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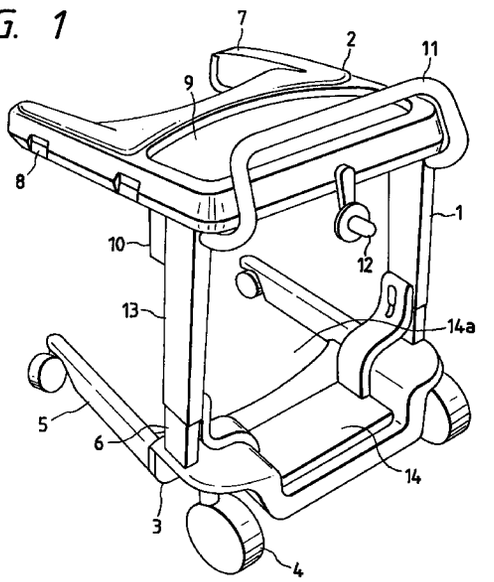
(54) Floor-traveling lifting apparatus

(57) The lifting apparatus is equipped with a lower frame portion with casters, an upper frame portion which can be lifted and lowered in a position opposite to the lower frame portion, and a detachable seat fitted to the upper frame portion in a such a manner that an aged disabled person can sit in.

FIG. 1



EP 0 730 855 A2

Description

BACKGROUND OF THE INVENTION

Field of the invention

The present invention relates to a floor-traveling lifting apparatus for use in helping aged bedridden disabled persons, for example, to keep a sitting position and in transferring those disabled or having difficulty in walking from beds to other places so that they may relieve themselves, take meals and a rest in a sitting position while they are taken care of at home, or nursed at hospitals or welfare facilities.

Related art

With the steady growth of the aged population in recent years, the number of persons disabled by age is increasing rapidly and as two-generation families increases in population, the tendency is for half the aged to live with only their spouses. In other words, most of those who are taking care of aged disabled persons at home are their spouses and this reflects the fact that the former is also the aged. However, the work required for looking after them is inconceivably heavy and it is often the case that aged disabled persons are left bedridden because of fatigue from nursing on the port of their spouses. The Japanese Government has worked out a golden plan to carry out a welfare policy in various aspects including putting emphasis on appealing to "on-chair from on-bed" even at home. Nevertheless, there is not sufficient equipment for reducing such a care work load at home, which results in compelling aged disabled persons to be "bedridden" rather than causing them to be "bedridden," and further keeping them "wearing diapers" at all times owing to the burden of care work as stated above under the present circumstances. Consequently, disabled persons tends to lose a desire to maintain • recover the residual function and also feel completely shattered.

It is conversely led to improvement that attendants are less burdened with a care work load and motivated to find life worth living to keep disabled persons on-chair, that is, in a sitting posture because swallowing force of them at the time of eating and drinking is improved (i.e., not interfered with choking) and because the physical function of them is recovered as their muscular force is improved; thus such disable persons become independently capable of setting themselves up in taking meals, relieving themselves and so forth. When attendants attempt to transfer disabled persons to any other chair or wheelchair to let them sustain a sitting posture without facilities and equipment, the attendants have to hold the disabled persons in their arms, which is hard work itself and may often hurt the attendants' backs.

Therefore, there has been an insistent necessity for lifting apparatus for use in helping aged bedridden disabled persons sustain a sitting position and transferring those disabled or having difficulty in walking from beds to other places so that they may relieve themselves, take meals and a rest in a sitting position with a reduced care work load while they are nursed at home, and lifting apparatus so designed as to reduce the care work load on the part of trained and practical nurses as well as attendants at hospitals and welfare facilities.

Conventionally, lifting apparatus of the sort intended for transferring disabled persons who are bedridden or have difficulty in walking have been classified broadly into three types.

1) A first type of lifting apparatus is constructed so that, with a rail installed in the ceiling, a disabled person is suspended by a lift fitted to the rail, together with a sling seat which is a sewn product for holding the whole body, to transfer the disabled person along the rail (a ceiling-traveling lift);
2) A second type of lifting apparatus has wheels so that it is able to travel on the floor; more specifically, it has a frame equipped with wheels so that it is movable into a space under a bed, an arm portion extended above and up to a disabled person on the bed, a lift installed on the arm portion and a sling seat as in the first type. The disabled person is then lifted and transferred by means of the lifting apparatus running on the wheels (a lifting-type floor-traveling lift);
3) A third type of lifting apparatus has a frame portion having wheels for floor traveling and for making itself movable into a space under a bed, so that the knees, loin and back of a disabled person in a sitting position is lifted obliquely or upwardly. (In this case, the knees are fixed with elastic kneepads, the loin and back are fixed with a sewn product). The whole lifting apparatus is caused to travel by means of the wheels (a forward-tilted type traveling lift).
4) In addition, there is a gatch bed as a conventional apparatus designed only to support disabled persons so as to sustain them in a sitting position on beds.

Generally speaking, a typical conventional lifting apparatus is intended primarily to transfer disabled persons when they need transferring to another chair or a wheelchair so as to sustain them in a sitting position in any other place other than the bed and therefore two steps have been followed; namely, steps of fitting the disabled person with a sling seat for supporting the body (by slipping belts and the seat under the loin and the back, and securing then to the lifting apparatus) and subsequently removing the sling seat from him/her on the chair thus moved (by removing the belts from the lifting apparatus and pulling the seat and the belts from under the loin). When the disabled person is moved back to the bed, the aforementioned two steps have been followed likewise. As a result, the problem is that

attendants using such conventional lifting apparatus have been burdened considerably with care work.

Since the conventional sling seat is a soft sewn product, the thighs, loin, back and like of the disabled person thus lifted tends to become accustomed therewith and the advantage is that the curved condition of a hammock set him/her free from being hurt by the load, whereas the disadvantage is that he/she has no freedom to move the body because of the pressure applied from both sides and is unable to stand this condition for hours.

Problems arising from the aforementioned three types of lifting apparatus are as follows:

1) With respect to the ceiling-traveling lift, a large amount of installation cost is required to furnish the rail in the ceiling and the moving distance is limited.
2) With respect to the lifting-type floor-traveling lift, the large-sized, heavy apparatus needs a great deal of strength for an attendant to bear the burden of moving it and besides such a large-sized apparatus which requires a large space for installation is not fit for the housing situation.
3) With respect to the forward-tilted type traveling lift, the knees of a disabled person is heavily burdened with the load of supporting his/her weight with the knees, waist and back and the problem is that he/she complains of a pain.
4) In the case of the "gatch bed," it is advantageous in that the upper half of the body may be raised from the laid-up condition as far as the maintenance of the sitting position is concerned. However, diapers, urinal equipment and bedpans are necessary for excretion and this makes it difficult for a disabled person on the gatch bed to use a portable or home toilet for the purpose of promoting his/her self-reliance. It is also impossible for the disabled person to move to any room (e.g., a living or dining room) other than the bed room and to pass time together with his/her family so as to effect mental improvement (to find life worth living).

Since equipment suitable for reducing a care work load is unavailable as stated above, not only disabled persons but also their attendants become exhausted. As a result, such an aged disabled person tends to make his/her whole family tired out and lose anything to live for, thus posing a serious social problem.

It is therefore an object of the present invention to provide a lifting apparatus so constructed as to be capable of: simply letting a disabled person sustain a sitting position; easily transferring (lifting) the disabled person from a bed; reducing a care work load by decreasing the number of steps of detaching and attaching a sling seat; making continuous use of equipment possible by reducing the load of attending the aged disabled person; motivating the disabled person to excrete by himself/herself as much as possible because helping excretion is one of the hardest kinds of care work; making the lifting apparatus itself movable on the floor while the disabled person is sustaining a sitting position without bearing any physical burden; and rendering equipment compact in agreement with the housing situation.

In order to accomplish the object above, a floor-traveling lifting apparatus comprises:

a lower frame portion having wheels for moving the apparatus, two arms for respective rear wheels and lower sliding frames extending upward from the respective arms for the rear wheels;
an upper frame portion having upper sliding frames which correspond to the respective lower sliding frames and can be lifted and lowered, and two sling arms fitted to the respective upper sliding frames with a predetermined space held therebetween;
fixing means installed on the sling arms and used for detachably securing a seat intended for a person to sit therein against the sling arms; and
lifting means for lifting and lowering the upper sliding frames and holding them at desired heights.

More specifically, the body of the lifting apparatus is of a floor-traveling type with casters and the two upper frames are each provided with arms for holding a disabled person in a sitting position from both sides. A buckle fixing part is formed in two places on the front side and two places on the rear side, that is, four places in total, so that a sling seat is detachably fitted to these arms. A table and a handle are integrally formed with the lifting apparatus, whereby the disabled person can have meals thereon, whereas an attendant is able to move the lifting apparatus with that handle. The whole upper frame portion is made vertically slidable with respect to the lower frame portion.

The sling seat for sustaining the sitting position incorporates seat, back and lifting belts with buckles and back-holding belts for holding the angle of the seat back. The seat and back portions each contain hard members resistant to a load and soft members for placing the contact side of the body in position with ease. Further, the seat and back portions are capable of bending to any angle.

As the body weight can be held by preventing the thighs from falling down and holding the whole waist on the front side though in a slightly forward-tilted posture at the time of excretion, the upper frame portion is provided with detachable thigh-holding fixtures and a waist-holding sewn product capable of holding the waist in such a manner as to wrapping the whole waist, the sewn product having a metal fixture an both sides. Thus an excretory action is made possible by removing clothing in the lower half of the disabled person's body when both ends of the waist-holding sewn product are anchored to the handle on the front side of the upper frame portion. The thigh-holding fixtures and the waist-holding sewn product can be fastened while the disabled person is sitting on the sling seat for sustaining the sitting position and even when the sling seat therefor is

removed after the fixtures and sewn product have been fastened, the body of the disabled person is held for excreting purposes.

With the aforesaid arrangement, a procedure for transferring the aged disabled person laid on the bed to the sling seat comprises the steps of: turning the face of the disabled person sideways and flatly laying out the sling seat for sustaining the sitting position in the place where he/she has lain on his/her back on the bed; returning the disabled person to the original upward position and placing him/her on the sling seat for sustaining the sitting position; letting an attendant raise the back portion of the sling seat and the back of the disabled person with one hand and pushing his/her legs with the other hand to turn the sling seat together with the legs by 90° and making him/her sit on the edge of the bed. (At this time, the seat portion is easily turnable since it is hard in the lateral direction); fastening together the buckles of the belts for holding the back of the sling seat. (In this state, the sling seat for sustaining the sitting position is of a truss structure as laterally viewed and only by letting the disabled person lean against its back, he/she may be able to sustain the sitting position on the edge of the bed); moving the lifting apparatus body from the front side of the bed edge where the disabled person is sitting and locking the casters; lowering the whole upper frame portion and setting the lifting belts in an easy-to-fit position; fastening the buckles of the four lifting belts attached to the sling seat to the respective arms of the lifting apparatus body one after another; elevating the whole upper frame portion and making the disabled person float above the bed; moving the lifting apparatus the bed while holding the its handle; sliding the whole upper frame portion vertically to adjust its height suitably as the disabled person desires; and moving the lifting apparatus inside the bed room to transfer it to any other room.

The above steps are followed to ensure that the disabled person is allowed to sustain a truly-intended sitting position with his/her lower legs kept in the upright position which is never attainable on the bed and the waist is set free from any lateral pressure. Since the seat and back faces for supporting the body are made of soft material, the equipment is capable of offering the sitting position for hours. Further, the two arms suspending the seat serve as armrests, so that such a comfortable sitting position is offered.

Since the whole seat is in the suspended condition, it follows a variable balance even when the body of the disabled person is tilted to the left or right, and he/she may feel a great deal of comfortable sitting. In other words, a disabled person who is half paralyzed may be allowed to sustain the sitting position without any increase in a care work load on the part of the attendant for reasons including having the balance of the seat followed, allowing the two arms to be used as armrests, and making the back-holding belts receive the lateral load.

Further, the nursing work which has conventionally necessitated two steps of fitting the sling seat to the disabled person when he/she is made to sit in the seat and removing it from him/her when he/she is dropped in a chair is reducible as the work can be done with only one step. Thus the care work load is halved with the effect of not solely making the attendant feel relieved but also letting the use of equipment last longer.

An excretory procedure comprises the following steps of: fitting the thigh-holding fixtures into the fixing portion for fixing the thigh-holding fixtures of the lifting apparatus body one by one while the disabled person is sitting in the sling seat for sustaining the sitting position; winding the sewn product for holding the waist of the disabled person on his/her waist and fitting both fixing hooks to the handle while slightly tilting himself/herself forward; unfastening the buckles of the sling seat for sustaining the sitting position mounted until then and removing the whole sling seat; moving the lifting apparatus up to a household toilet when it can be moved thereto or up to a portable toilet when it is difficult to move thereto in view of housing environment; stripping off clothing in the lower half of the disabled person' body up to the thigh-holding fixtures and lowering the whole upper frame portion until it contacts the sitting position of the toilet for excreting purposes.

Although the posture of holding the disabled person at this time is not so effective as to sustain him/her for hours, it is only necessary for him/her to be held during the time he/she is moved to a toilet seat before being undressed and redressed. Therefore, the disabled person is set free from dependence (i.e., free from diapers).

BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 is a perspective view of a floor-traveling lifting apparatus body;

Fig. 2 is a perspective view of a developed sling seat for sustaining a sitting position;

Fig. 3 is a perspective view of the assembled sling seat for sustaining the sitting position;

Fig. 4 is a perspective view of the sling seat for sustaining the sitting position fitted to the lifting apparatus body;

Fig. 5 is a sectional view of the seat portion of the sling seat for sustaining the sitting position;

Fig. 6 is a theoretic diagram illustrating the lifting mechanism of an upper frame portion;

Fig. 7 is a perspective view of a sewn product for holding the waist portion at the time of excretion;

Fig. 8 is a perspective view of thigh-holding fixtures at the time of excretion; and

Fig. 9 is a perspective view showing an operating condition at the time of excretion.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring to the accompanying drawings, there is shown a lifting apparatus embodying the present invention.

A lifting apparatus body 1 is, as shown in Fig. 1, U-shaped in construction and its lower frame portion 3 is allowed to slide under a bed even when a disabled person is lifted to ensure safety in view of not only strength but also the gravity position (in this case, the U-shaped coupled rod side is called the "front side" and the open side the "rear side").

The lower frame portion 3 is provided with wheels so as to make the lifting apparatus capable of traveling on the floor. Further, there are four wheels as casters 4 fitted to a lifting apparatus body 1 so as to render the body 1 stable and turnable even in a small room.

Arms 5 for the respective rear wheels in the lower frame portion 3 are situated closer to the floor so that they can correspond to a narrow space under the bed and the small-sized casters 4 are fitted to the respective arms 5, whereas the large-sized casters 4 are used as the front wheels to increase their traveling force and to make them easily turnable.

Two lower sliding frames 6 for making an upper frame portion 2 vertically slidable from both sides of the upper frame portion 2 are provided in such a manner that these frames are slightly tilted forward and integral with the lower frame portion 3. The reason for the provision of the lower sliding frame 6 on both sides is to secure a space sufficient for the disabled person in a sitting position to put his/her feet thereon. The reason for the provision of the lower frame portion 3 tilted forward is to secure a stepping space sufficient for an attendant to be set free from hitting his/her foot against the lower frame portion 3 while holding the handle 11 to move the lifting apparatus. The reason for the provision of the lower frame portion 3 tilted forward is also to make the gravity slightly close to the rear wheel side in a lower position when the disabled person placed on the lifting apparatus is lifted and to make the gravity slightly close to the front wheel side in a high position when he/she placed thereon is lifted; this is intended to shorten the distance between the front and rear wheels (the wheel base), that is, to provide a compact, easy-to-turn construction.

The upper frame portion 2 is equipped with the sling arm 7 on both sides so that the sling seat for sustaining the sitting position of the disabled person is readily stabilized during the time he/she is held from both sides in that sitting position, a table 9 for letting the disabled person take meals, for example, by himself/herself and a handle 11 which the attendant uses for moving the lifting apparatus, the table 9 and the handle 11 being integral with the upper frame portion 2.

The sling arm portion 7 is provided with a buckle fixing portion for fixedly slinging the seat for sustaining the sitting position and a fixing portion 10 for fixing thigh-holding fixtures at the time of excretion.

Upper sliding frames 13 with rollers corresponding to the respective lower sliding frames 6 are integrally formed with the lower portion of the upper frame portion 2 on the handle side, the whole upper free portion 2 being vertically slidable.

A foot step 14 for securing a predetermined height with respect to the upper frame portion 2 is provided under the upper sliding frames 13, whereby a space 14a for receiving feet is formed. The aforementioned height is generally set so that the soles of any disabled person's feet can totally contact the foot step 14 when he/she takes a sling seat for keeping the sitting position. Since the disabled person's feet are always in contact with the ground even when the surface of the seat is lifted or lowered, he/she is able to feel free from anxiety. Moreover, the foot step 14 is also structured so that it is pushed forward by the tilted face of the lowered frame when the upper frame portion 2 is lowered up to a predetermined height and lowered further after it abuts against the lower frame portion 3; this is because toilet seats are generally low in height, it has been arranged that the knees of disabled persons are prevented from hitting the upper frame portion 2 at the time of excretion.

Various methods of lifting and lowering the upper frame portion 2 are possible; for example, the upper frame portion 2 may be lifted or lowered electrically, hydraulically or mechanically. Fig. 6 is a theoretic mechanism drawing illustrating an inexpensive mechanical method of lifting and lowering the upper frame portion 2 employed according to this embodiment of the invention.

The lifting/lowering principle will subsequently be described. The aforementioned mechanism comprises a lift operating handle 12, a worm gear 25, a belt-winding roller 32 with a gear, a lifting belt 26, a roller A 30 and a roller B 31. The lifting belt 26 is passed through a slot provided in the belt-winding roller 32, bilaterally symmetrically turned by 90° and passed by the rollers B 31, A 30 before being anchored to the respective lower sliding frames 6. The upper frame portion 2 is set in the lowermost position in this state. When the lift operating handle 12 is turned, the torque is transmitted via the worm gear 25 and the belt-winding roller 32 is rotated, whereby the belt is wound so that the length of the belt at both ends is equally shortened. Further, the roller A 30 acts as a pulley for halving the winding force and when the lift operating handle 12 is turned with a force of about 2 kgs. according to this embodiment of the invention, a disabled person weighing 60 kgs. can be lifted and lowered. With the above construction, the upper frame portion 2 is set in the lowermost position first when the attendant is a left-handed person and then the lift operating handle 12 is turned counterclockwise to lift the upper frame portion 2. Thus the purpose of lifting the upper frame portion 2 can be achieved by turning the lift operating handle 12 clockwise or counterclockwise. Moreover, the use of the worm gear 25

allows that any desired height to be kept without mechanically locking the lift operating handle 12.

In order to reduce the care work load required, further, a motor may be added to the aforementioned construction to facilitate the operation.

As shown in Fig. 2, the sling seat for sustaining the sitting position of the disabled person includes: a seat portion 19, a back portion 20, belts 17, 18 with lifting buckles, and detachable back-holding belts 16, 16a, 16b for holding the angle between the seat and the back, these being integral with the sling seat.

The seat portion 19 and the back portion 20 are so structured as to form any desired angle.

As shown in a sectional view of Fig. 5, the seat portion 19 and the back portion 20 each contain hard members 22 for preventing both the portions from bending even when the body weight is put thereon and when the leaning force is applied thereto, and soft members 23 made of foamed urethane, for example, for placing the contact side of the body in position with ease. Further, surface covers are attached by sewing to cover the seat portion 19 and the back portion 20 respectively, and the belts are rigidly secured by sewing to the designated places.

According to this embodiment of the invention, a moisture-absorption plywood board is used as the hard member 22 in the seat portion 19, and a combination of metal pipes and a plywood board is used in the back portion 20 because there exists an open hip portion 21.

The provision of the open hip portion 21 has two objects: (1) one object is to provide a relief for the hip portion because the disabled person tends to sit deep and lean against the back portion 20 so as to sustain the sitting position for hours; and (2) the other object is to improve air permeability in the sultry summer season.

The surface cover 24 has the back made of smooth cloth and a non-slippery seat side intermittently made of rubber. This is because the disabled person is prevented from tumbling down forward while in the sitting position and because the sling seat itself is made easily turnable with respect to the bed while transferred on the bed.

While the disabled person is in an upright position as shown in Fig. 3, the back-holding belts 16 are used to tie the seat and back sides rigidly. A length-adjusting mechanism is provided on the seat side, whereby the back angle is made adjustable.

A high back type capable of holding the neck and the head may be used as another variation of the sling seat for sustaining the sitting position.

As shown in Figs. 7, 8, 9, waist-holding fixtures 27 and thigh-holding fixtures 29 are employed at the time of excretion.

- The waist-holding fixture 27 has a waist-fixing portion 27a for detachably fixing the waist surface and an extended portion 27b, a hook 28 being fitted to the extended portion 27b so as to anchor the latter to the handle 11. Consequently, most of the body weight of the person who performs excretion is received by the waist-holding fixtures 27 and transmitted to the lifting apparatus via the hooks 28 and the handle.

The thigh-holding fixtures 29 include a plurality of fixed pins 29a and thigh-mounting members 29b, and metal members whose surfaces are each covered with soft material, whereby part of the body weight is supported with the thigh portion.

An excretory sling seat conventionally employed for lifting and moving the body of the disabled person from the bed directly for excreting purposes is needless to say prepared, the excretory sling seat being in the form of a cloth hammock for hanging the waist, the loin and the thighs of the disabled person.

As set forth above, the disabled person is allowed actually to keep a sitting position with the lower legs set upright and the soles in touch with the ground, that position being never attainable on the bed. It is the first step to recover the physical strength.

Since the hard material is used in the seat and back structures to make them hardly bend even when a load is applied to them, the waist is set free from being pressed laterally. The seat and back sides for use in holding the body are made of soft material and open in structure so as to allow anyone to sit deep therein, whereby it is possible to provide equipment fit for keeping a sitting position for hours.

Moreover, the two arms suspending the seat serve as armrests, so that a comfortable sitting position is maintainable.

Since the whole seat is pending, further, it follows the balance even when the body is tilted to the left or right, it has the effect of rendering the seat considerably comfortable to sit in. In other words, a disabled person who is half paralyzed may be allowed to sustain the sitting position without any increase in the care work load on the part of the attendant for reasons such as the balance follow-up of the seat, the use of the two arms as means of suspending the seat and also as armrests, and the provision of the back-holding belts 16a, 16b for receiving the lateral load.

Further, the care work which has conventionally necessitated two steps of fitting the sling seat to the disabled person when he/she is made to sit in the seat and removing it from him/her when he/she is dropped in a chair is reducible as the work can be done with only one step. Thus the care work is halved with the effect of not solely making the attendant feel relieved but also letting the use of equipment last longer.

With the compact lifting apparatus body and the four-wheel casters, the lifting apparatus becomes easy to handle during movement.

Since the lifting apparatus is simple in construction, it is available less costly, so that domiciliary care can be strengthened in view of social welfare.

Therefore, the truly-intended sitting position that is not possible on the bed can be sustained and muscular

force necessary for daily life is recoverable even while the sitting position is sustained for a short time.

The formation of the table 9 integrally with the upper frame portion 2 contributes to mental improvement as the same feeling as what is derived from the time meals are taken on an ordinary dining table can be enjoyed.

The lifting apparatus is movable to any room other than the bed room because the lifting apparatus itself is movable on the floor with the disabled person kept in the sitting position, whereby the disabled person is allowed to take meals together with any one of his/her family members in the dining room.

It is also led to functional recovery as peace of mind is obtainable that the disabled person is able to watch TV with his/her family in the living room and sit with his/her family conversing with one another.

In the case of excretory, Unlike diapers and bedpans, excretory using a portable toilet in the bed room or a household toilet is facilitated and this is the first step to attain independence.

In case the disabled person is incapable of moving up to the such a household toilet due to the housing situation, the lilting apparatus is readily adjustable to the height of the portable toilet and besides the frame-to-frame space for accommodating the portable toilet permits its use with ease. As observed in the bed room or any other one, the recovery of mental potential capability is considerably accelerated as a slight change in environment gives a stimulus to the bedridden disabled person. This also proves that the effect of the lifting apparatus with the sitting-position sustaining function is conspicuous.

Claims

1. A floor-traveling lifting apparatus comprising:

   a lower frame portion having wheels for moving the apparatus;
   two arms for respective rear wheels and lower sliding frames extending upward from the respective arms for the rear wheels;
   an upper frame portion having upper sliding frames which correspond to the respective lower sliding frames and can be lifted and lowered, and two sling arms fitted to the respective upper sliding frames with a predetermined space held therebetween;
   fixing means, installed on the sling arms, for detachably securing a seat intended for a person to sit therein against the sling arms; and
   lifting means for lifting and lowering the upper sliding frames and holding them at desired heights.

2. A lifting apparatus as claimed in claim 1, wherein a footstep is fitted to the upper sliding frames.

3. A lifting apparatus as claimed in claim 1, wherein a handle for holding a fixing hook for a waist holder is fitted to the upper frame portion.

4. A lifting apparatus as claimed in claim 1, wherein thigh-holding fixtures can be fixed detachably to the upper frame portion.

5. A lifting apparatus as claimed in claim 1, wherein the upper frame portion is provided with a table.

6. A lifting apparatus as claimed in claim 1, wherein the seat which engages with the fixing means fitted to the sling arms has a seat and a back portion, each containing a soft member forming a portion which the human body contacts and a hard member which is difficult to bend by the body weight, the soft and hard members being formed in layers.

7. A lifting apparatus as claimed in claim 1, wherein the seat which engages with the fixing means fitted to the sling arms has suspending means for detachably engaging with the fixing means.

8. A lifting apparatus as claimed in claim 7, wherein the suspending means of the seat is formed integrally with the seat.

9. A lifting apparatus as claimed in claim 6, wherein the boundary between the seat and back portions of the seat is made bendable and wherein the seat includes the function of making the angle of the back portion variable and holding the angle thereof thus varied.

10. A lifting apparatus as claimed in claim 7, wherein the boundary between the seat and back portions of the seat is made bendable and wherein the seat includes the function of making the angle of the back portion variable and holding the angle thereof thus varied.

11. A lifting apparatus as claimed in claim 6, wherein the seat has a open hip portion between the seat and back portions.

12. A lifting apparatus as claimed in claim 7, wherein the seat has a open hip portion between the seat and back portions.

FIG. 1

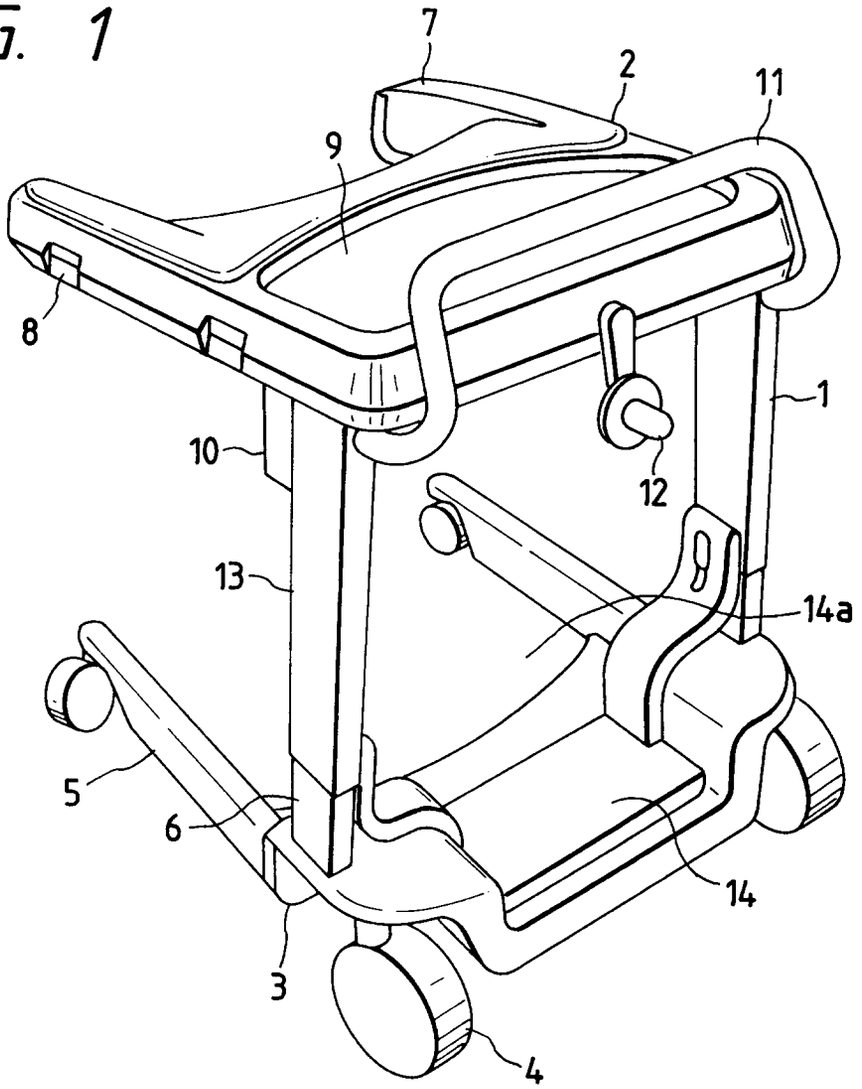


FIG. 2

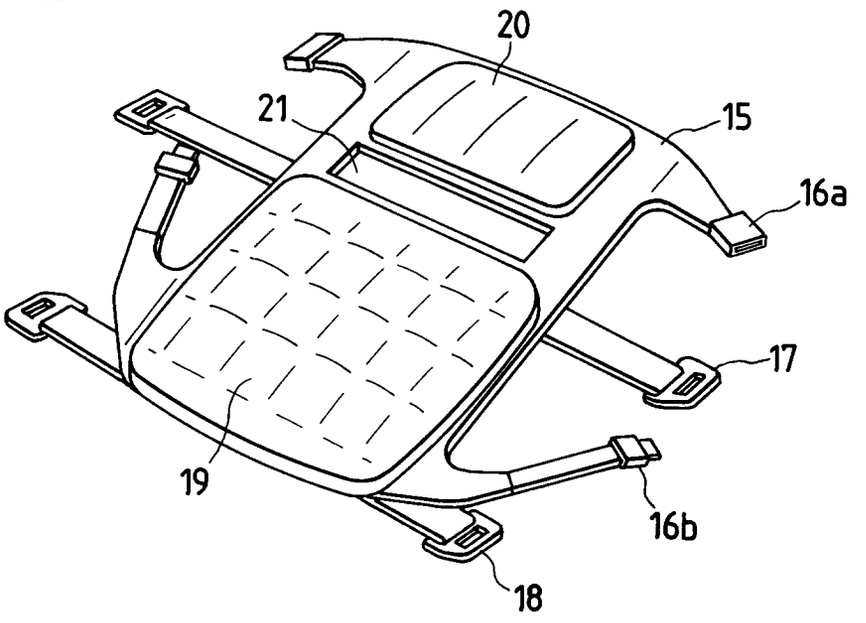


FIG. 3

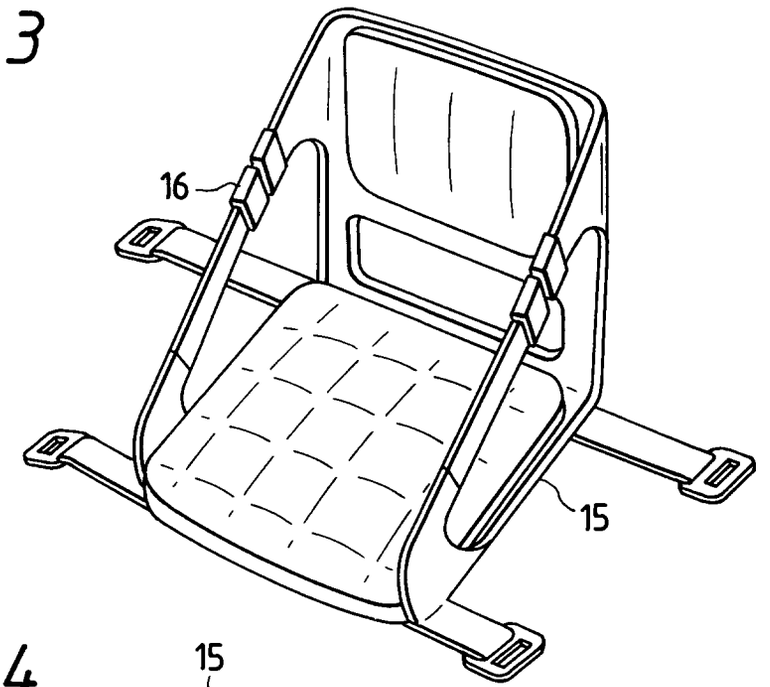


FIG. 4

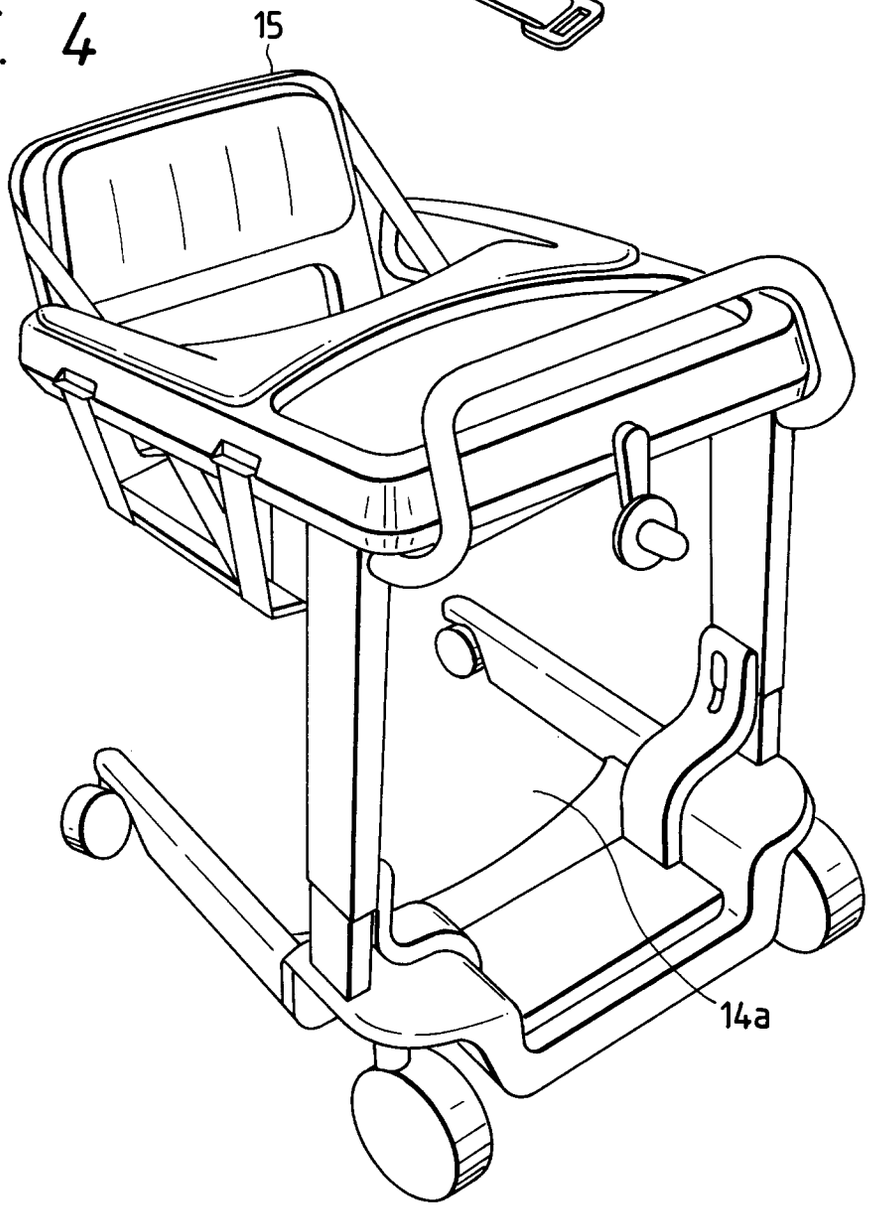


FIG. 5

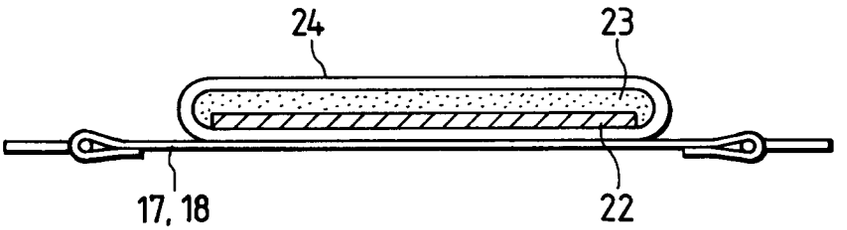


FIG. 6

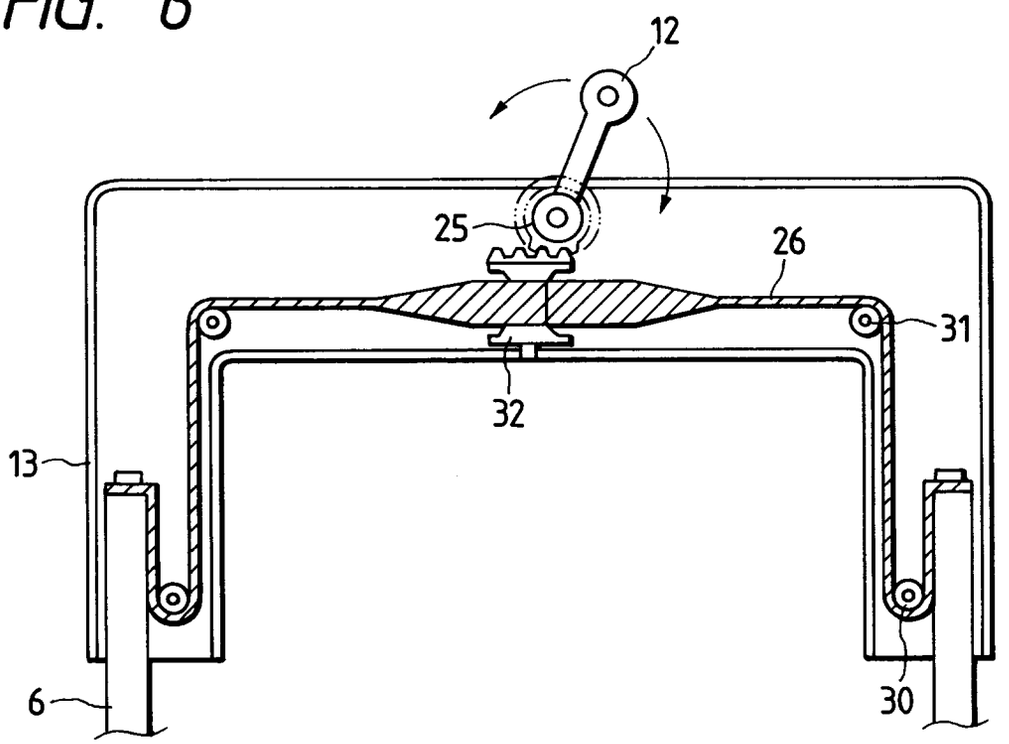


FIG. 7

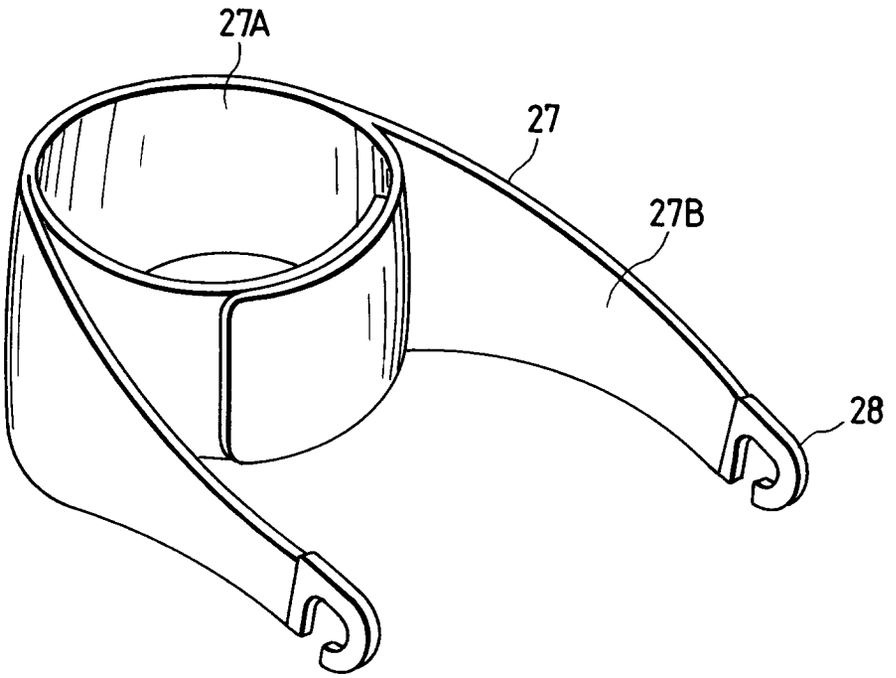


FIG. 8

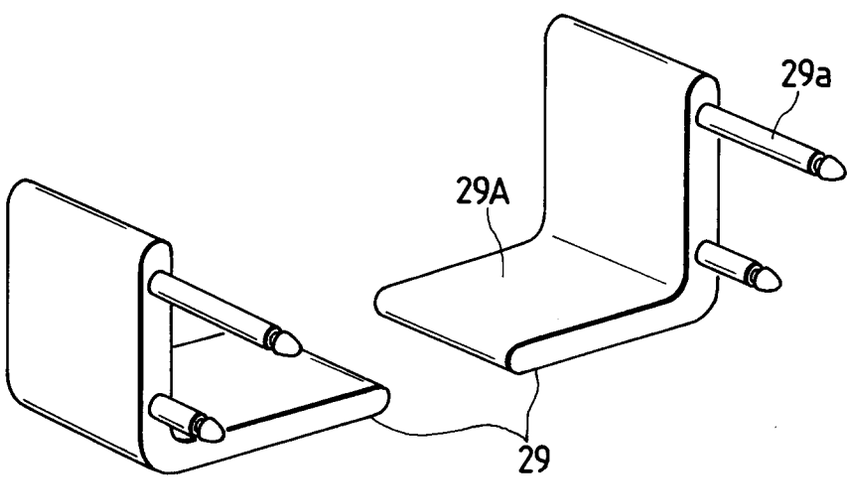


FIG. 9