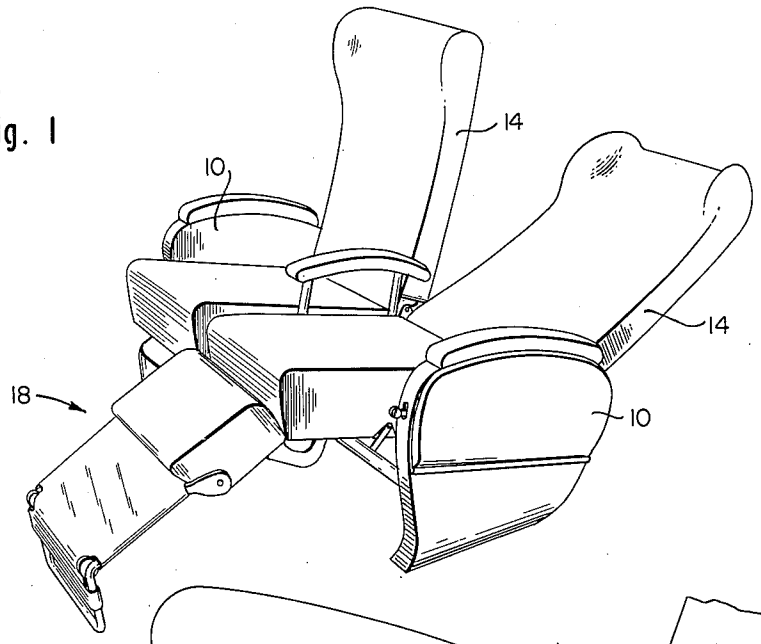
Jan. 10, 1956 D. E. HIGLEY ET AL 2,730,164

PIVOTAL ARRANGEMENT FOR RECLINER CHAIRS

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Fig. 1



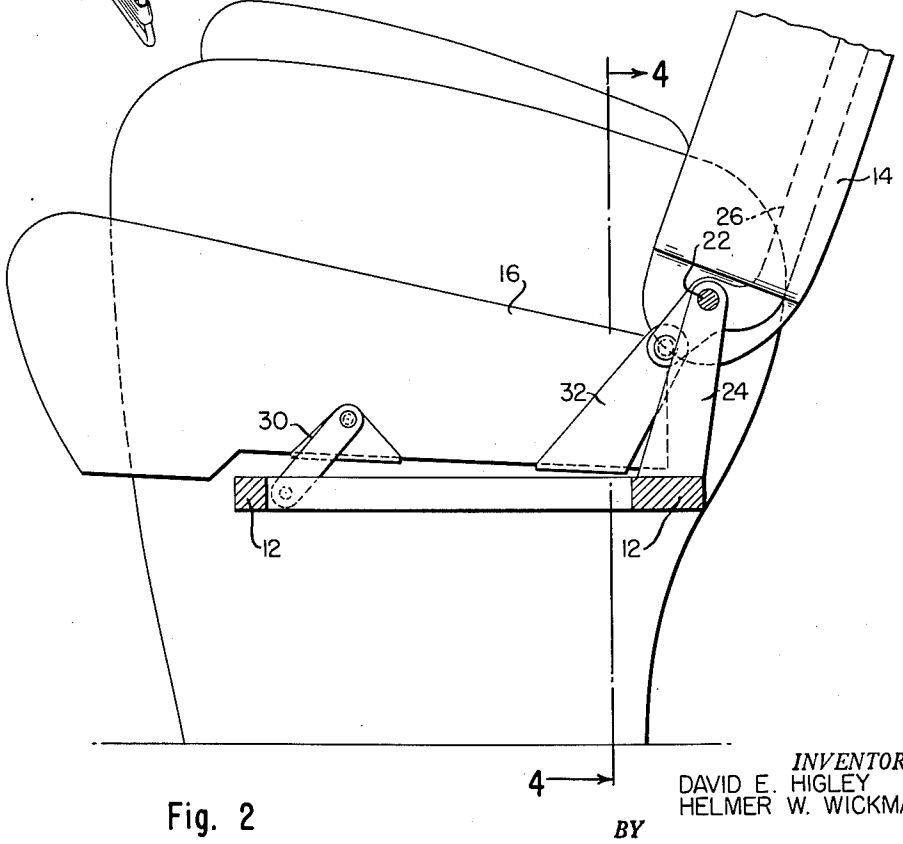


Fig. 2

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PIVOTAL ARRANGEMENT FOR RECLINER CHAIRS

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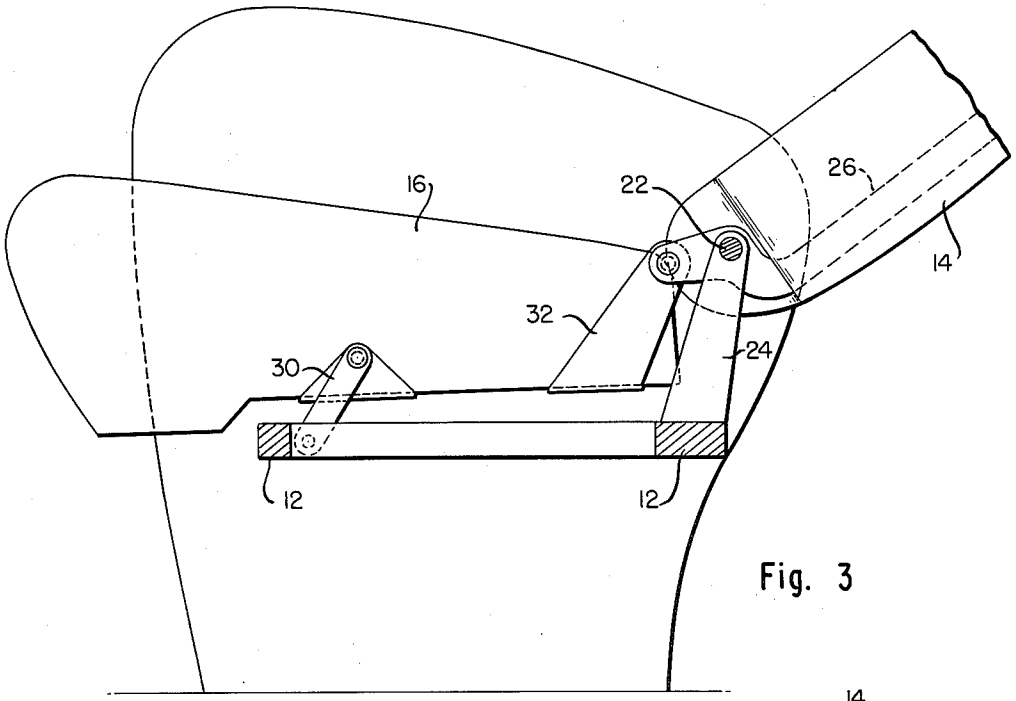


Fig. 3

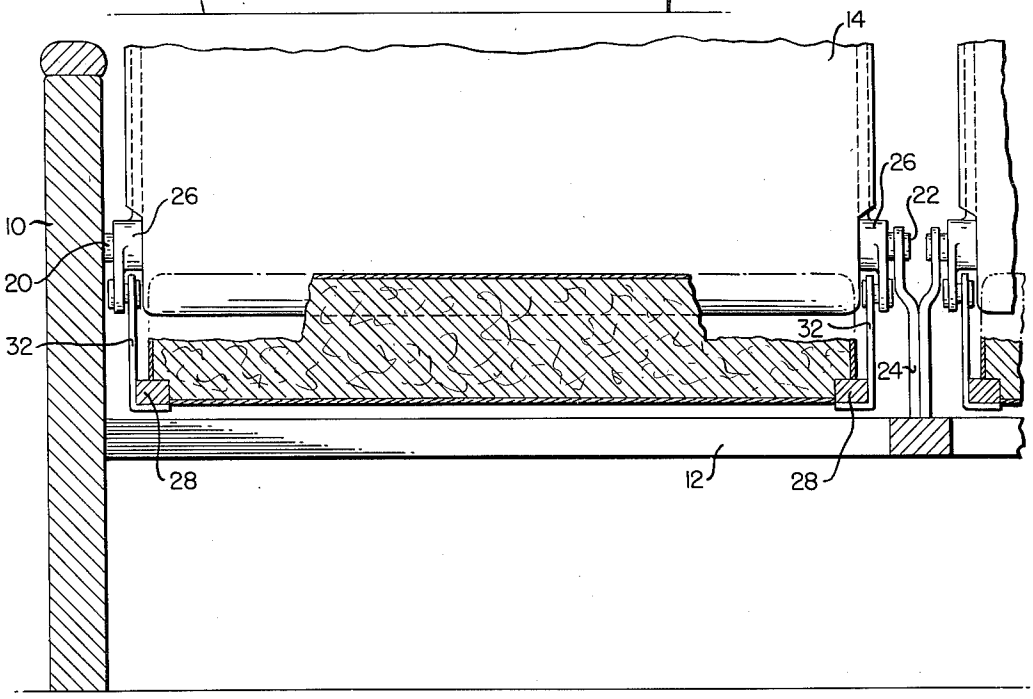


Fig. 4

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PIVOTAL ARRANGEMENT FOR RECLINER CHAIRS

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Application June 19, 1952, Serial No. 294,302

1 Claim. (Cl. 155—116)

This invention relates to reclining chairs and is concerned more specifically with the pivotal arrangement of the moving elements of reclining chairs for railroad cars, buses, airplanes and the like.

In the construction of reclining chairs for vehicles a number of important considerations must be borne in mind. In the first place, space is of primary importance in vehicles and any mechanism employed for the purpose of providing a reclining chair must be adapted to use as little extra space in the reclining operation as possible. Another factor to be borne in mind relates to the mechanism for restoring the seat from the reclined position to the erect position. Such restoring mechanism must be easy to operate, durable and strong, but yet it should not operate with so great a force as to jar the occupant of the seat. Another consideration relates to providing a comfortable arrangement for reclining the chair backward. For instance, as the chair back is reclined, it is highly desirable to maintain the seat and back rest tightly together so that a gap does not open up between the cushion elements. Also as the back is reclined to the rear, the pivotal arrangement should be adapted to avoid relative motion between the chair elements and the body of the occupant. Such relative motion causes the clothing of the occupant to bind or wrinkle and has hitherto been one of the major causes of discomfort in recliner chairs.

The general object of our invention may be expressed most broadly in terms of providing means for taking care of the foregoing considerations. More specifically, the objects of our invention are to provide a pivotal suspension arrangement for recliner chairs whereby the back rest of the chair may be reclined within a minimum of space, while at the same time the back rest may be reclined without causing relative motion between the back rest and the body of the occupant. A further object of our invention is to provide reclining mechanism in which the weight of the occupant is employed to assist springs in returning the back rest from the reclined position to the erect position. Still another object is to provide reclining mechanism further adapted to permit reclining without opening up a gap between the cushion elements of the seat and back rest.

In the accomplishment of these and other objects of our invention, we provide a chair with a cushion seat and back rest pivotally mounted within a chair frame. The back rest is mounted to pivot at a point substantially above its lower extremity. By mounting the back rest in this manner the pivot axis of the back rest corresponds substantially to the small of the back rather than the seat of the occupant. This permits the occupant to recline against the back rest by a kind of rocking motion with his body firmly against the back rest rather than sliding relative thereto. This feature adds materially to the comfort of the chair and by reducing the pivotal radius of the back rest, ensures reclining action within a minimum of space.

Another feature of our invention is that the back rest

is provided with side support frame members called "back irons" which pivotally support the back rest and extend downwardly from the pivot point to the lower extremity of the back rest. The rear portion of the cushion seat is pivotally connected to the lower ends of these back irons by upwardly extending arms. Thus the rear portion of the cushion seat is pivoted to the back rest along an axis coinciding with the lower extremity of the back rest with the result that, no matter how the back rest is reclined, a gap between the cushion seat and the back rest cannot appear. Also, the full depth of the cushion elements of the seat remains along the rear corner of the seat, thus materially enhancing the comfort of the chair.

A further feature of our invention is that the frame elements of the back rest which support the rear portion of the seat provide a short lever arm by means of which the weight of the occupant is employed in assisting conventional springs in restoring the back rest from the reclined position to the normal, erect position.

Still another feature of our invention includes the provision of a pivot link supporting the forward portion of the seat whereby the seat is raised during reclining. This feature, in conjunction with the suspension arrangement of the rear portion of the seat, permits the seat to rise and come more into alignment with the back rest when the chair is fully reclined despite the elevated pivot axis of the back rest. This alignment of seat and back rest lends materially to the overall comfort of the chair.

Further objects and features of our invention will be best understood and appreciated from a detailed description of a preferred embodiment thereof, selected for purposes of illustration, and shown in the accompanying drawings, in which:

Fig. 1 is a view in perspective of the recliner chair of our invention as it may be installed in a vehicle;

Fig. 2 is a view in side elevation of a chair made in accordance with our invention in the erect position;

Fig. 3 is a view in side elevation of the chair fully reclined; and

Fig. 4 is a partially broken away view in front elevation along the lines 4—4 of Fig. 2, showing the bearing suspension arrangement.

The general organization of the preferred embodiment of our invention herein shown includes side chair support elements 10 connected and braced by frame rods 12, a pivotally mounted back rest 14, and a cushion seat 16. As herein shown, the recliner chair of our invention may be arranged in a pair of chairs as shown in Fig. 1 with leg rests 18 and other usual conveniences. However, since our invention is directed specifically to the pivotal suspension arrangement for the back rest 14 and seat element 16, these conveniences will not be described in detail herein.

The back rest 14 as herein shown is an upholstered element comprising conventional frame members (not shown) with cushion elements mounted thereon (not shown) and covered by a conventional upholstery covering. The back rest 14 is pivotally connected to the chair frame on the aisle side by means of a pivot 20 mounted on the side frame 10. Centrally the back rest 14 is pivotally supported by a pivot 22 which is mounted on an upwardly extending arm 24 mounted on a cross frame member 12. The elements of the back rest 14 which bear the direct weight of the occupant are called "back irons" and are indicated at 26. The back irons 26 are provided with bearings and are journalled on the pivots 20 and 22 at a point substantially above the lower extremity of the back rest. Thus the pivot axis established in the back rest 14 corresponds to the pelvic area of the back of the occupant and permits him to rock against the back rest while reclining. Below the pivots, the back irons 26 extend downwardly to a point coinciding with

the lower extremity of the back rest. Conventional spring mechanism (not shown) is provided within the side frame **10** operatively associated with the adjacent back iron **26** to help bring the back rest from the reclined position to the erect position.

The cushion seat **16** herein shown comprises conventional frame members **28** upon which is mounted conventional cushion elements (not shown) covered by upholstery. The forward portion of the seat **16** is supported within the chair frame by means of a pair of pivot links **30** which are connected at their upper ends to the seat frame members **28**, and at their lower ends to the chair frame rods **12**. The rear portion of the seat **16** is supported by means of upwardly extending arms **32** which are welded to the seat frame members **28**. At their upper ends, the arms **32** are pivotally connected to the lower extensions of the back irons **26** along the axis of the upper rear corner of the cushion seat **16** and the lower extremity of the back rest **14**. Thus it will be seen that when the back rest is reclined, the pivotal motion between the back rest **14** and the seat **16** does not open a gap between the lower extremity of the back rest and the rear corner of the seat. Also it will be seen with reference to Fig. 4 that the full depth of the cushioning in the seat is provided between the arms **32** along the rear corner edge of the seat such that when the back rest is reclined, the occupant of the chair will feel no hard cross support element in that area of the seat.

With reference to Fig. 3, it will also be seen that, when the occupant is fully reclined and resting against the back rest **14**, his weight will tend to keep the chair in the fully reclined position, but when the occupant shifts his weight slightly forward in order to come to the erect position, the lower extensions of the back irons **26** then become lever arms, and the weight of the occupant then assists in urging the back rest from the reclined position to the erect position. This feature is important in providing the spring erecting elements of conventional design (not shown) with an additional restoring force about the pivot axis of the back rest and insures longer life as well as improved operation of the reclining mechanism. Additionally it will be seen that, as the back rest is reclined, the lower extensions of the back irons **26** lift the rear portion of the seat and bring it more into alignment with the back rest so as to make the combination of the seat and the back rest more even.

Minor variations of this preferred embodiment of our invention will be readily apparent to those skilled in the art after the concept of our invention has been more fully understood. For instance, links **30** may be positioned more forwardly and also the pivot axis between the back

rest and the seat may be moved somewhat to the rear without causing any serious defect. Therefore we do not intend that the invention be limited to the precise form of the preferred embodiment herein shown, but rather that it should be limited in accordance with the terms of the appended claim.

Having thus described and disclosed a preferred embodiment of our invention, what we claim as new and desire to secure by Letters Patent is:

A reclining chair for vehicles comprising a base frame, a cushion back rest, means for pivotally connecting said back rest to said frame at a point substantially above the lower extremity of the back rest; back rest frame arms connected to said back rest extending downwardly from said pivot points along the sides of said back rest to the lower corner of said back rest cushioning, a full depth of cushioning between the extremities of said back rest frame arms; a cushion seat including in its construction a seat frame, resilient cushion elements mounted on said seat frame and upwardly extending seat suspension arms mounted on said seat frame along the sides thereof at the rear of the cushion seat; means pivotally connected to the base frame of said chair and movably supporting the forward portion of said cushion seat including links pivotally connected at their lower ends to said base frame and pivotally connected at their upper ends to said forward portion of said cushion seat, and adapted to carry the forward portion of said seat in a forward and upward arcuate path when the back rest of said seat is reclined; and means pivotally connecting the upwardly extending seat suspension arms of the cushion seat to the lower extremity of said back rest frame arms at a point substantially coinciding with the line of the upper rear corner of said cushion seat and the lower extremity of said cushion back rest, whereby the full depth of seat cushion will be provided between the said upwardly extending arms of the cushion seat, the said seat cushion will pivot relative to the back rest on an axis coinciding with the lower extremity of the back rest without opening a gap therebetween, and the back rest will pivot relative to the chair frame on an axis substantially above the lower extremity of said back rest.

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