United States Patent

Morse-Brown

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[54] INVALID CHAIRS

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[52] **U.S. Cl.** **297/338,** 297/DIG. 10, 297/68

[51] **Int. Cl.** **A47c 15/00**

[58] **Field of Search** 297/DIG. 10, 338, 339, 337, 297/68, 335, 332, 301, 302; 248/399, 401, 377, 384, 382, 376

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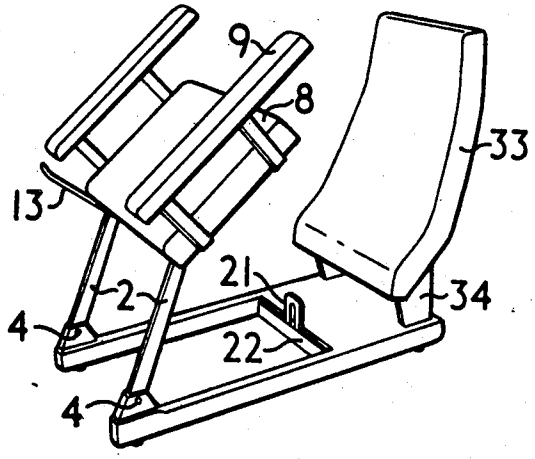
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[57] **ABSTRACT**

An invalid chair to facilitate entry and exit from the chair by an invalid comprises a chair base, a seat portion, guide means connecting said seat portion to said chair base, said guide means guiding said seat portion from a lowered position to a raised position with a combined upward, forward and forwardly tilting movement, and resilient means adapted to urge the seat portion towards said raised positions and a latch mechanism to enable the seat portion to be held in the lowered position.

5 Claims, 5 Drawing Figures



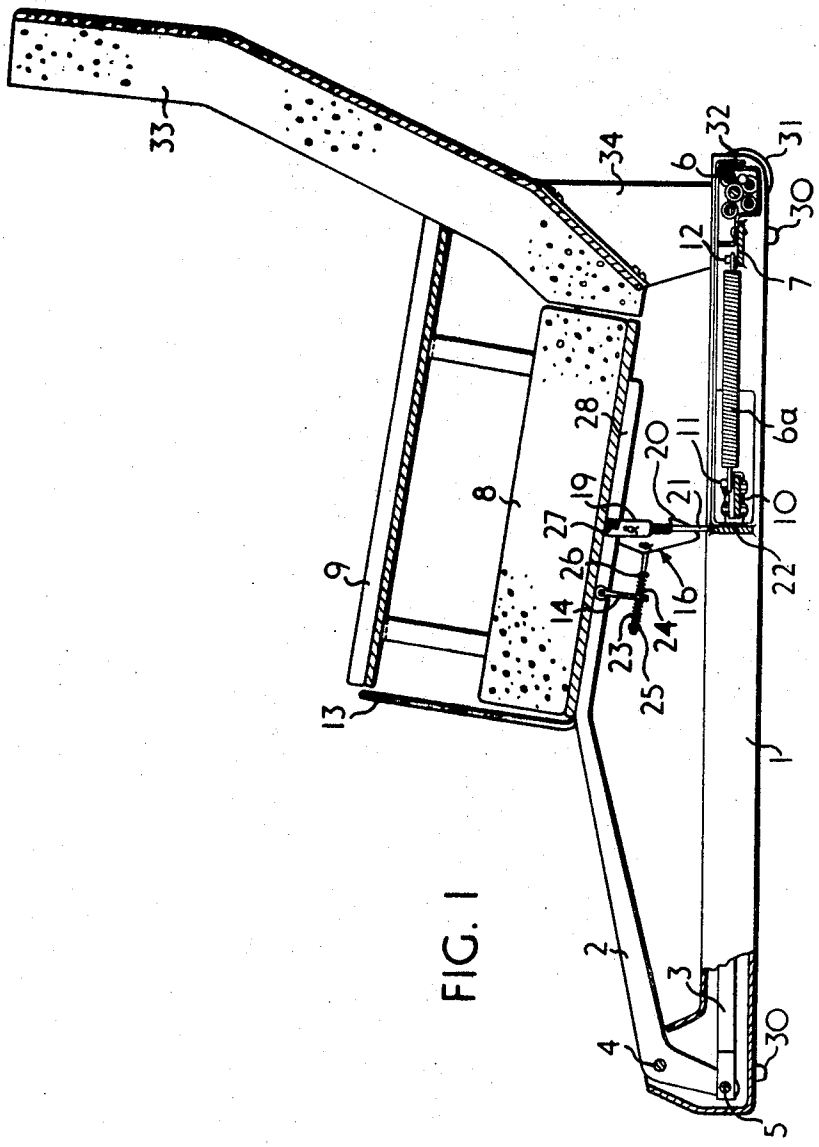


FIG. 1

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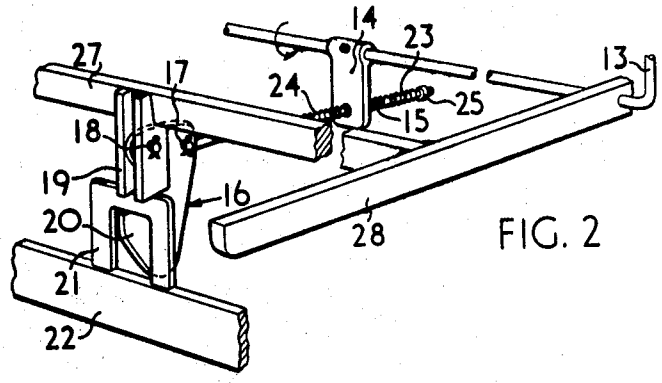


FIG. 2

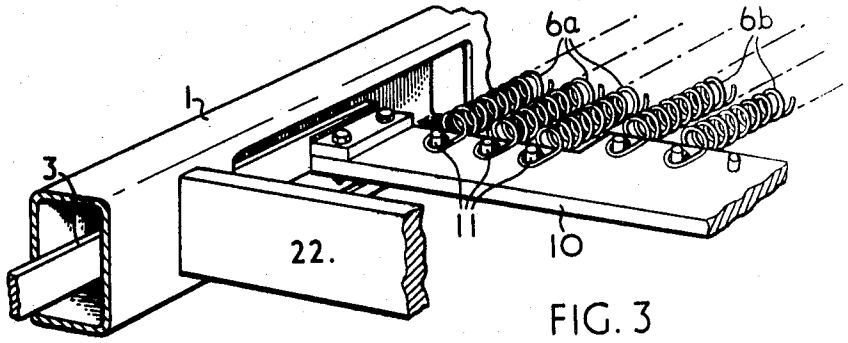


FIG. 3

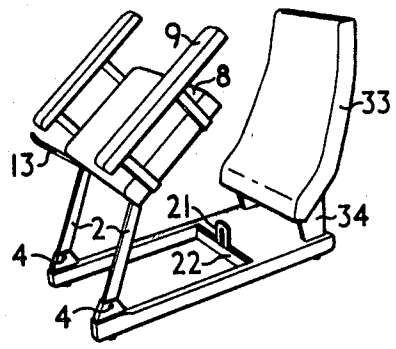


FIG. 4

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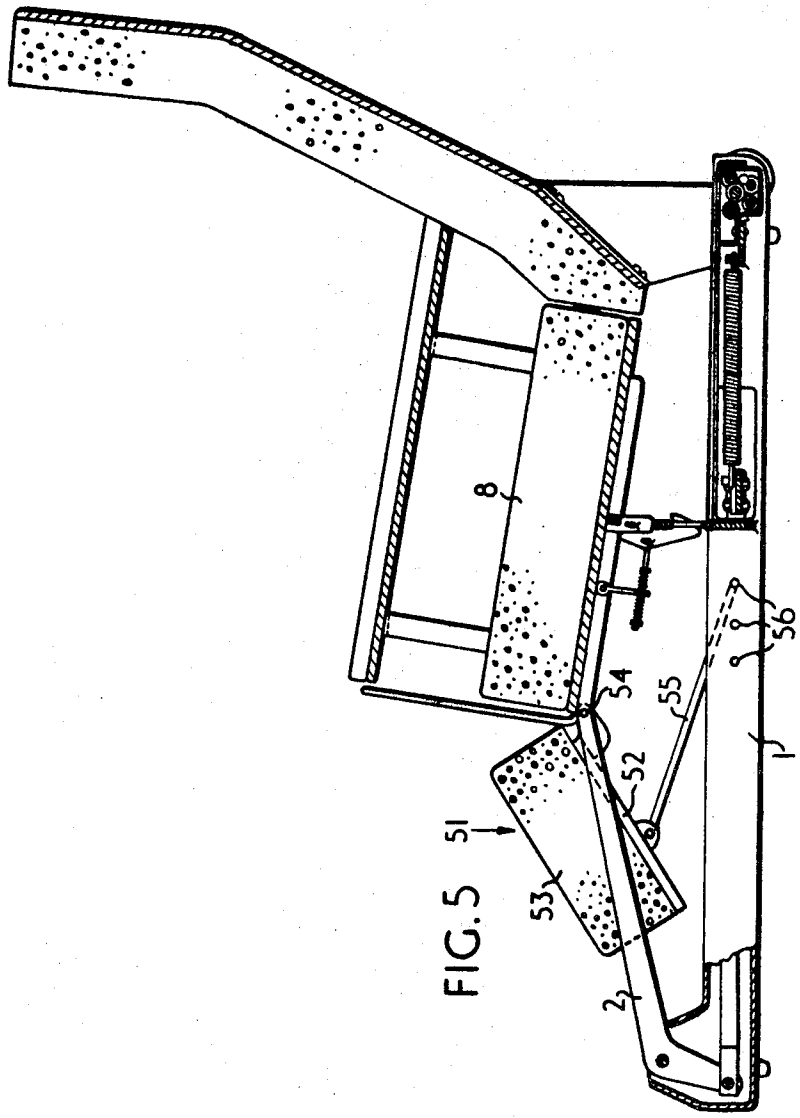


FIG. 5

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INVALID CHAIRS

BACKGROUND TO THE INVENTION

Patients who suffer from arthritis in their knee joints or other conditions which make it difficult or painful for them to bend their knees have substantial difficulties in lowering themselves into and raising up from conventional chairs. As such patients tend to have weaknesses in their arms and other parts of the body it is usually not possible for them to lower themselves into or raise themselves from a chair by their arms.

SUMMARY OF THE INVENTION

According to the present invention an invalid chair comprises a seat portion connected to a chair base by guide means which permits the seat portion to be displaced, from a lowered position to a raised position with simultaneous upward and forward tilting movements and resilient means adapted to urge the seat portion towards the raised position.

Preferably the guide means comprises two legs which extend forwardly and downwardly from the seat portion and which are pivoted to a forward extension of the chair base.

Preferably the guide means allows the seat portion to be guided through an arc centered on the approximate position occupied by the feed of an invalid about to lean against and sit upon the seat portion. Alternatively, the guide means comprises two legs each of unequal lazy tongs construction, to allow a movable center of rotation.

Preferably arms are attached to the seat portion to move therewith.

In operation of the invalid chair, an invalid with the seat portion in the raised position, stands with his buttocks against the seat portion, and holding the arms he then leans back. This overcomes the resilient force and the invalid is gently lowered with the seat portion to the lowered or normal sitting position. The resilient force should be such that with the invalid leaning back, the weight overcomes the spring force and causes the seat portion to be lowered or remain lowered, but when the patient leans forward, the same resilient force is sufficient to raise the patient and seat portion. This resilient force should preferably be adjustable to enable this result to be achieved with invalids of varying weights.

In this way, an invalid can be raised and lowered in the seat without bending his legs at the knees. The rate at which the raising and lowering takes place can be controlled by the patient by leaning back or forward to various extends.

A primary object of this invention is to provide a chair for use by invalids with defective legs. Other objects and advantages of the invention will be obvious from the following detailed description of the drawings.

DESCRIPTION OF THE DRAWINGS

One embodiment of the invention will now be described by way of example only with reference to the accompanying drawings in which:-

FIG. 1 is a diagrammatic cutaway side elevation of a chair according to the invention;

FIG. 2 is a diagrammatic perspective scrap view of a safety latch mechanism of the chair of FIG. 1,

FIG. 3 is a diagrammatic perspective view of a resilient means of the chair of FIG. 1,

FIG. 4 is a diagrammatic perspective view of the chair with the seat thereof in the raised position, and

FIG. 5 is a view corresponding to FIG. 1 of a chair modified by the addition of a leg rest.

An invalid chair, shown in FIG. 1, with the seat portion 8 thereof in the lowered position and in FIG. 4 in the raised position, is supported on a base comprising a pair of parallel rectangular tubes 1 connected by transversely extending frame members 22 and 7.

At the trailing end of each tube is provided a bracket 34 which supports a back rest 33 of the invalid chair. At the leading end of each tube 1 is mounted a leg 2 about a pivot 4 such that one end of each leg 2 on each tube 1 extends towards the

trailing ends of the tubes 1 forming a supporting portion 28 for the seat portion 8 of the chair. The end of each leg 2 remote from the seat portion 8 and disposed on the opposite side of pivot 4 is provided with a pivot 5 about which is mounted a tie bar 3, each tie bar being disposed within and extending longitudinally of each tube 1. The end of each tie bar 3 remote from the pivot 5 is rigidly attached to an end of a cross member 10, the cross member 10 being disposed transversely between the pair of parallel tubes 1 and being movable longitudinally of the tubes 1 in a slot formed in the side of each tube 1 to allow movement of tie bars 3 longitudinally of the tubes. The cross member 10 and the frame member 7 are each provided with a plurality of studs 11 and 12 respectively between pairs of which studs extend extension springs 6*a* and 6*b* in parallel relationship to the tubes 1. The studs 12 on frame member 7 are mutually disposed in aligned relationship. However, the studs 11 on cross member 10 are disposed in stepped relationship, the first three studs at either side of cross member 10 being disposed in a position more remote from frame member 7 than the remaining studs 11 on cross member 10 to accommodate springs 6*a*. The remaining studs accommodate springs 6*b*.

The springs 6*a* and 6*b* are anchored to pairs of studs 11 and 12 while the seat portion of the invalid chair is in the raised position (shown in FIG. 4). The springs 6*a* and 6*b* are substantially of equal size and spring rate, the relative positions of cross member 10 and frame member 7 in the raised position of seat portion 8 of the invalid chair being such as to allow springs 6*a* to be anchored to pairs of studs 11 and 12 under substantially sufficient tension to maintain the unloaded seat portion 8 in the raised position, and springs 6*b* to be anchored to pairs of studs 11 and 12 under substantially negligible tension. It will be appreciated therefore that springs 6*b* may be added or removed as desired with very little effort, in the raised position of seat portion 8 of the invalid chair. Extra springs may be stored within a storage trough 32 connected to the frame member 7.

It will also be appreciated that on application of a sufficiently large amount of force about pivot 4 in the raised position of seat portion 8, pivoting of the legs 2 about pivot 4 will be effected to cause the seat portion 8 to be lowered. Lowering of the seat portion 8 causes the tie bars 3 to move to increase the relative distance between cross member 10 and frame member 7 to expand the springs 6*a* and 6*b*. Upon sufficient decrease of the moment of force about pivot 4 the tension in the expanded springs 6*a* and 6*b* will cause the seat portion 8 to assume a raised position.

A safety latch mechanism is provided to enable the seat portion 8 of the invalid chair to remain in a lowered position for as long as desired without risk of the seat portion 8 being raised with decrease in the amount of force about pivot 4.

The safety latch mechanism shown in FIG. 2 comprises a striker 21, rigidly attached to frame member 22 and a latch 20 pivotally mounted between a pair of parallel plates 19 on a pivot 18, the plates 19 also acting as buffers engageable with the striker 21. The plates 19 are attached to a strut 27 extending between the seat support portions 28 of the pair of legs 2. The latch mechanism is operable by a lever 13, the handle of which is disposed adjacent one of the arms 9 of the invalid chair. The lever 13 is mounted in a pair of holes, each hole passing through each seat-supporting portion 28 of the legs 2 to allow pivoting of the handle portion of lever 13 about the holes. To the lever 13 disposed between the pair of mounting holes is attached a plate 14 pivoting of the handle portion of lever 13 causing the plate 14, to move forwards and backwards in an arc of a circle. A rod 15 passes through a hole in plate 14 and is pivotally connected to latch 20 by means of a pivot 17. Rod 15 is a sliding fit in the hole in plate 14 in the undisplaced and displaced conditions of plate 14. A pair of compression springs 23 and 24 are disposed on rod 15, one on each side of plate 14, the spring 23 being compressible between plate 14 and a collar 25 disposed at the end of rod 15 and spring 24 being compressible between plate 14 and a collar (not shown) adjacent the strut 27.

In order to disengage latch **20** from striker plate **21** the handle portion of lever **13** is pivoted about the holes in the seat-supporting portions **28** of the legs **2** to cause plate **14** to move in an arc of a circle to tend to compress spring **23** against collar **25**. It will be appreciated that the force exertable on rod **15** to disengage latch **20** from striker plate **21** will depend on the spring rate of spring **23**. The spring rate of spring **23** is chosen such that in the occupied condition of the invalid chair when a load is applied to the seat portion thereof, the force transmittable from lever **13** via plate **14** and through the spring **23** to rod **15** is sufficient to overcome frictional force between latch **20** and striker plate **21**. In the unoccupied condition of the invalid chair when no force is applied to the seat portion thereof, the frictional force between latch **20** and striker plate **21** will be so great as to cause plate **14** to compress spring **23** on pivoting of the handle portion of lever **13** so that transmission of the force from plate **14** to rod **15** will not be effected. Spring **24** is provided in order to allow the latch **20** upon striking striker plate **21** and pivoting about pivot **18** to engage and remain engaged with striker plate **21**. However spring **24** is of such spring rate as not to cause movement of plate **14** and thus lever **13** upon engagement of the latch.

The chair base is provided with four rubber feet **30**, one at each end of each tube **1**. In addition a pair of wheels **31** are located at the rear of the chair out of contact with the ground to allow movement of the chair by tilting the base to cause the wheels to engage the floor.

The operation of the invalid chair will now be described.

Prior to use the force exerted by springs **6*a*** and **6*b*** should be adjusted by addition or removal of springs **6*b*** to suit the weight of the patient. The required spring force may be ascertained by the following description of the operation which the springs help to perform.

When an invalid desired to sit down the chair is so arranged that the seat portion **8** is in the raised position, the invalid stands with his back to the chair and his feet at or adjacent the pivotal axis of legs **2** of the chair. As the invalid leans back the seat portion of the chair moves slowly downwardly to the position shown in FIG. **1**, the movement being resisted by the springs **6*a*** and **6*b***. The rate of descent of the seat portion of the chair may be controlled by a slight bending movement either backwards or forwards of the invalid. It will be appreciated that by leaning back the weight of the patient exerts a greater moment of force about the pivot **4** of the legs **2** to cause an increased rate of descent. When the seat portion is finally in the lowered position latch **20** engages with striker plate **21** to maintain the seat portion in the lowered position for as long as desired.

When an invalid desires to rise out of the chair the handle portion of lever **13** is swivelled to disengage latch **20** from striker plate **21** and release the chair from the base. On leaning forward the invalid exerts a reduced moment of force about the pivots **4** of legs **2** of the chair such that the force exerted by the expanded springs **6**a and **6**b is sufficient to cause the seat portion of the chair to rise.

In view of the proximity between the pivot points **4** and the feet of the patient little or no bending of the knees is required to enable the invalid either to sit down or to stand up. In addition, by virtue of the safety feature of the latch mechanism excessive imbalance between the force exerted by the springs **6*a*** and **6*b*** and the force exerted on or by the seat portion of the chair prevents the latch mechanism from being disengaged to obviate the risk of excessively rapid assent of the seat portion.

As many invalids who have difficulties in sitting down and standing are capable of walking without discomfort, a chair in accordance with the invention may enable an invalid to continue an independent life in circumstances where the invalid would otherwise have had to be dependent on assistance from others.

The invention allows these advantages to be achieved without involving the expense of chairs with power operated raising and lowering mechanisms and also allows, by virtue of its simplicity, an invalid chair of attractive appearance.

FIG. **5** shows a chair corresponding to the chair of FIGS. **1** to **4** with the addition of a leg rest **51**. The leg rest comprises a timber base **52** supporting a padded covered cushion **53**. The leg rest is pivoted by means of pivots **54** to the legs **2** which support the seat portion **8** in such a manner that when the leg rest is nearly horizontal or inclined slightly downwardly and forwardly it forms a forward continuation of the seat portion for supporting a patient's legs. In this operative position the leg rest is supported by a pair of struts **55** from the chair base.

The struts are so positioned that as the seat portion of the chair is raised the struts hold the center part of the leg rest back and thus as the seat portion moves forward during its raising movement the leg rest is pulled back relatively to the seat portion so that it takes up a position under the seat portion where it does not obstruct an invalid entering or leaving the chair.

The base is provided with a number of alternative mounting points **56** for the struts **55** and this enables the operative position of the leg rest to be adjusted between the position shown and the substantially horizontal position.

It may be convenient from a commercial point of view to provide the leg rest **51** as an optional extra on the chair disclosed in FIGS. **1** to **4**. In such a case it would be convenient to provide all such chairs with a series of mounting holes **56** in the base for the struts **55** and a pair of mounting holes for the pivoting of the leg rest with respect to the chair base. This would simplify the attachment of the leg rest.

I claim:-

1. An invalid chair comprising:

a. a chair base having a pair of mutually parallel forwardly extending members forming part thereof,

b. a seat portion,

c. guide means connecting said seat portion to said chair base and comprising two legs which extend forwardly and downwardly from said seat portion and which are pivoted to said members, said guide means guiding said seat portion from a lowered position to a raised position with a combined upward, forward and forwardly tilting movement,

d. extensions to said legs extending forward beyond said pivots,

e. a longitudinally extending tie bar associated with each member,

f. a pivotal connection between each tie bar and each of said extensions,

g. a transversely extending longitudinally movable cross member connected to said tie bars,

h. a fixed transversely extending frame member behind said cross member, and

i. a plurality of extension springs extending rearwardly from said cross member to said transversely extending frame member, said springs urging said seat portion towards its raised position.

2. An invalid chair according to claim **1** further comprising a plurality of studs on said transversely extending cross member and said transversely extending frame member to anchor said springs therebetween.

3. An invalid chair according to claim **2** wherein the studs on the transversely extending frame member are in aligned relationship longitudinally of the frame member, and at least two of the studs on the transversely extending cross member are arranged in stepped relationship with respect to the studs on the transversely extending frame member.

4. An invalid chair comprising:

a. a chair base,

b. a seat portion,

c. guide means connecting said seat portion to said chair base, said guide means guiding said seat portion from a lowered position to a raised position with a combined upward, forward and forwardly tilting movement,

d. arms carried by said seat portion and movable therewith,

e. resilient means operatively connected between said chair base and said seat portion to urge the seat portion

towards said raised position, the force of said resilient means being adjustable to substantially balance the weight of an invalid whereby an invalid by leaning back overcomes the force of the springs and lowers the seat portion or maintains it in its lowered position but the invalid by leaning forward is either raised by the resilient means or remains in the raised position,

f. a latch mechanism to enable the seat portion of the invalid chair to be held in the lowered position, said latch mechanism comprising a latch pivotally mounted on one of said seat portion and said chair base,

g. a striker plate rigidly attached to the other of said seat portion and said chair base,

h. spring loaded means operatively connected to the latch to maintain operative engagement between the striker plate and the latch in the lowered position of the seat portion of the chair, and

i. a latch release mechanism incorporating a resilient link in said latch release mechanism whereby said latch mechanism is releasable only when said seat portion is held in its lowered position by the weight of an occupant but not when the seat portion is held in its lowered position by the latch mechanism.

5. An invalid chair according to claim 4, said resilient link comprising a plate member, a rod extending slidably through a hole in said plate member, a compression spring mounted on said rod and an abutment on said rod for said compression spring.

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