

- [54] **FOOTREST MECHANISM**
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- [21] Appl. No.: **152,256**
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- [51] Int. Cl. A47c 1/02
- [58] Field of Search 297/40, 83, 84, 85, 86, 87, 297/75, 74, DIG. 7

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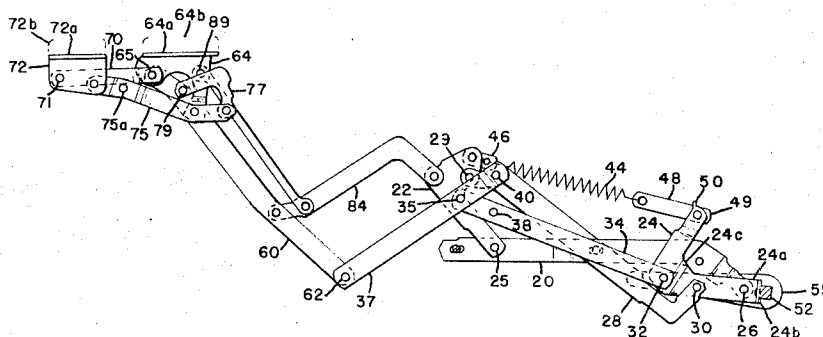
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[57] **ABSTRACT**

A footrest mechanism having primary and secondary footrest members. The primary footrest and secondary footrest have a nested position and an extended position and are so constructed and operated that the secondary footrest member slides out under the primary footrest when being moved to its extended position. The mechanism also has an overload safety feature to prevent deformation of its structural members in the event of excessive force being applied to the footrest when in its extended position.

3 Claims, 11 Drawing Figures



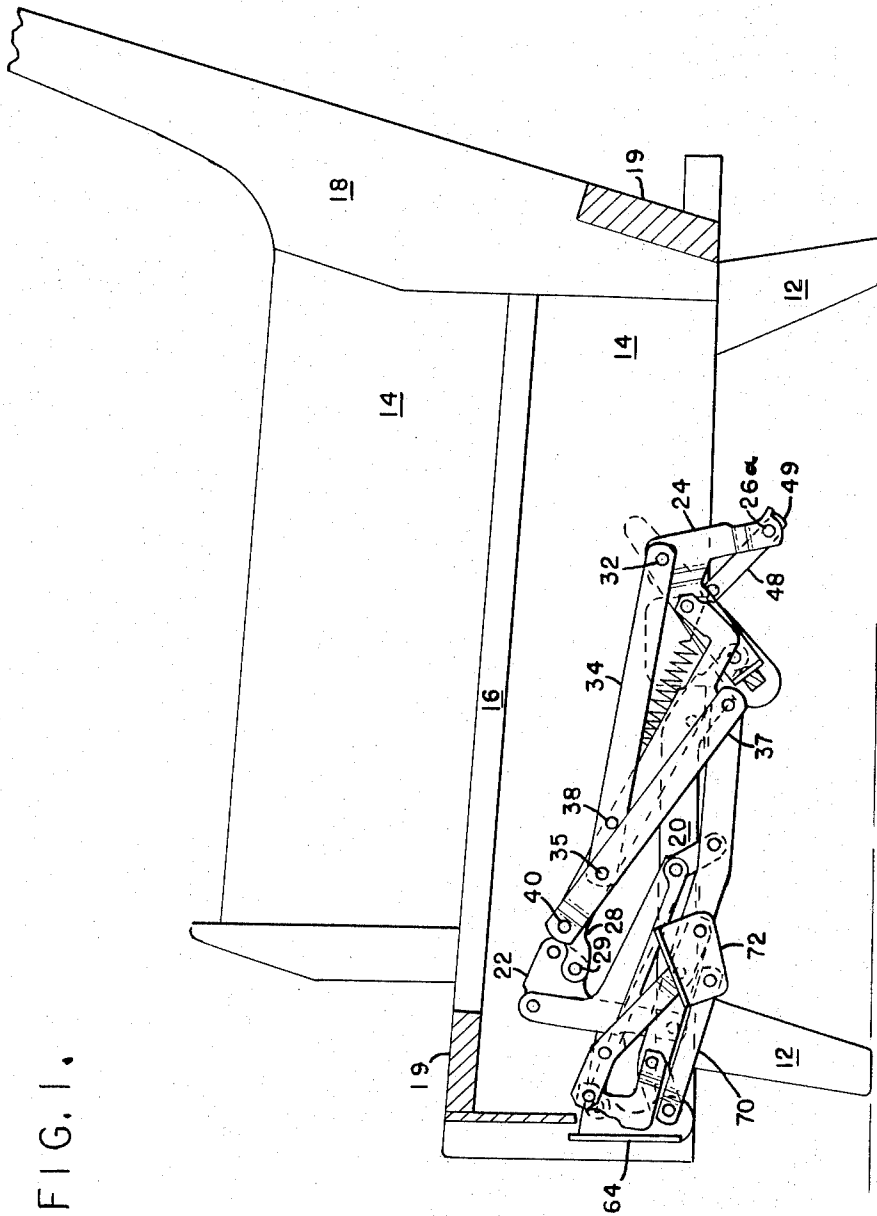


FIG. 1.

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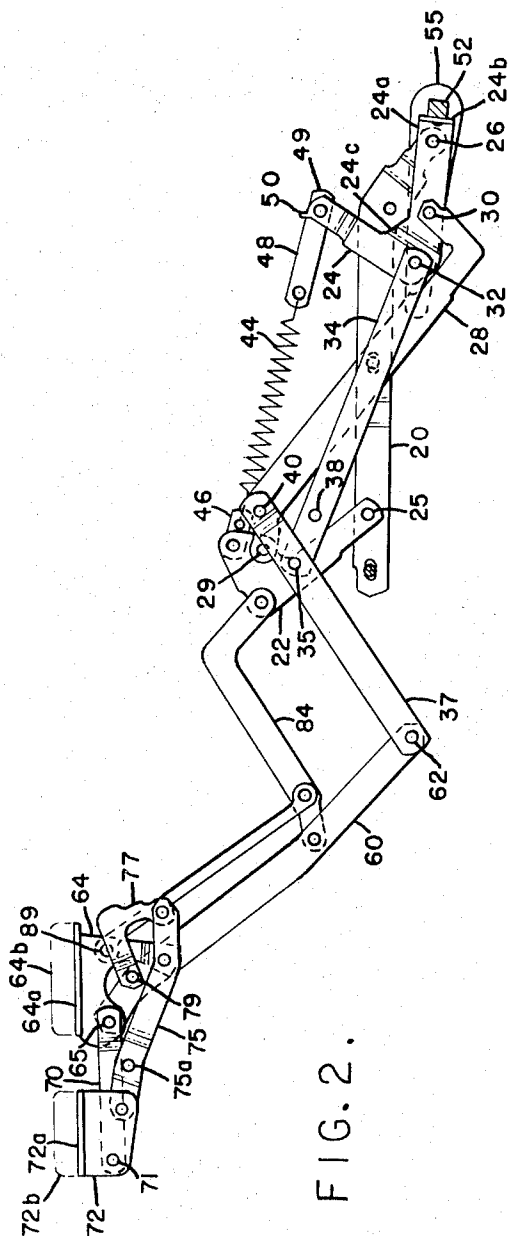


FIG. 2.

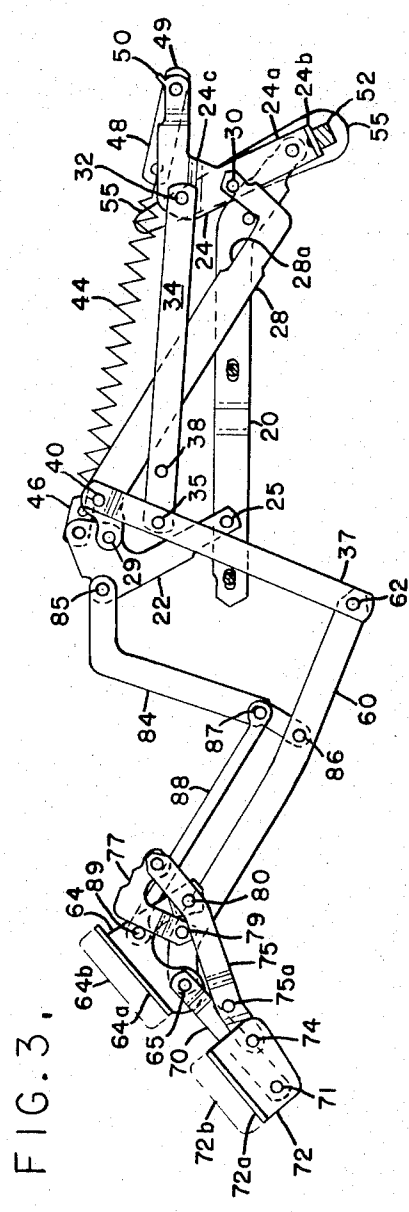


FIG. 3.

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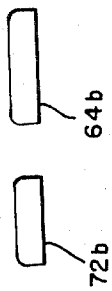


FIG. 4h.

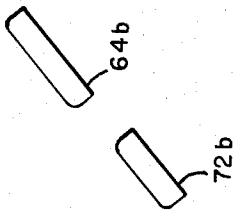


FIG. 4g.

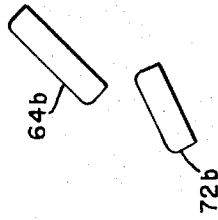


FIG. 4f.

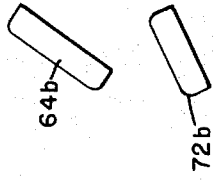


FIG. 4e.

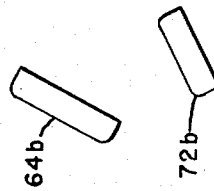


FIG. 4d.

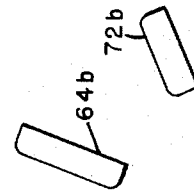


FIG. 4c.

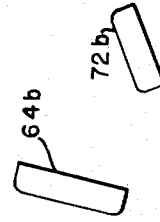


FIG. 4b.

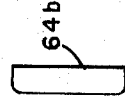


FIG. 4a.

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FOOTREST MECHANISM

This invention relates to articles of furniture and more particularly to such articles provided with a footrest assembly which occupies a normally inoperative or nested position wherein the footrest is nested in close proximity to the lower front portion of the chair and which can be raised to an extended or operative position wherein the footrest is positioned in a raised position forward of the chair to support the feet or legs of an occupant seated in the chair.

The footrest assembly of the present invention is adapted for use with chairs of non-reclining type and with chairs of the reclining type. In the present embodiment I show it in connection with a non-reclining chair, i.e., a chair of the type commonly referred to as a club chair.

In previous constructions involving a leg rest and linkage for raising it, the links and levers used have extended a considerably distance below the seat level, frequently almost to the floor, and have necessitated the use of a stationary base closed in all the way to the floor so as to conceal the linkage. It is an object of the present invention to provide a leg rest operating linkage which is located as close to the seat level and as far above the floor as possible so as to enable the article of furniture to be built with an open base. This permits the article to present the appearance of an ordinary article of furniture supported upon legs and open underneath so as to provide a stylish and airy appearance. Other objects are to improve the construction and general efficiency of reclining articles of furniture. For example, as will become apparent from the following disclosure, the instant invention has a locking means to lock the footrest in its extended position so that the normal downward force applied to the footrest by the legs or feet of an occupant seated in the chair will not collapse the footrest. As desirable as such a lock may be, it will be realized that such could be detrimental should the lock be such that it would block collapsing movement of the footrest regardless of the downward force applied. Thus, a further object of this invention is the provision of a footrest structure having a locking means to block collapsing movement of the footrest during normal usage, but which locking means is releasable under unusual conditions to prevent damage to the footrest assembly.

The above objects as well as other objects and advantages of the invention will become readily apparent from the following description taken in connection with the accompanying drawing wherein:

FIG. 1 is a side elevation view of the mechanism, carried at the right hand sitting side of the chair, in its nested position.

FIG. 2 is a view similar to FIG. 1 but showing the footrest assembly only, in its fully extended position.

FIG. 3 is a view similar to FIG. 2 showing the footrest assembly in a position intermediate its FIG. 1 and FIG. 2 positions.

FIGS. 4a through 4h are views showing the relative motion of the primary and secondary footrests in their progression from their nested position to their fully extended position. In FIG. 4a the footrests are nested while in FIG. 4h they are fully extended, with FIGS. 4b through 4g showing successive intermediate positions.

In the description and illustrations that follow, I show and describe what is referred to as the right hand sitting side of the chair, and its associated mechanism. Those familiar with the art to which this invention pertains will recognize that when I speak of the right hand sitting side I mean that side of the chair which is at the right side of an occupant sitting in the chair.

As is common in disclosures of this type, I have shown the mechanism carried on the inside of the right hand sitting side frame member, it being understood that a linkage assembly similar to that shown in the drawings will be carried on the left hand sitting side frame member. The left side mechanism is substantially the same as the right side mechanism, but modified to the extent necessary for left side mounting, as is well known in the art. Further, it may be found that certain elements found in the right side mechanism can be eliminated on the left side mechanism. For example, the instant disclosure shows a handle as being connected to the right side mechanism but it is not common to equip the left side mechanism with such a handle.

The chair illustrated in FIG. 1 includes a pair of leg supported side frame members such as a right side frame member 14 and a left side frame member, not shown, with conventional seat and back members 16 and 18. The side frame members are interconnected by cross frame members 19 all as well known in the art and the chair, as well as the footrest members hereinafter described, may be suitably upholstered as desired.

Secured to the right side frame member 14 is a main mounting bracket 20. The main mounting bracket 20 carries a front support link 22 and a torque link 24 on pivot members 25 and 26, respectively. Interconnected between the support link 22 and the torque link 24 is a control link 28, which control link 28 is connected to the support link 22 by means of a first pivot member 29 and to the torque link 24 by a second pivot in the same vertical plane as an offset portion 24c of the torque link 24. The portion 24c is offset towards the left hand sitting side of the chair.

The torque link 24 is a V-shaped link and, at its apex, carries, on a pivot member 32, a forwardly extending actuator link 34. The actuator link, in turn, is pivotally connected at its forward end, by means of a pivot member 35, to a carrier link 37. The carrier link 37 is further pivotally connected to the aforementioned control link 28 by a pivot member 40.

A stop pin 38 is secured to the actuator link 34 intermediate its ends, and, as shown, the stop pin 38 abuts the carrier link 37 when the mechanism is in the position of FIG. 1. A spring member 44 is connected between the support link 22 and the torque link 24 through a pair of spring links 46 and 48 pivotally mounted on the links 22 and 24, respectively. The rear spring link 48 has an end portion 49 turned inwardly to lie in the path of travel of and cooperate, in a manner hereinafter described, with a lip 50 formed at one end of the torque link 24.

The V-shaped torque link 24 has arms of unequal length and the end portion 24b of the longer of these arms, 24a, is turned inwardly toward the inside of the chair. This inwardly turned extension 24b is fixedly secured to a shaft 52 which extends athwart the chair assembly and which is operatively connected to a left side linkage assembly torque member (not shown) in a manner that will be readily apparent to those skilled in

the art. The shaft 52 extends through a suitably formed aperture in the right side frame member 14 and, at its outer end, the shaft 52 fixedly carries a handle member 55.

The above described structure carries a dual footrest assembly, as hereinafter described.

An extension link 60 is pivotally connected to the aforementioned carrier link 37 by a pivot member 62. The extension link 60 extends toward the front of the chair, leftwardly in the drawings, and at its forward end pivotally carries a primary footrest bracket 64. The primary footrest bracket 64 is connected to the extension link 60 by a pivot member 65. This footrest bracket 64 is somewhat L-shaped and has an inwardly turned flange portion 64a.

Also carried on the pivot member 65 is a secondary footrest control link 70, one end of which is pivotally attached by a pivot member 71 to a secondary footrest bracket 72, which bracket 72 has a flange portion 72a similar to the aforementioned flange 64a. Each footrest bracket 64 and 72 supports a footrest member 64b and 72b, respectively. These footrest members 64b and 72b have been omitted from FIG. 1 for the sake of clarity.

Pivotally connected to the bracket 72 by a pivot member 74 is a secondary footrest carrier link 75. This latter link 75 is, in turn, pivotally connected at its end remote from the pivot 74 to a secondary footrest drive link 77. The drive link is L-shaped and has an arm pivoted to the aforementioned extension link 60 by a pivot member 79.

A pivot member 80 pivotally connects one arm of the primary footrest bracket 64 to the secondary footrest carrier link 75 at a point intermediate the ends of the latter link. A stop pin 75a is fixed to the link 75 in such a position that it closely underlies or abuts the link 70 when the footrest assembly is in the FIG. 2 position.

An idler link 84 is connected by pivots 85 and 86 to the front support link 22 and the actuator link 60, respectively, and intermediate its ends the idler link 84 is pivotally connected, by a pivot member 87, to one end of a footrest rotating link 88. The other end of the footrest rotating link 88 is connected by a pivot member 89 to the primary ottoman bracket 64.

The operation of the above described mechanism is now described.

FIG. 1 shows the primary and secondary footrests in their nested or at home position while FIG. 2 shows them in their fully extended position.

When it is desired to extend the footrests from their FIG. 1 position to their FIG. 2 position, an occupant seated in the chair grasps the handle 55 and rotates it, counterclockwise in the drawings. Such action causes the shaft 52 to similarly rotate and, since the torque link 24 is fixed to the shaft 55, the torque link 24 will rotate counterclockwise about its pivoted connection 26 to the main mounting bracket 20, thereby thrusting the actuator link 34 in a direction toward the front of the chair to cause the carrier link 37 to rotate in a clockwise direction about its pivotal connection 40 to the control link 28. The above described counterclockwise movement of the torque link 24 also imparts to the control link 28 a generally leftward motion, such latter motion, because of continued rotation of the torque link 26 about its pivot 26, causing the right end of the control link 28 to eventually move also downwardly. Thus, as the actuator link 34 and control link 28 move as above described, the support link 22 is moved in a

counterclockwise direction about its pivotal connection 25 to the main mounting bracket 20, due to its connection with the control link 28 by the pivot member 29.

The spring member 44 is utilized to assist in moving the mechanism from its nested position to its extended position by imparting a counterclockwise rotational force to the torque link 24 after the pivotal connector 26a securing the rear spring link to the torque link 24 moves away from its FIG. 1 position.

Counterclockwise movement of the torque link 24 continues until the offset portion 24c of the torque link 24 travels a distance sufficient to abut the surface 28a of the control link 28, whereupon further counterclockwise movement of the torque link 24 is blocked. Such is the position shown in FIG. 2.

As the above described motion of the torque link 24 in a counterclockwise direction from its FIG. 1 to its FIG. 2 position reaches its final extent, the pivot member 32 passes over center of, i.e., below, an axis drawn through the pivot members 30 and 35, and such relative position of these three pivot members results in the mechanism being locked in its FIG. 2 position against collapsing movement by a downward force on the footrest, except as hereinafter described through the well known over center lock principal.

While the actuator link 34 and the control link 28 move as hereinbefore described toward their FIG. 2 position, the support link 22 rotates counterclockwise and 65 carrier link 37 continues its movement in a clockwise position about its pivotal connection 40, while the pivotal member 40 moves generally leftwardly with the control link 28. Such movement of the carrier link 37 thrusts the extension link 60 forwardly and upwardly to elevate the primary footrest bracket 64 and its footrest 64b to their FIG. 2 position. As this motion occurs, the footrest rotating link 88 due to its connection between the idler link 84 and the primary footrest bracket 64 causes the bracket 64 to rotate in a clockwise direction about its pivotal connection 65 to the extension link 60 to thereby cause the secondary footrest drive link 77 and the secondary footrest carrier link 75 to rotate in a clockwise direction about their pivots 79 and 80, respectively, to thereby move the secondary footrest bracket 72 and its footrest 72b from their FIG. 1 position to their FIG. 2 position under control of the secondary footrest control link 70 which moves in a clockwise position about its pivotal connection 65 to the primary footrest bracket 64, until such motion is limited by the previously described engagement of the offset portion 24c of the torque link 24 with the surface 28a of the control link 28.

The relative motion of the primary and secondary footrest members 64b and 72b is illustrated in FIGS. 4a through 4h where it can clearly be seen that the secondary footrest 72b is thrust or slid outwardly from its FIG. 1 position to clear the primary footrest 64b, whereupon it is raised to its FIG. 2 position. FIG. 4a shows the footrest members 64b and 72b in their nested positions while FIGS. 4b through 4h show these members in successive stages of their travel to the elevated position of FIG. 4h.

The stop pin 75a carried on the secondary footrest carrier link 75 closely underlies the control link 70 to limit downward movement of the secondary footrest 72b should such movement tend to occur when down-

ward force is applied to the footrest 72b by the legs of an occupant seated in the chair.

As above described, the mechanism is locked in the FIG. 2 position by the over center locking means herebefore described. It will be apparent to those skilled in the art that such a locking means is most desirable to prevent the footrest assembly from sagging or collapsing unexpectedly, yet it is also highly desirable that the mechanism not be so securely locked that an excessive downward force applied to the footrest will cause the linkage assembly to be bent out of shape.

In the instant mechanism I have found that a strong force exerted downwardly on the footrest assembly, when it is in its FIG. 2 position, will release the over center locking means. Such a force will flex the actuator link 34 a sufficient amount, without permanently deforming such link, to move the pivot member 35 downwardly, thereby moving the common axis connecting the pivot members 35 and 30 below the pivot member 32 to release the over center lock.

To return the footrest assembly from its FIG. 2 extended position to its FIG. 1 nested position, the procedure is the reverse of that above described. That is, the handle 55 is rotated in a clockwise direction to first rotate the shaft 52 in a similar direction to release the over center lock means and thence rotate the torque link 24 fully clockwise direction until the upper surface of the carrier link 37 abuts the stop pin 38, at which time the footrest assembly is fully rested in its FIG. 1 position. As the torque link 24 moves toward its nested position, I have found it to be desirable to reduce the opening force exerted on the torque link by the spring assembly 44, 46, 48 and this is accomplished by the action of the lip 50 formed on the torque link 24 engaging the inwardly turned portion 49 of the spring link 48 to interrupt the straight line orientation of the spring 44 and the spring link 48.

From the foregoing illustrative embodiment of this invention, it will be appreciated that in accordance with the present invention an improved article of furniture with a footrest structure and control arrangement is provided.

A latitude of modifications, change and substitution is intended in the foregoing disclosure and accordingly the appended claims should be construed broadly and in a manner consistent with the spirit and scope of the

invention. In some instances, some features of the invention will be used without a corresponding use of other features.

Having thus described my invention, what I claim is:

5 1. A footrest assembly for use with a chair comprising leg supporting means having primary and secondary footrest members carried on said chair in a first nested position wherein said primary footrest member lies closely adjacent the front of the chair and said secondary footrest member is in nested position underneath said chair with its leg supporting surface facing upwardly, moving means operatively connected to said footrest members to move said members from said first position to a second position to position said footrest members in an extended position forward of said chair, said moving means operable to move said footrest members forwardly and upwardly, to position said primary footrest member intermediate said secondary footrest member and a seat portion of said chair while maintaining said leg supporting surface facing upwardly when moving said members from said first position to said second position, said moving means including means to lock said leg supporting means in said second position, said locking means being releasable by a downward force exerted on said leg supporting means, a control link for controlling movement of said leg supporting means, a movable extension link pivotally associated with both said footrest members, and a drive link indirectly pivotally connected to both said footrest members and pivotally connected to said extension link, an idler link, and a rotating link interconnecting said idler link and said primary footrest member, said idler link pivotally associated with said extension link and said control link, said moving means also including a torque link pivotally interconnected to said chair, a flexible actuator link, said torque link being movable to move said actuator link and control link to move and control movement of said supporting means.

2. The invention of claim 1 wherein said control link and torque link cooperate to limit movement of said leg supporting means.

3. The invention of claim 2 wherein said control link and said idler link are interconnected by a support link pivotally connected to said chair.

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