

PATENT SPECIFICATION

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(54) IMPROVEMENTS IN OR RELATING TO A CHAIR

(71) We, MOHASCO CORPORATION, a Corporation organized and existing under the laws of the State of New York, United States of America, of 57 Lyons Street, Amsterdam, New York 12010, United States of America, do hereby declare the invention for which we pray that a patent may be granted to us and the method by which it is to be performed to be particularly described in and by the following statement:

This invention relates to a chair of the type in which an assembly comprising a seat, a backrest, armrests, and a legrest incorporates a reclining linkage mechanism having mutually similar left-side and right-side linkages operable to adjust the assembly between an upright configuration in which the legrest is retracted and a reclining configuration in which the legrest is extended and *vice versa*, and the assembly is shiftably mounted on a stationary base. Hereinafter and in the appended claims such a chair is referred to as being 'of the type stated'.

In a chair of the type stated, the purpose in the assembly being shiftably mounted on the base is to permit, where the base is located close to a wall, bodily shifting of the assembly away from the wall so that the backrest does not contact the wall when the assembly is adjusted to a reclining configuration.

According to the present invention, there is provided a chair of the type stated including a base drive linkage means having mutually similar left-side and right-side linkages all disposed generally at the front region of the chair underneath the seat and connected to the said reclining linkage mechanism and to a front portion of the stationary base and adapted and arranged automatically to shift the said assembly respectively forwards and rearwards with respect to the base upon operation of the reclining linkage mechanism to adjust the

assembly to the reclining and the upright configurations.

An embodiment of the invention will now be described, by way of example, with reference to the accompanying drawings in which:

Figure 1 is a side view of a chair embodying the invention, looking from the inside of the chair toward the right side of the chair, and showing the chair in upright position;

Figure 2 is a view similar to *Figure 1* but showing the chair in T.V. inclined position;

Figure 3 is a view similar to *Figure 2* but showing the chair in fully reclined position;

Figure 4 is a partial rear vertical view of the lower right end of the chair; and

Figure 5 is a partial bottom view of the right side of the chair.

Referring now in detail to the drawings, 10 designates a chair embodying the invention, and here shown in the form of a lounge. The chair 10 comprises a chair body or frame 11 having left and right similar, symmetrical arm rests 12, (only the right arm rest is shown). Arm rest 12 (See *Figure 5*) comprises a vertical inner wall 12a, and bottom filler or former 12b connected by a front wall 13 and a rear wall 14. The inner walls 12a are interconnected by a cross rail 15. The frame or body also comprises a front cross-rail 16 which has a sheet metal angle-shaped partial cover 17 covering the front and bottom surfaces of said cross-rail 16.

Arm rests 12 also include top arm members 19, vertical members 20 and front, inclined members 21 in the well known manner. A rear cross-rail 22 reinforces the rear ends of the arm rests.

Fixed to the inner side of the arm rests are horizontal movable tracks 25. The track 25 on the right side of the chair only is shown in *Figure 4*. Said movable track 25 has an upwardly projecting, horizontally-extending vertical flange 25a lying against the inner

side of inner arm rest wall 12a and is fixed thereto by any suitable fasteners, not shown. Extending inwardly from the lower end of flange 25a is a horizontal web 25b provided at its inner end with a short downwardly extending flange 25c. Web 25b is formed with an upwardly extending boss 25d for the purpose hereinafter appearing. A pair of plastics bumper buttons 25e are fixed to flange 25a and have heads 25f projecting inwardly of said flange.

Fixed to the rear end of flange 25a is an axle 26 on which is rotatably mounted a nylon or other low frictional wheel 26a on ball bearings and projecting down to a level above web 25b and inwardly somewhat beyond flange 25c, for the purpose hereinafter appearing.

The chair 10 can be located near a vertical wall (not shown) of the room in which the chair is placed. The chair, as will be explained hereinafter, has a reclining backrest 27, which in the upright position of the chair, may be located close to the wall (not shown).

Resting on the floor F, near the vertical wall (not shown), is a cross board or support 28. Resting on and fixed to the cross board 28 are a pair of parallel horizontal stationary tracks 30. Only the right track 30 will be described and shown, as said tracks are similar, and symmetrically disposed one to the other. The stationary track 30 on the right side of the chair is shown in cross-section in Figure 4 of the drawings. Said track 30 comprises a horizontal flange 30a, the rear end of which lies on the cross board 28. Extending up from the outer end of flange 30a is a vertical web 30b disposed parallel to and spaced inwardly of flange 25c of the movable track. Extending outwardly from the upper end of web 30b is a horizontal web 30c on which the wheel 26a rolls. Wheel 26a contacts web 30c at the bottom of the wheel. Extending up from the outer end of web 30c is a short vertical flange 30d disposed between the wheel 26a and the head 25f of the plastics button 25e. Projecting down from web 30c is a boss 30e placed close to a wheel 31a; and projecting up from web 25b is the boss 25d near wheel 26a. Mounted on web 30b, just below web 30c are plastics bumper buttons 30f, having heads 30g in opposed relation to web 25c of track 25. Mounted on the web 30b, adjacent the front end of track 30 is an axle 31 carrying the wheel 31a which contacts the underside of web 25b and lies between flange 25c and the adjacent part of frame 11. The flanges 30a on both sides of the chair are interconnected in a suitable manner by a cross rail 32 overlapping said flanges.

Hollow, tubular cantilevered feet 35 are fixed to the undersides of the flanges 30a of stationary tracks 30 and project forwardly

thereof in alignment therewith. The front ends of said feet 35 are cut away at a downwardly and rearwardly inclined slant, at their front ends as shown at 36; and buttons 37 are fixed to the undersides of the top wall 35a at the front ends of said feet to contact the floor F to keep the undersides of said feet 35 somewhat above the floor level. The cantilever feet may be made of wood if desired.

The stationary tracks are thus supported at their rear ends by board 28 and at their front ends by buttons 37.

The chair 10 comprises a seat frame 40 comprising parallel side walls 41 interconnected at their front ends by a cross wall 42 and at their rear ends by a cross-wall 43.

Fixed to the inner sides of walls 41 are seat mounting members or seat links 45. Only the seat link and its controlling means on the right side of the chair will be described, because only the right side is shown, and both sides are similar and symmetrically disposed. Seat link 45 has a longitudinal portion 46 having a front end 47. Extending from the rear of portion 46 is an upwardly curved arm 48. Pivoted to the upper end of arm 48 as at pivot 49, is a backrest-mounting member or plate 50 fixed to side walls 51 of the backrest 27. Arms 48 are located forwardly of the rear cross-wall 43 as shown in Figure 3.

Fixed to the top of cross rail 15 at both sides of the chair are armrest-mounting members or plates 55. Only the plate 55 on the right side of the chair will be described. Mounting plate 55 comprises a bottom flange 56 from which a vertical flange 57 extends upwardly in a vertical plane. Pivoted to the mounting plate 55 as at pivot 60 is a short link 61. Pivoted to link 61 as at pivot 62, is a link 63 which extends rearwardly. Pivoted to the rear end of link 63, as at pivot 64, is a link 66. The upper end of link 66 is pivoted to the upper end of arm 48 at the pivot 49.

At the rear end of vertical flange 57 is a downwardly and rearwardly inclined arm 67. Pivoted to the lower end of arm 67, as at pivot 68, is a link 69 which is pivoted to backrest-mounting plate 50, as at pivot 70.

Pivoted to the vertical flange 57 at pivot 71 near the rear end of said flange, is one end of a link 72 which crosses link 63 and is interpivoted thereto as at pivot 73.

Pivoted to the seat link 45 as at pivot 75 is a bellcrank 76. Bellcrank 76 has an upwardly extending arm 76a, the upper end of which carries the pivot 75. Extending forwardly from said arm 76a is an arm 76b. The front end of link 72 is pivoted to arm 76a, as at pivot 77, above the junction of arms 76a and 76b.

Pivoted to a front ear 78 of vertical flange 57 as at pivot 79 is a lock arm 80 formed with

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a slot 81. On arm 76b of bellcrank 76 is a pin 82 slidable in slot 81. At the junction of arms 76a, 76b of bellcrank 76 is a pivot pin 83. Pivoted to a pivot pin 90 on a front ear 47 of the seat link 45, is a link 91. A link 92 is pivoted, at one end, as at pivot 93, to an intermediate portion of link 91. At its other end, link 92 is pivoted to the pivot pin 83 at the junction of arms 76a, 76b of bellcrank 76. Pivoted to the seat link 45 as at pivot 95, between the pivots 90 and 75, is a link 98. Pivoted to the front end of link 98, as at pivot 99, is one end of a link 100. The front end of link 91 is pivoted, as at pivot 101, to an intermediate portion of link 100. A link 102 is pivoted to link 91 as at 103 near pivot 101. Links 100, 102 are pivoted as at 100a, 102a, respectively to a leg rest bracket 104 supporting a leg rest frame 105. The above description of the reclining linkage mechanism beginning with the link 61 and ending with the leg rest bracket 104 is substantially similar to the structure described and shown in US Patent No. 3,550,952, with small modifications, and operates similarly thereto.

In the upright position of the chair 10, as illustrated in Figure 1 of the drawings, the legrest is vertical. The lock arm 80 projects down from pivot 79 and pin 82 is at the upper end of the slot 81.

To go to T.V. inclined position, the occupant holds the arm rests and pushes back on the seat and backrest, causing the seat to tilt up to the position of Figure 2. This action causes bellcrank 76 to swing in a clockwise direction, looking at Figures 1 and 2, to project the legrest. During this motion, link 72 cannot swing up because pin 82 on said bell crank 76 cannot move up, being at the upper end of slot 81. However, lock arm 80 swings in a clockwise direction to its Figure 2 position. When the T.V. Figure 2 position is reached, further pressure will allow link 72 to swing up in a clockwise direction about pivot 71 and allow the seat to move from T.V. position to fully reclined position.

Means is provided to cause the body of the chair and the track 25, to move together longitudinally forwardly relative to the stationary track 30, when going from upright to T.V. position, and then to move said body and movable track 25 further together forwardly, relative to the stationary track 30, when going from T.V. position to fully reclined position.

To this end there is fixed to the upperside of front cross brace 16, a pivot plate or bracket 110 having a downwardly projecting apertured ear 111. Pivoted to ear 111 as on pivot pin 112 is a base drive bellcrank or armrest control link 113. Said bellcrank 113 comprises two parts attached together. One part is part 114 and the other part is part 115

attached fixedly thereto. Part 114 is Z-shaped and comprises an arm 116 projecting vertically downwardly in the upright position of the chair as shown in Figure 1. The lower end of arm 116 is pivoted to the pivot 112. Extending forwardly from the upper end of arm 116 is an intermediate horizontal portion 117 (in the Figure 1 position). Extending vertically upwardly from the forward end of portion 117 is an arm 118. Part 115 may be a straight bar the lower end of which projects below portion 117 and carries a pivot pin 120 for the purpose hereinafter explained. A bracket 119 overlies arm 118 and is riveted thereto and to part 115 by rivets 119a. In the upright position of the chair shown in Figure 1, arm 118 is in vertical position and its upper end is disposed just forwardly of pivot 90 at the front end of the seat link 45. At the upper end of said arm 118 is a pivot pin 121.

Attached to the underside of base front cross rail 32 is a stationary pivot plate 125 provided at its forward end with an upwardly extending ear 126 carrying a pivot pin 127 and having a forwardly extending finger 128. Pivoted to said pin 127 is a base control link or base secondary drive link 129. Said drive link 129 is formed with a pushed-out projection 129c. Extending vertically upwardly (in Figure 1 position) from the upper end of inclined portion 129a of link 129 is a portion 129b, the upper end of which is pivoted to the upper end of arm 118 by said pivot pin 121. As shown in Figure 1, link portion 129b coincides with arm 118 in the Figure 1 position of the chair. Pivoted to said pivot pin 120 is a base primary drive link or actuator link 130. Link 130 comprises a portion 131 inclined upwardly and rearwardly in the upright position of the chair as shown in Figure 1. Extending rearwardly from the upper end of portion 131, in said Figure 1 position, is a portion 132 pivoted as at pivot 133 to arm 76a of bellcrank 76 at a point between pivot 75 and pivot 77. Portion 129a of link 129 has the projection 129c which contacts finger 128 when the chair reaches the fully reclined position.

As the chair is moved from the upright position of Figure 1 to the T.V. position of Figure 2, the top portion 76a of bellcrank 76 rotates rearwardly (clockwise in the drawing) driving base primary drive link 130 rearwardly relative to the frame 11 of the chair.

Base primary drive link 130 drives the portion 117 of part 114 upwardly and rearwardly relative to the frame 11, causing bellcrank 113 to rotate clockwise of the drawing. Arm 118 of bellcrank 113 rotates rearwardly and downwardly relative to the frame 11 and drives base secondary drive link 129 rearwardly relative to the frame 11. Base secondary drive link 129, in turn,

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drives stationary pivot plate 125 rearwardly of the frame 11, thus driving stationary track 30 rearwardly relative to the frame 11; or conversely, the chair frame is moved forwardly relative to the stationary track, because the base drive bellcrank 113 is pivoted at pivot 112 to the front end of the movable track 25.

When the movable track reaches the T.V. position, the front wheel 26a on one side of the chair drops into a small recess in web 30c of the fixed track 30 and wheel 31a on the fixed track enters a small recess 141 at the underside of web 25b of track 25, to releasably hold the chair in T.V. position.

The plastics buttons on opposite sides of the chair prevent the wheels from laterally sliding off the tracks or from striking the flanges 30d and 25c, thus minimizing lateral play of the chair relative to the track base.

The shallow bosses 30e, 25d near the wheels restrict vertical movement of the movable track relative to the stationary track thus minimizing rocking movement of the chair body relative to the stationary track. The plastic buttons 25f, 30g furthermore maintain straight line movement of the movable track, front to rear and vice-versa while preventing any metal to metal contact and noise.

As the chair is moved from T.V. position to fully reclined position, bellcrank 76 moves upward to pull the rear end of base primary drive link 130 upward and the front end of the base primary drive link upward and rearward, thus further rotating base drive bellcrank 113 clockwise on the drawing. This action continues to drive the body of the chair and the movable track 25 further forward until, at the fully reclined position, the pivot pin 121 joining the base drive bellcrank 113 with the base secondary drive link 129 approaches the common center line of the pivot rivet 112 connecting the base drive bellcrank 113 and movable plate 110 and the pivot rivet 127 connecting the base secondary drive link 129 and stationary pivot plate 125. The arm 116 of the base drive bellcrank 113 and the portion 129a of base secondary drive link 129 approach a straight line in their fully extended position as shown in Figure 3. Lug or finger 128 on stationary pivot plate 125 stops secondary drive link 129 by engaging push out projection 129c and preventing link 129 from traveling overcenter and striking the floor.

The "Half-Track" construction disclosed herein provides more freedom of movement to the wheels, since the tracks contact the wheels only at the common points of vertical support. Yet its unique retainer system provides more rigidity to the chair throughout its cycle. By pivoting the rear wheel on the movable track, and the front wheel on

the stationary track, the distance between the wheels in the upright (closed) position is close to the depth of the armrest frame, and is greater than the corresponding distance on previous chairs. This gives the chair greater stability and more adequately supports the front of the chair as the occupant gets in and out of the chair. As the chair approaches recline position, the wheels move closer together, but remain near the center of gravity of the chair and occupant mass. This is sufficient since, in this position, the occupant's mass is relative immobile. A larger wheel can be used on the rear to carry the greater load in this area. This maximizes the life span of the rolling surface, and insures a smoother ride.

In prior art structures, the two wheels ride on top of a horizontal lower surface of a track. We moved the contact surfaces up $1\frac{1}{2}$ ". The contact surface is at the top of the lower wheel at the front end. At the rear end, it is still higher. Since the contact surfaces of the tracks are higher, there is less likelihood of gripping a thick shag carpet, which could stop the body of the chair from moving.

The three front base drive control links 113, 129, 130 herein are inside the hardware of the legrest. This enables putting in stabilizing cross-members 119b to connect brackets 119 on both sides of the chair. If the three control links 113, 129, 130 were on the outside of legrest hardware, then you could not use the stabilizing cross rail 119b.

The primary drive link 130 is connected to the bellcrank 76 which is accessible from the inside of the chair body between the opposite sides.

It will now be understood that the path of the forwardly moving chair frame is controlled by movable tracks 25 resting on and traveling across front wheels 31a, the axles of which are mounted on the stationary tracks 30, and by rear wheels 26a, the axles of which are mounted on the movable tracks 25 and roll along the stationary tracks 30. Means on the tracks is provided for preventing the wheels from sliding laterally off the tracks. Bumper buttons projecting from the tracks minimize lateral play of the chair body. Means 30c, 25d is provided, on the tracks, near the wheels, to restrict vertical movement of the movable tracks relative to the stationary tracks thus minimizing rocking motion of the chair body. The plastics buttons on the tracks maintain straight line movement of the movable tracks front to rear and vice-versa while preventing metal-to-metal contact and consequent noise. An adjustable front foot assures forward stability when the chair is in the forward fully reclined position, regardless of weight distribution due to styling. The distance between the wheels reduces as the chair body moves

forwardly, but remains substantially under or near the center of gravity of the occupant and chair body mass. The contact surfaces of the wheels is raised up above the floor to prevent gripping a thick shag carpet. The front base drive control links 113, 129, 130 for moving the arm rest, are inside the legrest projecting hardware, thus enabling use of stabilizing cross-rails 119b. The base drive control links 113, 129, 130 are connected to parts of the linkage mechanism, which are accessible from the inside of the chair between the arm rests.

WHAT WE CLAIM IS:-

1. A chair of the type stated, including a base drive linkage means having mutually similar left-side and right-side linkages all disposed generally at the front region of the chair underneath the seat and connected to the said reclining linkage mechanism and to a front portion of the stationary base and adapted and arranged automatically to shift the said assembly respectively forwards and rearwards with respect to the base upon operation of the reclining linkage mechanism to adjust the assembly to the reclining and the upright configurations.

2. A chair according to claim 1, wherein each base drive linkage includes a base control link having one end operatively connected to the base, an armrest control link having one end operatively connected to the associated armrest and an opposite end operatively connected to the other end of the base control link, and an actuator link having one end operatively connected to the associated reclining linkage and an opposite end operatively connected to the said armrest control link, said actuator link being operative to change the angular relationship between the base control link and the armrest control link during operation of the reclining linkage mechanism thereby to move the said assembly relative to the base.

3. A chair according to claim 2, including means interconnecting the armrests and comprising an armrest cross-rail extending transversely underneath the seat between the armrests at a lower front region of the chair, and said armrest control link is operatively connected to said armrest cross-rail.

4. A chair according to claim 3, wherein said armrest control link is operatively connected to the armrest cross-rail rearwardly of the latter, and said actuator link is operatively connected to said armrest control link forwardly of the armrest cross-rail with the assembly in the upright configuration.

5. A chair according to claim 4, comprising a reinforcement bracket mounted on said armrest cross-rail, and said armrest control link is pivotally connected to said reinforcement bracket.

6. A chair according to claim 2, including a first pair of (movable) tracks each mounted on a respective armrest, and said base includes a second pair of (stationary) tracks each mounted on opposite sides of the chair in engagement with a respective movable track, and each base control link is operatively connected to a forward region of a respective one of the stationary tracks.

7. A chair according to claim 1, wherein each base drive linkage is located inwardly of the associated reclining linkage, and comprising stabilizing means interconnecting the base drive linkages, said stabilizing means comprising a cross-rail extending transversely underneath the seat between the base drive linkages.

8. A chair according to claim 1, comprising stop means on said base drive linkage means for limiting adjustment of the assembly at the fully reclined configuration.

9. A chair according to claim 1, including a first pair of (movable) tracks each mounted on a respective armrest, and said base includes a second pair of (stationary) tracks each mounted on opposite sides of the chair in engagement with a respective movable track, and rolling means mounted intermediate the movable and stationary tracks for engaging the latter in rolling contact during forward and rearward movement of the assembly.

10. A chair according to claim 9, comprising means on the movable and stationary tracks to limit sidewise movement of the tracks relative to each other.

11. A chair according to claim 9, comprising means on the movable and stationary tracks to minimise rocking movement of the tracks relative to each other.

12. A chair substantially as hereinbefore described with reference to and as shown in the accompanying drawings.

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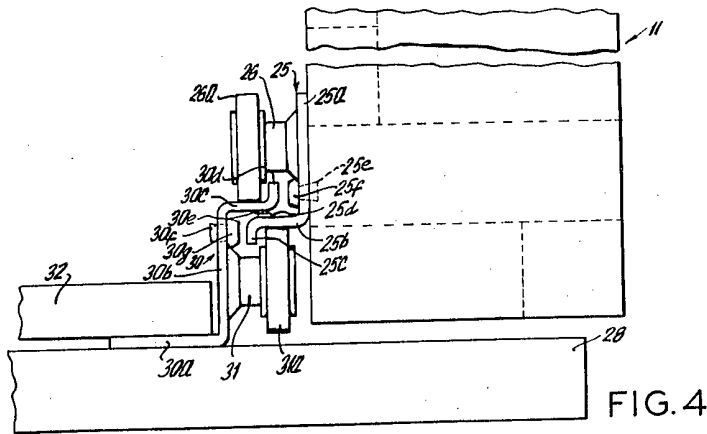
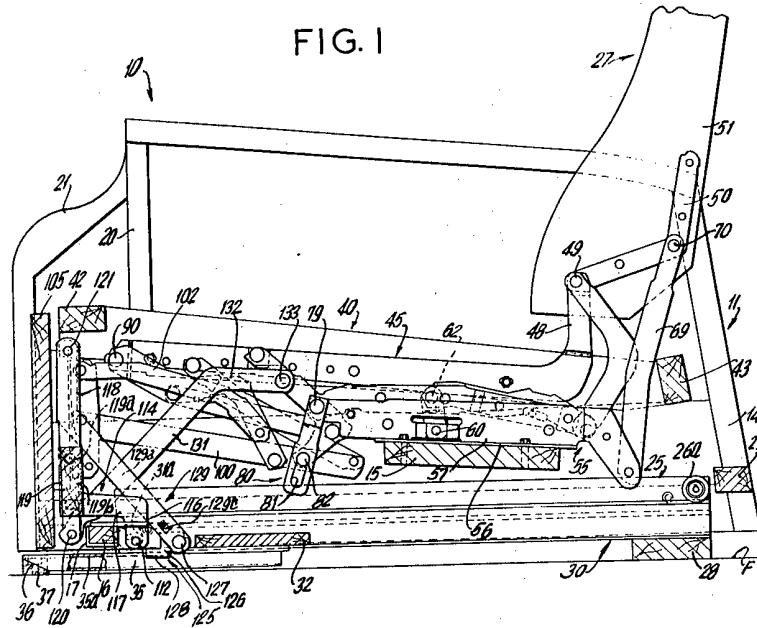
Agents for the Applicants.

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COMPLETE SPECIFICATION

4 SHEETS

This drawing is a reproduction of
the Original on a reduced scale
Sheet 1



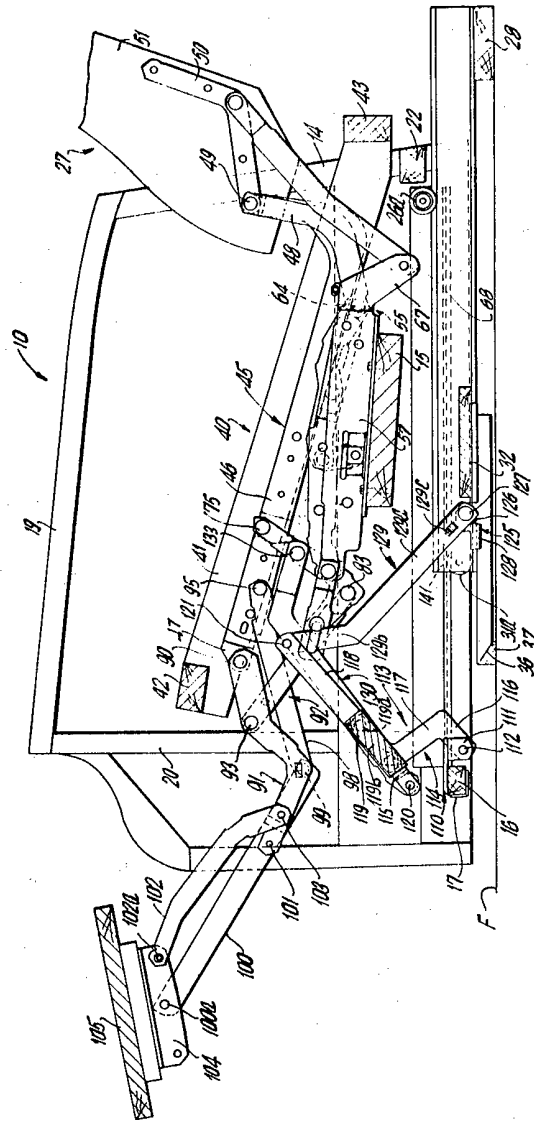


FIG. 2

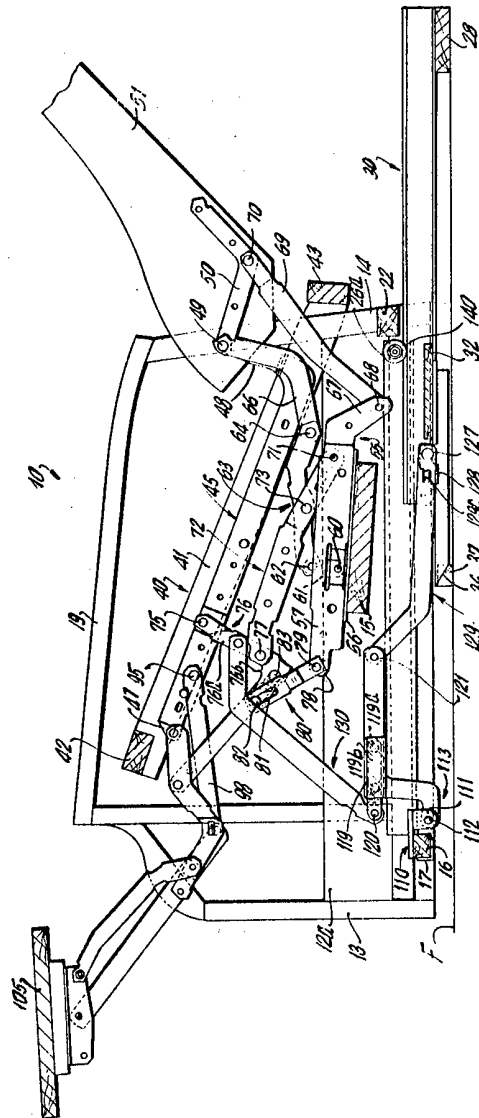


FIG. 3

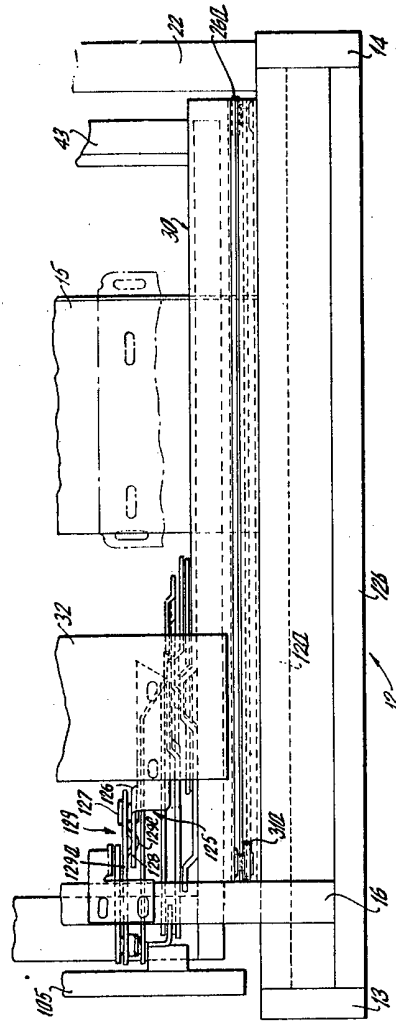


FIG. 5