

July 19, 1966

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3,261,641

INDEPENDENT FOLDING TABLET ARM CHAIR

Filed Oct. 6, 1965

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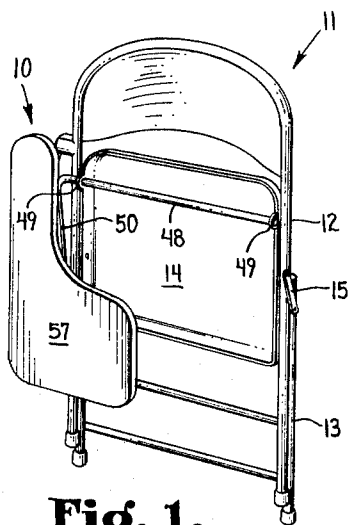


Fig. 1.

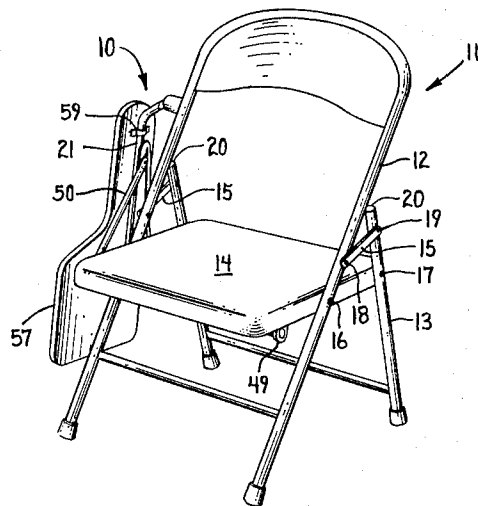


Fig. 2.

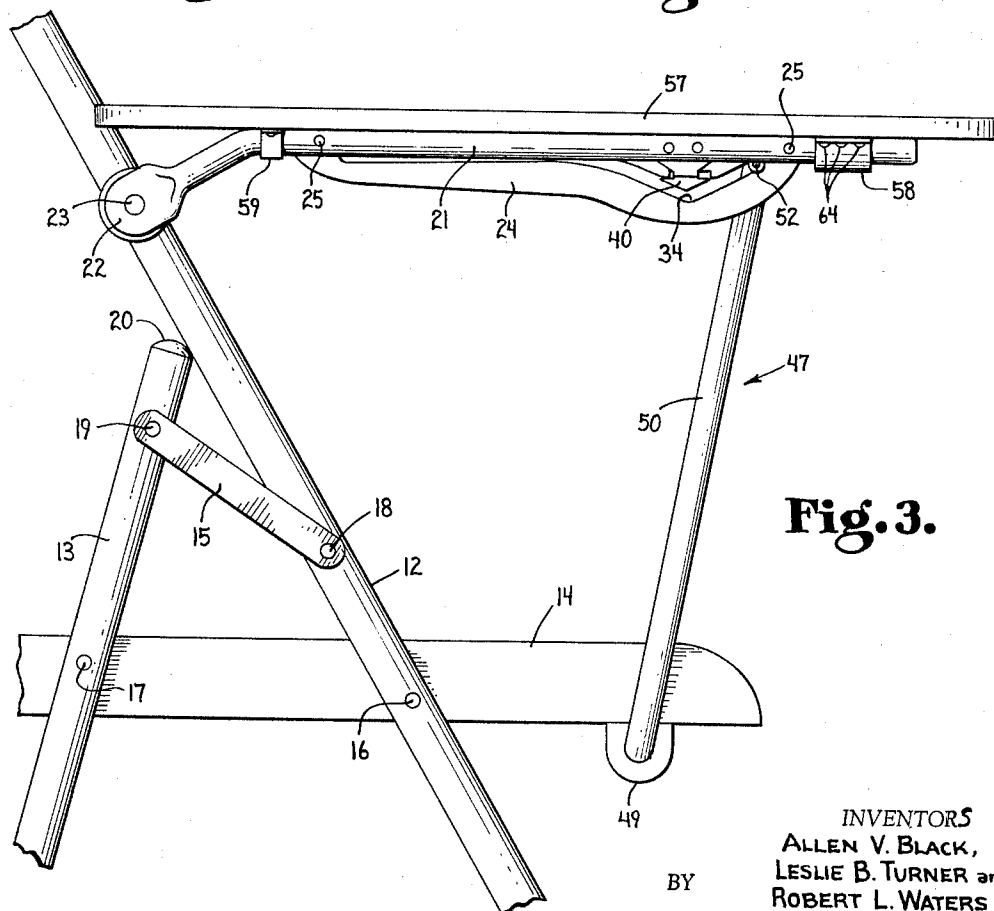


Fig. 3.

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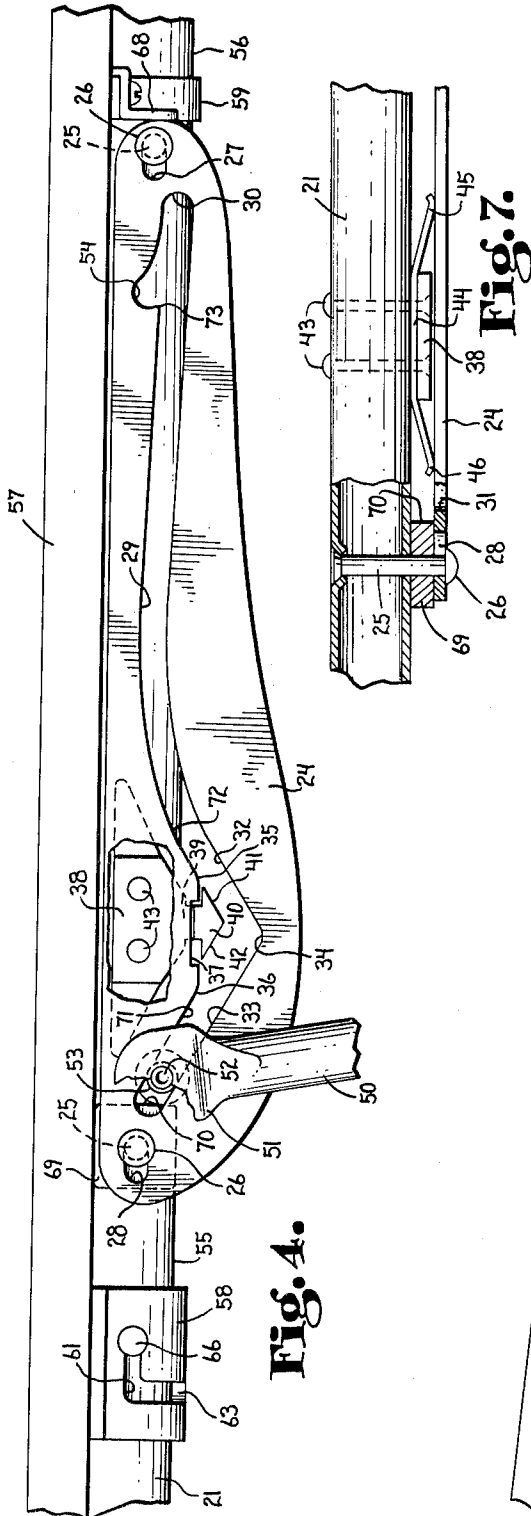
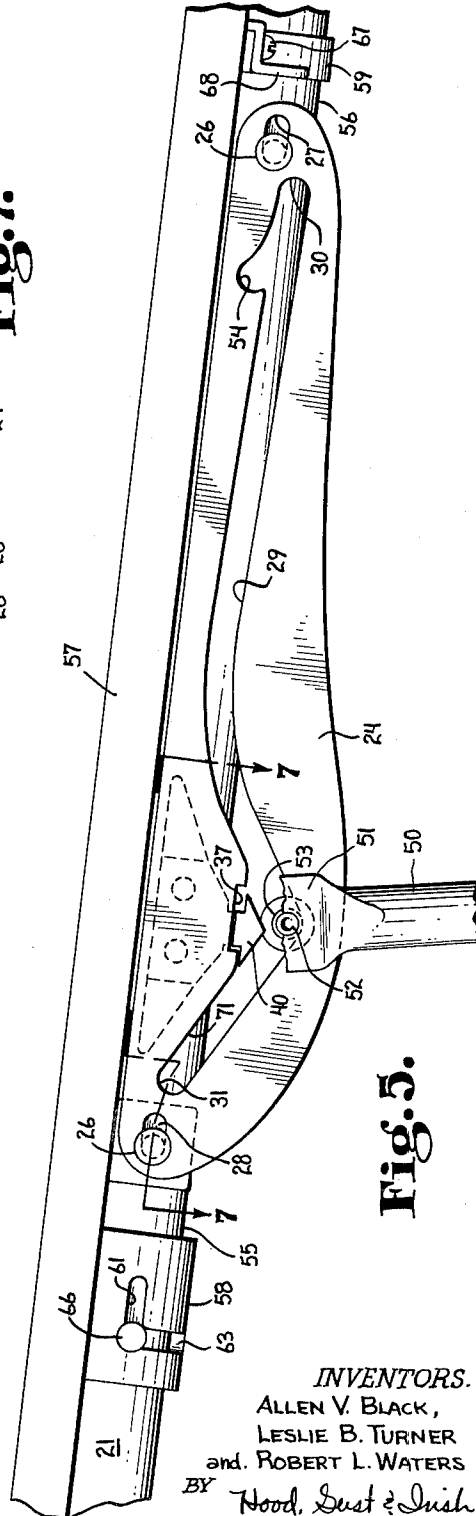
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Fig. 8.

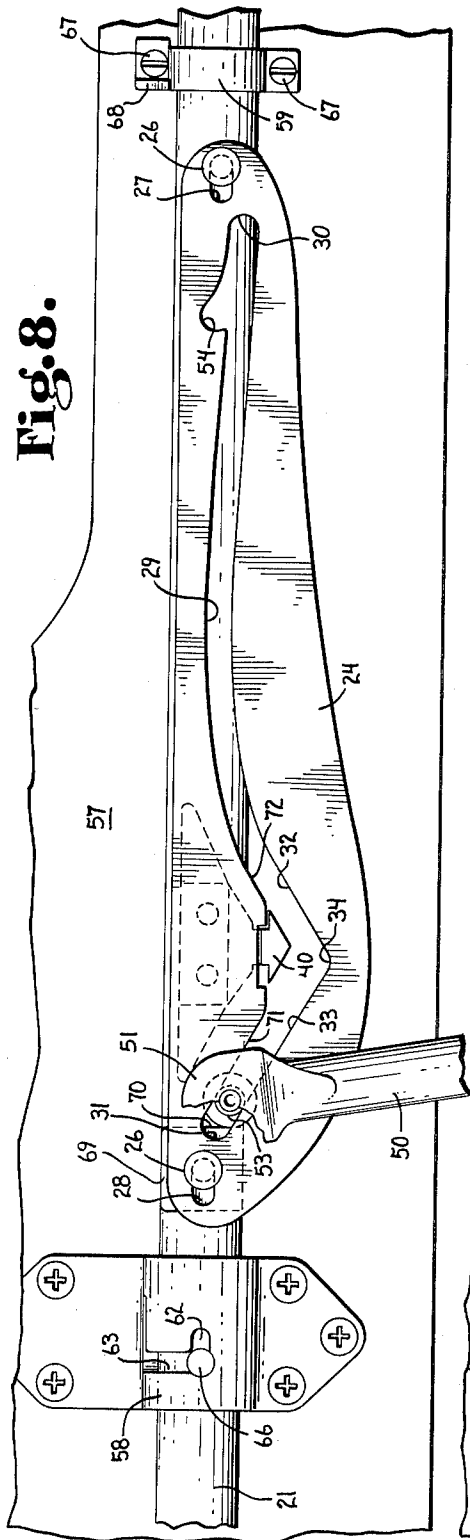
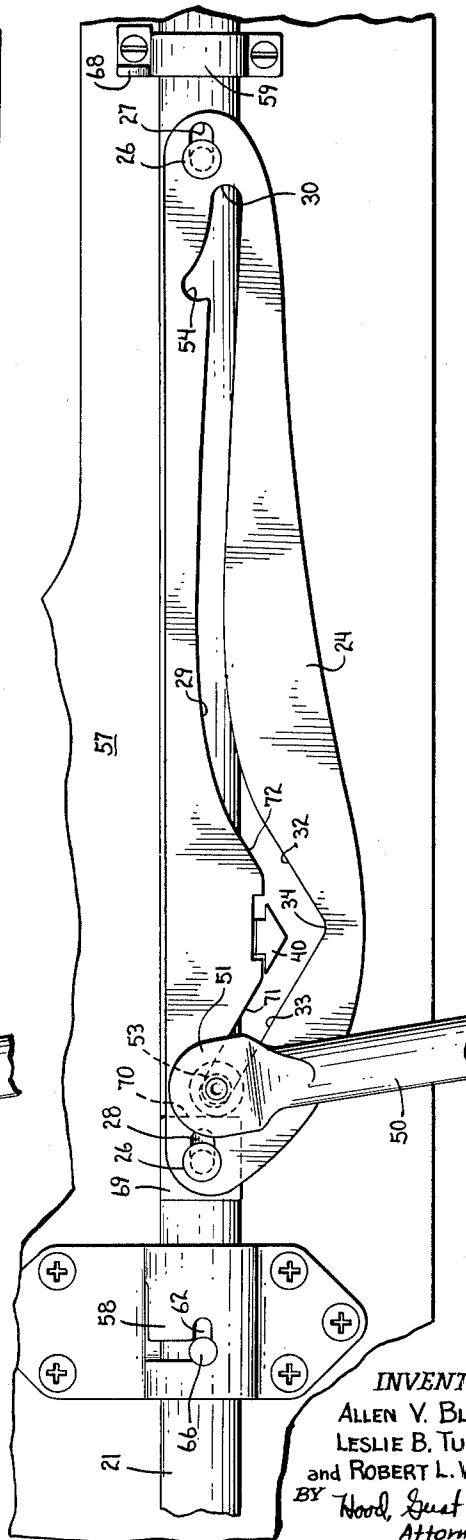


Fig. 9.



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3,261,641

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Filed Oct. 6, 1965

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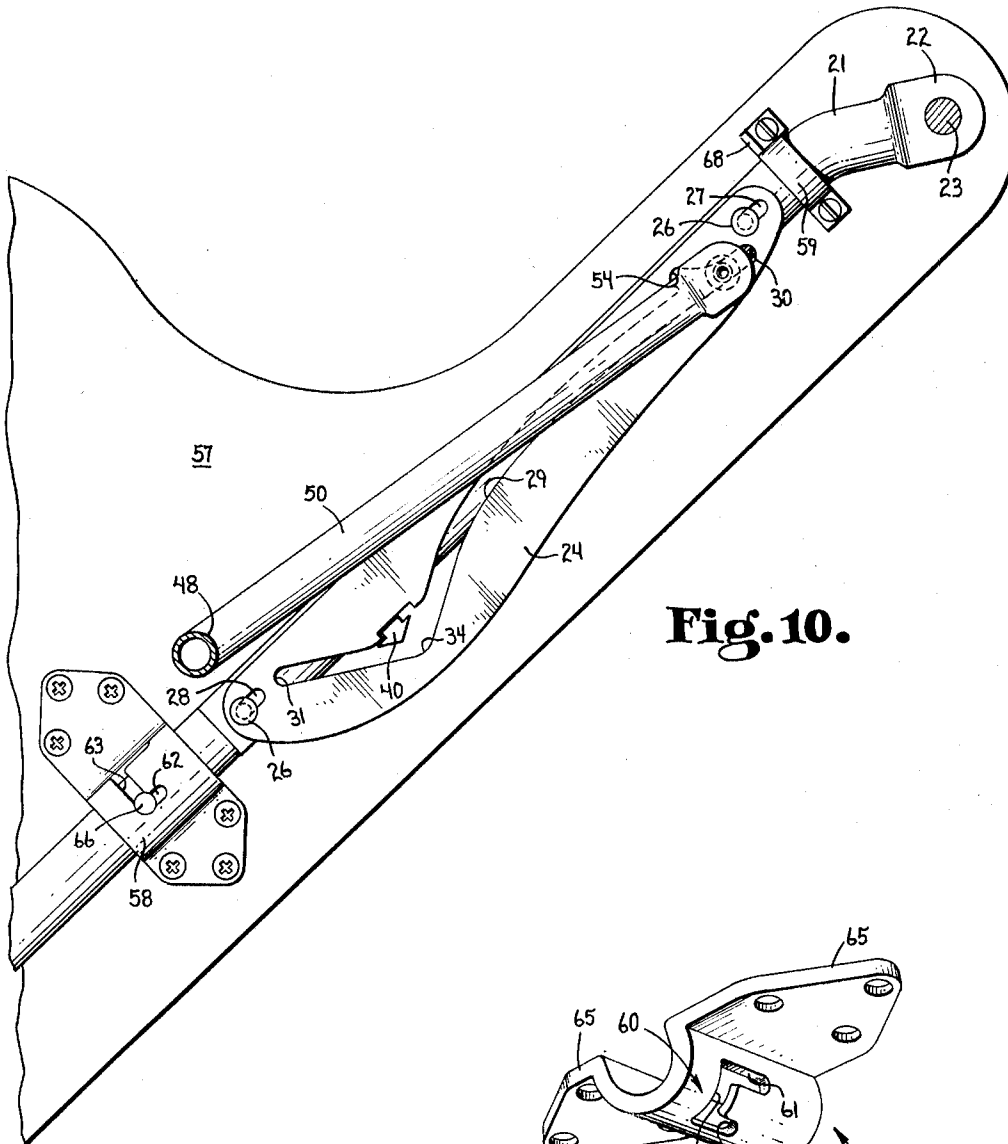


Fig. 10.

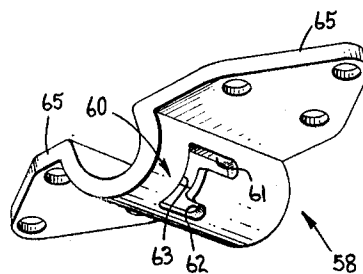


Fig. 6.

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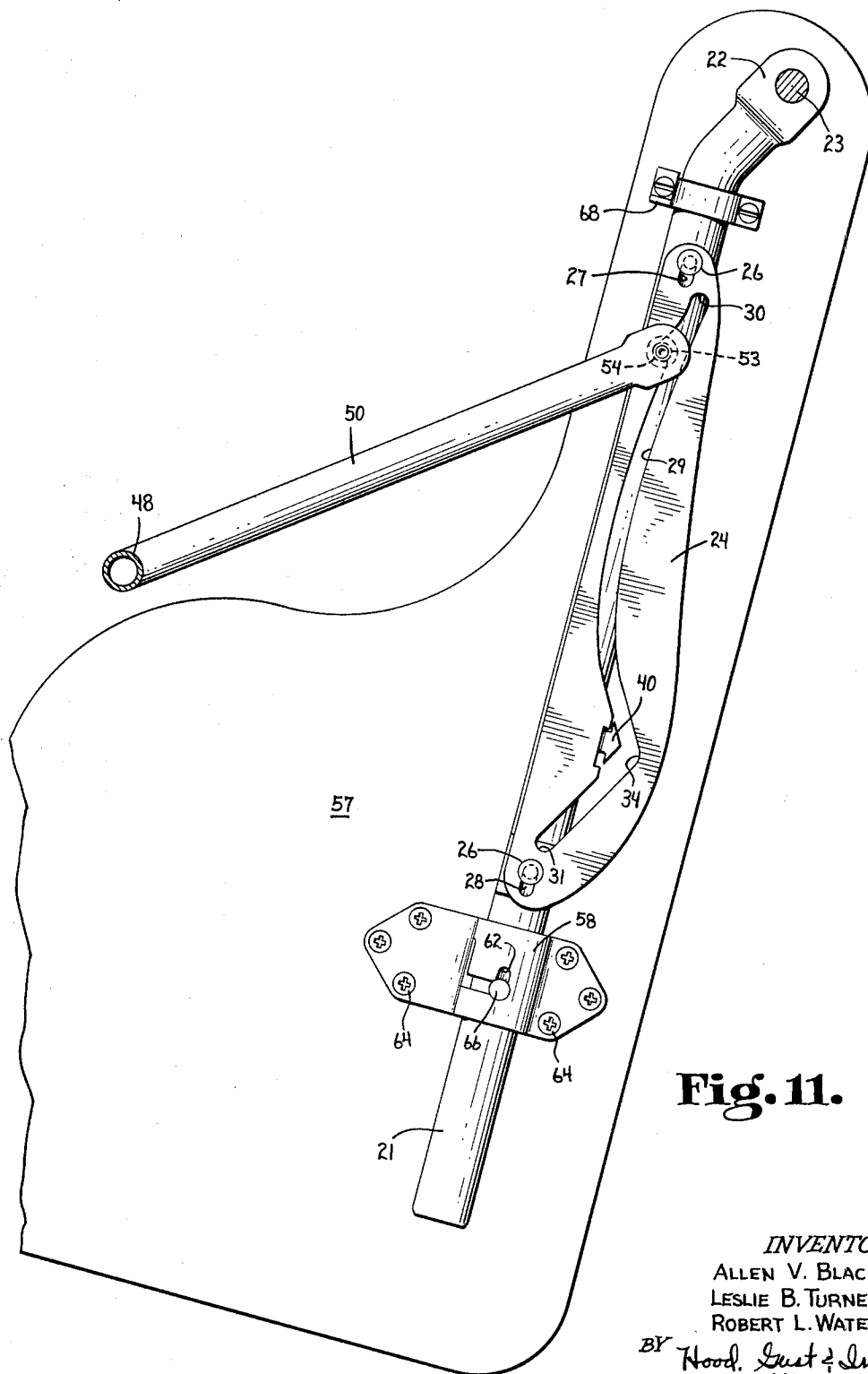
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INDEPENDENT FOLDING TABLET ARM CHAIR
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Filed Oct. 6, 1965, Ser. No. 493,378

13 Claims. (Cl. 297—162)

The present invention relates to an independent folding tablet arm chair, and more particularly to a folding tablet arm assembly for a chair which may be either rigid or of the folding type.

A primary object of the invention is to provide such an assembly so constructed and arranged that, when it is assembled with a rigid chair or with a folding chair, the tablet arm rest may be arranged in a horizontal plane partially overlapping the chair seat or may be turned into a vertical plane, entirely out of the way of the chair seat, without affecting the folding mechanism either of the arm assembly or of the chair, if the latter is of the folding type.

A further important object of the invention is to provide, in such an assembly, means which will affirmatively prevent accidental collapse of the folding arm assembly when the tablet arm rest is in its horizontal, use position.

Another object of the invention is to provide such an assembly in which the folding arm may be freely moved between forwardly-projecting, substantially horizontal position and collapsed, depending position, without affecting the folding mechanism of the chair if the latter is of the folding type.

A further object of the invention is to provide, in such an assembly, means whereby, when the arm is moved to dependent position while the chair remains in use condition, the arm assembly will be affirmatively held against free swinging movement under gravity or inertial forces.

Still another object of the invention is to provide, in such an assembly, a brace link for supporting the arm assembly in use position and a movable guide plate carried by the arm rest and cooperative with said link automatically to guide said link to arm supporting position when the arm rest is moved out of folded position, and automatically to guide said link to arm folded position when said arm rest is moved out of use position.

A further object is to provide means, manually manipulable when the tablet rest is in use position, to lock said arm rest assembly against accidental collapse toward folded position.

The basic concept of the invention is to provide, in an assembly including a bar swingable in a substantially vertical plane between a dependent position and a substantially horizontal position, a brace link having a pivoted proximal end and a distal end, said distal end of said link being movable through a vertical position between a first position inclined in one direction to support said bar in horizontal position, and a second position inclined in the opposite direction when said bar is in its dependent position, and including means automatically operable normally to ensure travel of said distal link end through its vertical position in either direction; said means being optionally manipulable to guard, at times, against inadvertent travel of said distal link end through its vertical position toward said second position.

Stated otherwise, the invention contemplates a guideway for the distal end of such a brace link, said guideway having an offset portion cooperating with said distal link end when said link is substantially vertical, and bridge means associated with said offset portion, said bridge means and said offset portion being relatively movable to determine the direction of travel of said link end out of said offset portion.

Further objects of the invention will appear as the description proceeds.

To the accomplishment of the above and related objects, our invention may be embodied in the form illustrated in the accompanying drawings, attention being called to the fact, however, that the drawings are illustrative only, and the change may be made in the specific construction illustrated and described, so long as the scope of the appended claims is not violated.

FIG. 1 is a perspective view of a conventional form of folding chair equipped with the independent folding tablet arm assembly of the present invention, the parts being in fully-collapsed, storage condition;

FIG. 2 is a similar view of the same assembly with the chair in open, use condition and the folding tablet arm assembly in collapsed, dependent position;

FIG. 3 is a fragmentary, side elevation of the same assembly with the tablet arm in position for use and locked against accidental collapse;

FIG. 4 is a further-enlarged, fragmentary elevation of the folding arm assembly in the condition of FIG. 3, but viewed from the opposite side;

FIG. 5 is a view similar to FIG. 4 but showing the parts in the positions assumed after the initial step in the folding or collapsing operation;

FIG. 6 is an enlarged, perspective view of an element of our folding arm assembly;

FIG. 7 is a fragmentary, horizontal section taken substantially on the line 7—7 of FIG. 5;

FIG. 8 is a fragmentary elevation of the parts shown in FIG. 4 in a pre-final use position;

FIG. 9 is a similar view with the parts in final use position but before manual locking;

FIG. 10 is a similar view showing the parts in pre-final folded position; and

FIG. 11 is a similar view showing the parts in final folded position.

Referring more particularly to the drawings, our folding tablet arm assembly is indicated generally by the reference numeral 10 in operative association with a conventional form of folding chair, indicated generally by the reference numeral 11. The particular form of chair chosen for convenience of illustration comprises a front leg and back rest unit 12, a rear leg unit 13, a seat 14 and a pair of links 15 operatively joining the two leg units. The seat 14 is received between the respective legs of the front and rear leg units and is pivotally connected thereto as at 16 and 17. The links 15 are pivotally connected to the respective leg units at 18 and 19, so that, when the chair is opened to use position, the upper ends 20 of the rear leg unit bear against the back rest portions of the front unit 12.

The folding arm assembly 10 of the present invention comprises a bar 21 the proximal end 22 of which is flattened and pivotally connected to one of the uprights of the back rest upon a transverse axis above the seat 14 by means of a pin 23, or the like. A guide plate 24 is mounted upon the bar 21 to depend therefrom in a plane substantially perpendicular to the axis of the pin 23.

As is most clearly to be seen in FIGS. 4 and 5, the guide plate 24 is supported from the bar 21 upon two rivets 25, 25, projecting inwardly from said bar and provided with retaining heads 26 somewhat spaced from said bar, said rivets penetrating a short, longitudinally-extending slot 27 adjacent the proximal end of the guide plate and a similar slot 28 adjacent the distal end of the guide plate, respectively. Thereby, the guide plate is supported for limited longitudinal movement relative to the bar 21.

The guide plate is formed to provide a guideway 29, shown as a longitudinally-extending slot which is of substantially uniform width, as measured transversely in the plane of the plate, from its closed proximal end 30 to

its closed distal end 31, except for a widening in the region of a substantially V-shaped dip near the distal end of said guideway. As is clearly to be seen in FIGS. 4 and 5, the guideway is formed with a downwardly and distally inclined slope 32 joining an upwardly and distally inclined slope 33 at the nadir 34 of said dip; and the guideway is significantly widened from the point 35 to the point 36 in the region of said nadir 34. The upper boundary of the guideway is formed, between the points 35 and 36, with a notch 37 which substantially symmetrically opposes the nadir 34 of the dip in the lower guideway boundary.

A bridge element 38 having a depending shank 39 terminating in a head 40 is interposed between the bar 21 and the guide plate 24 and is so constructed and arranged that its head 40 is disposed in the plane of the plate 24 and spans the mouth of the notch 37. Said head is formed to define a surface 41 opposed to the slope 32 and a surface 42 opposed to the slope 33. As is clearly to be seen from a comparison of FIGS. 4 and 5, the nadir 34 of the V-dip is movable between positions on opposite sides of the apex of the head 40 as the plate 24 is shifted relative to the bar 21 between its limiting positions, for a purpose which will appear.

Preferably, as is most clearly illustrated in FIG. 7, the mid portion of a leaf spring 44 is interposed between the bar 21 and the bridge element 38 and is penetrated by the rivets 43, the opposite end portions 45 and 46 of said spring bearing upon the guide plate 24 to offer frictional resistance to movement of said guide plate in either direction relative to the bar 21. Also interposed between bar 21 and plate 24, and fixedly held by rivet 25, is a stop washer 69 for a purpose which will appear.

An L-shaped link 47 comprises an arm 48 journaled in spaced ears 49, 49 beneath the forward edge of the seat 14 upon an axis parallel to the axis of the pivot 23, and another arm 50, the flattened, distal end 51 of which carries a projection 52 which may be a simple pin or which, as shown, may carry a roller 53 confined in the guideway 29. It will be obvious that, as the bar 21 moves about its pivotal axis 23, the projection 52 or roller 53 will travel in the guideway 29 and the link 47 will oscillate about the axis of its transverse arm 48. The manner of such travel will be described in detail hereinafter.

Adjacent its proximal end 30, the guideway 29 is formed with a forwardly and distally inclined branch 54 in its upper boundary for a purpose which will appear.

At least the region 55 of the bar 21 distally adjacent the distal end of the guide plate 24 and the region 56 of said bar proximally adjacent the proximal end of said guide plate are axially straight and circular in cross section. An arm rest 57 which may be of the tablet type carries on its lower surface a sleeve 58 which is slidably and oscillably mounted on the region 55 of the bar 21, and carries on its same surface a second sleeve 59 which is slidably and oscillably mounted on the region 56 of the bar 21. As is most clearly illustrated in FIG. 6, the sleeve 58 is formed with a generally U-shaped slot 60 comprising a relatively long, axially extending leg 61, a relatively short, axially extending leg 62 and a peripherally-extending base 63 joining the distal ends of said legs. Said sleeve may be secured to the arm rest 57 by means of screws 64 penetrating openings in the laterally-extending wings 65, 65 of said sleeve; and a headed projection 66 fixedly carried by the bar 21 is confined in said slot 60 to limit the movements of the sleeve 58 relative to the bar 21.

Similar screws 67 penetrating openings in similar wings of the sleeve 59 secure the latter sleeve to the arm rest 57, and an abutment 68 is carried by said sleeve 59.

The slot 60 is so formed that, when the projection 66 is in registry with the slot leg 61, the arm rest 57 will be in the position illustrated in FIG. 1 or FIG. 3; and when said projection is in registry with the slot leg 62, the arm rest will be in the position of FIG. 2, relative

to the bar 21. The distance of the abutment 68 from the proximal end of the slot leg 61 is equal to the distance from the projection 66 to the proximal end of the guide plate 24, when said plate is in its forwardmost position illustrated in FIG. 4.

Operation

When the parts are in the positions of FIGS. 2 and 10, the effect of gravity on the folding arm assembly causes the link 47 and the roller 53 engaged in the branch 54 to exert a force on the plate 24 tending to hold that plate in its forwardmost position in which the nadir 34 is disposed on the distal side of the apex of the head 40. Thus, as the distal end of the bar 21 is raised, the roller 53 leaves the branch 54 and travels almost to the proximal end 30 of the slot 29 before it reverses its direction of travel in said slot, bearing always on the lower boundary of slot 29. As bar 21 passes through a horizontal position, the roller travels down slope 32 into nadir 34, and thus to the left past the apex of head 40, arresting upward travel of the distal end of bar 21. Now, when said bar end is released, it will drop by gravity and roller 53 will be guided first by head surface 42 and then by the surface 71 of slot 29 until it encounters face 70 of stop washer 69 which, as is clearly to be seen in FIG. 8, overlaps the distal end 31 of slot 29 when plate 24 is in its extreme left-hand position.

Downward pressure exerted on the distal end of bar 21 will now force plate 24 downward relative to roller 53; and since stop washer 69 positively prevents further leftward movement of roller 53, such downward movement forces plate 24 to the right by the camming action of slot surface 71 on the roller as said roller moves into the distal end 31 of slot 29. Thus, the nadir 34 is shifted to the proximal side of the apex of head 40, as shown in FIG. 9 so that, if the distal end of bar 21 is now lifted, roller 53 will travel slope 33 into nadir 34, and thus past the head apex so that, if the bar is now released, first head surface 41 and then slot surface 72 will guide roller 53 toward the proximal end 30 of slot 29. Before the slot end 30 is reached, however, the direction of movement of the roller in the slot is reversed, and the roller enters branch 54 to arrest movement of bar 21 before it reaches a vertical position, whereupon gravity acts to shift plate 24 forwardly to move the nadir 34 again to the distal side of the apex of head 40.

If, when the parts are in the positions of FIG. 9, the tablet arm rest 57 is turned into horizontal position so that leg 61 of slot 60 registers with the projection 66, said arm rest may then be shifted forwardly to the position of FIG. 4. During such movement, abutment 68 engages the proximal end of plate 24 to move the nadir 34 again to the distal side of the apex of head 40. If, now, the distal end of bar 21 is raised, either intentionally or inadvertently, as by being struck by a knee of an occupant of the chair, it will be seen that the roller 53 will not be carried rearwardly beyond the head apex because the nadir 34 is held on the distal side thereof; and therefore when the bar end is released the roller 53 will travel again toward the distal end 31 of slot 29. Thus, accidental collapse of the assembly toward folded condition is prevented.

Of course, when it is desired to move the assembly to folded condition, and if the tablet arm rest 57 has been shifted forwardly to the locked position of FIG. 4, it will be necessary first to move said tablet element rearwardly (or to turn it into a vertical plane) thereby removing the abutment 68 from restraining engagement with the plate 24. Now, a slight downward pressure on the distal end of the bar 21 will shift plate 24 rearwardly in the manner above described, whereupon lifting the distal end of bar 21 and then releasing it will cause the parts to move to the positions of FIGS. 2 and 11.

In one embodiment of the invention, the pivot 23 is spaced approximately 9" above the pivot 16; the proximal rivet 25 is spaced approximately 4" along the bar 21

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from the pivot 23; the two rivets 25 are 10 $\frac{1}{4}$ " apart; the guideway 29 measures 10" in a straight line from end 30 to end 31; the slope 32 is 2" long, the slope 33 is 2 $\frac{3}{8}$ " long and they meet each other at an angle of 120°; the slots 27 and 28 are $\frac{1}{2}$ " long; the axis of the link arm 48 is 7" from the pivot 16; and the axis of the roller 53 is 10 $\frac{1}{4}$ " from the axis of link arm 48. When the plate 24 is in its extreme forward position, the distal end of guideway 29 overlaps the proximal face 70 of stop washer 69 by approximately $\frac{1}{8}$ " and the nadir 34 is offset distally by approximately $\frac{1}{8}$ " from the apex of head 40. Point 73 is 1 $\frac{1}{4}$ " from proximal end 30 of slot 29 and about 1" from the proximal limit of movement of roller 53.

With the parts in the positions of FIG. 2, the chair cannot be folded, but it will be seen that an occupant can freely leave the chair and return to it without interference by the tablet arm assembly.

When the parts are in the positions illustrated in FIG. 3, the chair may be folded by lifting the front edge of the seat. During the major portion of such folding seat movement, the projection 52 remains at the distal end of the guideway 29 and the arm 48 of the link 47 turns relative to the ears 49, 49, while the distal end of the arm assembly is somewhat raised. As the seat approaches its fully folded position, the link 47 will begin to turn about the axis of its arm 48 to permit the distal end of the arm assembly to move downwardly, and just before attainment of fully folded condition, the projection 52 begins to move away from the distal end of the guideway 29 until, when the chair and arm assembly reach the condition of FIG. 1, the projection 52 will almost have reached the nadir of the V-dip. At this time, the arm rest 57 and the guide plate 24 will be, and they will remain, in their forwardmost positions relative to the bar 21, although by manual manipulation, the arm rest can be moved to the position which it occupies in FIG. 2.

With the arm rest in position of FIG. 1, of course, the chair cannot be unfolded without first lifting the distal end of the arm rest assembly. However, if the arm rest is turned, from the position of FIG. 1 to the position of FIG. 2, the chair may be unfolded without affecting the arm rest assembly.

We claim as our invention:

1. The combination with a chair having a seat and a back rest extending above said seat, of an independently folding arm rest assembly comprising a bar having one end pivotally supported from said back rest upon a transverse axis above said seat, a guide plate supported from said bar for limited longitudinal movement relative thereto and disposed substantially in a plane substantially perpendicular to said axis, said guide plate being provided with a generally longitudinally-extending guideway shaped to define, near its end remote from said axis, a generally V-shaped dip, the transverse width of said guideway, measured in said plane, being substantially constant except for an enlargement in the region of the nadir of said dip, a rigid link having its lower end pivotally connected to said seat upon a second axis parallel with said first-named axis and having its upper end slidably confined for movement along said guideway, and a substantially V-shaped bridge means fixed relative to said bar and cooperatively associated with said guideway in the widened region thereof, the nadir of said dip being disposed at one side of the apex of said bridge means when said guide plate is at one limit of its movement relative to said bar, and being disposed at the other side of said bridge means apex when said guide plate is at the opposite limit of its movement relative to said bar.

2. The combination of claim 1 in which said guideway is a slot through said guide plate, and said upper link end carries a projection penetrating and confined in said slot.

3. The combination of claim 2 in which the upper boundary of said slot is formed, adjacent the proximal end

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of said guide plate, with a branch inclining upwardly and toward the distal end of said guide plate.

4. The combination of claim 1 in which those regions of said bar distally adjacent the distal end of said guide plate and proximally adjacent the proximal end of said guide plate are axially straight and circular in cross section, an arm rest, a first sleeve fixed to said arm rest and slidably and oscillably mounted on the region of said bar distally adjacent the distal end of said guide plate, said first sleeve being formed with a U-shaped slot therein having a relatively long, axially-extending leg, a relatively short, axially extending leg and a peripherally-extending base joining the distal ends of said legs, a radial projection fixed to said bar and confined in said U-shaped slot, a second sleeve fixed to said arm rest and axially aligned with said first sleeve, said second sleeve being slidably and oscillably mounted on the region of said bar proximally adjacent the proximal end of said guide plate, and abutment means fixed with respect to said arm rest, spaced from the proximal end of said relatively long leg of said U-shaped slot by a distance substantially equal to the distance from said radial projection to the proximal end of said guide plate when said guide plate is at the distal end of its path of movement relative to said bar, and aligned with said guide plate when said radial projection is engaged in said long leg of said slot.

5. The combination of claim 1 in which said guideway is a slot through said guide plate and said upper link end carries a projection penetrating and confined in said slot, stop means fixed relative to said bar in the plane of movement of said projection adjacent the distal end of said guide plate and overlapped by the distal end of said slot when said guide plate is at the distal end of its path of movement.

6. The combination of claim 1, including means resisting movement of said guide plate relative to said bar.

7. The combination of claim 6 in which said movement resisting means is a leaf spring interposed between said bar and said guide plate, fixed relative to one of them and frictionally bearing upon the other.

8. The combination with a chair having a seat and a back extending above said seat, of a folding arm rest assembly comprising a bar having a proximal end pivotally supported from said back upon a transverse axis above said seat, means carried by said bar and providing a guideway elongated in the direction of length of said bar, said guideway having a V-dip adjacent its forward end, said dip being defined by upper and lower boundaries each of which includes oppositely sloping faces disposed in angularly-related intersecting planes, said upper and lower boundaries of said dip being respectively defined upon separate elements relatively movable in the direction of length of said bar between a first position in which the line of intersection of the planes of the sloping faces of said lower boundary is distally offset from the line of intersection of the planes of the sloping faces of said upper boundary and a second position in which the line of intersection of the planes of the sloping faces of said lower boundary is proximally offset from the line of intersection of the planes of the sloping faces of said upper boundary, and link means having one end pivotally mounted upon an axis parallel with said first-named axis and near the front edge of said seat, the other end of said link means being confined to travel in said guideway.

9. The combination of claim 8 including means cooperating with said other end of said link means when said bar is in dependent position automatically to shift said separate elements into said first position.

10. The combination of claim 8 including means cooperating with said other end of said link means when said bar is in substantially horizontal position to shift said separate elements into said second position.

11. The combination of claim 10 including an arm rest mounted on said bar for adjustment about the axis of said bar between a first position in a plane substantially per-

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pendicular with said pivotal axes and a second position in a plane substantially parallel with said axes, and means carried by said arm rest and operable, when said arm rest is in said second position, to shift said separate elements from said second position to said first position.

12. The combination of claim 11 in which said arm rest is mounted for limited axial movement relative to said bar and said means carried by said arm rest is an abutment cooperatively aligned with one of said separate elements only when said arm rest is in its second position.

13. The combination of claim 8 in which said means carried by said bar is a guide plate mounted for limited reciprocation longitudinally of said bar, the lower boundaries of said dip being formed on said plate and the upper boundaries of said dip being formed on an element fixed relative to said bar.

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