This invention relates to reclining chairs for vehicles, and more particularly to a reclining chair and leg rest combination for railway vehicle compartments.

In the development of railway coaches, the recent trend has been towards making use of both the horizontal and vertical space in the car by locating chairs in staggered relation in alternately higher and lower compartments along the car. In this way more leg room, privacy and comfort is provided for the passengers than is available in more conventional coaches in which the chairs are simply arranged one after the other on the same level. However, when the chairs are thus arranged in small compartments, the problem of devising a reclining chair is further complicated by the fact that the back rest of the chair cannot be pivoted to the rear as is conventional without employing extra space to no advantage. Therefore, it is an object of our invention to provide a reclining chair for a small compartment, of the sort described, in which the chair may be reclined without necessitating extra space to accommodate the reclining motion of the back rest of the chair.

Still another problem presented in the arrangement of these small compartments is the provision of a leg rest for the chair occupant when the chair is reclined. Obviously, if the chair is to be reclined to a substantially horizontal position, some provision must be made for supporting the legs of the occupant, otherwise the position would be extremely uncomfortable. For this reason, it is an additional object of our invention to provide a reclining chair for a small compartment together with a leg rest arrangement that cooperates with the chair in an easily operable and convenient manner.

In the accomplishment of these and other objects of our invention, we provide a chair for a small compartment mounted in a sliding frame in which a back rest and a seat are pivotally mounted. The frame may be moved forward and back by the occupant by releasing a simple catch element followed by applying slight pressure in the desired direction. Then as the frame slides forward, the back rest reclines backwardly relative to the frame, but generally follows a downward path relative to the compartment. In this way the necessity for extra space in the compartment to accommodate the reclining motion of the back rest is obviated.

Still another feature of our invention relating to the sliding motion of the chair is that when the chair is in the erect position a leg rest in opposed relation and spaced adequately in front of the chair when the chair is in the erect position, thereafter lift his leg and recline the chair by sliding the frame forward to a point at which the seat is in position closely adjacent to the leg rest, and in which the chair is fully reclined. When this is done the occupant of the chair may lie in a nearly horizontal position for sleeping with his legs comfortably supported.

A further feature of our invention lies in the fact that the chair arms and side elements of the chair are carried with the frame as the frame slides forward and the chair reclines. In this way relative motion between the chair arm and side elements is largely obviated and the chair may be reclined without disturbing the occupant’s clothing or otherwise discomforting him.

An additional feature of our invention relates to the ease of operating the chair frame from its extreme positions of motion. In order to assist the motion of the frame, we provide springs arranged to urge the chair forwardly from its extreme rearward position, and conversely, to urge it rearwardly from its forward position. These and other objects and features of our invention will best be 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 side elevation of the chair and leg rest of our invention showing in a partial section of a small compartment in a modern railway coach;

Fig. 2 is a view in side elevation generally showing the ratchet and pawl arrangement limiting the motion of the chair frame;

Fig. 3 is a view in side elevation showing the general components of the chair of our invention in the fully reclined position with the foot rest likewise in position for use;

Fig. 4 is a view in side elevation of the sliding mechanism upon which the chair frame is mounted;

Fig. 5 is a plan view of the sliding frame mounted on the base with the seat elements of the chair removed;

and Fig. 6 is an end view of the sliding elements of the chair and the base elements substantially as shown in Fig. 5.

The preferred embodiment of our invention herein shown includes its general organization, a chair indicated at 10 and a leg rest indicated at 12 mounted within a railway car compartment having a forward wall 14, a rear wall 16, a forward shelf 18, a rear shelf 20 and a floor 22.

The chair 10 comprises a base 24 upon which a frame 26 is slidably mounted. A back rest 28 is pivotally connected to the frame 26 on each side at 30. With reference to Figs. 1 and 3 it will be understood that the support elements illustrated and numbered are only on the near side of the chair. These elements are duplicated on the opposite side, of course, but since they are the same on both sides, only one side will be described herein in detail. The back rest 28 is supported from the rear by means of links 32 which are pivotally connected at 34 to the back rest 28 and at 36 to the chair base 24. It will be noted that the pivotal connection 30 of the back rest 28 is located in the lower part of the said back rest and that the pivotal connection 34 of the link 32 to the back rest 28 is at a high point substantially in the middle of the back rest 28. Thus it will be seen that when the frame 26 slides forward on the base 24, the back rest 28 will recline relative to the frame 26, and simultaneously lower rather than pivoting to the rear in the conventional manner.

A seat 38 is mounted within the frame 26 being supported in its forward portion by links 40 pivotally connected at 42 to the frame 26 and pivotally connected at 44 to the seat 38. The rear portion of the seat 38 is pivotally connected at 46 to depending arms 48 integral with the back rest 28 but extending to a point below the pivot 30 of the back rest 28. Thus it will be seen, particularly with reference to Fig. 3, that the seat 38 will pivot forwardly and upwardly by operation of the links 40 and the arms 48 when the frame 26 slides forwardly on the base 24.

As regards internal construction, the leg rest 12, the
back rest 28 and the seat 38 may be of conventional frame and upholstered construction as is normally employed in arrangements of this sort.

The frame 26 may be seen more in detail in Figs. 4, 5 and 6 and it comprises generally a base pan 50 which extends transversely of the chair, being supported at each side by an upward bar 52 having a substantially Z-shaped cross section. Each bar 52 is bolted to a plate 54 which extends downwardly and has an interrupted flange 56 at its outer extremity. The flange 56 in turn rides on rollers 58 which are rotatably mounted on an intermediate slide element 60 as may be seen in Fig. 4. Each intermediate slide element 60 has a shallow channel cross section and fits into a similarly shaped but slightly larger opening formed between an upward extending angle section 62 and the outwardly extending side margins of the base 24. The intermediate slide 60 carries six different rollers 58 and these rollers 58 ride on the inner surfaces of flange 66 of the base angle member 62, and on the margin of the base 24.

Thus, it will be seen that the depending plates 54 which support the frame 26 ride on the lower rails 58 and when the frame 26 is withdrawn, the intermediate slide elements 60 travel outwardly approximately one-half of the distance of the motion of the frame 26. It should also be noted, however, that the two upper rollers 58 of the intermediate slide 60 lie above the flanges 56 of the plates 54, and by holding the flanges 56 downwardly, the upper rollers 58 resist any downward tipping force that might be applied to the outer extremity of the frame 26.

In order to limit the travel of the frame 26 and also to keep the intermediate slide element in proper position, we provide a pair of positioning bolts 68 secured to the Z-shaped member 52 and operating in a slot 70 on the base channel 62 and in a slot 72 in the intermediate slide 60. The slot 70 may serve to limit the travel of the frame 26 at an extreme forward and at an extreme rearward position and the slot 72 serves to position the intermediate slide element 60 properly within the moving elements shown.

The frame 26 carries a side arm support 74 on one side thereof and a back rest pivot support 76 on the other side. It will be understood that the chair described herein with particular reference to Fig. 6, illustrates only one of a pair of such chairs mounted in tandem relation on each side by of course, it would be possible to employ an arm rest support 74 on each side of the frame 26 if desired. The back rest support 76 and the arm rest support 74 serve to mount the pivot 30 of the back rest 28. In order now to connect the seat 38 and to support the same in the forward portion of the frame 26, the links 40 are provided with flanged retaining bolts which drop into slotted holders 78 secured to the Z-shaped members 52 of the frame 26. When the seat 38 is in the fully retracted position, it is supported on upstanding cushioned supports 80 mounted on the base pan 50 on either side in the forward portion thereof. Thus it will be seen with reference to Fig. 1 that the cushioned supports 80 bear the weight of the forward portion of the seat 38 when the links 40 are withdrawn to their extreme rearward position in which their leverage for support is provided.

In order to hold the chair in a multiplicity of positions of recline, we provide a ratchet and pawl arrangement shown generally in Fig. 2, including a release knob 82 pivoted to the arm rest support 74 and communicating through a linkage system indicated at 84 to a vertically operating pawl 86 carried in the frame 26. The pawl 86 engages appropriately positioned holes 88 in the base 24. With reference to Fig. 5 it will be seen that five such holes 88 are shown corresponding to five different positions of recline for the chair. It will be understood, however, that other arrangements for limiting the reclining motion of the chair may be provided without departing from the spirit of our invention.

With reference to Fig. 1, it will be seen that when the chair is erect, the link 40 is in a position whereby the weight of the occupant substantially resists forward motion of the seat 38 relative to the frame 26. Conversely, with reference to Fig. 3, it will be seen that when the chair is in the reposed position, the link 52 is in a position in which the weight of the occupant resists returning motion of the frame 26 relative to the base 24. In order to counteract this otherwise disadvantageous arrangement, we provide springs 90 and a pair of rear springs 92 effectively operating between the pan 50 and the base 24. This is accomplished by means of a pair of rods 94 secured to an upward flange 96 on the base 24. The rods 94 extend forwardly from the flange 96 and pass through upstanding bar guides 98 mounted on the pan 50. The springs 90 are mounted on the forward ends of the rods 94, being held in position by retaining nuts 100 threaded to the forward ends of the rods 94. The rear springs 92 are likewise mounted on the rods 94 but adjacent to the rearward ends thereof and abutting the upstanding flange 96 of the base 24. The bar guides 98 compress the springs 90 whereby the slide 26 is in its extreme forward position, and conversely, they return and compress the springs 92 when the frame 26 is in its extreme rearward position. Thus the springs 90 and 92 aid the motion of the slide from its extreme positions. The distance of the travel of the frame 26 may be regulated by means of the rod 102 secured to the slide 26 and passing through a sliding spool 104 mounted on a bracket 106 secured to the pan 50 of the frame 26. Adjusting bolts 108 may be threaded to the rod 102 to give varying distances of travel for the frame 26.

It will now be seen that the operation of the leg rest 12 in cooperation with the chair 10 is to swing from a vertical stowed position, as may be seen in Fig. 1, downwardly into a relatively horizontal position for use, as may be seen in Fig. 3. When in the position for use, the occupant of the chair may slide his chair forwardly substantially to fill the gap between the seat 38 and the leg rest 12 or he may slide the seat back to provide room for standing up between the seat 38 and the leg rest 12. Inasmuch as the base member 24 of the chair 10 is integrally attached and connected to the compartment elements, it will be seen that the leg rest 12 may be regarded as being pivotally connected to the same basic element as is the chair 10.

Since numerous minor variations of our invention will now be apparent to those skilled in the art, it is not our intention to confine the invention to the precise form shown herein, but rather to limit it in terms of the appended claims.

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

1. A reclining chair for vehicles comprising a base, a slide mounted on said base, a frame slidably mounted on said slide, a back rest pivotally connected near its lower end to said frame, a first link pivotally connected at one of its ends to said base to the rear of said back rest and at its other end to said back rest at a substantially elevated point thereon, a seat pivotally connected to the lower end of said back rest at a point below the pivot between said back rest and frame and a second pivotally connected between said frame and seat toward the front of said chair whereby said back rest and said second link support the seat above said slide and movement of said slide forward causes said back rest to recline and said seat to shift forwardly through operation of said first link.

2. A reclining chair for vehicles comprising a base, a slide mounted on said base, a frame including chair arms mounted on said slide, a back rest pivotally connected near its lower end to said frame, a first link pivotally connected at one of its ends to said base to the rear of said back rest and at its other end to said back rest at a substantially elevated point thereon, a seat pivotally connected
to the lower end of said back rest at a point below the pivot between said back rest and frame, and a second link pivotally connected between said frame and seat toward the front of said chair whereby said back rest and said second link support the seat above said slide and movement of said slide forward causes said back rest to recline and said seat to shift forwardly through operation of said first link.

3. A reclining chair for vehicles comprising a base, a frame slidably mounted on said base, a back rest pivotally connected near its lower end to said frame, a first link pivotally connected at one of its ends to said base to the rear of said back rest and at its other end to said back rest at a substantially elevated point thereon, a seat pivotally connected to the lower end of said back rest at a point below the pivot between said back rest and frame, a second link pivotally connected between said frame and seat toward the front of said chair, and means for limiting the sliding motion of said frame on said base in any one of a multiplicity of positions.

4. The reclining chair defined in claim 3 further characterized by said means for limiting the sliding motion of said frame including a ratchet and releasable pawl.

5. A reclining chair for vehicles having in combination, a base, a frame slidably mounted on said base, a seat and back rest mounted on said frame, linkage means pivotally connected between said base and back rest for reclining said back rest and linkage means connected between said seat and frame for shifting said seat forward relative to said frame when said frame slides forward on said base, and means for resiliently urging said frame forward from an extreme rearward position on said base.

6. The chair defined in claim 5 further characterized by said means for urging said frame forward including a spring positioned to bear rearwardly against said base and forwardly against said frame when said frame is in the said rearward position.

7. A reclining chair for vehicles having in combination, a base, a frame slidably mounted on said base, a seat and back rest mounted on said frame, linkage means pivotally connected between said base and back rest for reclining said back rest and linkage means connected between said seat and frame for shifting said seat forward relative to said frame when said frame slides forward on said base, means limiting the sliding motion of said frame on said base at an extreme forward and at an extreme rearward position and resilient means urging said frame rearwardly and forwardly when said frame is in said extreme forward and extreme rearward positions respectively.

8. A reclining chair for vehicles comprising a base, a frame slidably mounted on said base, a back rest pivotally connected near its lower end to said frame, a first link pivotally connected at one of its ends to said base to the rear of said back rest and at its other end to said back rest at a substantially elevated point thereon, a seat pivotally connected to the lower end of said back rest at a point below the pivot between said back rest and frame, a second link pivotally connected between said frame and seat toward the front of said chair, means limiting the sliding motion of said frame on said base at an extreme forward and at an extreme rearward position, and resilient means urging said frame rearwardly and forwardly when said frame is in said extreme forward and extreme rearward positions respectively.

9. The reclining chair defined in claim 8 further characterized by means for limiting the sliding motion of said frame on said base in any one of a multiplicity of positions between the two said extreme positions.

10. A reclining chair and leg rest combination comprising a base, a frame slidably mounted on said base to slide from a rearmost position to a forward position, a back rest pivotally mounted in said frame, a seat pivotally connected to said back rest, first linkage means connected to said base for reclining said back rest second linkage means connected to said frame for moving said seat forward relative to said frame when said frame moves forward on said base, a leg rest pivotally mounted on said base in front of said seat to swing from a stowed position to a horizontal position in front of said seat and spaced from said seat in its rearmost position by a distance suitable for passage of a person to and from said seat, and said frame adapted to move forward to a position adjacent to said leg rest.

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