June 28, 1960 F. D. HOFFMAN, JR 2,942,650

RECLINING CHAIR WITH FRICTIONAL RESISTANCE ADJUSTMENT

Filed March 19, 1956

Fig 1.

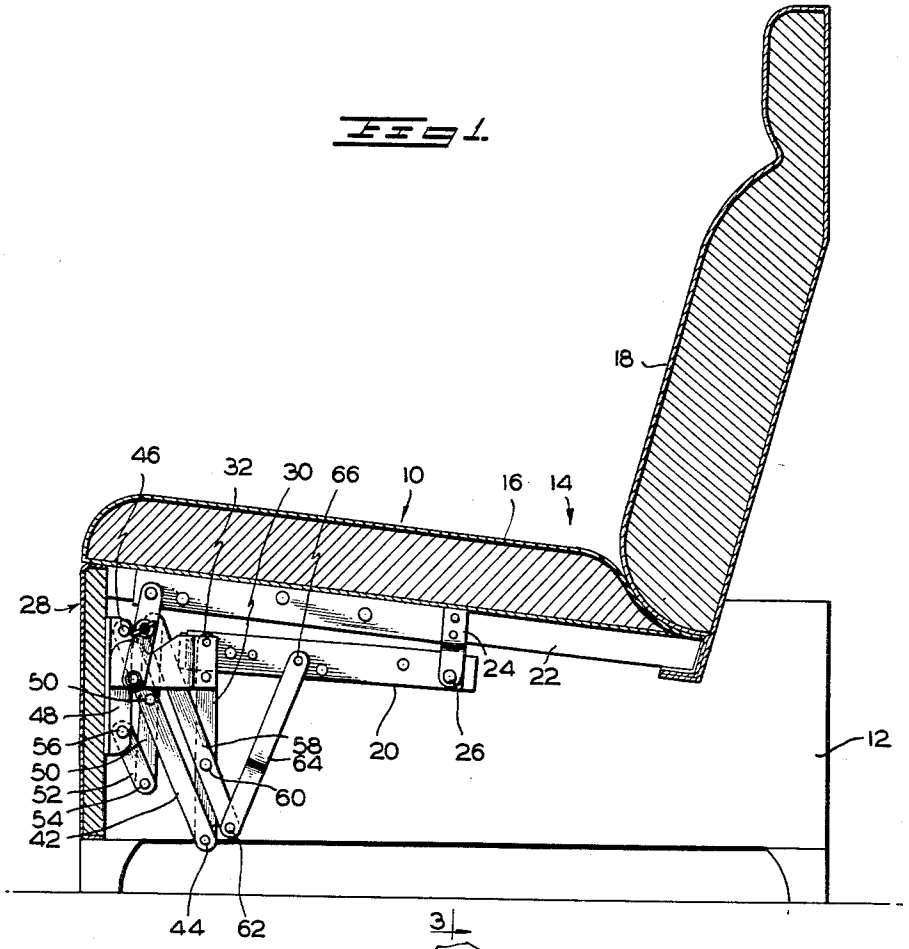



Fig 3.

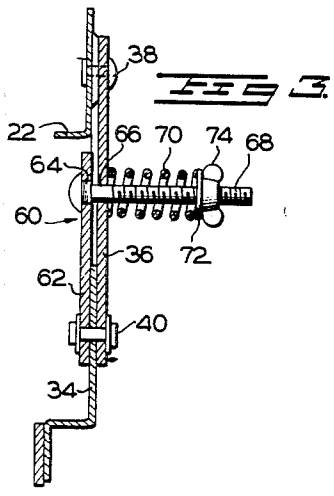
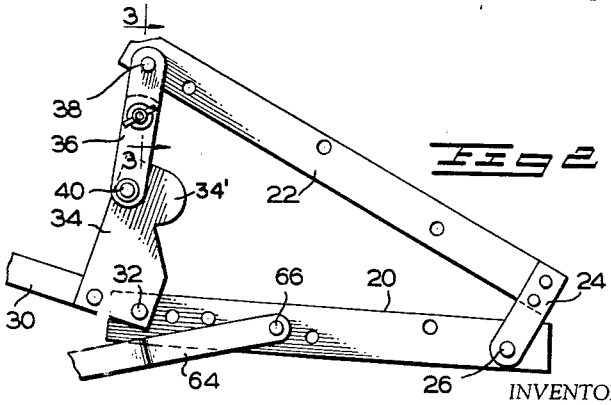



Fig 2.




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United States Patent Office 2,942,650 Patented June 28, 1960



2,942,650

# RECLINING CHAIR WITH FRICTIONAL RESISTANCE ADJUSTMENT

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Filed Mar. 19, 1956, Ser. No. 572,346

1 Claim. (Cl. 155—106)

This invention relates to reclining chairs, and more particularly to reclining chairs having leg rests whose movement is coordinated with the movement of the chair into reclining position.

Many types of reclining chairs have been developed in which a reclining member such as a seat, back, or seat-back member is moved with respect to a stationary frame structure into a reclining position. Many of these chairs include a leg rest member which is moved upwardly as the reclining member is moved into reclining position. In such chairs, the movement of the reclining member into reclining position requires the application of a predetermined force, this force usually being supplied at least in part by the weight of the occupant of the chair. Since the weight of persons using the chair is a variable factor, the ease with which the reclining members are moved into reclining position in chairs of the prior art varies in accordance with the individuals using the chair. Thus, in using reclining chairs of the prior art, a person of light weight may find it more difficult to move the reclining members, including the leg rest, to reclining position than a person of heavier weight.

Accordingly, it is an object of this invention to provide a reclining chair including means for adjusting the force required to move the chair mechanism into reclining position.

It is still another object of this invention to provide a reclining chair construction which permits adjusting the operating force required to move a reclining chair into reclining position in accordance with the requirements and desires of different individuals, as well as to accommodate the chair mechanism to persons of different weights.

In achievement of these objects, there is provided in accordance with an embodiment of this invention, a reclining chair including a seat-back member which is movable with respect to a stationary framework and a leg rest member which is connected by a linkage to the seat-back member in such manner that movement of the seat-back member to reclining position causes movement of the leg rest upwardly and forwardly of the chair. The operating linkage interposed between the movable seat-back member and the leg rest includes a pair of pivotally connected links whose resistance to movement is controlled by a resistance adjusting device engaging these links. By suitably adjusting the frictional resistance adjusting device, the force required to move the chair to reclining position may be adjusted in accordance with the requirements or desires of the occupant of the chair.

Further objects and advantages of the invention will become apparent from the following description taken in conjunction with the accompanying drawing in which:

Fig. 1 is a view in vertical section of a reclining chair mechanism incorporating an embodiment of the invention;

Fig. 2 is an enlarged side elevation view of a portion of the operating linkage of the chair including the frictional resistance adjusting device of the invention; and



Fig. 3 is a view in enlarged vertical section taken along line 3—3 of Fig. 2.

Referring now to the drawing, there is shown a reclining chair generally indicated at **10** including a stationary supporting framework **12** and a unitary seat-back structure **14** which includes a seat **16** and a back **18**. In the embodiment shown, the seat and back are rigidly connected together and move as a unit. A substantially horizontally extending metal bracket member **20** is rigidly attached to stationary supporting framework **12** intermediate the height of the supporting framework and extends lengthwise or in a front-rear dimension of the chair. A second metal bracket member **22** is rigidly secured to the lower edge of seat **16**.

Seat-back structure **14** is pivotally supported for movement about stationary framework **12** by means of a link member **24** which is rigidly attached at one of its ends to metal bracket member **22**, and thus to the seat-back structure. The opposite or lower end of link member **24** is pivotally connected to metal bracket member **20** on stationary framework **12** by a pin **26**.

A leg rest member **28** is positioned at the forward end of the chair and is connected to the seat-back structure **14** by a linkage system similar to that shown in my prior Patent No. 2,693,845, issued November 9, 1954, and assigned to the same assignee as the present application. This linkage system includes a lever member **30** which is pivotally connected at point **32** to the forward end of bracket member **20**. A crank arm **34** is rigidly secured to lever **30** in the region of pivot **32** and extends substantially perpendicularly from lever **30**. The combination of crank arm **34** with lever **30** constitutes in effect a bell crank.

The movement of seat-back structure **14** is transmitted to lever **30** by an actuating link member **36** which is pivotally connected at point **38** to the forward portion of bracket member **22** connected to seat-back structure **14**. The opposite end of link **36** is pivotally connected at point **40** to crank arm or link **34** in spaced relation to the pivotal axis **32** of lever **30**.

A level member **42** is pivotally connected at **44** to the outer end of lever **30**. The opposite end of lever **42** is pivotally connected at **46** at the inner end of a bracket member **48** secured to the under-surface of leg rest **28**. A lever member **50** is pivotally connected at **51** to lever **42** intermediate its own length and also intermediate the length of lever **42**. A link **52** is pivotally connected to the outer end of link **50** at point **54** and to the forward end of leg rest bracket **48** at point **56**. A lever **58** is pivotally connected at point **60** to lever **30** intermediate its own length and also intermediate the length of lever **30**. One end of lever **58** is pivotally connected to an end of lever **50** opposite the end of lever **50** connected to link **52**. The opposite end of lever **58** projects beyond lever **30** and is pivotally connected at point **62** to an end of a guide link **64**. The opposite end of guide link **64** is pivotally connected at point **66** to bracket **20** on stationary framework **12**.

The linkage system just described causes the leg rest to move upwardly and forwardly to an elevated position upon movement of the seat-back structure **14** to reclining position, as described and shown in my aforementioned prior Patent No. 2,693,845.

In accordance with this invention, the force required to move the seat-back **14** and the connected leg rest **28** to reclining position is controlled by a frictional resistance adjusting means generally indicated at **60**. The frictional resistance adjusting means **60** provides a variable frictional resistance to movement at the pivotal connection **40** between actuating link **36** and crank arm **34** and includes an arm member **62** which is pivotally mounted on the same pivot **40** which connects link **36** to crank arm

34. Arm 62 is disposed adjacent an opposite surface of crank 34 than that which link 36 faces. Thus, as best seen in Fig. 3 crank arm 34 is in effect "sandwiched" between link 36 and arm 62.

The upper end of arm 62 has an aperture 64 which aligns with a similar aperture 66 in link 36, and a screw 68 passes through aligned apertures 64 and 66. A spring-biasing device in the form of a spiral spring member 70 is disposed coaxially about screw member 68. The inner end of spring 70 bears against the surface of link 36 while the opposite end of spring 70 bears against a washer 72 which, in turn, bears against a butterfly nut 74 which is in threaded engagement with screw 68.

It can be seen that by adjusting the position of butterfly nut 74 along screw 68, the pressure of spring 70 can be adjusted, the amount of pressure of spring 70 in turn controlling the friction exerted by by arm 62 and link 36 on crank arm 34. The frictional pressure of arm 62 and link 36 on crank arm 34 in turn controls the resistance to movement of the reclining members including seat-back structure 14 and leg rest 28, relative to the stationary supporting framework 12, and of the linkage connecting these members. By moving butterfly nut 74 inwardly along screw 68 toward link 36, the frictional force exerted by link 36 and arm 62 on crank arm 34 is increased, thereby requiring more force to move the chair to reclining position. Conversely, a movement of butterfly nut 74 along screw 68 away from link 36 decreases the pressure of spring 70 and decreases the frictional force of link 36 and arm 62 on crank arm 34, thereby reducing the force necessary to move the reclining members to reclining position. Crank arm 34 is formed, as best seen in Fig. 2, with an enlarged portion 34' adjacent pivot 40 in order that a relatively large frictional bearing area on arm 34 is located between link 36 and arm 62 throughout the operative range of relative pivotal movement between arm 34 and link 36. It can be seen, therefore, that the frictional resistance adjusting device 60 provides a means of adjusting the force required to move the chair to reclining position so as to accommodate the individual requirements or desires of different occupants of the chair and so as to better accommodate the chair to persons of varying weights.

While there has been shown and described a particular embodiment of the invention, it will be obvious



to those skilled in the art that various changes and modifications may be made therein without departing from the invention and, therefore, it is aimed to cover all such changes and modifications as fall within the true spirit and scope of the invention.

What I claim as my invention is:

In a reclining chair assembly including a support, chair seat and back elements mounted for movement upon said support, and a reclining control for controlling movement of said chair elements relative to said support, said reclining control including a first link, a second link, and a pivot connecting said second link to said first link for pivotal movement relative to said first link in face to face engagement with one side of said first link; a frictional control comprising a clamping arm having one end mounted upon said pivot in face to face engagement with the other side of said first link, an enlarged portion on said first link adjacent said pivot moveable between said arm and said second link upon relative pivotal movement of said first and second links, said arm extending from said pivot in substantially parallel relationship with said second link to a location beyond that portion of said second link engaged by said enlarged portion during relative pivotal movement of said links, coupling means at the other end of said arm coupling said arm to said second link for movement therewith relative to said first link about said pivot, and adjustable biasing means on said coupling means biasing said other end of said arm toward said second link to frictionally grip said first link between said arm and said second link to thereby exert an adjustable frictional resistance to pivotal movement of said links relative to each other and control movement of said chair elements relative to said support.

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