

[54] **RECLINING BACK WHEELCHAIR**

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[22] Filed: **June 3, 1974**

[21] Appl. No.: **475,524**

[52] U.S. Cl. **297/377; 297/DIG. 4**

[51] Int. Cl. **A47c 1/026**

[58] Field of Search **297/377, 376, 375, DIG. 4; 5/77, 74, 75**

[56] **References Cited**

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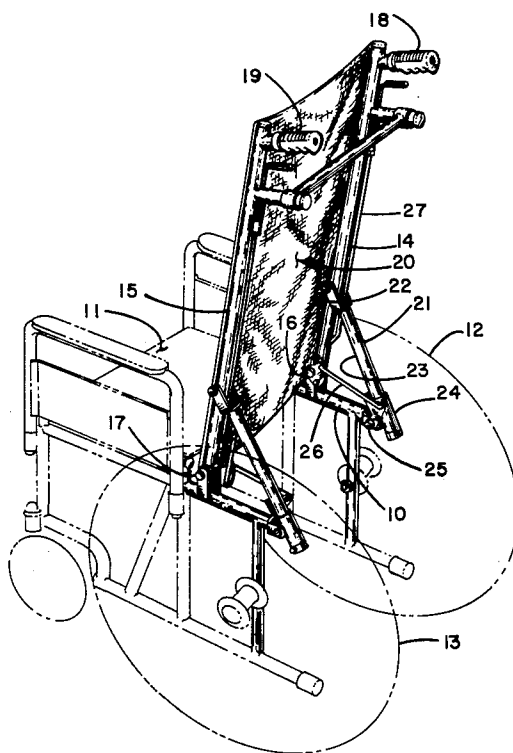
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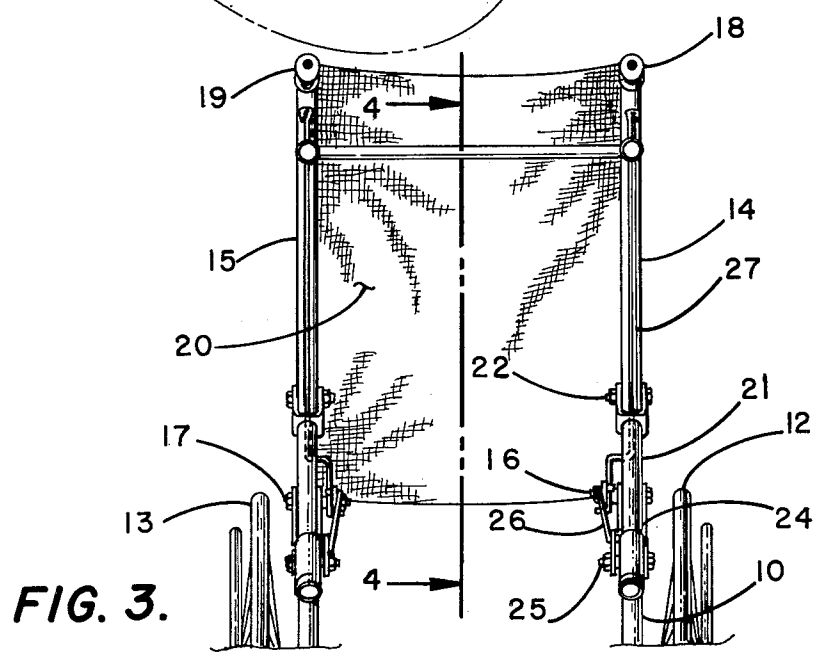
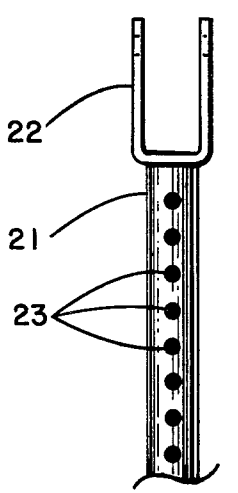
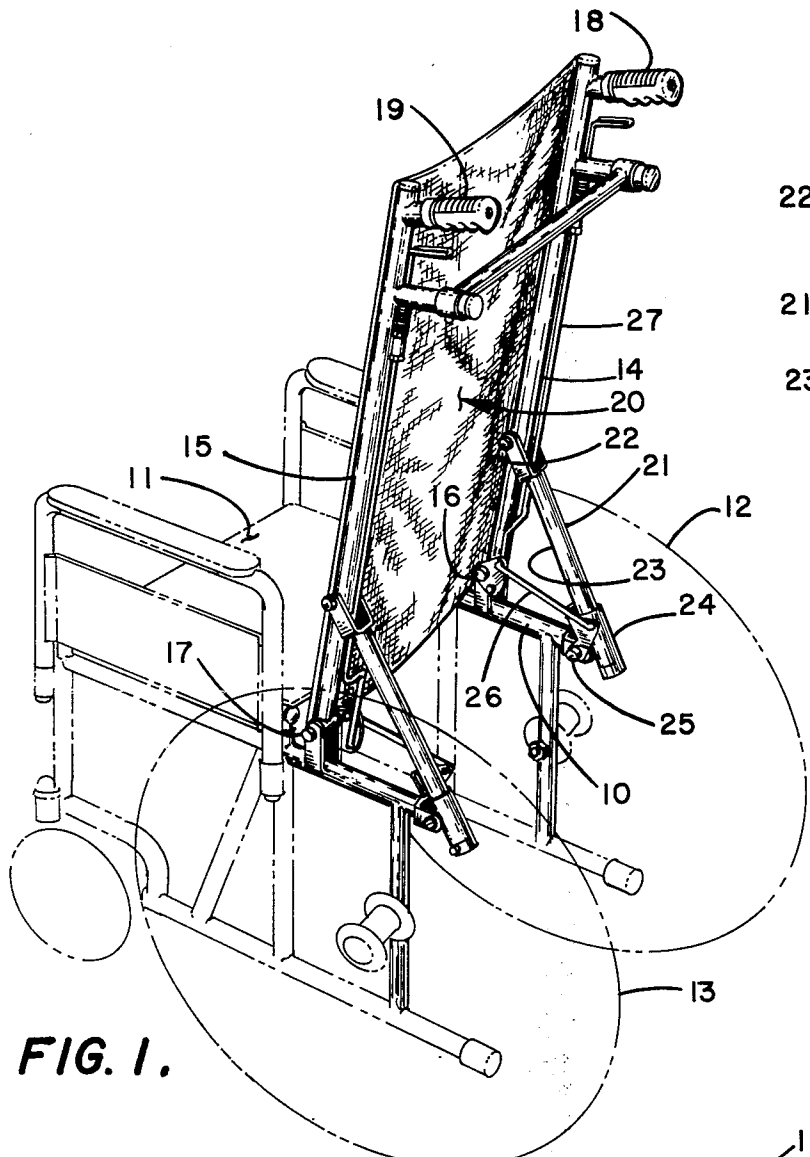
Primary Examiner—Francis K. Zugel
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[57] **ABSTRACT**

The back structure of a wheelchair is pivoted to the frame of the wheelchair for movement from a generally upright to a reclining position. Locking of the back rest relative to the seat in a selected reclined position is accomplished by an adjusting tube having a plurality of openings along one longitudinal side pivoted intermediate the lower and upper ends of the back rest at one end. A guide cylinder receives the other end of the adjusting tube and in turn is pivoted to the wheelchair frame structure to the rear of the pivot point for the back rest. An actuating linkage manually operable is provided on the frame structure enabling insertion and removal of a pawl from any one of the plurality of openings in the adjusting tube to lock the adjusting tube to the guide cylinder and thus lock the back rest in a selected reclining position in a positive manner.

6 Claims, 7 Drawing Figures





SHEET 2 OF 2

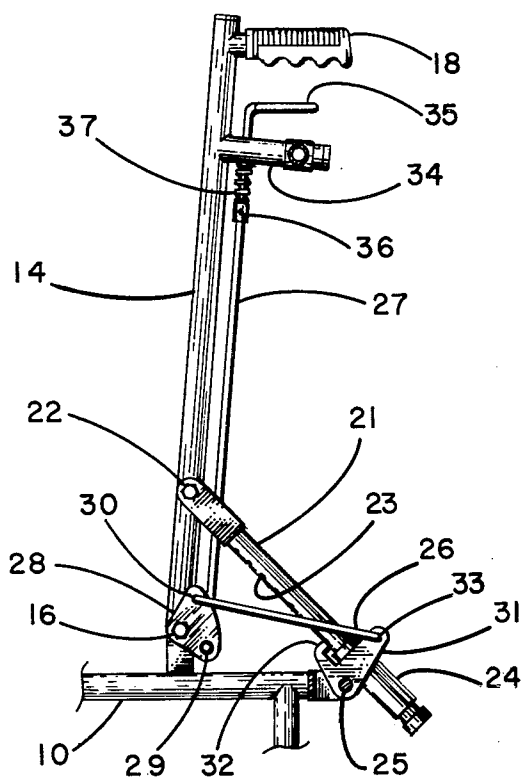


FIG. 4.

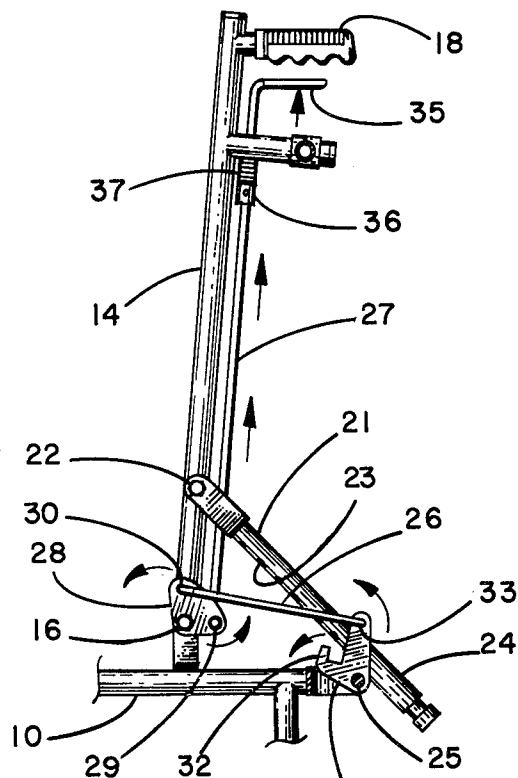


FIG. 5.

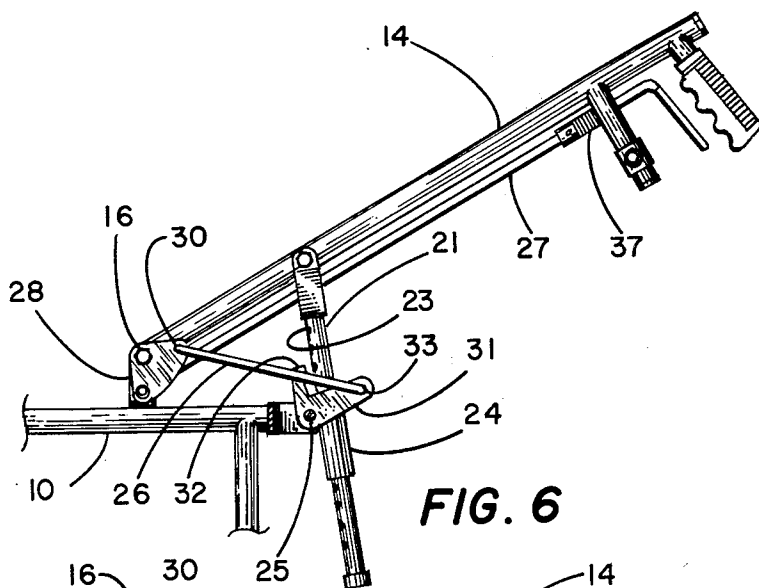


FIG. 6

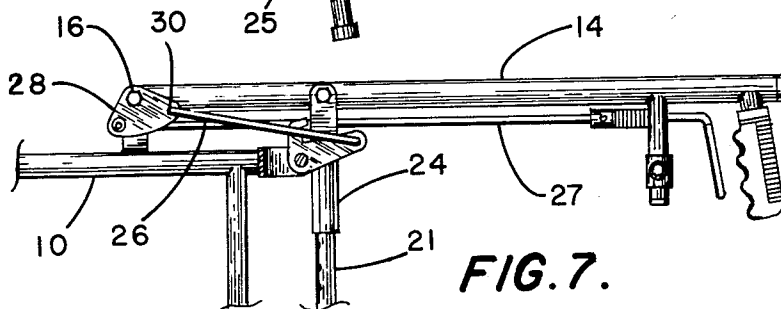


FIG. 7.

RECLINING BACK WHEELCHAIR

This invention relates broadly to reclining back rests and more particularly to an improved reclining back rest in combination with a wheelchair.

BACKGROUND OF THE INVENTION

Wheelchairs provided with reclining back rests are well known in the art. Some of these arrangements permit the back rest to be reclined through a definite angle to a definite position. Others permit various selected positions to be assumed by the backrest.

The most usual means for permitting selected adjustment of a wheelchair back rest is to provide a ratchet type member which selectively engages a cross bar or link to hold the back rest in a desired reclining position. The arrangement in some respects is similar to lawn chairs. One of the problems associated with this type is the requirement for a nurse or attendant to assume awkward positions when releasing or locking the ratchet member. Since the back rest itself must be supported while it is being moved to a reclining position, final adjustment of the back rest in a selected position and locking of the ratchet becomes difficult at best. Further, pitching movements of a patient can result in inadvertent release of the ratchet and collapsing of the back rest.

Further problems are involved when considering a wheelchair of the type normally designed to be collapsible. In this respect, a suitable type of locking means for holding the back rest in a set inclined position must support both longitudinal sides of the back rest and should the locking mechanism associated with one side inadvertently become unlocked, the back rest will cant or twist. Again, there is required careful adjustments on the part of the operator.

BRIEF DESCRIPTION OF THE PRESENT INVENTION

With the foregoing in mind, the present invention contemplates an improved reclining back locking arrangement preferably in combination with a wheelchair wherein a positive locking action is assured together with an arrangement providing for easy operation by a nurse or attendant without having to assume awkward positions.

Briefly, the invention comprises in combination with a frame structure supporting a seat such as a wheelchair, a reclining back assembly including back rest means pivoted at a first pivot point to the frame structure for movement from a generally upright position to a reclining position. In the preferred embodiment, the back rest can be inclined to any one of a plurality of positions between upright and horizontal wherein the back rest is coplanar with the seat.

An adjusting tube is pivoted at one end at a second pivot point to the back rest means intermediate its upper and lower ends and cooperates with a guide means preferably in the form of a cylinder receiving the other end of the adjusting tube. This cylinder is pivoted to the frame structure at a third pivot point spaced to the rear of the first pivot point.

The assembly is completed by an actuating linkage means coupled to the frame structure and manually movable to lock the back rest means relative to the seat. This linkage means includes an actuating rod extending upwardly adjacent to the back rest means to

terminate in a position for convenient manual operation. Further, the adjusting tube in the preferred embodiment includes a plurality of openings along one longitudinal side, the linkage means including a pawl member arranged to be inserted and removed from a selected opening depending upon the inclination of the back rest. The linkage is so designed that the pawl member will remain in a consistent relationship with the guide cylinder throughout the various inclined positions of the back rest means.

BRIEF DESCRIPTION OF THE DRAWINGS

A better understanding of the invention will be had by now referring to a preferred embodiment as illustrated in the accompanying drawings in which:

FIG. 1 is a perspective view of the rear of a wheelchair in which the back rest can be inclined to a number of selected positions in accord with the present invention;

FIG. 2 is an enlarged fragmentary view of a longitudinal side of an adjusting tube utilized in the structure of FIG. 1;

FIG. 3 is a rear elevational view of the wheelchair of FIG. 1;

FIG. 4 is an enlarged fragmentary elevational side view of the back rest actuating link structure looking in the direction of the arrows 4—4 of FIG. 3;

FIG. 5 is a view similar to FIG. 4 but showing the actuating linkage mechanism in an unlocked position;

FIG. 6 is a view similar to FIG. 5 showing the relative positions of the linkage mechanism when the back rest is partially inclined to an intermediate position; and,

FIG. 7 is a view similar to FIG. 4 showing the back rest in a completely reclined position.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring first to FIG. 1, there is shown a wheelchair having a frame structure 10 supporting a seat 11 and rotatably mounting wheels 12 and 13.

The reclining back rest assembly includes first and second upwardly extending back members 14 and 15 pivoted at their lower ends at first pivot points 16 and 17 to the frame structure. As shown, the upper ends of these back members include handle grips 18 and 19, the members themselves supporting a canvas type back rest 20 there between. As will become clearer as the description proceeds, the pivoting of the upstanding first and second back rest members 14 and 15 permits the back rest to pivot from a generally upright position to a generally horizontal position in which the back rest itself is substantially coplanar with the seat 11.

A locking means for securing the back rest assembly in any selected one of a plurality of intermediate reclining positions is associated with each of the upwardly extending back members 14 and 15 on either side of the chair. Since these locking means are the same for each side, description of one will suffice for both.

Thus referring to the locking means associated with the first upwardly extending back member 14, the structure includes an adjusting tube 21 pivoted at one end 22 at a second pivot point on the first upwardly extending back member 14 intermediate its ends. This adjusting tube includes a plurality of openings along one longitudinal side as indicated at 23.

A guide means slidably receives the other end of the adjusting tube and in the particular embodiment

shown, this guide means takes the form of a cylinder 24 pivoted to the frame structure 10 at a third pivot point 25 to the rear of the first pivot point 16. The arrangement is such that when the back rest is reclined, the adjusting tube 21 will slide through the cylinder 24.

An actuating linkage means forming part of the locking means includes a tie rod 26 cooperating with an actuating rod 27 extending upwardly along the upwardly extending back rest member 14 to terminate adjacent to the handle grip 18. As will become clearer as the description proceeds, movement of the actuating rod 27 will cause a pawl member adjacent to the cylinder 24 to be removed from and inserted in a selected one of the various openings 23 on the adjusting tube 21 thereby securing the back rest in a selected reclined position.

Referring now to FIG. 2, there is shown in greater detail the adjusting tube 21 wherein the plurality of openings 23 is clearly visible. The second pivot point of the one end of the adjusting tube 23 takes the form of a bifurcated structure arranged to cradle about the first upwardly extending member 14.

In the rear elevational view of FIG. 3, the relationship of the various components described will be evident, the same numerals being utilized to designate corresponding parts described in conjunction with FIG. 1. In FIG. 3, it will be noted that an additional locking means similar to the first mentioned locking means described in FIGS. 1 and 2, is associated with the second upwardly extending member and has its actuating rod terminating at its upper end adjacent to the second handle grip 19.

Referring to FIG. 4, further details of the actuating linkage associated with the first upwardly extending member 14 will be described. As shown, there is included a bell crank type bracket member 28 pivoted at the first pivot point 16 and including fourth and fifth pivot points 29 and 30, defining the vertices of a first triangle with the first pivot point 16. A pawl member 31 in turn is pivoted at the third pivot point 25 adjacent to the cylinder 24 and includes a pawl 32 juxtaposed the adjacent adjusting tube 21 in a position to be received in and removed from a selected one of the openings 23 upon rocking movement about the third pivot point 25. This pawl member further includes a fixed pivot point 33 defining with the third pivot point and pawl the vertices of a second triangle.

The tie rod 26 referred to in FIG. 1 extends between and is pivoted to the fifth and sixth pivot points 30 and 33 as shown.

The actuating rod 27 also described briefly in FIG. 1, is pivoted at its lower end to the fourth pivot point 29 and, in the embodiment shown, passes upwardly through a frame member 34 integrally formed with the upwardly extending member 14 to terminate in a handle grip 35 adjacent to the handle grip 18. The frame member 34 serves to guide and stabilize back and forth longitudinal movement of the actuating rod 27. As shown, the rod 27 itself includes a collar 36 below the frame member 34. A compression spring 37 is positioned between the collar and frame member to bias the actuating rod in a downward direction.

FIG. 5 shows the relative positions of the bell crank type member 28 and the pawl member 31 as a consequence of manual movement of the actuating rod 27 upwardly against the bias of the spring 37. Essentially,

this action releases the pawl 32 from one of the openings in the adjusting rod 21.

FIG. 6 shows the back rest in a partially inclined position and FIG. 7 shows the back rest in a fully reclined position. In all of these latter FIGS. 5, 6 and 7, these same elements are designated by the same numerals utilized in FIG. 4.

OPERATION

The operation of the reclining back wheelchair of this invention will be evident from FIGS. 4, 5, 6 and 7. In the position of the components as illustrated in FIG. 4, the back rest is in a normal upright position wherein the pawl 32 on the pawl member 31 is received in the lowermost opening 23 of the adjusting tube 21. The pawl is held in this position as a consequence of the spring 27 biasing the actuating rod 27 downwardly thereby exerting a clockwise bias on the bell crank type member 28. This force urges the tie rod 26 to the right as viewed in FIG. 4 thereby exerting a similar clockwise biasing force on the pawl member 31 to hold the pawl 32 in the lowermost opening 23.

When it is desired to recline the back to a selected position, the nurse or attendant who would normally be holding the hand grip 18 need only extend her fingers downwardly to engage the handle grip 35 of the actuating rod 27 and then pull upwardly by closing her fist.

Referring to FIG. 5, the foregoing action will rock the bell crank type member 28 in the counter-clockwise direction as indicated by the arrow to pull the tie rod 26 to the left and effect a similar rocking movement of the pawl member 31 thereby removing the pawl 32 from the opening 23 in the adjusting tube 21. The tube 21 is now free to move through the guide cylinder 24 and thus permit the back rest to be lowered.

Referring to FIG. 6, the moving action of the adjusting tube 21 through the guide cylinder 24 is shown, the guide cylinder 24 being pivotally mounted at the third pivot point 25 as described so as to remain in coaxial alignment with the adjusting tube 21 during this motion.

If the position illustrated in FIG. 6 is a desired selected position, the nurse or attendant need then only release the actuating rod 27, the spring then urging this rod 27 downwardly to rotate the bell crank type bracket member 28 in a clockwise direction thus effecting a similar movement of the pawl member about the third pivot point 25 to cause the pawl 32 to be received in a juxtaposed opening 23.

If it is desired to recline the back completely so that it is substantially coplanar with the seat of the wheelchair, the actuating rod 27 will be held in its pulled position to retain the pawl free of the opening until the desired horizontal position is obtained. The actuating rod 27 may then be released and the pawl will be inserted in the uppermost opening of the adjusting tube 21. FIG. 7 shows this fully reclined position.

As described in conjunction with FIG. 3, the additional locking means associated with the second upwardly extending member 15 of FIG. 1, is simultaneously operated so that both sides of the back rest are positively locked in a selected, reclined position.

A more simplified version of the back rest assembly could take the form of a single pre-determined reclined position of the back rest, the maximum reclined position being determined by the length of the guide cylinder 24 in a direction towards the second pivot point.

Thus, simple abutment of the upwardly extending back rest member against the top of the cylinder would determine the preset reclining position and it would not be necessary to provide a plurality of openings on the adjusting tube.

When the preferred embodiment is utilized, wherein a plurality of different reclined positions can be assumed by the back rest and positively locked in such selected position, it is important that the relationship of the pawl member 31 with respect to the adjusting tube and guide cylinder 24 remain consistent throughout the swinging movement of the back. This desired relationship is maintained by dimensioning the linkage components such that the ratio of the distances between the first and fifth pivot points 16 and 30 of the bell crank type member 28 to the distance between the third and sixth pivot points 25 and 33 of the pawl member 31 is inversely proportional to the ratio of the angle through which the first upwardly extending member 14 moves and the angle through which the adjusting tube 21 moves. By providing these inversely proportioned ratios, the pawl member remains in a given relationship to the adjusting tube during reclining movements of the back rest so that insertion and removal of the pawl into or from any one of the plurality of openings can take place by effecting substantially identical movements of the actuating rod 27 relative to the first upwardly extending member 14.

From the foregoing description, it will thus be evident that the present invention has provided a greatly improved reclining back wheelchair wherein reclining positioning of the back and locking thereof in a selected position can be very conveniently carried out by a nurse or attendant without removing her hands from the normal back rest grips. Moreover, positive locking of the back rest is assured in any selected position even should the patient pitch or squirm in the seat. Thus, there is no possibility of inadvertent unlocking as a consequence of movement of the back rest itself. The only manner of unlocking the arrangement is to manually manipulate the actuating rod as described.

What is claimed is:

1. In combination with a frame structure supporting a seat, a reclining back assembly including:

- a. back rest means pivoted at a first pivot point to said frame structure for movement from a generally upright position to a reclining position;
- b. an adjusting tube pivoted at one end at a second pivot point to the back rest means intermediate its lower and upper ends;
- c. a guide means in slidable engagement with the other end of the adjusting tube and pivoted at a third pivot point to the frame structure at a spaced point to the rear of said first pivot point;
- d. actuating linkage means coupled to said frame structure and manually movable to lock said back rest means relative to the seat, said guide means comprising a cylinder receiving said adjusting tube, said adjusting tube having a plurality of openings along one longitudinal side, said actuating linkage means including a bell crank type bracket pivoted coaxially with said first pivot point and including fourth and fifth pivot points defining the vertices of a triangle with said first pivot point;
- e. a pawl member pivoted at said third pivot point and including a pawl juxtaposed the adjusting tube in a position to be received in and removed from

a selected one of said openings upon rocking movement about said third pivot point and further including a sixth pivot point defining with said third pivot point and pawl the vertices of a second triangle; and

f. a tie rod pivoted to said fifth and sixth pivot points, whereby rocking movement of said bell crank type bracket member moves said tie rod to thereby rock said pawl member in a direction to remove the pawl from an opening in said adjusting tube and permit the back rest means to be moved to a desired reclining position and locked in said position by rocking said bell crank type bracket member in an opposite direction to insert the pawl in a juxtaposed opening, the ratio of the distances between said first and fifth pivot points and the distance between said third and sixth pivot points being inversely proportional to the ratio of the angle through which said back rest means moves and the angle through which said adjusting tube moves, so that the relationship between the pawl member and the guide cylinder remains substantially constant throughout reclining movements of said back rest means.

2. The subject matter of claim 1, including an actuating rod pivoted to said fourth pivot point and extending along said back rest means to terminate adjacent the upper end of said back rest means for permitting easy manual rocking of said bell crank type member while manually reclining said back rest means to a desired position.

3. In combination with a wheelchair including a frame structure supporting a seat and wheels, a reclining back assembly including:

- a. first and second upwardly extending back members pivoted at their lower ends at first pivot points to said frame structure and including first and second handle grips at their upper ends respectively, said members supporting a back rest therebetween and being pivotable from a generally upright position to a generally horizontal position in which said back rest is substantially coplanar with said seat; and,
- b. a locking means for securing said back rest assembly in any selected one of a plurality of intermediate reclining positions, and locking means including:
 - an adjusting tube pivoted at one end at a second pivot point on said first upwardly extending back member intermediate its ends, and including a plurality of openings along one longitudinal side;
 - a guide cylinder slidably receiving the other end of said adjusting tube, said guide cylinder being pivoted to said frame structure at a third pivot point to the rear of said first pivot point;
 - a bell crank type bracket member pivoted at said first pivot point and including fourth and fifth pivot points defining the vertices of a first triangle with said first pivot point;
 - a pawl member pivoted at said third pivot point and including a pawl juxtaposed the adjusting tube in a position to be received in and removed from a selected one of said openings upon rocking movement about said third pivot point and further including a sixth pivot point defining with said third pivot point and pawl the vertices of a second triangle;
 - a tie rod extending between and pivoted to said fifth and sixth pivot points; and,

an actuating rod pivoted at its lower end to said fourth pivot point and extending upwardly along said first member to terminate at its upper end adjacent to said first handle grip, whereby longitudinal movement of said actuating rod rocks said bell crank type bracket member to move said tie rod and thereby rock said pawl member in a direction to remove the pawl from an opening in said adjusting tube and permit the back rest to be moved to a desired reclining position and locked in said position by moving said actuating rod in an opposite direction to insert the pawl in a juxtaposed opening.

4. The subject matter of claim 3, in which the ratio of the distances between said first and fifth pivot points and the distance between said third and sixth pivot points is inversely proportional to the ratio of the angle through which said first upwardly extending member moves and the angle through which said adjusting tube moves so that said pawl member remains in a given relationship to said adjusting tube during reclining movements of said back rest so that insertion and removal of said pawl into or from any one of said plurality of openings can take place by effecting substantially identical

movements of said actuating rod relative to said first upwardly extending member.

5. The subject matter of claim 4, including a frame member secured to an upper portion of said first upwardly extending member through which said actuating rod passes to guide and stabilize the same for longitudinal movement, said actuating rod including a collar below said frame member; and a compression spring between said collar and frame member biasing said actuating rod in a downward direction, removal of the pawl from an opening to unlock the back rest being effected by an upward movement of said actuating rod against the bias of said spring.

6. The subject matter of claim 5, in which there is provided an additional locking means having elements corresponding to said first mentioned locking means associated with said second upwardly extending back member, the actuating rod in said additional locking means extending upwardly along said second member to terminate adjacent to said second handle grip, whereby a person holding said handle grips can actuate both actuating rods simultaneously.

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