April 7, 1959 F. F. SCHLIEPHACKE 2,880,785

RECLINING ARTICLE OF FURNITURE HAVING MOVABLE LEG REST

Filed Jan. 8, 1957 3 Sheets-Sheet 1

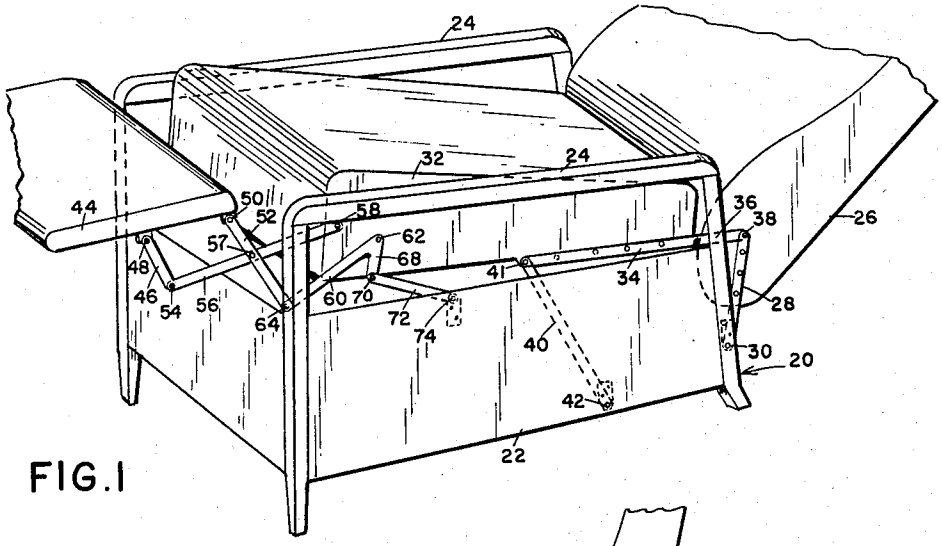


FIG.1

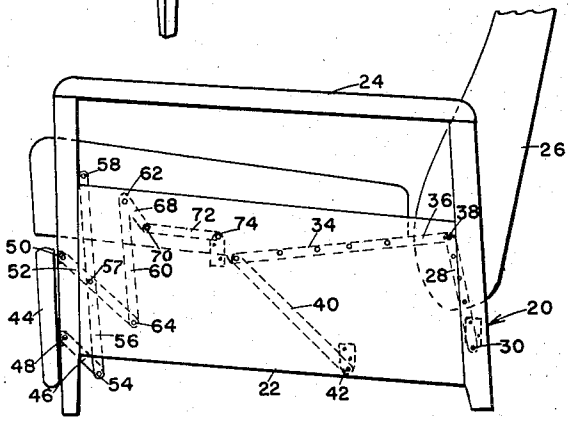


FIG.2

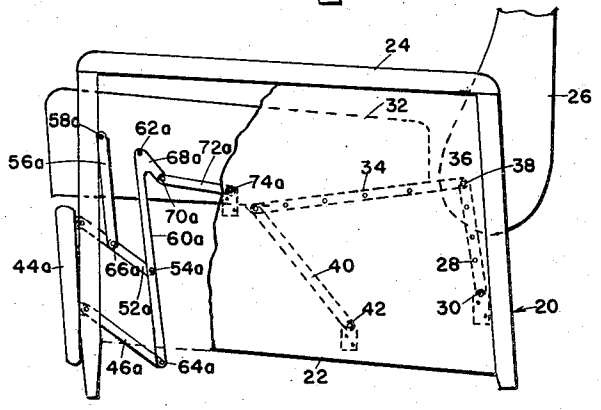


FIG.3

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RECLINING ARTICLE OF FURNITURE HAVING MOVABLE LEG REST

Filed Jan. 8, 1957 3 Sheets-Sheet 2

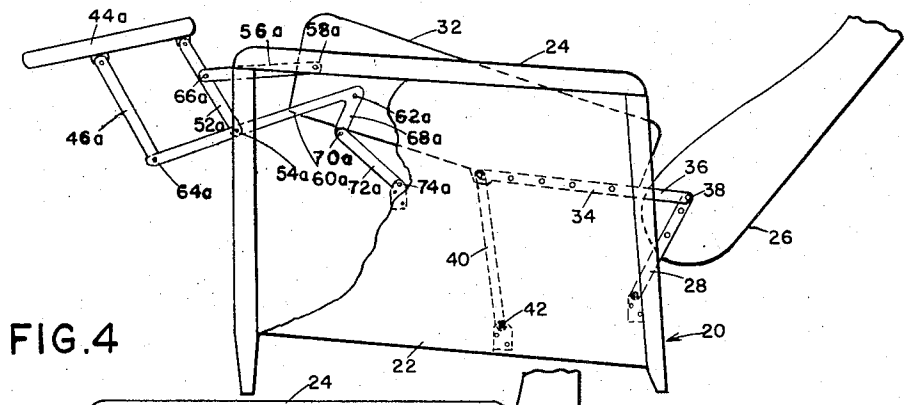


FIG.4

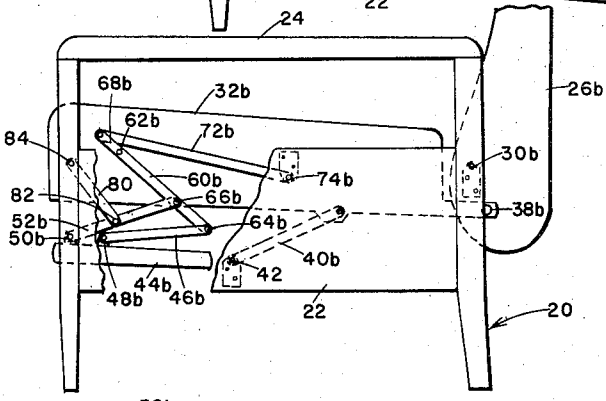


FIG.5

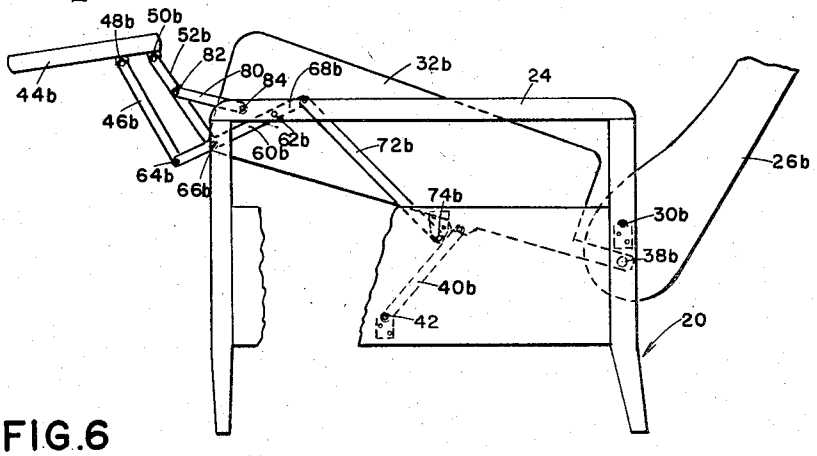


FIG.6

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RECLINING ARTICLE OF FURNITURE HAVING MOVABLE LEG REST

Filed Jan. 8, 1957 3 Sheets-Sheet 3

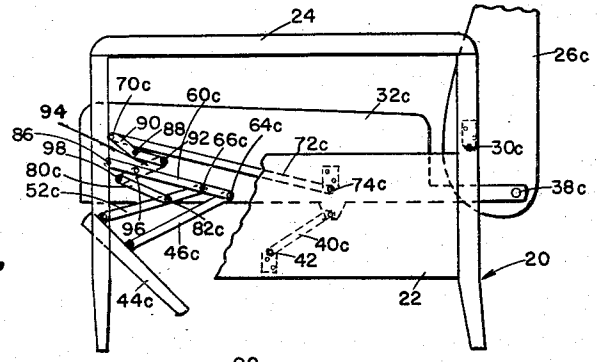


FIG.7

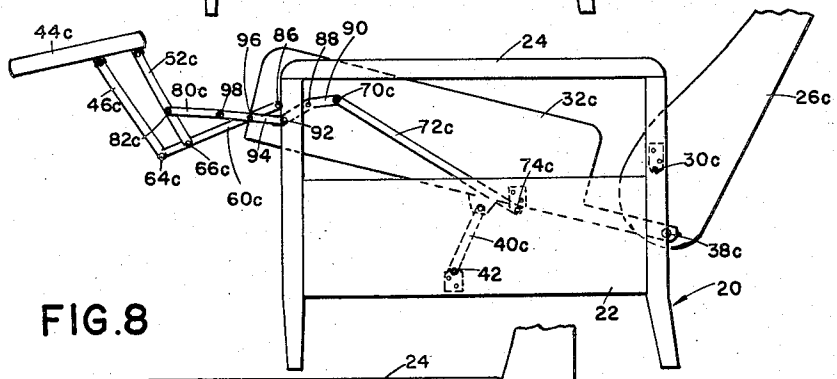


FIG.8

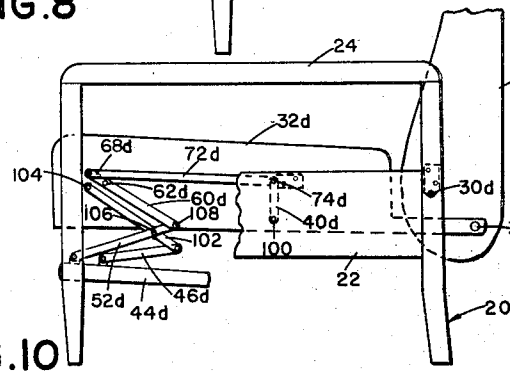


FIG.10

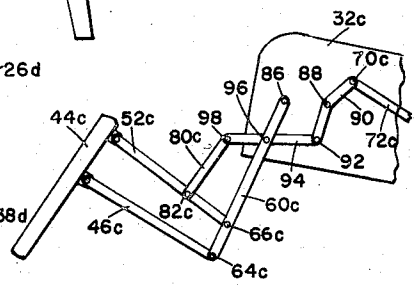


FIG.9

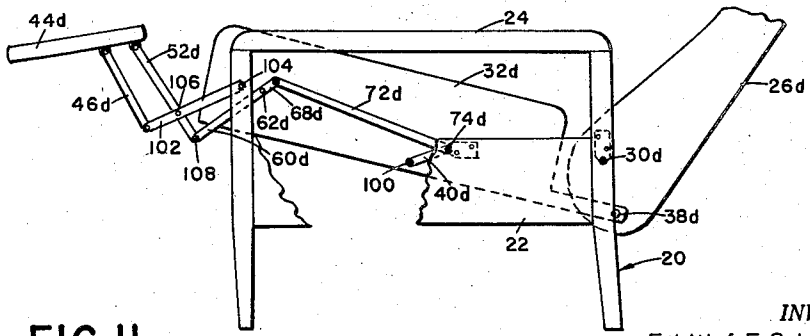


FIG.11

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2,880,785

RECLINING ARTICLE OF FURNITURE HAVING MOVABLE LEG REST

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Application January 8, 1957, Serial No. 632,993

10 Claims. (Cl. 155—106)

This invention relates to seating units having body supporting elements which may be moved from an upright to a more or less reclining position and which are provided with leg rests supported by linkage which will elevate the leg rest when the seating elements are moved to a reclining position and will retract the leg rest when the seating elements are moved to an upright position.

The objects of the invention are to provide improved linkages for supporting and operating the leg rest in accordance with the movement of the seating elements so as to provide a structure which is compact, strong and has improved operating characteristics. In general, the seating unit comprises a stationary frame or base, a back rest member and a seat. The back rest member is mounted on the frame to swing about an axis located either at a point substantially above the lower end of the back rest or at or below such lower end. The seat is pivoted to the back rest. The leg rest is supported on linkage connected to the seat and operated by linkage connected to the stationary frame so that it is controlled by the movements of the seat with respect to the frame when the back rest and seat are moved to reclining position.

Specific objects and advantages of the invention will appear in the course of the description of certain preferred embodiments of the invention chosen to illustrate the principles thereof.

In the accompanying drawings:

Figure 1 is a perspective view of a chair showing one form of the invention with the parts in a reclining position;

Figure 2 is a side elevation of the construction shown in Figure 1, with the parts in an upright seating position;

Figures 3 and 4 are side elevations showing another form of the invention in upright seating and reclining position, respectively, part of the side frame being shown broken away.

Figures 5 and 6 are views similar to Figs. 3 and 4 showing another form of the invention;

Figures 7 and 8 are views similar to Figs. 3 and 4 showing another form of the invention.

Figure 9 is a side view of a part of the linkage shown in Figs. 7 and 8 in an intermediate position.

Figures 10 and 11 are views similar to Figs. 3 and 4 showing another form of the invention.

Referring to the drawings in detail, the article of furniture comprises a stationary frame or base **20** having side frames **22** and arms **24**. Any suitable form of frame may of course by employed, depending upon the style of furniture desired. **26** is a back rest which is movably mounted upon the frame, it being shown in Figures 1 and 2 as having downwardly projecting arms **28** rigidly attached thereto which are pivoted at their lower ends to the frame at points **30**. **32** is a seat which is movably supported so as to be tilted upward at an appropriate angle when the back rest is tilted back. For this purpose the seat may be mounted in various ways but

in the particular example shown in Figures 1 and 2 the seat has bars **34** fastened to the sides thereof which have rearward extending ears **36** which are pivoted to the back rest at points **38**, these points being substantially above the pivots **30** so that when the back rest is tilted back the seat will also move back. The forward part of the seat is supported on seat guide links **40** which are pivoted to the front ends of the bars **34** at points **41** and which at their lower ends are pivoted to the frame at points **42**. As the seat moves back these guide links serve to raise the front part of the seat so as to tilt it to the proper angle.

The leg rest **44** is supported on links carried by the forward part of the seat and is actuatde by means of links anchored to the frame so that the movement of the seat with respect to the frame will actuate the linkage to project or retract the leg rest. In the construction shown in Figures 1 and 2 the leg rest is provided with short links **46** pivoted at **48** to the leg rest, the pivot points **48** being spaced at a distance from the rear edge of the leg rest. Also pivoted to the leg rest at points **50** in rear of the points **48** are links **52** which are in this instance longer than the links **46**. In describing the pivot points of the leg rest carrying links as located with reference to the "rear" edge of the leg rest, the extended position of the leg rest as shown in Figures 1, 4, 6, 8 and 11 is referred to. The outer ends of the links **46** are pivoted at **54** to connecting links **56** which are pivoted to the seat at points **58**. Leg rest actuating levers **60** are provided as a part of the leg rest carrying linkage, these levers **60** being pivoted at fulcrum points **62** to the seat and at their outer ends at points **64** to the ends of links **52**. The links **52** cross the connecting links **56** and are pivoted thereto at such crossing points **57**.

The levers **60** have short arms **68** which are bent back at acute angles and which are pivoted at points **70** to leg rest direct actuating links **72** which are pivoted at **74** to the stationary frame. When the seat is tilted and drawn back by rearward movement of the back rest, the movement of the fulcrum points **62**, relative to the pivot points **70** and pivotal anchor points **74** of links **72**, which act as thrust links, will swing the actuating levers **60** to a more horizontal position as shown in Figure 1 which will cause the leg rest to be raised from the retracted position shown in Figure 2 to an elevated or projected position as shown in Figure 1. Restoration of the body supporting unit to upright or seating position will, of course, cause a retraction of the leg rest.

Figures 3 and 4 show a modified form of leg rest supporting linkage. The back rest, seat and frame are of the construction shown in Figures 1 and 2. The leg rest **44*a***, in this instance, is carried by pairs of links **46*a*** and **52*a*** which are of the same or nearly the same length. The outer ends of both links **46*a*** and **52*a*** are pivoted to the leg rest operating lever **60*a*** at points **64*a*** and **54*a***, respectively, the lever being fulcrumed at **62*a*** to the seat. This lever has an arm **68*a*** bent back at an acute angle. The leg rest guide link **56*a*** is shorter than the lever **60*a*** and is pivoted at point **66*a*** to an intermediate point of the link **52*a*** and at point **58*a*** to the seat. The short arm **68*a*** of the leg rest operating lever is connected at **70*a*** to the link **72*a*** which is anchored to the frame at the point **74*a***.

In the construction shown in Figures 5 and 6 a chair is shown in which the back rest **26*b*** is pivoted to the frame **20** at points **30*b*** substantially above the bottom of the back rest. The seat **32*b*** is pivoted to the back rest at points **38*b*** which are substantially below the pivot points **30*b*** of the back rest. With this construction the seat will move forward when the back rest is tilted

back. The seat is mounted on seat guide links **40***b* which are pivoted at their upper ends to the seat and at the lower ends to the frame at points **42**. The leg rest **44***b* is carried on pairs of links **46***b* and **52***b*, the upper ends of which are pivoted at spaced points **48***b* and **50***b* on the leg rest. At their opposite ends the links **46***b* and **52***b* are pivoted at spaced points **64***b* and **66***b* to leg rest operating levers **60***b* which are pivoted to the seat at fulcrum points **62***b*. The ends of the short arms **68***b* of the operating levers are connected by links **72***b* to anchorage points **74***b* on the frame. Guide links **80** are anchored at points **82** to the links **52***b* between the ends thereof and to points **84** on the chair seat, the points **84** in the example shown being in advance of the fulcrum points **62***b*. The linkage shown is so proportioned that the leg rest when retracted will be drawn underneath the seat as shown in Figure 5 so that it will move through an arc of nearly 180° when it is moved to fully projected position.

Figures 7, 8 and 9 disclose another form of the invention in which the back rest **26***c* is pivoted to the frame **20** at points **30***c* above the bottom of the back rest. The seat **32***c* is pivoted at points **38***c* on the back which are substantially below the back rest pivot points **30***c* and in rear of such points when the back rest is in upright position as shown in Fig. 7. The seat is also supported on seat guide links **40***c* pivoted at their upper ends to the seat and at their lower ends to the frame. The leg rest **44***c* is carried on a pair of links **46***c* and **52***c* similar to the links **44***b* and **52***b* shown in Figures 5 and 6. The lower ends of the pairs of links **46***c* and **52***c* are pivoted at points **64***c* and **66***c* to leg rest operating levers **60***c* which are pivoted to the seat at their inner ends at points **86**. Also pivoted to the seat at fulcrum points **88** are bent levers **90**. The ends of these bent levers are pivoted at points **70***c* to the ends of actuating links **72***c* which are pivoted at points **74***c* to the stationary frame. The other ends of the levers **90** are pivoted at **92** to the short levers **94** which cross the levers **60***c* and are pivoted thereto at points **96**. The ends of the levers **94** are pivoted at **98** to guide links **80***c* which are pivoted at points **82***c* to the links **52***c*.

Figures 10 and 11 show another modification of the invention in which the back rest **26***d* is mounted on the frame on pivots **30***d* located above the bottom of the back rest. The seat **32***d* is pivoted to the back rest at points **38***d* located below the pivot points **30***d* as in the construction shown in Figures 7, 8 and 9. In this instance, the seat is supported by seat guide links **40***d* which are pivoted at their upper ends at points **74***d* on the frame and at their lower ends at points **100** on the seat. The seat is thus more or less suspended on the seat guide links **40***d*. The leg rest **44***d* is carried on links **46***d* and **52***d*. Links **46***d* are pivoted at their ends to the ends of links **102** which are pivoted to the seat at points **104**. The links **102** cross the links **52***d* and are pivoted thereto at points **106**. The ends of the links **52***d* extending beyond the pivot points **106** are pivoted **108** to leg rest operating levers **60***d* which are pivoted to the seat at fulcrum points **62***d*. The short arms **68***d* of the operating levers **60***d* are connected by links **72***d* to anchor points on the frame which may be the same as the anchor points **74***d* to which the seat guide links **40***d* are pivoted although these points need not necessarily coincide. In the construction shown in these Figs. 10 and 11, the leg rest has a full movement of nearly 180° from a concealed position under the seat to a projected position.

It is understood that certain parts, elements or mechanisms shown in one figure may be substituted for corresponding parts, elements or mechanisms of the embodiments shown in other figures of the drawings.

I have described preferred embodiments of my invention, but it is understood that this disclosure is for the purpose of illustration, and that various omissions or changes in shape, proportion and arrangement of parts, as well as the substitution of equivalent elements for those herein shown and described may be made without departing from the spirit and scope of the invention as set forth in the appended claims.

I claim:

1. In a reclining article of furniture having a stationary frame, a seat and a back rest and means for mounting said seat and said back rest on said frame permitting tilting movement thereof with respect to said frame, a leg rest and means for connecting said leg rest and said seat permitting movement of said leg rest from a retracted position when said seat and said back rest are tilted, said means comprising a system of linkage including two links pivoted to said leg rest at spaced locations thereof, said system also including two links pivoted to said seat at spaced locations thereof, said two links pivoted to said seat being operatively connected with said two links pivoted to said leg rest, and a direct actuating link one end of which is pivoted to one of the links of the leg rest supporting system and the other end of which is pivoted to said frame to actuate said leg rest linkage to change the position of said leg rest when said seat and said back rest are tilted on said frame.

2. In a reclining article of furniture having a stationary frame, a seat and a back rest and means for mounting said seat and said back rest on said frame permitting tilting movement thereof with respect to said frame, a leg rest and means for connecting said leg rest and said seat permitting movement of said leg rest from a retracted position when said seat and said back rest are tilted, said means comprising a system of linkage including two links pivoted to said leg rest at spaced locations thereof, said system also including two links pivoted to said seat at spaced locations thereof, one of said two links pivoted to said seat being pivoted to both of said two links pivoted to said leg rest, the other of said two links pivoted to said seat being pivoted to only one of said links pivoted to the leg rest, one of said links pivoted to the seat constituting a lever having a rigidly connected arm projecting beyond the point at which said link is pivoted to the seat, a direct actuating link, said arm being pivoted to one end of said direct actuating link, the other end of which is pivoted to said frame to actuate said leg rest linkage to change the position of said leg rest when said seat and said back rest are tilted on said frame.

3. In a reclining article of furniture having a stationary frame, a seat and a back rest and means for mounting said seat and said back rest on said frame permitting tilting movement thereof with respect to said frame, a leg rest and means for connecting said leg rest and said seat permitting movement of said leg rest from a retracted position when said seat and said back rest are tilted, said means comprising a system of linkage including two links pivoted to said leg rest at spaced locations thereof, said system also including two links pivoted to said seat at spaced locations thereof, one of said two links pivoted to said seat being operatively connected with both of said two links pivoted to said leg rest, and a direct actuating link, said last named seat pivoted link being pivoted to one end of said direct actuating link, the other end of which is pivoted to said frame to actuate said leg rest linkage to change the position of said leg rest when said seat and said back rest are tilted on said frame, the other of said links pivoted to the seat being pivoted to only one of said links pivoted to the leg rest.

4. In a reclining article of furniture having a stationary frame, a seat and a back rest and means for mounting said seat and said back rest on said frame permitting tilting movement thereof with respect to said frame, a leg rest and means for connecting said leg rest and said seat permitting movement of said leg rest from a re-

tracted position when said seat and said back rest are tilted, said means comprising a system of linkage including two links pivoted to said leg rest at spaced locations thereof, said system also including two links pivoted to said seat at spaced locations thereof, one of said two links pivoted to said seat being pivoted to the outer ends of both of said two links pivoted to said leg rest, the other of said two links pivoted to said seat being pivoted to an intermediate point of one of said links pivoted to the leg rest, one of said links pivoted to the seat constituting a lever having a rigidly connected arm, a direct actuating link, said arm being pivoted to one end of said actuating link the other end of which is pivoted to said frame to actuate said leg rest linkage to change the position of said leg rest when said seat and said back rest are tilted on said frame.

5. In a reclining article of furniture having a stationary frame, a seat and back rest and means for mounting said seat and back rest on said frame permitting tilting movement thereof with respect to said frame, a leg rest and means for connecting said leg rest and said seat permitting movement of said leg rest from a retracted position when said seat and said back rest are tilted, said means comprising a system of linkage including two links pivoted to said leg rest at spaced locations thereof, said system also including a link pivoted to the forward part of the seat and to said two links pivoted to the leg rest, a lever pivoted to the seat in rear of the point at which said seat-pivoted link is pivoted, linkage connecting said lever with one of said links pivoted to the leg rest, said linkage including a member pivoted to said seat-pivoted link at a point thereof below the point at which said link is pivoted to the seat, and a direct actuating link connected to said lever and pivotally anchored to the frame.

6. In a reclining article of furniture having a stationary frame, a seat and back rest and means for mounting said seat and back rest on said frame permitting tilting movement thereof with respect to said frame, a leg rest and means for connecting said leg rest and said seat permitting movement of said leg rest from a retracted position when said seat and said back rest are tilted, said means comprising a system of linkage including two links pivoted to said leg rest at spaced locations thereof, said system also including a link pivoted to the forward part of the seat and to said two links pivoted to the leg rest, a lever pivoted to the seat in rear of the point at which said seat-pivoted link is pivoted, linkage connecting said lever with one of said links pivoted to the leg rest, said linkage including a member pivoted to said seat-pivoted link at a point thereof below the point at which said link is pivoted to the seat, one end of said member being pivoted to the lever pivoted to the seat, the other end of said member being connected by a link to an intermediate point of said link pivoted to the leg rest, and a direct actuating link connected to said lever and anchored to the frame.

7. In a reclining article of furniture having a stationary frame, a seat and a back rest and means for mounting said seat and said back rest on said frame permitting tilting movement thereof with respect to said frame, a leg rest and means for connecting said leg rest and said seat permitting movement of said leg rest from a retracted position when said seat and said back rest are tilted, said means comprising a system of linkage including two links pivoted to said leg rest at spaced locations thereof, said system also including two links pivoted to said seat at spaced locations thereof, one of said two links pivoted to said seat being pivoted to both of said two links pivoted to said leg rest, the other of said two links pivoted to said seat being pivoted to only one of said links pivoted to the leg rest, a direct actuating link, said second seat pivoted link constituting a lever having a ridigly connected arm, said arm being pivoted to one end of said direct actuating link the other end of which is pivoted to said frame to actuate said leg rest linkage to change the position of said leg rest when said seat and said back rest are tilted on said frame.

8. In a reclining article of furniture having a stationary frame, body supporting members comprising a seat and back rest, the back rest being pivoted on the frame, the seat being pivoted to the back rest at a point removed from the pivotal axis of the back rest, a leg rest, and a linkage of lazy tongs type for supporting and moving said leg rest including two links connected to the leg rest at spaced points thereof and two links connected to the seat at spaced points, and a single actuating link connected to a part of said leg rest linkage and pivotally anchored at a fixed point to the frame.

9. A construction as claimed in claim 8 in which the back rest is pivoted to the frame above its lower end and the seat is pivoted to the back rest below the pivotal axis of the back rest on the frame whereby the seat will have a forward movement when the back rest is tilted backward and in which the leg rest supporting linkage includes a leg rest guide lever pivoted to the seat and having an arm projecting beyond its pivotal point on the seat, the single actuating link being a pull link and being connected to said lever arm and pivotally anchored to the frame.

10. A leg rest and control arrangement for a reclining chair of the type including a stationary frame, and body-supporting means including a seat and back rest movably mounted on said frame, said arrangement comprising a leg rest, and leg rest actuating means operatively connected between said frame, said body-supporting means and said leg rest for moving said leg rest to an elevated leg-supporting position in response to movement of said body-supporting means, said actuating means comprising a system of linkage including a first pair of links, respective means pivotally connecting said first pair of links to said leg rest at spaced locations thereof, a second pair of links, respective means pivotally connecting said second pair of links to said seat at spaced locations thereof, the pair of links pivoted to the seat being operatively connected with the pair of links pivoted to the leg rest to provide a leg rest mounting linkage, a direct actuating link, means pivotally connecting said actuating link to one link of said leg rest mounting linkage and means pivotally mounting said actuating link on said frame.

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