seated posture, and thereafter the person can be slid from the seat of the apparatus onto the chair. Where it is desired to raise the person from the chair to a standing posture, the person is slid from the chair onto the seat of the apparatus, which is then operated for raising the person into the standing posture.

It is also envisaged that the apparatus according to the invention may be used as a wheelchair. In which case, suitable ground engaging wheels would be provided on the main framework, and the wheels may be of the type which would facilitate a
person seated in the wheelchair to move themselves from one location to another. Alternatively, the apparatus when adapted as a wheelchair may be provided with its own motive power for facilitating the person seated therein to drive themselves from one location to another. Indeed, where motive power is provided, it is envisaged that the drive means for urging the carrier means between the first and second orientations would be powered by the motive power of the wheelchair. Needless to say, the apparatus, whether provided as a wheelchair or otherwise, may be provided with its own motive power for operating the drive means for urging the carrier means between the first and second orientations. When the apparatus is provided as a wheelchair, in general, the apparatus would be provided with a back rest, and in general, though not essential, the back rest would be of the type described with reference to Figs. 11 to 19, and would be moveable between the first and second positions as the carrier means is moved between the first and second orientations. Additionally, where the apparatus is provided as a wheelchair, foot and calf supports would be provided for the person seated therein.

It is also envisaged that straps may be provided on the back rest for engaging around the person for securing the person as the apparatus is being operated for raising and/or lowering the person between the substantially standing posture and the seated posture.

While the drive means for operating the first linkage mechanisms has been described as being provided by a pair of electrically powered linear screw motors, any other suitable motors or drive means could be used. Indeed, in certain cases, it is envisaged that a single drive motor driving one of the first linkage mechanisms may be adequate, and it is further envisaged that where a single drive motor is provided, which would operate one of the first linkage mechanisms, a spring or other suitable balancing mechanism, for example, an air spring would be provided acting between the other first linkage mechanism and the main framework.

It is also envisaged that while the main frameworks have been described as comprising an upper cross member, the upper cross member may be dispensed
with, however, where an upper cross member is provided, it should be located at a level above the level of the toilet bowl for facilitating locating the apparatus with the side members of the base frame and the support members of the main framework embracing the toilet bowl.

It is also envisaged that while a pair of first linkage mechanisms have been provided, in certain cases, a single first linkage mechanism may be sufficient. Additionally, where the apparatus is provided with a single first linkage mechanism, the apparatus described with reference to Figs. 11 to 19 could also be provided with a single second linkage mechanism for constraining movement of the back rest for maintaining the back rest in a substantially vertical plane as the back rest is being moved between the first and second positions.

Further, it will be appreciated that the arm rests may in certain cases be dispensed with. However, an advantage of providing the arm rests is that they enhance the support offered to the person, thus allowing the person to balance and adjust themselves during movement of the toilet seat between the first raised tilted orientation and the second lower horizontal orientation.

Additionally, while the apparatus have been described as being provided with ground engaging wheels, it is envisaged that the apparatus may be provided without ground engaging wheels, and would be provided to be carried from one toilet bowl to another, and indeed, in certain cases, it is envisaged that the apparatus may be provided fixed in position relative to a toilet bowl, and may be secured to the floor or an adjacent wall.

It is also envisaged that adjustment may be provided for adjusting the height to which the seat rises when the carrier frame or carrier plate is in the first orientation. This would be achieved by facilitating adjustment of the seat on the carrier frame or carrier plate. However, this adjustment, while it would provide for adjustment of the height of the seat when the carrier frame or carrier plate is in the first orientation, would not alter the height of the seat when the carrier frame or carrier plate is in the
second orientation, since in the second orientation, it is important that the carrier frame or carrier plate and in turn the seat should be located just above the toilet bowl.

Additionally, it will be appreciated that while the apparatus has been described with the seat being at an angle of approximately 60° to the horizontal when the carrier means is in the first orientation, the seat may be at any suitable angle to the horizontal when the carrier means is in the first orientation. Typically, it is believed desirable that the seat be at an angle in the range of 55° to 90° to the horizontal when the carrier means is in the first orientation.

It is also envisaged that the apparatus according to the invention may be provided with an in-built commode, whereby a waste receptacle may be fixed to the carrier frame or carrier plate, or may be secured to the main framework. When secured to the main framework, the commode would effectively take up the position of a toilet bowl, and when secured to the carrier frame or carrier plate, the commode would move with the carrier frame or carrier plate as the carrier frame or carrier plate is urged between the first and second orientations.

It is also envisaged that one or more springs may be provided in the telescoping members of the back rest for ensuring smooth movement of the telescoping members as the back rest is being urged between the first position and the second position as the carrier means is being urged between the first orientation and the second orientation.
Claims
1. Apparatus for assisting a person between a substantially standing posture and a seated posture, the apparatus comprising a main framework, a carrier means for carrying a seat for the person, a first linkage mechanism coupling the carrier means to the main framework, and constraining the carrier means to move relative to the framework between a first orientation with the carrier means positioned and oriented for locating the seat in a raised tilted orientation for abutting the posterior of the person in the substantially standing posture, and a second orientation with the carrier means positioned and oriented for locating the seat in a lowered substantially horizontal orientation with the person in a seated posture thereon, and a drive means for operating the first linkage mechanism for urging the carrier means between the first and the second orientations, characterised in that the first linkage mechanism comprises a first link member and a second link member, the first and second link members being pivotally coupled to the main framework at spaced apart locations, and being pivotal relative to the main framework about respective spaced apart first and second parallel pivot axes, the first and second link members being pivotally coupled to the carrier means at spaced apart locations and being pivotal relative to the carrier means about respective spaced apart third and fourth pivot axes parallel to the first and second pivot axes, the third pivot axis being spaced apart along the first link member from the first pivot axis, and the fourth pivot axis being spaced apart along the second link member from the second pivot axis, and the first and second link members being simultaneously pivotal about the first and second pivot axes in one sense for urging the carrier means from the first orientation to the second orientation, and in the opposite sense about the first and second pivot axes for urging the carrier means from the second orientation to the first orientation.

2. Apparatus as claimed in Claim 1 characterised in that the spacing between the first and third pivot axes is greater than the spacing between the second and the fourth pivot axes.

3. Apparatus as claimed in Claim 1 or 2 characterised in that the spacing between the third and fourth pivot axes is less than the spacing between the first and
second pivot axes.

4. Apparatus as claimed in any preceding claim characterised in that the first link member is located below the second link member, so that as the first and second link members are being pivoted about the first and second pivot axes in one of a clockwise and anticlockwise sense, the carrier means is urged between the first and second orientations in the other of the clockwise and anticlockwise sense.

5. Apparatus as claimed in Claim 4 characterised in that the carrier means is urged from the second orientation to the first orientation by pivoting the first and second link members in a generally upwardly direction about the first and second pivot axes relative to the main framework.

6. Apparatus as claimed in any preceding claim characterised in that the first and second pivot axes lie in a common first plane, and the third and fourth pivot axes lie in a common second plane, the first and second planes defining an angle therebetween, and the angle defined between the first and second planes varying as the first and second link members are simultaneously pivoted in either one of the senses for urging the carrier means between the first and second orientations.

7. Apparatus as claimed in Claim 6 characterised in that the angle defined between the first and second planes is an acute angle when the carrier means is in the second orientation, and decreases as the first and second pivot members are pivoted simultaneously about the first and second pivot axes for urging the carrier means from the second orientation to the first orientation.

8. Apparatus as claimed in Claim 6 or 7 characterised in that the first plane extends substantially vertically.

9. Apparatus as claimed in any of Claims 6 to 8 characterised in that the second plane extends substantially parallel to the first plane when the carrier means is in the first orientation.
10. Apparatus as claimed in any of Claims 6 to 9 characterised in that the first and second link members extend sidewardly from the first plane, so that as the first and second link members are pivoted about the first and second pivot axes for urging the carrier means from the second orientation to the first orientation, the respective perpendicular distances from the third and fourth pivot axes to the first plane reduces.

11. Apparatus as claimed in any preceding claim characterised in that the locus of movement described by the third pivot axis as the first and second link members are being pivoted for urging the carrier means between the first and second orientations crosses the locus of movement of the fourth pivot axis.

12. Apparatus as claimed in any preceding claim characterised in that the carrier means comprises a carrier bracket pivotally coupled about the third and fourth pivot axes to the first and second link members, respectively.

13. Apparatus as claimed in Claim 12 characterised in that a carrier member for carrying the seat extends sidewardly from the carrier bracket.

14. Apparatus as claimed in any preceding claim characterised in that a back rest is provided extending upwardly from the main framework for engaging and providing support to the back of the person.

15. Apparatus as claimed in Claim 14 characterised in that the back rest is coupled to the carrier means, and is moveable relative to the main framework so that as the carrier means is moved between the first and second orientations, the back rest is correspondingly moved between a first position and a second position.

16. Apparatus as claimed in Claim 15 characterised in that the back rest and the carrier means are pivotally coupled together about a fifth pivot axis at a first mounting location on the back rest, the fifth pivot axis extending parallel to the first
pivot axis.

17. Apparatus as claimed in Claim 16 characterised in that the back rest is coupled to the main framework by a second linkage mechanism for constraining movement of the back rest between the first and second positions as the carrier means is being urged between the first and second orientations, respectively.

18. Apparatus as claimed in Claim 17 characterised in that the second linkage mechanism is coupled to the back rest at a second mounting location on the back rest.

19. Apparatus as claimed in Claim 18 characterised in that the back rest is extendable between the first mounting location and the second mounting location.

20. Apparatus as claimed in Claim 19 characterised in that the back rest comprises an extendable telescoping member located between the first and second mounting locations.

21. Apparatus as claimed in any of Claims 18 to 20 characterised in that the second linkage mechanism comprises spaced apart first and second link arms, the first link arm being pivotally coupled to the main framework about the first pivot axis, and the second link arm being pivotally coupled to the main framework about the second pivot axis, the first and second link arms being pivotally coupled to the back rest at the second mounting location and being pivotal relative to the back rest about respective spaced apart sixth and seventh pivot axes, the sixth and seventh pivot axes being parallel to each other and being parallel to the first and second pivot axes.

22. Apparatus as claimed in Claim 21 characterised in that the first and second link arms form with the main framework and the second mounting location and the first, second and sixth and seventh pivot axes a parallel linkage.
23. Apparatus as claimed in any of Claims 18 to 22 characterised in that the back rest comprises a back rest panel, and a mounting member extending downwardly from the back rest panel, the first and second mounting locations being located on the mounting member.

24. A back rest as claimed in Claim 23 characterised in that the back rest comprises a pair of spaced apart mounting members extending downwardly from the back rest panel on respective opposite sides thereof.

25. Apparatus as claimed in any of Claims 17 to 24 characterised in that a pair of spaced apart second linkage mechanisms are provided coupled between the back rest and the main framework on respective opposite sides thereof.

26. Apparatus as claimed in any preceding claim characterised in that an arm rest extends from the second link member.

27. Apparatus as claimed in Claim 26 characterised in that the arm rest is rigidly secured to the second link member, so that the arm rest moves with the second link member as the second link member is being pivoted for urging the carrier means between the first and second orientations.

28. Apparatus as claimed in Claim 26 or 27 characterised in that the arm rest is an elongated arm rest, and is cranked intermediate its ends to form a portion extending forwardly upwardly from the second link member to an arm engaging portion.

29. Apparatus as claimed in any of Claims 26 to 28 characterised in that the arm rest comprises a gripping portion for facilitating gripping by a person as the carrier means is being urged between the first and second orientations.

30. Apparatus as claimed in Claim 29 characterised in that the gripping portion of the arm rest is located so that as the carrier means is being urged from the first
orientation to the second orientation the gripping portion of the arm rest is lowered for accommodating the position of the hand of the person as the carrier means is being urged from the first orientation to the second orientation and the person is being lowered from a substantially standing posture to a seated posture.

31. Apparatus as claimed in Claim 29 or 30 characterised in that the gripping portion of the arm rest is located so that as the carrier means is being urged from the second to the first orientation, the gripping portion of the arm rest is raised.

32. Apparatus as claimed in any of Claims 29 to 31 characterised in that the gripping portion of the arm rest is located adjacent a forward portion thereof.

33. Apparatus as claimed in any preceding claim characterised in that the drive means is coupled between the framework and the first linkage mechanism.

34. Apparatus as claimed in Claim 33 characterised in that the drive means is coupled to one of the first and second link members.

35. Apparatus as claimed in Claim 33 or 34 characterised in that the drive means is coupled to the first link member.

36. Apparatus as claimed in any preceding claim characterised in that the drive means comprises a linear motor.

37. Apparatus as claimed in Claim 36 characterised in that the linear motor is an electrically powered linear motor.

38. Apparatus as claimed in any preceding claim characterised in that a pair of spaced apart first linkage mechanisms are provided pivotally coupled to the main framework and the carrier means on respective opposite sides thereof.

39. Apparatus as claimed in Claim 38 characterised in that a pair of drive means
are provided, each drive means being associated with a corresponding one of the first linkage mechanisms.

40. Apparatus as claimed in Claim 38 or 39 characterised in that a pair of arm rests are provided, each arm rest being associated with a corresponding one of the first linkage mechanisms.

41. Apparatus as claimed in Claim 40 characterised in that a manually operated input means is provided on one of the arm rests for controlling the drive means.

42. Apparatus as claimed in any preceding claim characterised in that the apparatus is adapted for assisting a person onto and off of a toilet bowl, and the carrier means is adapted for carrying a seat for supporting the person in a seated posture thereon over the toilet bowl for facilitating urinating and defecating.

43. Apparatus as claimed in Claim 42 characterised in that an opening extends through the carrier means for facilitating urinating and defecating therethrough.

44. Apparatus as claimed in Claim 43 characterised in that an entry slot extends through the carrier means from a front edge thereof to the opening.

45. Apparatus as claimed in any of Claims 42 to 44 characterised in that the main framework comprises a base frame of U-shape construction when viewed in plan for accommodating a toilet bowl therebetween, the base frame comprising a transversely extending forward member and a pair of spaced apart side members extending rearwardly from the forward member for embracing a toilet bowl therebetween.

46. Apparatus as claimed in any preceding claim characterised in that the main framework comprises a pair of spaced apart upwardly extending support members located on respective opposite sides of the main framework for pivotally carrying the first and second link members about the respective first and second pivot axes, the
support members being spaced apart for accommodating a toilet bowl therebetween.

47. Apparatus as claimed in any preceding claim characterised in that a locating means is provided on the main framework for engaging a person prior to the person being supported on the seat when the carrier means is in the first orientation for facilitating aligning of the person with the seat.

48. Apparatus as claimed in Claim 47 characterised in that the locating means is provided for engaging the rear of the legs of the person.

49. Apparatus as claimed in Claim 47 or 48 characterised in that the locating means is located on the main framework for engaging the legs of the person behind the angles thereof.

50. Apparatus as claimed in any of Claims 47 to 49 characterised in that the forward member of the base frame of the main framework forms the locating means.

51. Apparatus as claimed in any preceding claim characterised in that at least one pair of spaced apart ground engaging wheels is provided on the main framework for facilitating wheeling of the apparatus.

52. Apparatus as claimed in Claim 51 characterised in that two spaced apart pairs of spaced apart ground engaging wheels are provided on the main framework.

53. Apparatus as claimed in Claim 51 or 52 characterised in that at least one of the ground engaging wheels comprises a brake for securing the apparatus in a desired location.

54. Apparatus as claimed in any preceding claim characterised in that at least one handle extends from the main framework for facilitating wheeling of the apparatus.
55. Apparatus for assisting a person onto and off of a toilet bowl, the apparatus comprising a main framework for locating adjacent the toilet bowl, a carrier means for carrying a seat for facilitating urinating and defecating by a person seated thereon, a first linkage mechanism coupling the carrier means to the main framework, and constraining the carrier means to move relative to the framework between a first orientation with the carrier means positioned and oriented for locating the seat in a raised tilted orientation for abutting the posterior of a standing person, and a second orientation with the carrier means positioned and oriented for locating the seat in a lowered substantially horizontal orientation for supporting the person in a seated posture thereon over the toilet bowl, and a drive means for operating the first linkage mechanism for urging the carrier means between the first and the second orientations, characterised in that the first linkage mechanism comprises a first link member and a second link member, the first and second link members being pivotally coupled to the main framework at spaced apart locations, and being pivotal relative to the main framework about respective spaced apart first and second parallel pivot axes, the first and second link members being pivotally coupled to the carrier means at spaced apart locations and being pivotal relative to the carrier means about respective spaced apart third and fourth pivot axes parallel to the first and second pivot axes, the third pivot axis being spaced apart along the first link member from the first pivot axis, and the fourth pivot axis being spaced apart along the second link member from the second pivot axis, and the first and second link members being simultaneously pivotal about the first and second pivot axes in one sense for urging the carrier means from the first orientation to the second orientation, and in the opposite sense about the first and second pivot axes for urging the carrier means from the second orientation to the first orientation.

56. A wheelchair comprising a main framework, a carrier means, a seat carried on the carrier means, and at least one pair of spaced apart ground engaging wheels rotatably coupled to the main framework, characterised in that a first linkage mechanism couples the carrier means to the main framework, and constrains the carrier means to move relative to the framework between a first orientation with the carrier means positioned and oriented for locating the seat in a raised tilted
orientation for abutting the posterior of a standing person, and a second orientation
with the carrier means positioned and oriented for locating the seat in a lowered
substantially horizontal orientation for supporting the person in a seated posture
thereon, and a drive means operates the first linkage mechanism for urging the
carrier means between the first and the second orientations.

57. A wheelchair as claimed in Claim 56 characterised in that the first linkage
mechanism comprises a first link member and a second link member, the first and
second link members being pivotally coupled to the main framework at spaced apart
locations, and being pivotal relative to the main framework about respective spaced
apart first and second parallel pivot axes, the first and second link members being
pivotally coupled to the carrier means at spaced apart locations and being pivotal
relative to the carrier means about respective spaced apart third and fourth pivot
axes parallel to the first and second pivot axes, the third pivot axis being spaced
apart along the first link member from the first pivot axis, and the fourth pivot axis
being spaced apart along the second link member from the second pivot axis, and
the first and second link members being simultaneously pivotal about the first and
second pivot axes in one sense for urging the carrier means from the first orientation
to the second orientation, and in the opposite sense about the first and second pivot
axes for urging the carrier means from the second orientation to the first orientation.
INTERNATIONAL SEARCH REPORT

A. CLASSIFICATION OF SUBJECT MATTER
   A61G7/10  A61G5/14

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
   A61G

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)
   EPO-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

<table>
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<tr>
<th>Category</th>
<th>Citation of document, with indication, where appropriate, of the relevant passages</th>
<th>Relevant to claim No.</th>
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<tbody>
<tr>
<td>X</td>
<td>US 5 142 709 A (MCGUIRE ET AL) 1 September 1992 (1992-09-01) the whole document</td>
<td>1-8, 10-13, 55-57</td>
</tr>
</tbody>
</table>

X Further documents are listed in the continuation of box C.  

X Patent family members are listed in annex.

* Special categories of cited documents:

"A" document claiming the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubt on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date of priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance: the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance: the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"Z" document member of the same patent family

Date of the actual completion of the international search 19 January 2006

Date of mailing of the international search report 06. 02. 2006

Name and mailing address of the ISA
   European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-3040, Tx. 93651 epo nl Fax: (+31-70) 340-3016

Authorized officer
   Godot, T

Form PCT/ISA/2010 (second sheet) (January 2004)
# INTERNATIONAL SEARCH REPORT

## X (Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

<table>
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| X        | US 6 189 164 B1 (KRAPU JON A)  
20 February 2001 (2001-02-20)  
the whole document                  | 1-7,  
10-13,  
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| X        | US 5 772 226 A (BOBICHON ET AL)  
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55-57                           |
| X        | EP 1 197 465 A (FREELIFT B.V)  
17 April 2002 (2002-04-17)  
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23-26,  
28-32,  
55-57                           |
| X        | US 2 690 208 A (MARY FRANCIS)  
28 September 1954 (1954-09-28)  
the whole document                  | 1-7,  
10-19,  
23-26,  
28-32,  
55-57                           |
## INTERNATIONAL SEARCH REPORT

### Box II  Observations where certain claims were found unsearchable (Continuation of Item 2 of first sheet)

This International Search Report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1.  ☐ Claims Nos.:  
because they relate to subject matter not required to be searched by this Authority, namely:

2.  ☐ Claims Nos.:  
because they relate to parts of the International Application that do not comply with the prescribed requirements to such an extent that no meaningful International Search can be carried out, specifically:

3.  ☐ Claims Nos.:  
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

### Box III  Observations where unity of invention is lacking (Continuation of Item 3 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

```plaintext
see additional sheet
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1.  ☑ As all required additional search fees were timely paid by the applicant, this International Search Report covers all searchable claims.

2.  ☐ As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.

3.  ☑ As only some of the required additional search fees were timely paid by the applicant, this International Search Report covers only those claims for which fees were paid, specifically claims Nos.:

   1-32, 55-57

4.  ☐ No required additional search fees were timely paid by the applicant. Consequently, this International Search Report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

**Remark on Protest**

☐ The additional search fees were accompanied by the applicant’s protest.

☐ No protest accompanied the payment of additional search fees.
This International Searching Authority found multiple (groups of) inventions in this international application, as follows:

1. claims: 1-25, 55-57

Apparatus for assisting a person between a substantially standing posture and a seated posture, comprising a framework, a carrier means for carrying a seat, a first linkage mechanism with first and second link members, and a back rest coupled to the framework by a second linkage mechanism.

2. claims: 1, 26-32

Apparatus for assisting a person between a substantially standing posture and a seated posture, comprising a framework, a carrier means for carrying a seat, a first linkage mechanism with first and second link members, and an arm rest extending from the second link member.

3. claims: 1, 33-41

Apparatus for assisting a person between a substantially standing posture and a seated posture, comprising a framework, a carrier means for carrying a seat, a first linkage mechanism with first and second link members, and a drive means coupled between the framework and the first linkage mechanism.

4. claims: 1, 42-46

Apparatus for assisting a person between a substantially standing posture and a seated posture, comprising a framework, a carrier means for carrying a seat, a first linkage mechanism with first and second link members, and wherein the carrier means is adapted to be used over a toilet bowl.

5. claims: 1, 47-50

Apparatus for assisting a person between a substantially standing posture and a seated posture, comprising a framework, a carrier means for carrying a seat, a first linkage mechanism with first and second link members, and a locating means.

6. claims: 1, 51-53
Apparatus for assisting a person between a substantially standing posture and a seated posture, comprising a framework, a carrier means for carrying a seat, a first linkage mechanism with first and second link members, and at least one pair of spaced apart ground engaging means.

7. claims: 1,54

Apparatus for assisting a person between a substantially standing posture and a seated posture, comprising a framework, a carrier means for carrying a seat, a first linkage mechanism with first and second link members, and at least one handle.
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<th>Publication date</th>
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<tr>
<td>US 6507961 B1</td>
<td>21-01-2003</td>
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