Nov. 11, 1947. J. M. DORTON 2,430,604

RECLINING SPRING SUPPORTED BACK REST

Filed Feb. 16, 1944 2 Sheets-Sheet 1

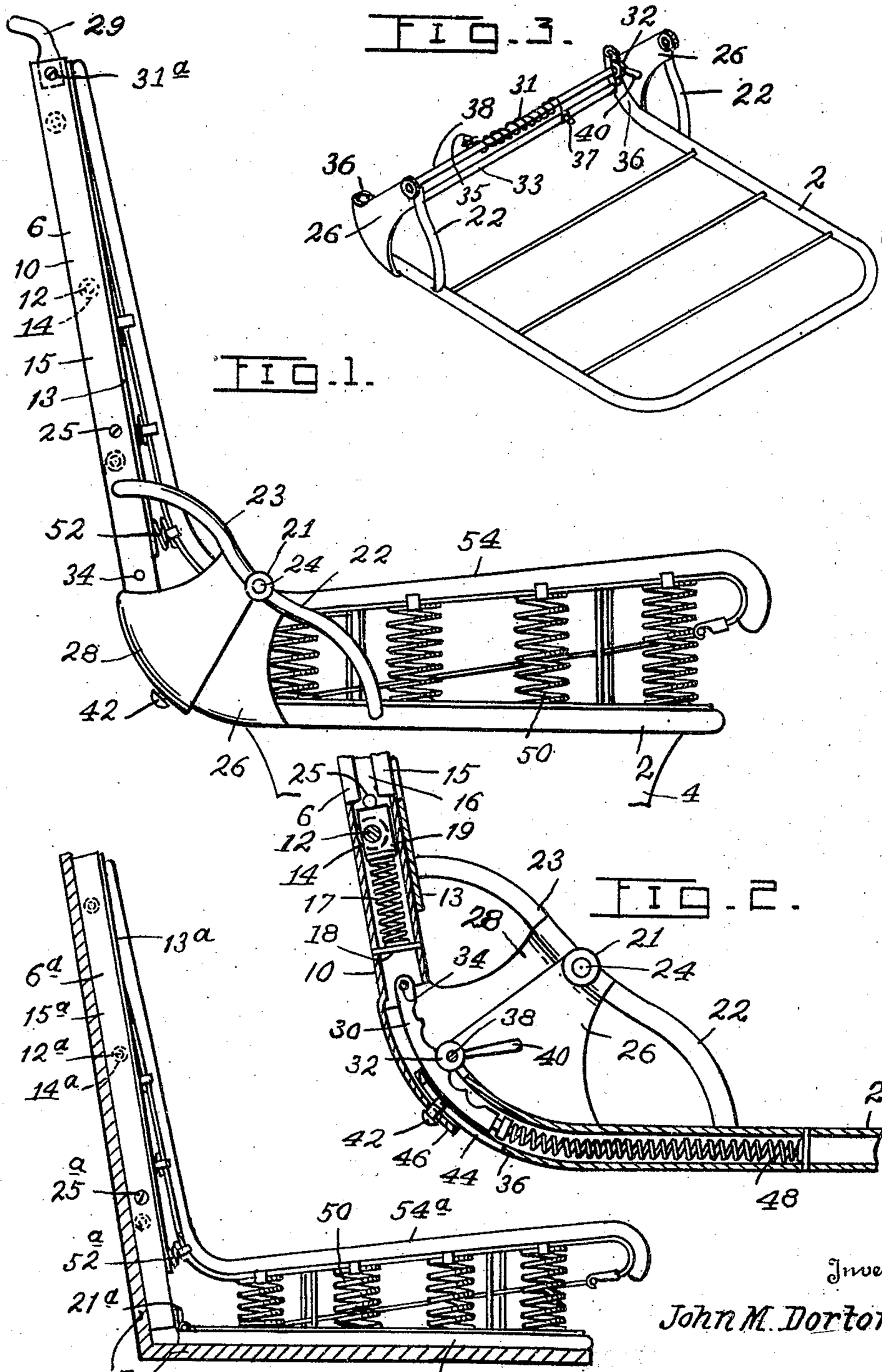


FIG. 3.




FIG. 1.

FIG. 2.

FIG. 4.

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Fig. 4.

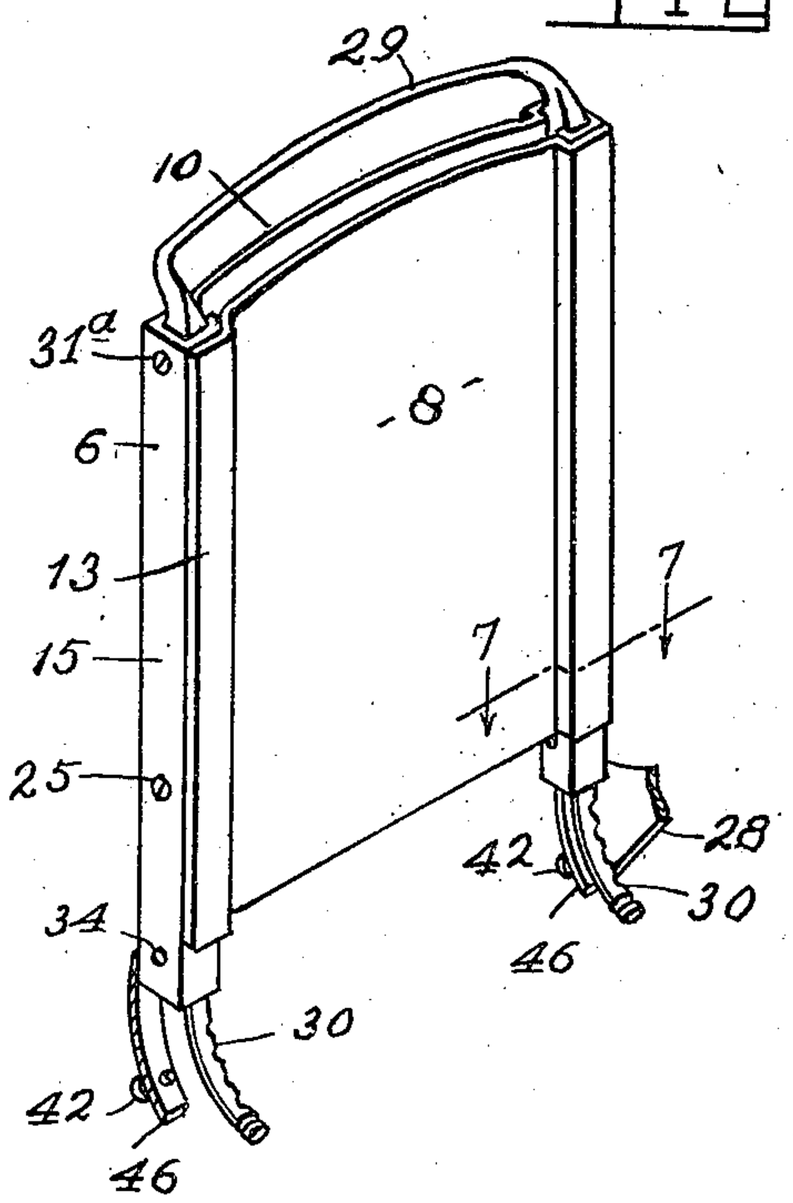



Fig. 5.

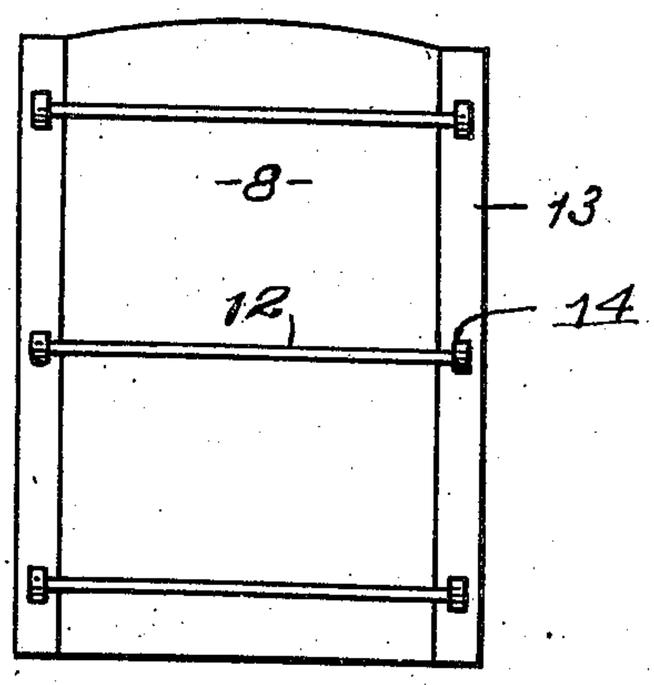
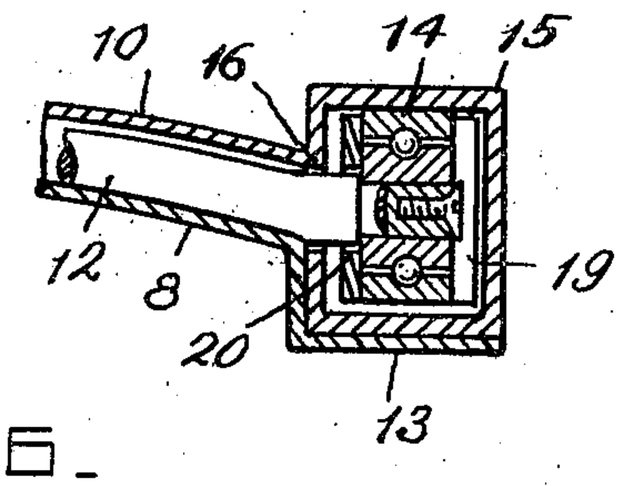



Fig. 7.



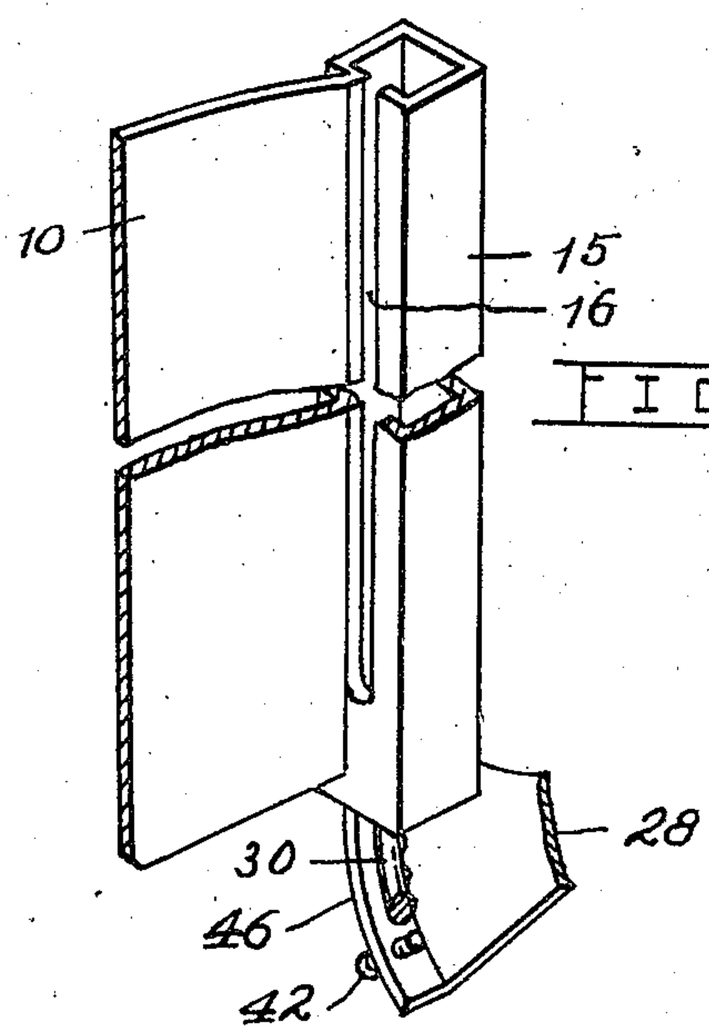
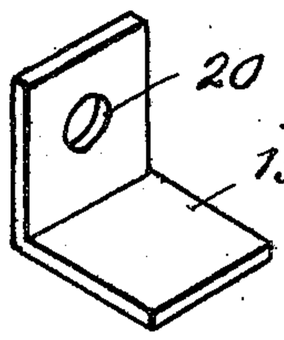




Fig. 6.

Fig. 8.

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2,430,604

# UNITED STATES PATENT OFFICE

2,430,604

## RECLINING SPRING SUPPORTED BACK REST

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Application February 16, 1944, Serial No. 522,664

4 Claims. (Cl. 155—53)

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My invention relates to adjustable chairs, and more particularly to a chair designed for transportation purposes such as in airplanes, railway coaches, busses, trucks, and other motor vehicles, but obviously may be used in other environment where a chair of this character is desired.

The principal object of my invention is to provide a chair of this character with a thin, light weight back of novel construction that will occupy less space than the conventional chair with a back comprising a thick, heavy frame covered with overstuffed upholstery.

A further object of my invention includes the provision of an adjustable chair which occupies a smaller space than is generally required for chairs of this type, and a chair which is especially desirable for use in airplanes, railway coaches, automobile busses and other vehicles, or any other environment where seating with the utmost economy of space and maximum comfort is desired.

Another object is to provide a chair which is durable, convenient and easy of operation, so that the occupant may readily adjust the chair to the most comfortable reclining position.

A further object is to provide a chair having a back comprising only a few simple and inexpensive parts which may be assembled at a minimum expenditure of time and labor.

Other objects will hereinafter appear and in order that the invention may be fully understood, reference will now be had to the accompanying drawings in which:

Fig. 1 is a side elevation of the chair with the supporting base removed.

Fig. 2 is an enlarged broken sectional view disclosing portions of the seat and back frames, respectively, at the opposite side of the chair from that disclosed by Fig. 1.

Fig. 3 is a perspective view of the seat frame with the upholstery removed.

Fig. 4 is a perspective view of the back frame with the upholstery removed and parts broken away.

Fig. 5 is a rear elevation of the front member of the back frame.

Fig. 6 is an enlarged broken perspective view of a portion of the rear member of the back frame.

Fig. 7 is an enlarged fragmentary cross section of the back frame on line 7—7 of Fig. 4.

Fig. 8 is a detail of one of a pair of angle-plates associated with the back frame.

Fig. 9 is a modified form showing the seat and back assembly installed in the seat frame of an automotive truck.

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Referring in detail to the different parts of the chair, 2 designates the seat frame which may be mounted upon legs or other suitable base 4. The seat frame 2 consists preferably of tubular stock bent into U-form as shown by Fig. 3.

The seat frame 2 is associated with an adjustable back frame designated generally by the reference numeral 6 and comprising front and rear members 8 and 10, respectively, consisting preferably of sheet metal plates to provide a thin, compact and light weight back frame. The front and rear members 8 and 10 are slightly concaved at their upper portions to lend rigidity thereto and provide a comfortable support for the back of an occupant of the chair. A plurality of spaced shafts 12 extend transversely across the rear side of the front member 8, Fig. 5, to which they are fixed and are provided at their respective ends with antifriction ball-bearing rollers 14.

The rear member 10 of the back frame 6, is formed at its longitudinal side margins into tubular guide members 15 in which the rollers 14 are free to travel so that the front member 8 may move up or down to a limited extent upon the rear member 10. The guide members 15 are preferably of rectangular cross section with forwardly extending confronting sides having longitudinal slots 16 through which the shafts 12 extend from the rear of the front member 8, which latter has marginal side flanges 13 that overlap the guide members 15 and thus prevent the back of occupant's clothes from sliding up and down on the guide members and becoming disarranged thereby. The front member 8 is normally held in raised position on the rear member 10 by coil springs 17, located in the tubular guide members 15 and interposed between abutments 18 and angle-plates 19, Fig. 2. The angle-plates 19, Fig. 8, have respective apertures 20 through which the lowermost shaft 12 extends. Upward movement of the front member 8 is limited by stops 25, which are preferably in the form of screws which extend into the guide members 15, against which the angle-plates 19 are normally held by the respective springs 17. The stops 25 may be threaded or otherwise removably secured in the outer side walls of the guide members 15 into which latter they extend to limit the upward movement of the angle plates 19 over which they project.

The seat frame 2 and the back frame 6 are operably connected by a pair of hinges 21 located at opposite sides of the chair. Each hinge com-

prises arms 22 and 23 connected at their adjacent ends by a pivot 24 and fixed at their opposite ends to the seat frame 2 and the adjacent guide member 15, respectively. The arms 22 and 23 of each hinge are reinforced by quadrants 26 and 28, secured to the seat frame 2 and the adjacent guide member 15, respectively. A handle 29 is fixed to the upper ends of the guide members 15, whereby the back frame 6 can be easily swung to either a position perpendicular to the seat or to a reclining position by a person standing beside the chair. The stops 25 and the handle 29 are removable so that the different parts of the back frame 6 may be taken apart for adjustment or repairs. In order that the stops 25 and the handle 29 may be quickly removed the stops may be in the form of screws and the handle 29 be held in place by screws 31*a*.

The back frame 6 may be secured in any of its adjusted positions by means of a pair of segmental racks 30 and a pair of eccentric detents 32, which latter are adapted to engage and force the former into frictional engagement with the upturned ends 36 of the seat frame 2. The racks 30, which are concentric to the pivots 24 of the hinges 21, are connected at their rear ends by pivots 34 to the lower ends of the tubular guide members 15 and telescopically arranged at their forward portions in the upwardly curved rear ends 36, respectively, of the seat frame 2. The detents 32 are fixed upon a transverse rod 38 and manually controlled by handles 40, respectively. The ends of rod 38 are journaled in the quadrants 26 and the rod extends through a coil spring 31, secured at its ends to the rod 38 and a transverse member 33 by any appropriate means such as pins 35 and 37, respectively. The spring 31 is under tension to normally effect engagement of the detents 32 with the racks 30. The ends of the transverse member 33 are fixed in the respective upturned rear ends 36 of the seat frame 2.

Forward and reclining movements of the back frame 6 are limited by appropriate means consisting in the present instance of set screws 42, which project into slots 44 in the respective upturned rear ends 36 of the seat frame 2. The set screws 42 are threaded in the lower ends of arcuate flanges 46 which are concentric to the axis of the hinges 21 and formed integral with the lower portions of the respective quadrants 26.

When the back frame 6 is relieved of the pressure of the occupant of the chair and the detents 32 are manually disengaged from the racks 30, the back frame is automatically swung upward from a reclining position by springs 48 located in the opposite sides of the seat frame 2. Upon reaching an approximately vertical position the back frame 2 is checked by the set screws 42 contacting the rear ends of the slots 44.

The seat and back frames 2 and 6, respectively, may be covered with any suitable upholstery to render the chair comfortable to an occupant. In the present instance I have shown upholstery including spiral springs 50 and 52 for the seat frame 2 and the back frame 6, respectively, and a pad 54 of soft material covering said springs. The springs 52 are secured to the front member 8 of the back frame 6 and are shorter than the springs 50 to reduce the weight and thickness of the back frame and obtain maximum compactness thereof. The pad 54 is suitably secured to the inner springs 50 on the seat frame 2 and the springs 50 on front member 8 to pull the latter downward with the seat portion of the cushioning means when depressed by the weight



of an occupant, and thus prevent disarrangement of the clothes of the latter.

From the foregoing the operation of the chair will be readily apparent. Should an occupant desire to lower the back to a reclining position he merely moves the detents 32 out of engagement with the racks 30 and then allows his body weight to carry the back frame 6 into the desired inclination, after which the detents 32 are adjusted to active position to maintain the back in the reclining position. To raise the back, the occupant need merely disengage the detents 32 from the racks 30 and allow the back to be moved up by the springs 48.

It will also be understood that the front member 8 of the chair back is free to move up and down longitudinally on the rear member 10, with the cushioned back rest portion of the pad 54 surface of the chair without the clothes of the occupant becoming disarranged or pulled upward or downward at the back, and that the springs 48 are strong enough to automatically swing the back 6 of the chair upward when the chair is unoccupied and the detents 32 are disengaged from the racks 30. The springs 17 act as antirattlers, thereby preventing the different parts from vibrating and rattling due to vibrations of the vehicle in which the chair is installed. Furthermore, the construction of the chair back condenses the amount of space usually taken up by chairs of this type. If desired the back frame 6 may be either folded upon the seat cushion or swung backward to approximately a horizontal position by unscrewing the set screws 42 until they clear the slots 44.

From the foregoing description taken in connection with the accompanying drawings, it will be understood that I have provided a chair having a simple and inexpensive back frame including a rear member 10 which is reinforced by the marginal tubular guide members 15, and a front member 8 which is reinforced by the right angular flanges 13 and shafts 12, so that extraneous reinforcing means are not required. Also it is understood that the front and rear members 8 and 10, respectively, can be assembled at a minimum expenditure of time and labor as the ends of the shafts 12, the angle-plates 19, and the rollers 14 can be readily inserted in the upper open ends of the slots 16 and the tubular guides 15, respectively, after the springs 17 have been installed in said guide members and rest upon the abutments 18.

The modified form disclosed by Fig. 9 is somewhat similar to the preferred form hereinbefore described, as is evident by corresponding reference numerals with exponents *a*, the main differences residing in the omission of the seat base 4 and direct hinge connections 21*a* of the rear ends of the seat frame 2*a* to the lower ends of the tubular guide members 15*a* of the back frame 6*a*. This modified form is intended more particularly to provide a comfortable substitute for the relatively hard and uncomfortable cushions usually employed in the seat frames A of trucks and like vehicles.

While I have shown a preferred form and modified form I reserve all rights to such other forms and modifications thereof as properly fall within the scope of the invention as claimed.

Having thus described my invention, what I claim and desire to secure by Letters Patent is:

1. In a reclining chair, a tubular seat frame having upwardly curved rear ends, a back frame adapted to swing up or down comprising a rear

member having tubular guide members and a front member which is free to move up and down on the rear member, transverse means fixed to the rear side of the front member having ends movable up and down in said tubular guide members, supporting means including resilient elements in the tubular guide members adapted to cooperate with the transverse means in supporting the front member, pivotal means connecting the seat frame to the rear member of the back frame, segmental racks pivotally associated with the rear member and projecting freely into the respective rear ends of the tubular seat frame, said racks and rear ends being concentric to the pivotal means connecting the seat and back frames, and detents associated with the rear ends of the seat frame and adapted to engage the racks to secure the back frame at any point to which it may be swung.

2. In a chair, a back frame comprising a rear plate and a front plate which latter is movable up and down on the former, tubular guide members integral with the two marginal sides of the rear plate and of substantially rectangular cross section, confronting sides of said guide members being slotted longitudinally and projecting forwardly beyond said longitudinal slots, the side margins of the front plate extending forwardly at right angles thereto and then laterally outwardly to slidably engage the confronting sides and the front portions of the guide members, respectively, spaced shafts fixed to the rear portion of the front plate and extending into the guide members through the respective longitudinal slots, means including coil springs arranged within the tubular guide means to cooperate with the shafts in supporting the front plate, and rollers mounted upon the ends of the shafts and adapted to traverse the interior of the guide members.

3. In a reclining chair, a seat frame, a back frame comprising a rear plate and a front plate, said rear plate being formed at each side with a tubular guide member having a longitudinal slot therein ,said front plate having longitudinal side flanges adapted to slide up and down on the front sides of the guide members, spaced shafts fixed to the rear side of the front plate



and projecting at their ends into the tubular guide members through the slots in the latter, antifriction rollers mounted on the shafts and adapted to traverse the inner portion of the guide members, means yieldably cooperating with the shafts and the guide members in holding the front and rear plates in assembly with each other, and means adjustably connecting the lower ends of the guide members to the rear end of the seat frame.

4. In a reclining chair, a seat frame, a back frame comprising a rear plate and a front plate, said back plate having its opposite sides formed into tubular guide members provided with longitudinal slots confronting each other, said front plate having longitudinal side flanges bent forwardly and outwardly to slidably engage the slotted sides and the front sides, respectively, of the guide members, means on the front plate projecting into the tubular guide members through the slots thereof to retain the front plate in assembly with the back plate, means in the tubular guide members for cooperating with the means on the front plate in retaining the latter in assembly with the back plate.

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