Jan. 1, 1957 D. T. MILLAR 2,775,996

SLEEPING CHAIR-UNIT

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FIG. 1.

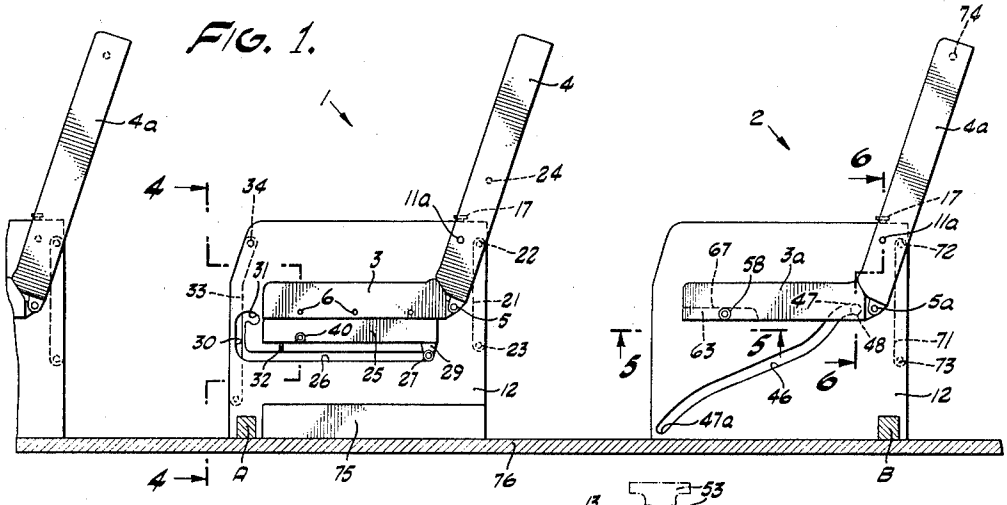


FIG. 8.

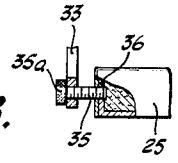
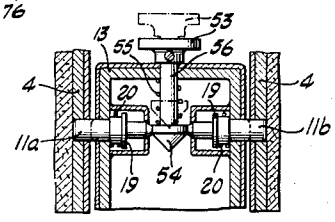


FIG. 7.



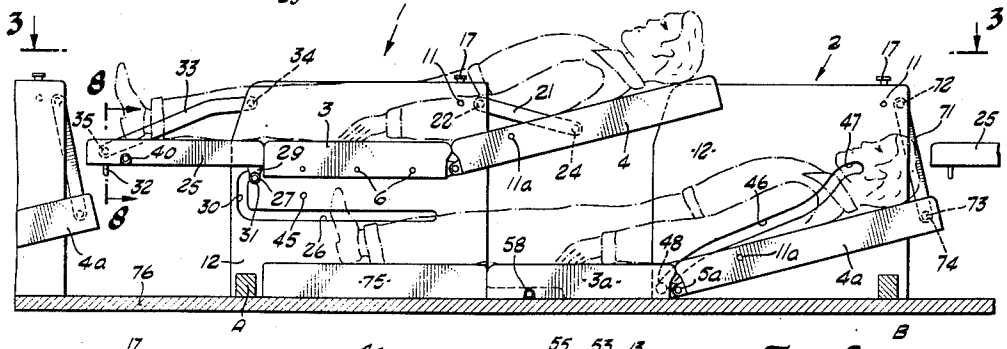


FIG. 2.

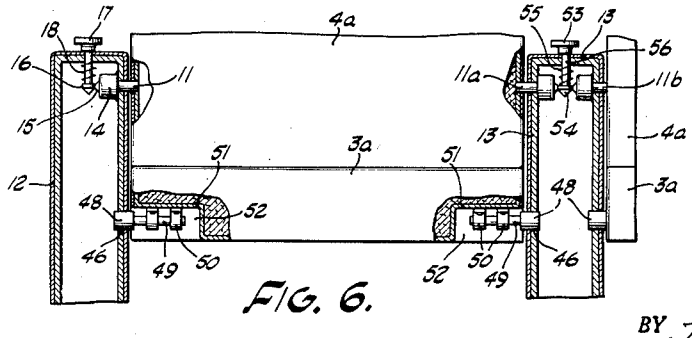


FIG. 6.

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SLEEPING CHAIR-UNIT

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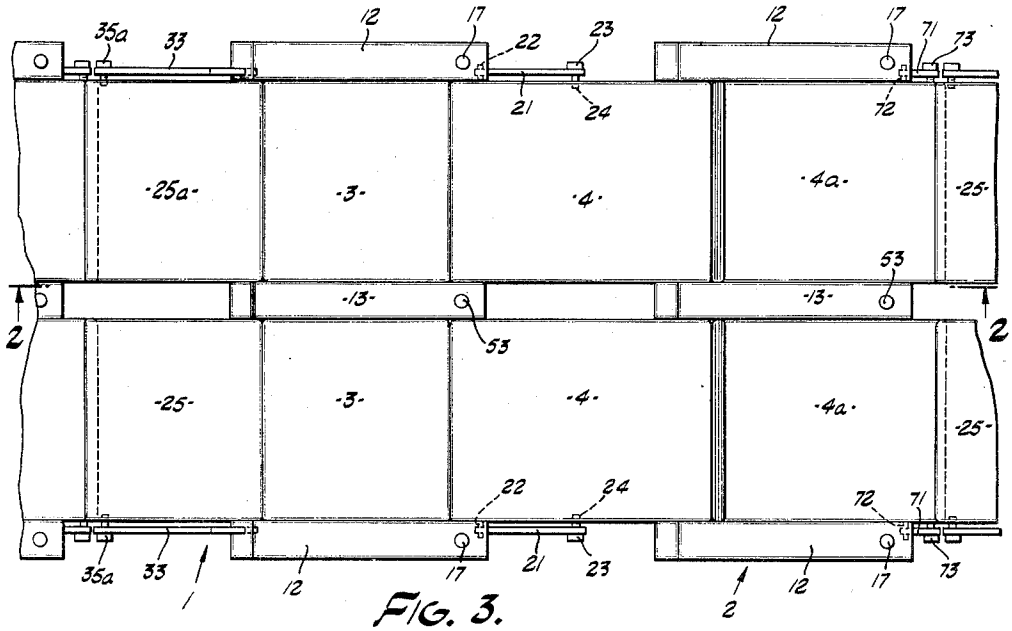


FIG. 3.

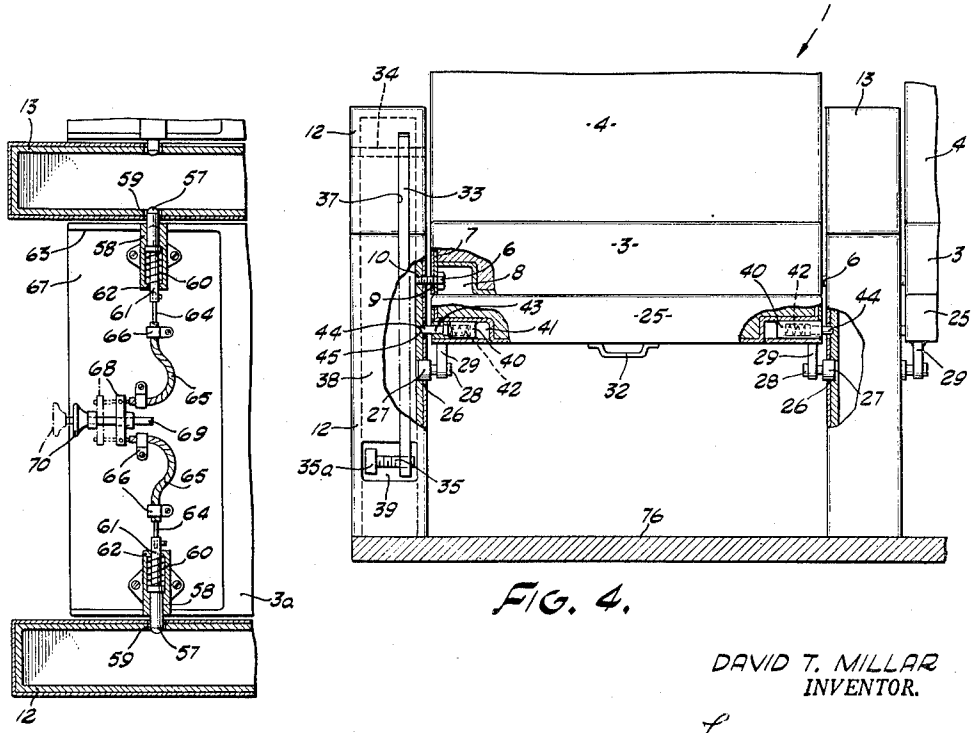


FIG. 5.

FIG. 4.

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United States Patent Office 2,775,996 Patented Jan. 1, 1957

2,775,996

SLEEPING CHAIR-UNIT

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Application September 16, 1952, Serial No. 309,840

5 Claims. (Cl. 155—7)

This invention relates to chairs such as used in busses, Pullman coaches, and the like, that are capable of functioning as upright chairs in which the occupant can sit, and which are also capable of being transformed into a second position on which the occupant can recline.

As usually constructed the chairs of this type are located in a row, one behind the other extending in a front-and-rear direction, and if and when the chairs are disposed in their "reclining" position the seats of the chairs are all at the same level; and although they are sometimes constructed so that it is possible for the lower limbs of the occupant of a rear chair to extend partially under the seat of the next chair in advance, nevertheless, his knees must be left in a slightly bent condition. In other words, with such chairs as now usually constructed, it is not possible for the occupants of the chairs to be supported in a prone or sleeping position, such as when the entire body of the occupant is disposed substantially at the same level.

It is one of the objects of this invention to provide means for accomplishing this desirable effect, that is, to enable the chair occupants to be supported prone as in a bed.

Another object of the invention is to provide a unit construction for the chairs composed of at least two chairs having features of construction that will enable both of them to assume a position for their seats and backs that will enable the occupants to assume a substantially lying position as in a bed or berth; also to accomplish this by simple means embodied in the constructions of the chairs.

In one aspect my invention may be regarded as enabling two "tandem disposed" chairs normally in an upright seating position, to be quickly transformed into two chairs with their seats and backs disposed in a "reclining" position, and disposed or related in such a way that the leg portion of the body of the occupant of the rear chair can extend to considerable distance forwardly, and with ample clearance, under the forward chair.

Another object of the invention is to provide two such chairs composing such a unit, when operating as berths, with simple means for including a seat extension located forwardly of the seat of each chair to afford support for the feet and extremities of the lower limbs.

The invention also resides in the co-ordinated means employed as accessories or attachments to the chairs to enable them to be quickly altered from their normal upright position to a disposition of their elements that enables them to accommodate occupants in a sleeping position.

Further objects of the invention will be evident from a careful reading of the following specification, and a study of the accompanying drawing.

The invention consists in the novel parts and combination of parts to be described hereinafter, all of which co-operate to produce a novel and efficient sleeping chair unit.

In the drawing:

Figure 1 is a vertical section taken in the plane of the line 2—2 of Figure 3, but instead of showing the chairs

in the relation they have in Figure 2, it shows them in the upright position in which they are illustrated in Figure 1. This view also shows a portion of a third chair ahead of the forward chair in Figure 2.

Figure 2 is a view similar to Figure 1, but shows the chairs with their elements disposed in the relation they have when they are adapted to support the occupants in a sleeping position.

Figure 3 is a plan of the two chairs of the unit when extended as indicated in Figure 2, however, the ends of this view being broken away.

Figure 4 is a vertical cross-section taken in the plane of the broken line 4—4 of Figure 1, to illustrate further details of the preferred features of construction of the forward chair.

Figure 5 is a fragmentary view, and is a horizontal section taken in the plane of the line 5—5 of Figure 1 to illustrate details of the locking mechanism and its controlling means that may be employed for releasably supporting the forward portion of the rear chair's seat.

Figure 6 is a vertical section and is a fragmentary view taken on the broken line 6—6 of Figure 1 on the rear chair, and illustrating the details of the parts included in the releasing means for the back of the rear chair.

Figure 7 is a fragmentary view and is a section taken in the same plane as Figure 6, but is upon a slightly larger scale. It passes through the bolt housing employed where a twin-bolt construction is used on the intermediate or common wall between two front-and-rear rows of seats.

Figure 8 is a fragmentary view taken about on the line 8—8 of Figure 2 illustrating details of means that may be employed for supporting the forward portion of the seat extension for the forward chair when it is in the reclining position.

In practicing the invention I prefer to provide a chair-unit composed of two chairs 1 and 2 that are disposed in tandem relation. They are constructed so that normally they are set up as regular chairs, but so that they can readily be altered or adjusted into a "set-up" in which they are disposed in a substantially horizontal position, which position, for convenience, may be called their "reclining" position.

While most of the features of construction that enable the chairs to assume their two operating positions are not identical, they are correlated so as to enable the two reclining positions for the chairs to co-operate in such a way that the lower limbs of the person lying on the rear seat will project to a considerable distance under the forward chair.

The forward chair 1 includes a seat 3 and a back 4 which are preferably articulated together by means of a pivotal or hinge, joint 5. The seat 3 is preferably secured in a fixed position by any suitable means, as a plurality of fastenings three in number. As indicated in Figure 1, these may be in the form of small bolts 6 (see Figure 4). These bolts are applied through the outer wall 7 of a bolt housing 8 which is set in the bottom and side edge of the seat at each side and extending along back so as to carry all the bolts 6. These bolt housings are sufficiently wide horizontally to provide clearance to enable the bolts to be passed up into the space within the housings and pushed outwardly through openings such as the openings 9 (see Figure 4) with their threaded ends received in threaded sockets such as the socket 10.

In the "chair" position or "set-up" indicated in Figure 1, the back 4 may be held in the usual upright, but slightly inclined position by means of a releasable bolt 11 such as indicated in Figure 6. This bolt 11 is a single-type bolt which is used when the bolt is mounted in an outside box-form wall 12, and corresponds in construction to one half of the twin-type bolt construction that is used in an intermediate or common box-form wall be-

tween two tandem chairs located alongside each other, as indicated in Figure 3. The bolt **11** is spring-pressed in locking position, that is, toward the wall **12** at the back, to maintain it in an opening or socket provided for it. This bolt has an enlarged head in a bolt housing **14** through which its tip **15** projects. This tip lies within the path of a conical head **16** on an operating stem having a knob **17** for pulling it.

A coil spring **18** holds the conical head **16** with the large diameter of the cone opposite the tip **15** of the bolt **11**. When it is desired to release the bolt **11** this is accomplished by pulling up on the knob **17**, whereupon a spring under the head of the bolt **11** will withdraw the bolt from the socket **11**. A spring such as this is illustrated in Figure 7, and will be further described in connection with the twin-bolt device shown in Figure 7. This twin-bolt construction has two bolts **11***a* and **11***b* which project in opposite directions from the opposite sides of the intermediate wall **13** (see Figures 6 and 7) so that their tips can engage in sockets in the sides of two backs **4** of two forward chairs disposed alongside of each other.

Figure 7 shows the large bolt heads **19** with flanges against which coil springs **20** thrust to hold the bolts normally engaging their sockets. This is their position when the chair backs **4** and **4***a* are in their upright position. After releasing the side bolts **11** and **11***a* the back **4** can be dropped back to the depressed position as indicated in Figure 2. Suitable means is provided for supporting the back in such position which, if desired, may be slightly inclined as shown. In the present instance this means includes two links **21** which normally hang pendant from their supporting bolts **22** respectively (see Figure 1). The lower end of each of these links **21** carries a threaded bolt **23** adapted to fit into a threaded socket **24** in the side of back **4**.

Beneath the seat **3** (see Figure 1) there is a foot member or extension seat **25**, which is preferably supported near the underside of the seat **3**. This part is provided with means to facilitate its being lifted, and set up in a forwardly disposed position in front of the seat **3** as indicated in Figure 2. Any suitable means may be provided for this purpose, and in the present instance such means includes two guide-channels or slots **26** on the inner faces of the side-walls of the chair (see Figure 4), in which two rollers **27** run respectively, said rollers being carried on the ends of long pins **28** carried on brackets **29**.

These slots **26** have upwardly turned extensions **30** at their forward ends that terminate in rearwardly and downward extensions in the form of hook shaped sockets **31**.

In transferring the seat extensions **25** from the position shown in Figure 1 to that shown in Figure 2 it is merely necessary to seize a small handle **32**, and pull the seat extension forward. When doing so its rear end is supported in the slots **26**; and when the rollers **27** arrive at the extensions **30**, the seat extension **25** should be lifted and pushed slightly toward the seat **3** so that the rollers can then drop down into the sockets **31**. This will support the rear end of the seat extension **25**. Any suitable means may be provided for supporting the forward end of the extension **25**.

In the present instance this is accomplished by utilizing two links **33** (see Figure 2), that are normally pendant from pins **34** like the pins **22** that support the rear links **21** already described. The lower end of each link **33** carries a screw **35** the end of which is threaded to be received in a threaded socket **36** in the adjacent side of the seat extension **25** (see Figure 8).

Figure 4 shows one of the links **33** at rest and indicates how it hangs in a slot **37** in the forward face **38** of an outside wall **12**; and also indicates the presence of a pocket **39** that is formed in the forward face of this wall in which the screw **35** and its knurled head **35***a* is carried.

Figure 4 also illustrates means mounted in the forward end of the seat extension **25** for yieldingly supporting it stowed away under the seat **3** when not in use. For this purpose the upper portion of each bracket **29** is formed into a spring housing **40** that is welded into a channel **41** countersunk into each edge of the extension **25**. A coil spring **42** in the spring housing presses the bolt **43** outward so that its rounded nose **44** fits into a shallow curved socket **45**, from which it will release itself automatically when the foot extension is drawn out by pulling on the handle **32** as described above.

Referring to the features of construction that enable the upright rear chair to be transformed into a depressed berth it should be understood that the back **4***a* and the seat **3***a* of the rear chair are articulated by a joint **5***a*, and these parts are similar to the corresponding parts in the forward seat, in fact these parts can be identical, fundamentally. But, in accordance with my invention I provide means of some kind to enable the seat **3***a* to be moved down to a depressed position, and provide means to allow the back **4***a* to be swung down also on its joint **5***a* to a depressed position. Any suitable means may be employed for this purpose, but in the present instance (referring particularly to Figure 6) I provide the intermediate side walls **12** and **13** of the rear chair on their inner faces with guide means, for example, comprising guide grooves or slots such as the slot **46** illustrated in Figures 1 and 2. Each of these slots has its rear end formed with a substantially horizontal extension **47**, and the body of the slot is inclined downwardly toward the front and has its forward end rounded below, as shown most clearly in Figure 1, to form a socket **47***a*.

The rear end of the seat **3***a* is provided with two outwardly projecting pins or rollers **48** that are received in the guide slots **46**, respectively and these rollers are mounted on stub-shafts **49** respectively, mounted in bearings **50** that are secured in angle form housings **51** that are countersunk into the bottom of the seat **3***a* at each side where they are received in recesses **52**.

The back **4***a* is normally held in its upright position by two bolts, one the bolt **11** shown at the left of Figure 6 that forms part of a releasable detent that can be released by pulling up on the knob **17**. When this movement occurs a coil spring similar to the springs **20** shown in Figure 7, will withdraw the bolt **11** from its socket in the side or left edge of the back **4***a* as shown in Figure 6.

The bolt **11***b* for locking the other side of the back **4***a* is in line with the bolt **11** and has the same fundamental construction except that it is part of a twin-bolt device such as illustrated in Figure 7 that carries an operating knob **53** for pulling up a cone **54** similar to the cone **16** (already described) and normally held down by a coil spring **55** on the stem **56** that carries the knob **53** and the cone **54**. The widest part of this cone engages the rear ends of the bolts **11***a* and **11***b* and as soon as the knob **53** is pulled up the bolts **11***a* and **11***b* will be withdrawn by their springs **20**.

The forward end of the seat **3***a* is supported in its normal position (Figure 1) by two bolts **57**, see Figure 5 (which by the way is a section looking upward from the section line **5—5** shown in Figure 1). These two bolts are mounted opposite to each other in bolt housings **58**, the ends of which are normally held in their sockets **59** in the side walls **12** and **13** by coil springs **60**. While they could be withdrawn separately by pulling upon the stem **61** integral with each bolt that projects through the rear end of head **62** of each housing **58**, I prefer to provide means for withdrawing these two bolts simultaneously. The two bolt housings **58** are attached to the side wall of a large rectangular recess **63** that extends throughout substantially the entire width of the seat, and in the middle portion of this recess I provide two flexible cables **64** carried in sheaths or flexible hose **65**. The ends of the two sheaths are supported in hangers **66**

attached to the upper wall **67** of the recess **63**, and the two flexible shafts or cables are attached at their inner ends to a cross-head **68**, the middle portion of which is attached to a long threaded bolt **69** which may carry a lock-nut, if desired, as indicated; and the outer end of this bolt carries a knob **70** operating as a handle for pulling the flexible cables **64**.

In order to support the back **4***a* in its depressed position I employ a pair of links **71** which are normally disposed in a vertical position pendant from their supporting bolts **72**. They are normally housed in recess in the rear faces of the side walls, similar to the recess **37** at the forward faces of the side walls of the forward chair. They have threaded bolts **73** at their lower ends to be received in corresponding threaded sockets **74** at elevated points on the chair back.

In order to support the forward ends of the limbs of the occupant of the rear chair when berthed below the forward chair, I prefer to provide a cushion or thick pad **75** that may lie on the floor **76** directly in front of the seat **3***a*. As this pad **75** is not in the way of any moving part it can be left in the place it should occupy. So, if desired, it can be secured there.

It is obvious that in practicing my invention, two tandem arranged chairs can be employed, the rear one of which is capable of being transformed into a berth by any means whatever which may not necessarily be identical or even resemble the means I prefer to employ for effecting this transformation for the rear seat into a low level berth. Likewise the forward chair can be provided with any other kind of means for transforming it into a high-level berth.

With two chairs so constructed either one or both of them can be provided with rollers, carried on the side walls of the chairs and guided on the chair frame or car floor for enabling them to be shifted into the relation shown in Figure 2. It would, of course, be necessary to provide means for holding the two chairs fixedly in their positions to which they have been moved on their rollers and guides.

In such a case it would be desirable to have the side walls of the forward chair connected to each other by a cross bar A for the forward chair to connect its side walls, thereby enabling the side walls and the bar A to operate as a unitary carriage; a similar bar B will be used for connecting the side walls of the rear chair. In order to enable these bars to operate without interfering with any other moving parts of the chairs I prefer to have the bar A locked toward the front and the bar B located toward the rear of their corresponding chairs.

The practice of this invention enables a greater number of chairs to be installed in busses and in the coaches of trains on a given floor length, by reason of the fact that the overall length of each pair of tandem chairs is considerably reduced. The achievement of this result is one of the objects of my invention.

Many other embodiments of the invention may be resorted to without departing from the spirit of the invention.

I claim as my invention and desire to secure by Letters Patent:

1. A chair-unit comprising a forwardly disposed chair and an adjacent rearwardly disposed chair, said chairs facing in the same direction, said rear chair including a seat and a back articulated to the rear portion of the seat, means for normally holding the seat and the back in a normal relation for supporting one's body in a sitting position, side walls for the rear chair between which its seat and back are mounted, means including guides on the inner faces of the side walls, and means projecting from the side edges of the seat received in said guides for effecting the guiding of the said seat forwardly and downwardly into a horizontal depressed position, directly and flatly resting upon and supported by, the floor, means

for supporting the forward edge of the back at substantially the same level as the depressed seat, thereby enabling the same to support the body in a reclining position with the lower limbs lying in a horizontal position under the seat of the forward chair.

2. A chair unit according to claim 1, including means located forward of the seat for supporting the feet and lower portions of the legs at substantially the level of the upper face of the depressed seat.

3. A chair-unit comprising a forwardly disposed chair and an adjacent rearwardly disposed chair in alignment therewith, said forward chair including a seat and a back articulated together, means for normally holding the seat and the back in a relation to function as an upright chair, said chair having side walls between which its seat and back are mounted, a seat extension with means for normally supporting the same under the seat, guiding means on the inner faces of the side walls for effecting the guiding of the seat extension forwardly and upwardly and including sockets located at about the level of the seat, means projecting from the side edges of the seat extension adjacent the rear edge to travel along said guiding means and finally entering said sockets to support the rear edge of the seat extension in a raised position at about the level of the seat and forward of the same, means including links pivotally supported on the said chair sides and pivotally attached to the chair back for supporting said back in a let down position substantially horizontally in line with the horizontal plane in which said seat is located, a pair of tension links pivotally supported respectively on the sides of the forward chair above the level of the seat extension with means at their free ends for connecting the same to the forward portion of the seat extension at the sides thereof and co-operating with the seat and lowered back to enable the occupant of the forward chair to lie extended in a substantially horizontal position, said rear chair having a seat and a back articulated thereto, and having means for effecting the guiding of the seat on the rear chair forwardly and downwardly into a depressed horizontal position resting on, and supported by, the floor, said rear chair also having means for holding the back thereof in a depressed position so that the seat and the back of the rear chair are disposed at substantially the same level, and so that the lower limbs of an occupant reclining on the seat and back of the rear chair will lie under the seat of the forward chair and occupy a portion of the space which the said seat extension occupied when the forward chair was set up to function as an upright chair.

4. In a two-chair unit, the combination of a forward chair and a rear chair behind the first chair and facing in the same direction, said forward chair having box-form sides with a fixed seat between the same and supported thereby, box-form sides for the rear chair, a back for the first chair jointed to the rear portion of the fixed seat, hand operated means on the sides of the forward chair for holding its back in an inclined substantially upright position, and in a lowered position at substantially the level of the fixed seat, a seat-extension supported removably immediately under the fixed seat, guide means on the inner faces of the sides of the forward chair and cooperating means for the same carried by the seat extension functioning with the guide means for enabling the seat extension to be pulled forwardly, raised, and supported in a fixed position at the level of the fixed seat, said rear chair having a rear seat normally in an elevated position between its box-form sides, hand-controlled means including movable pins carried adjacent the forward edge of the rear seat for supporting the same on the said rear chair sides, the rear portion of the said rear seat having laterally projecting pins, and the adjacent faces of the rear chair sides having guide ways thereon for said last named pins, said guide ways being elevated at their rear ends and cooperating with the said pins at that point to support the rear seat normally in

said elevated position, said grooves having their forward ends located at a depressed low level to enable the rear seat, when the removable pins have been released, to descend substantially to the floor level below the first position of the seat extension, under the fixed seat and bodily forward of the forward chair; and a pad located between the sides of the forward chair and supported at substantially the same level of the depressed rear seat, and operating to support the lower limbs of an occupant of the rear chair reclining therein; and means carried by the rear portion of the sides of the rear chair for supporting the rear and upper end portion of the rear chair back in a depressed position.

5. A two-chair unit according to claim 4, in which the said pad is maintained located in a position such that its rear edge will be abutted against by the forward edge of the seat of the rear chair when the same is in its depressed position.

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