July 22, 1941. E. G. EMERY, JR., ET AL 2,250,193

CONVERTIBLE SEAT AND BERTH ARRANGEMENT

Filed April 14, 1937 4 Sheets-Sheet 1

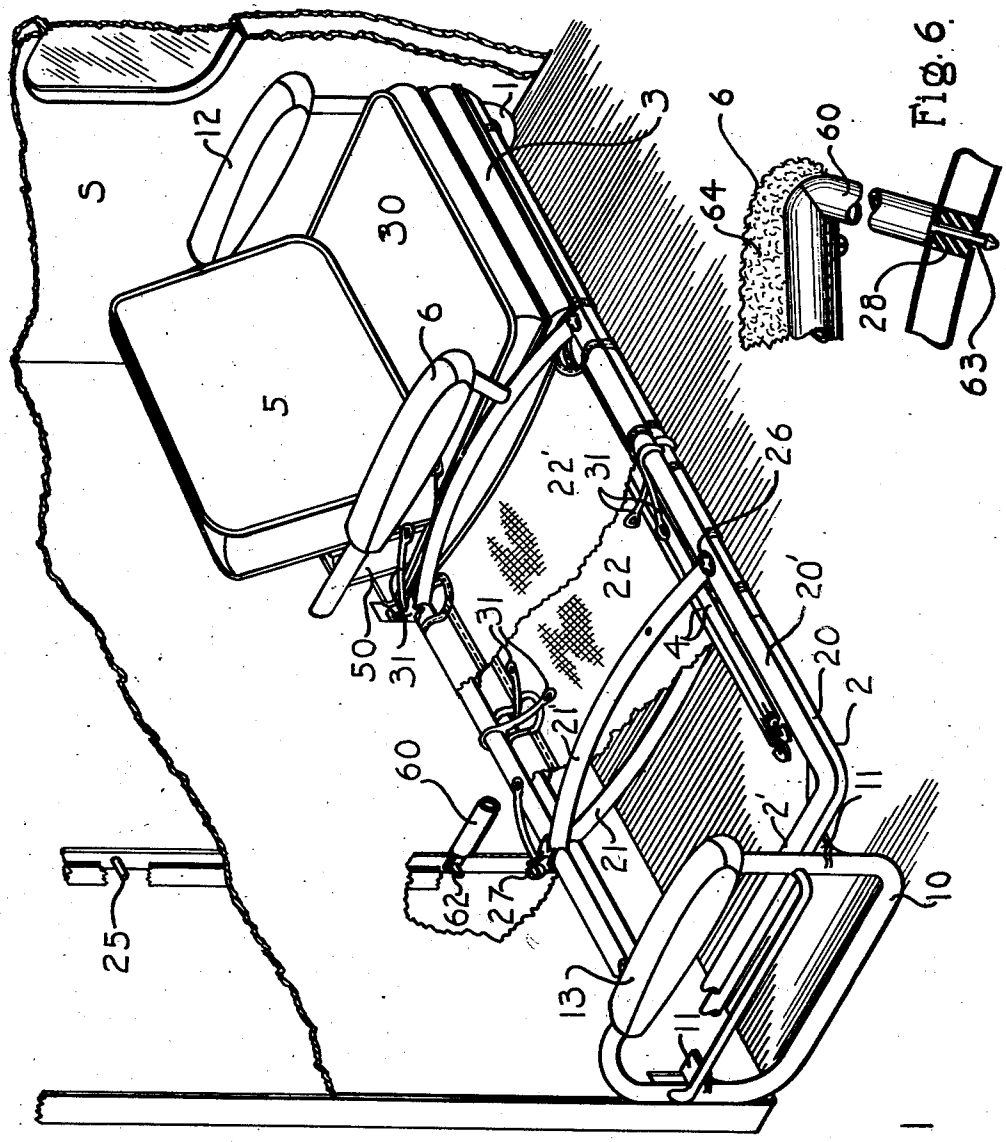

Fig. 6

Fig. 1

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Filed April 14, 1937 4 Sheets-Sheet 2

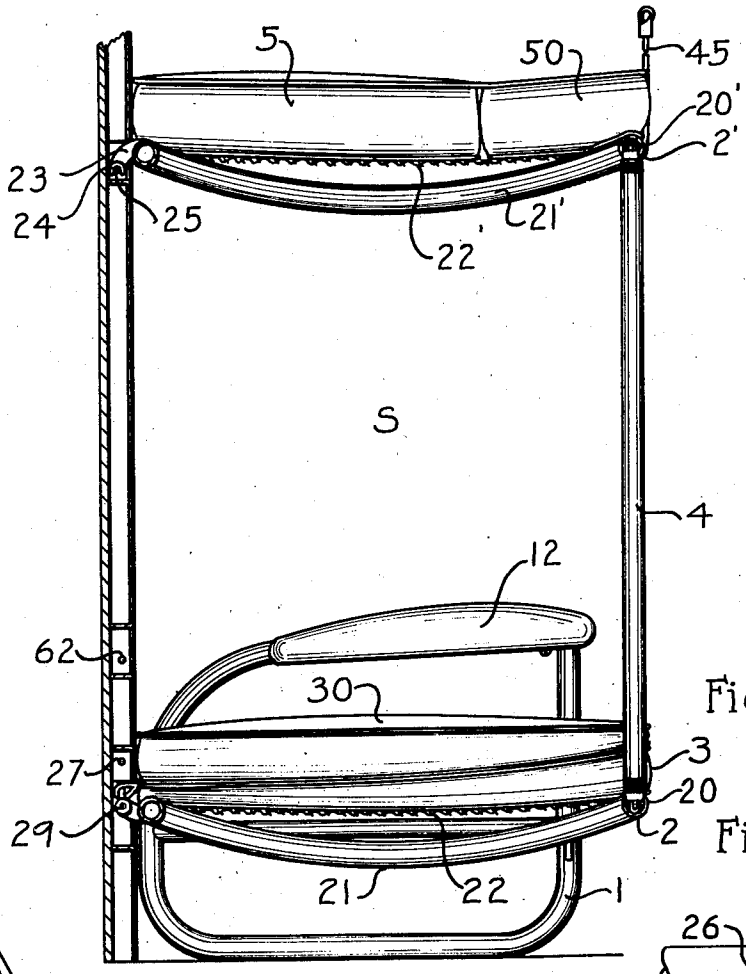

Fig. 3

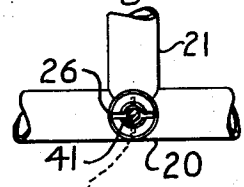

Fig. 5

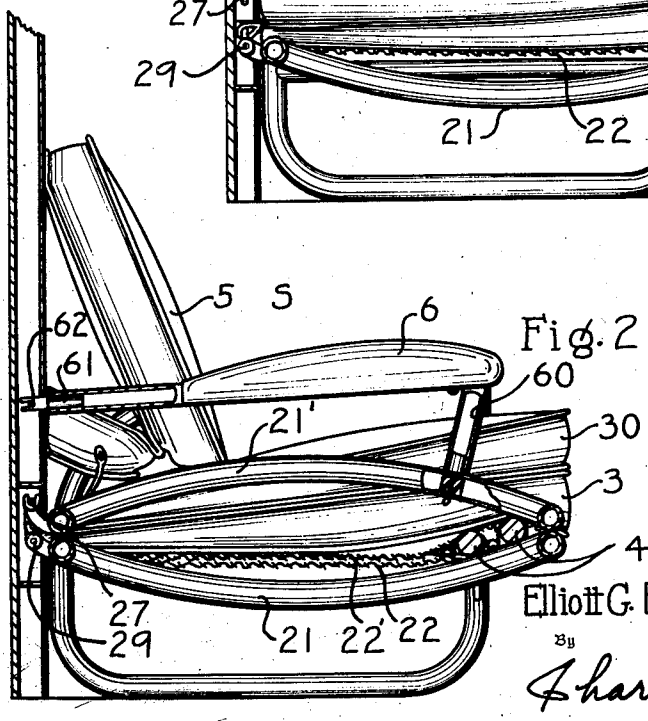

Fig. 2

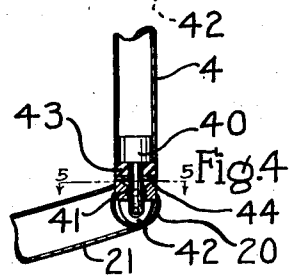

Fig. 4

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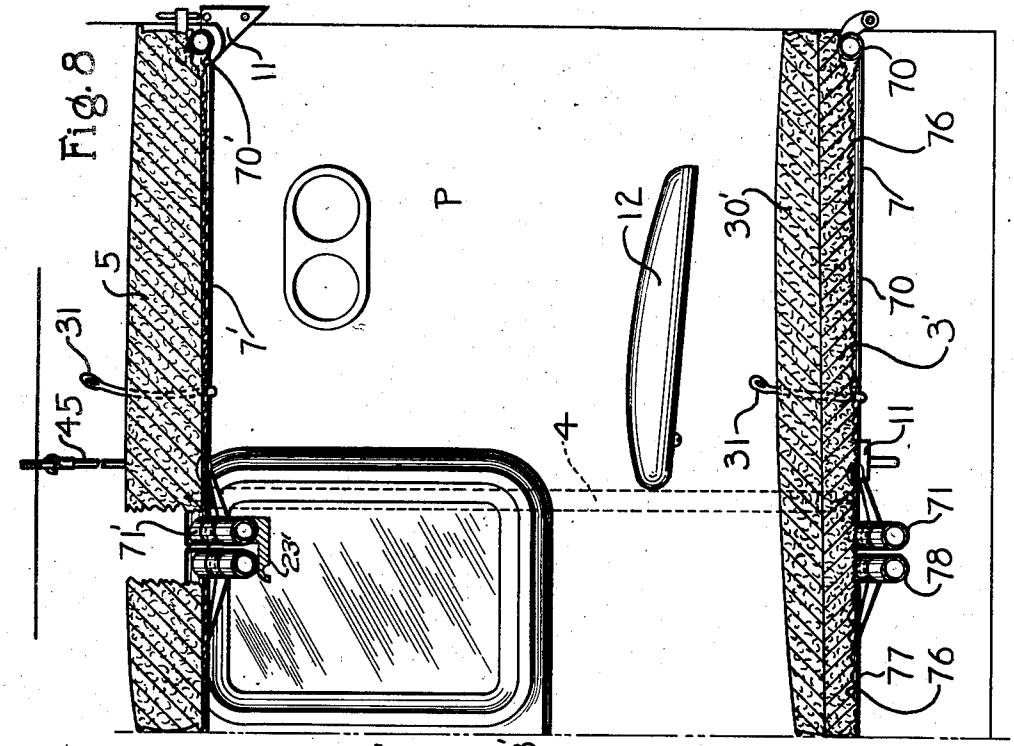
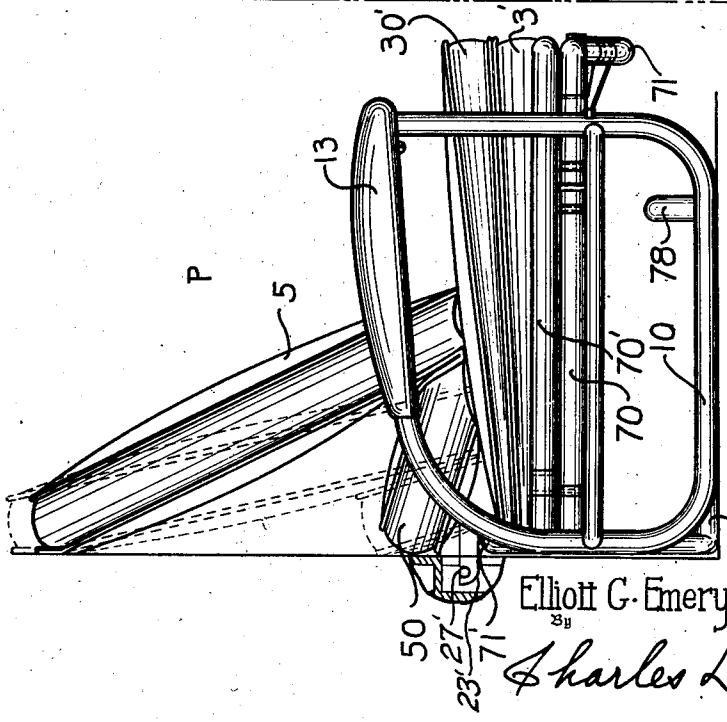
CONVERTIBLE SEAT AND BERTH ARRANGEMENT

Filed April 14, 1937 4 Sheets-Sheet 3





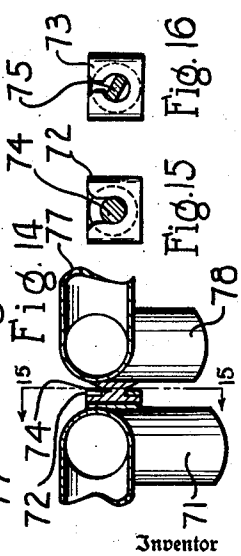


Fig. 7

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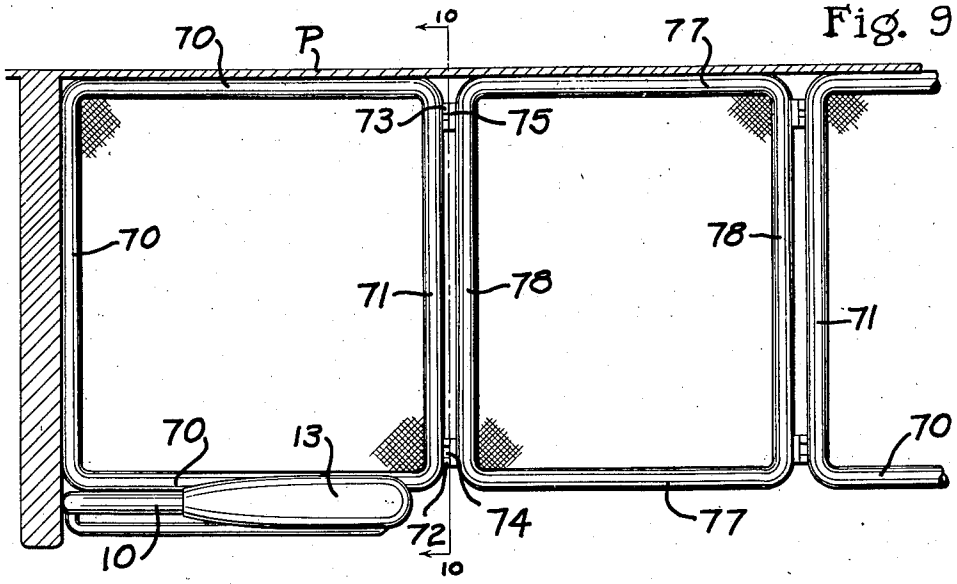
CONVERTIBLE SEAT AND BERTH ARRANGEMENT

Filed April 14, 1937 4 Sheets-Sheet 4

Fig. 9



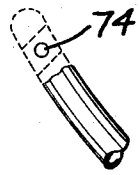


Fig. 12.

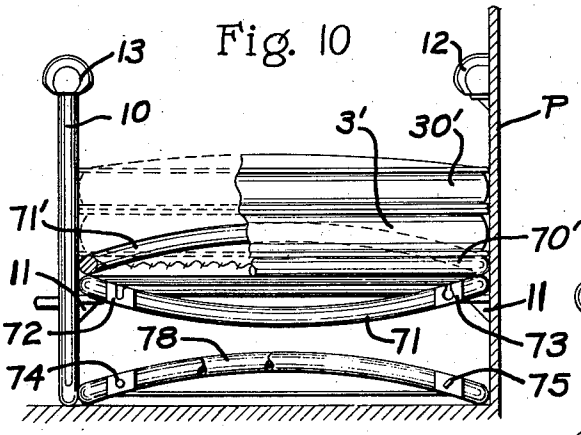


Fig. 10

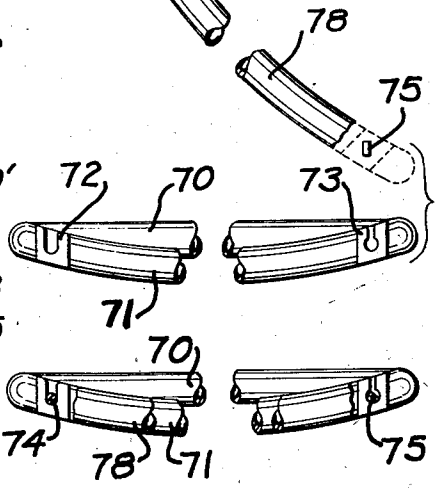


Fig. 13

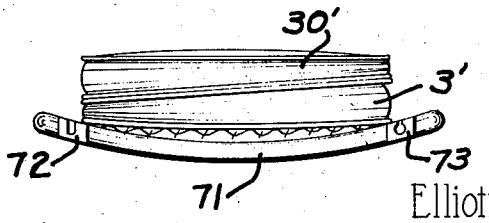


Fig. 11

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UNITED STATES PATENT OFFICE

2,250,193

CONVERTIBLE SEAT AND BERTH ARRANGEMENT

Elliott G. Emery, Jr., and Hudson T. Patten, Jr., Seattle, Wash., assignors, by mesne assignments, to Boeing Aircraft Company, Seattle, Wash., a corporation of Washington

Application April 14, 1937, Serial No. 136,742

23 Claims. (Cl. 155—6)

Our invention is for an arrangement which can be set up either as a seat or as a berth, and preferably as an upper and a lower berth, which arrangement is particularly suited for employment in an airplane or similar vehicle.

Characteristics of our device are its compactness and light weight coupled with its simplicity of construction of elements which may be converted from incorporation in a berth assembly to a seat with ease. Such a structure is well adapted for use in airplanes where reduction of weight to a minimum is of extreme importance and space is limited.

The principal object of our invention is to provide such a structure which can be made up into a spacious and comfortable seat, or which can be transformed almost entirely by use of the seat elements into a berth and preferably both an upper and a lower berth, which will be of standard length and of comfortable width. Such an upper and lower berth may be formed from a single seat of a width equal to the length of the berth, or from the elements in combination of two seats of normal depth facing each other.

In referring to the seats they will be considered as having depth from front to rear, and as having width transversely to their depth, but in referring to the berths their length will be understood as running lengthwise of the occupant, and their width will be the distance from side to side. It will be seen that the length of one type of berth will be the width of the seat from which it is formed, whereas the length of the other berth will parallel the depth of the seats from which it is formed.

It is a further object to provide such a seat arrangement, and cushions therefor, that the seat and back cushions may be used as mattresses, when the structure is converted into berth form, yet to employ cushions in the seat of a form that is most conducive to the comfort of the occupant. Frames to support such cushions as mattresses are constructed so that they may be stored quickly in small space, preferably as part of the seat, and though strong will be light, to facilitate handling, and to lessen the nonpay load in an airplane.

Another object of our invention is to provide easily removable upper berth supports, arm rests, and similar elements which can be assembled and taken down quickly, and stored as part of or in association with the seat, but which when in place or when so stored will be held securely, so that they cannot become disconnected or dislodged unintentionally.

Still other objects, and in particular those inherent in the unique details of our device, will be discussed hereafter.

Our invention includes the novel form and construction of the several parts of our combination, as well as the assembly of such parts into a seat structure or into a berth structure, and the convertibility of such assembly from one structure into the other, as illustrated in the drawings and described in the specification, the novel characteristics of which are defined in the claims appended hereto.

The drawings, it will be seen, illustrate representative forms of our invention which have been found to be practicable. For installations of different types, however, it will be evident that alterations within the scope of our invention may be effected by one skilled in the art to adapt our invention better to the exigencies of the particular situation at hand.

Figure 1 is a perspective view of our device in seat-forming position, showing certain parts removed and certain other parts broken away.

Figure 2 is a transverse section of our device in seat-forming relation, showing certain parts partially in elevation and partly in section. Figure 3 is a view similar to Figure 2 except that the parts are shown in berth-forming relation instead of in seat-forming position.

Figures 4, 5 and 6 are fragmentary views, showing details of our device, Figure 4 being a vertical section of a portion of Figure 3, while Figure 5 is a plan view taken along the line 5—5 of Figure 4. Figure 6 is a side elevation view of a portion of Figure 2, showing certain parts in section.

Figure 7 is a side elevation view of a slightly modified form of our invention, showing the parts in seat-forming relation, while Figure 8 is a section taken transversely of one-half of a facing seat arrangement from one end thereof to the center line, of the type shown in Figure 7, with the parts in berth-forming position.

Figure 9 is a view in plan, with parts broken away, of frame members of the type shown in Figure 7, in berth-forming position.

Figure 10 is a view in elevation taken along the line 10—10 in Figure 9 except that the parts are shown in seat-forming position as in Figure 7.

Figure 11 is a fragmentary view taken along the same line but showing the disposition of the trapezoidal seat cushions in mattress-forming position.

Figures 12 and 13 are fragmentary elevation

and sectional views, respectively, Figure 12 illustrating the manner of assembling the frame members of Figure 9 in berth-forming position, and Figure 13 showing them assembled.

Figure 14 is a fragmentary vertical section, showing in detail one connection in a joint between the berth's sectional frames of Figure 9.

Figure 15 is a vertical section of the same joint connection, taken on line 15—15 of Figure 14.

Figure 16 is a section similar to Figure 15 through the other connection of the frame joint shown in Figure 9.

While the form of our device shown in Figures 7 and 8 has been described as a modified form, it employs the same principles of construction, and may advantageously be combined with a construction of the type shown in Figures 1 to 6 inclusive. Thus two oppositely facing seats of the type shown in Figure 1 may project from a starboard wall S, of an airplane cabin, for example, while a seat and berth arrangement of the type shown in Figures 7 and 8 may be disposed at the aisle end of the seat arrangement of Figure 1, projecting from the port wall P of the cabin. The two oppositely facing seats on the starboard side, seating three persons each, will seat in all six persons, and will provide sleeping accommodations for four persons, while the modified seat arrangement on the port side of the cabin, including two oppositely facing seats, will seat four or two persons, depending upon its width, and will provide sleeping accommodations for two persons. Thus such a port and starboard assembly might form a compartment providing spacious and comfortable seating accommodations for ten or eight persons and sleeping accommodations for six persons.

While the suggested arrangement is convenient and practicable, it is evident that for cabins of large size an arrangement such as illustrated in Figure 1, including two oppositely facing seats, might be installed both on the starboard and on the port side of the cabin to increase the seating and sleeping accommodations. On the other hand, for a narrower cabin, the arrangement shown in Figures 7 and 8 might be used exclusively, sets of oppositely facing seats of this type being placed on each side of the cabin.

Describing first the seat and berth structure of Figures 1 to 6 inclusive, reference is made to Figure 3, showing our device in berth-forming position. Between two fixed end supports 1 and 10 (see Figure 1) is supported a frame 2 of approximately 6 feet in length and 2½ feet in width. To provide a frame of maximum strength for its weight it is composed of a rectangular marginal member in the form of a metal tube 20, preferably of an aluminum alloy, which is strengthened centrally by transverse struts 21. These struts are preferably curved downwardly so that a dished frame is formed, across which may be stretched a sheet of flexible material 22 such as canvas or netting, which, under the weight of an occupant, will sag somewhat into the dished frame to provide a resilient support of comfortable contour. This sheet may be secured to the frame in any suitable manner. The frame 2 may be supported from the end members 1 and 10 by brackets 11, and since it is unnecessary to remove this frame it may be permanently secured to such members by screws or like securing means, and also to the wall, if desired. It may be hinged to the wall, as at 29, whereby it may be swung upward for cleaning beneath it. The lower berth is completed, as shown in Figure 3, by the superposition of two trapezoidal cushions 3 and 30 to form a mattress. By the term "trapezoidal" we refer to cushions which are thicker along one longer edge than along the other longer edge, so that a transverse section will be trapezoidal in shape. This term is also intended to include a cushion of triangular cross section, which, of course, is merely a special form of trapezoid wherein the narrower edge is reduced to a line. Hence when the cushions are superposed with the thicker edge of one substantially in a vertical plane with the thinner edge of the other, a mattress of uniform thickness results.

The upper berth is of the same length and width as the lower berth, and includes a frame 2' much like the frame 2, having a margin 20' and curved cross pieces 21', all of tubular material. A similar cover sheet 22' is also stretched over the frame and secured thereto. The only difference in the frames lies in the manner in which the frame 2' is supported. Lugs 23, projecting rearwardly from the rear edge of the frame 2', in berth-forming position are curved downwardly, and each terminates in a horizontal, cylindrically concave socket 24 extending perpendicular to the lug and adapted to seat upon a horizontal pin 25 secured in the adjacent wall structure in a position parallel to the length of the frame. By the engagement of the socket 24 over the pin 25 the rear edge of the frame 2' is supported, and by engagement of the lug 23 with the upper edge of the wall socket which contains the pin (see Figure 3) the lug can not become disengaged from the pin so long as the frame 2' is horizontal. Engagement and disengagement is accomplished with the frame in a downwardly inclined position. The front edge of the frame is supported in horizontal position from the frame 2 of the lower berth by vertical struts 4, which may be locked into the frame members 20 and 20', or by any other suitable means. Details of a satisfactory lock are shown in Figures 4 and 5.

The lock of the strut 4 to the marginal tube 20 may be the same as the lock between the tube 4 and the tube 20', and hence only one such means will be described. A plug 40 may be welded or bolted into the open end of the tube 4. This plug has an outwardly projecting pin 41 with a spade-shaped head formed by securing to the lower end of the pin a plate 42. This head may be inserted into a slot 26 having an enlarged circular central portion of a size to receive the pin 41. After the plate 42 and the end of pin 41 have been inserted into this slot the strut 4 may be turned through an angle of 90 degrees to dispose the plate in the position shown in dotted lines in Figure 5, so that the head will be locked in the tube 20 and cannot be withdrawn endwise therefrom without rotation. To privide a resilient bearing between each frame and strut, a rubber washer 43 may be interposed between the end of the tube 4 and block 40, and the metal bearing washer 44.

In addition to or in substitution for the struts 4, suspension cables 45, for interconnection between the frame 20' and a ceiling fixture, may be provided to support the upper frame. The upper berth is then completed by using as a mattress the seat back cushion, which is preferably formed of two sections 5 and 50 having adjacent edges hingedly and permanently joined for a purpose which will be described hereafter. When such berth arrangements are used in an airplane it may be desirable to provide anchor loops 31 secured to the side tubes of the frames

to be engaged by belts secured across the seat or berth occupants.

In converting the upper and lower berth structure shown in Figure 3 into a seat, as shown in Figure 2, the seat back cushion, 5, 50, is removed, the struts 4 are rotated into unlocked position, and by swinging upward the front edge of the frame 2' these struts 4 may be removed from both frames. The suspension members 45 are now disconnected. Because of the shape of the socket 24 engaging the pin 25, as shown in Figure 3, it will be evident that the frame 2' cannot be withdrawn directly away from the wall. Instead the now unsupported front edge of the frame must be allowed to swing downward and backward into an inclined position until the open side of the socket 24 faces rearwardly. The frame may now be drawn outward away from the pin 25, and thus completely removed from berth-forming position, and the upper berth has been completely taken down.

Next the cushions 3 and 30 are removed from the lower berth. While these cushions may be of a length to extend from end to end of the berth, we prefer that they be only a fraction of this length, so that the several sets of these cushions which constitute the several seats will be required to fill the complete length. The struts 4 may be stored as shown in Figures 1 and 2 on top of the frame 2, preferably at its front edge, with suitable means (not shown) to hold them in such position. The frame 2' is now inverted, and with the lugs 23 projecting rearwardly, is laid on top of the frame 2. To lock the frame 2' securely in place pins 27 are provided, which are secured to the wall structure directly beneath and parallel to the pins 25. If the front edge of the frame 2' is now raised upwardly, the lugs 23 may be moved rearwardly to engage their sockets 24 beneath the pins 27. Lowering the front edge of the frame 2' will now lock the frame in position, as it was locked in the upper position, but now superposed upon the frame 2. The struts 21 and 21' of the respective frames curve in opposite directions, the latter forming partitions extending transversely of the seat.

The upper portions of the fixed end supports 1 and 10 may be formed and upholstered as arm rests 12 and 13, respectively. Intermediate removable arm rests 6 may be provided, one at each partition formed by the frame struts. While such intermediate arm rests might be formed integral with the struts 21' to project downward from the frame 2' when disposed in berth-forming position, and upward therefrom in seat-forming position, we prefer that they be removable. A suitable construction for these elements is shown in detail in Figures 2 and 6. The core consists of a bent tubular member 60, the horizontal rearward end of which has secured therein, by welding or in any other suitable manner, a plug 61 terminating in a bifurcated plate adapted to engage by endwise movement a pin 62. This pin is secured to the wall structure preferably in a position coplanar with and parallel to the pins 25 and 27.

With the horizontal portion of the member 60 thus supportingly engaged, a pin 63, as shown in Figure 6, having a slightly enlarged head and formed on the end of a plug secured in the upright forward end of the core tube 60, may be inserted into a hole piercing the strut 21' of the frame 2'. To hold the arm 6 steady, and to prevent its accidental disengagement, a rubber bushing 28 may be inserted into and secured in the tube 21', and provided with a hole slightly smaller than the pin 63 and in registry with the strut apertures. The enlarged end of the pin may be forced through the bushing hole, and the pin, thus seated in and gripped by the rubber bushing, will hold the arm rest firmly in place. To complete the arm rest any suitable padding 64 may be secured around the tubular core 60.

With the frame 2' and the arms 6 secured in place in the manner described, the seat may be completed by replacing the seat cushions 3 and 30 and arranging the back cushions 5, 50. These latter, like the seat cushions, are preferably only a fraction of the length of the seat, so that they may be interposed between the arm rests and adjusted according to the individual taste of the occupant of each seat, in the manner hereafter described. When the trapezoidal cushions 3 and 30 are replaced, one of them is reversed so that the two wider edges now lie one above the other, at the front of the seat, and the two narrower edges lie one above the other at the back. With the two thicker edges placed at the front, a rearwardly sloping seat is formed, which is more comfortable than one in which the seat is precisely horizontal.

The back cushion, including the parts 5, 50, may now be arranged with the wider section 5 disposed upright and facing outward from the wall, which serves as a back rest for the cushion, while the narrower section 50 is doubled back beneath the section 5 and lies between the latter section and the wall. This arrangement provides a seat back adjustable in inclination. The lower edge of the section 5 may be slid forwardly to a position such as shown in Figure 7, wherein the section 50 lies flat upon the seat 30. At the other extreme the lower edge of the section 5 may be slid rearwardly at the same time that the rearward edge of the section 50 is being moved upwardly along the wall, until the parts assume the relative broken line positions shown in Figure 7. In Figure 2 an intermediate position of the cushion is shown. In every position of the section 5 it will be evident that the section 50 is disposed in the triangle between the wall, seat cushion and section 5 of the back cushion. Moreover, this section 50 in every position is engaged between and in contact with both the wall and the lower edge of the section 5, so that unless the angle of the section 5 is intentionally changed by altering the angular relationship between the two sections 5 and 50, the angle of the section 5 to the seat will not be disturbed accidentally by pressure thereagainst.

The general structural principles involved in the modified berth arrangement shown in Figures 7 to 16 are the same as those embodied in the form already discussed. An end support 10 provided with an arm rest 13 is employed in this construction, but, as a variation, the supporting bracket on the wall side, instead of being mounted on a separate end support such as 1, is in this case secured directly to the wall, as shown in Figure 8. In this form the distance between the end support 10 and the wall is less than 6 feet, the length of a berth, and preferably is one-half such length. Instead of providing a complete dished berth frame of integral members, therefore, the width of the seat becomes the width of the berth frame, and two facing seats are required for a complete berth, the length of which is from the wall at the back of one seat to the

wall at the back of the oppositely facing seat. However, as the depth of two seats, from rear to front, is still not sufficient to make up the length of a berth, a separable intermediate section or mid-section is interposed between each frame which constitutes a normal part of the seat, as heretofore described. The length of a lower berth frame is thus made up of three sections—two end sections which form part of the seat frames of the two separate chairs, and a mid-section joining them. The upper berth frame is similarly made up of three sections. Such a mid-section is secured to and supported from each corresponding end section, and bridges the gap between the latter. In seat-forming position the separable mid-sections are stowed beneath the chairs, as shown at 77 and 78 in Figure 7, or in any convenient place. One-half of such a berth structure is shown in Figure 8, with the parts in berth-forming arrangement.

Each of the two end sections of the dished lower berth framework is formed with three coplanar marginal members 70 disposed to form one end of a rectangle, and a downwardly curved cross strut 71, corresponding to the struts 21. Each end section, in berth-forming or in seat-forming position, is supported on brackets 11, extending outward from the side wall, and inward from the end frame 10, and by suitable means engaging the end wall, such as a hinge mounting similar to that employed at 29 for the frame 2. Between the downwardly curved struts or ends 71, of the two end sections, is supported a frame mid-section, made up of parallel coplanar marginal side elements 77 adapted to be aligned with the marginal side elements 70 of the end sections, and having their ends joined by downwardly curved cross struts 78. The struts 78 are adapted to be disposed in registry with he struts 71 when the mid-section is inserted between the two end sections to form the complete frame 7. Approximately adjacent the extremities of the transverse struts 71, adjoining the extremities of the transverse struts 78, socket members 72 and 73 are secured to receive headed pins 74 and 75, which project outwardly from the transverse struts 78 of the mid-section. The socket members 73 (Figure 12) consist of a pocket open at the top and having an outwardly facing wall provided with a keyhole slot opening at the upper edge of the wall. The headed pin 75 has a head of a width and thickness for reception in the pocket of the socket member 73, and a shank of rectangular cross section, of a width to move downward through its slot into the lower circular part of the keyhole slot. The width of this rectangular shank approaches the diameter of the circular part of the keyhole slot, so that its rotation out of alignment with the narrow part of the slot will prevent upward movement as in Figure 13. The socket member 72, on the other hand, has in its face a groove extending from the upper edge of the socket wall to the circular aperture, the full width of the aperture. The shank of the engaging pin 74 is therefore not flattened, but is cylindrical, and of a size to drop down through the slot into the bottom of the circular aperture whatever angular position the pin may assume with respect to the socket.

To insert the mid-section of the frame 7 between the two end sections, therefore, the shanks 75 are first lowered edgewise into the socket members 73 at the side of the frame away from the aisle. During this operation the frame mid-section will be held at an inclined angle, illustrated in Figure 12, since the position of the shank 75 as shown in Figures 13 and 16 is that which it assumes when the frame section is horizontal. After such insertion the edge of the mid-section remote from the wall will be lowered until the pin shanks 74 engage in the socket members 72. With the frame rotated to this horizontal position it will be evident that the pin shanks 75 are locked in the sockets 73, and with the parts in such relation a continuous frame, approximately 6 feet long and 3 feet wide, will be formed. Each section of the frame is provided with a sheet of material 76 stretched over it, as in the form previously described. To complete the lower berth the triangular seat cushions 3' and 30' are disposed in superposed relation with the thick edge of one lying above the thin edge of the other, and these are then placed on the frame with their greater dimension extending lengthwise of the frame, two such pairs of seat cushions forming a mattress over the entire length of the frame, but of a width slightly less than the frame width.

The upper berth consists of a frame 7' which is substantially identical with the frame of the lower berth, including a similar mid-section. The side of the frame next to the wall is supported by tension members 45 adapted to be attached to ceiling fixtures. Unintentional upward movement of the frame ends is prevented by provision of a pivoted latch bar to swing out over the marginal tube 70', thereby to hold it down in the supporting bracket 11, or by any equivalent means. Struts 4, as described previously, may be used to support the edge of the upper frame nearer the aisle. When not in use these struts also may be stored between the upper and lower berth frames disposed in seat forming position of Figures 1 and 2 as previously described, or in any convenient storage space. The upper berth is completed by placing lengthwise thereof the greater dimension of the back cushions 5, 50. A full length upper berth will thus be formed, although the width of the mattress elements may be slightly narrower than the frame.

The modified form with the parts in seat-forming arrangement is shown in Figure 7. The frame end-sections of the lower berth remain in position. Each frame end-section of the upper berth, after removal, is placed on a lower frame end-section after being turned end for end and inverted, so that the curved cross strut 71' (see Figure 7) is disposed at the rear of the seat. In this position it will not interfere with the disposition of the seat cushions as shown at 3' and 30' and the marginal member 70', opposite the strut 71', will lie across the chord of the downwardly curved strut 71 and comprise a level support for the front end of seat cushion 3'. Any suitable latching means such as lugs 23' and pins 27' engaged thereby may be provided for restraining the frame end sections of the upper berth from endwise movement, when disposed in this seat-forming position. The seat and back cushions may now be put in place to complete the seat. The mid-sections, including the side members 77 and curved struts 78, may be disposed one under each of the two facing seats, inverted so that the struts 78 curve upwardly, and there secured in stored position. In this modified form it will be noted that no central removable arm rests are employed, for here the cushions are of a width to extend across the entire width of the seat, and each seat can accommodate two persons.

What we claim as our invention is:

1. An upper and lower berth arrangement for an aircraft compartment or the like convertible to form a seat arrangement, comprising a lower berth framework, of a length and width corresponding to that of a berth, means to support the same adjacent its ends, elevated above the floor of the compartment to a height convenient for a lower berth or seat, the same framework including linear marginal tubular members and transverse struts interconnecting the side marginal members at points spaced therealong and downwardly curved to allow space for the sag of mattress means supported from the side marginal members, under the weight of an occupant, thereby to provide a resilient support of comfortable contour, an upper berth framework of substantially the same length and breadth as said lower berth framework and including marginal tubular members and downwardly curved transverse tubular struts interconnecting the side marginal members and corresponding in position to the struts of said lower berth framework, means to support the upper berth framework above the lower berth framework in berth-forming position, said upper berth framework in seat-forming position being formed and shaped to rest when inverted upon said lower berth framework, to form the upper portion of a seat frame, and with its transverse struts upwardly curved to define, in combination with each other and with the end members of said marginal frame, the widths of individual seats, means to maintain the said two frameworks in such relative position in seat-forming position, a flexible web secured to and stretched over each such framework, and seat and back cushion means shaped to rest upon the upper berth framework, between the cross struts thereof, when the latter is in seat-forming position, or to rest upon the said flexible sheets to constitute a mattress when said frameworks are in berth-forming position.

2. The combination of claim 1, and removable arm rests each releasably engaged by an upwardly curved strut of the upper berth framework in seat-forming position, and disposed between the seat cushion means at each side of such strut.

3. An upper and a lower berth arrangement convertible to form similar, oppositely facing seats, comprising a sectional lower berth framework, including an end section separable from the rest of such framework and having an arched cross member, an upper berth framework including an end section separable from the rest of such framework and having a similarly arched cross member, means to support said two frameworks in spaced, superposed, berth-forming position with their arched cross members projecting downward, said upper berth end section being shaped complementally to said lower berth end section to rest thereupon in seat-forming position with the arched cross member of the upper berth section projecting upward and the arched cross member of the lower berth section projecting downward, and seat cushion means of a size and shape to cover said upper berth framework end section when the latter is in seat-forming position.

4. An upper and lower berth arrangement convertible to form oppositely facing seats, comprising a sectional lower berth framework including two end sections, each incorporating linear marginal tubular members and at the central end a downwardly curved transverse tubular strut, and a center section incorporating linear side tubular members and, at each end, a downwardly curved transverse tubular strut, and means to interconnect said center section to each end section of said lower berth framework; means supporting said lower berth end sections in seat and berth forming position, an upper berth framework substantially identical with said lower berth framework, including similar end and center sections, means for supporting said upper berth framework in berth-forming position, an end section of said upper berth framework being shaped for disposition in seat-forming position by being disconnected from the upper berth center section, removed from berth-forming position, swung end for end, inverted, and superposed upon an end section of said lower berth framework supported by said first means, after disconnection of the lower berth center section from such end section, with the transverse struts of said superposed upper and lower end sections disposed at opposite edges of the seat and curved oppositely, means to retain the upper berth end-sections in such seat-forming position, and seat cushion means of a size and shape to cover an upper berth framework end section in seat-forming position.

5. A seat structure convertible to form a berth, comprising a substantially level support, two independent seat cushions each of trapezoidal shape in transverse section and of a size to be disposed in superposed position with their wider faces coplanar and extending along the front edge of the support and their narrower faces adjacent the support's rear edge to form, when supported on said support, a rearwardly inclined seat, or when superposed on said support with the narrower face of one adjacent to the wider face of the other, to form of said two cushions a mattress of substantially uniform thickness.

6. A seat convertible into a berth comprising a frame disposed substantially at seat level, a second similar frame adapted to rest upon the first frame, means engageable with a rear element of the second frame, when tilted upwardly and forwardly, to prevent its movement in its own plane while resting upon the first frame, means disposed above the first means, and supportingly engageable with such rear element of the second frame, when tilted downwardly and forwardly, to prevent its movement in its own plane while disposed horizontally spaced above the first frame, and means to support the forward edge of the second frame, when thus elevated, to hold it in horizontal position.

7. A berth arrangement comprising a framework, two spaced brackets projecting rearwardly from the rear edge of said framework, each provided with a socket, horizontally disposed pins secured to the wall in a position parallel thereto and adapted to be engaged by said bracket sockets only when said framework is inclined outwardly and downwardly from said pins, said socket-engaged pins guiding the framework for upward swinging movement into horizontal position, and restraining movement of the framework away from the wall while in such horizontal position, and means to support the outer edge of said framework when the latter is in horizontal position.

8. An upper and lower berth arrangement convertible to form a seat, comprising an upper berth framework, a lower berth framework, two brackets spaced lengthwise of the upper berth framework and projecting rearwardly from the rear edge thereof, each bracket being provided with a pin-receiving socket, two pins secured to said

wall in a horizontal position parallel thereto at the height of the upper berth, two pins disposed parallel to said first two pins and secured to the wall immediately above said lower berth framework, said first two pins being engageable by the pin-receiving sockets of the upper berth framework by movement thereof toward such pins in a position inclined downward therefrom, said pins after engagement by the bracket sockets guiding the upper berth framework for swinging upward into a horizontal position, and in such position restraining movement of the framework away from the wall, said second two pins being engageable by the bracket sockets by advancing the upper berth framework toward such pins in an inverted position and inclined upward from such pins, said pins thereafter guiding the framework for swinging downward into horizontal position resting on the lower berth framework, and in such position restraining its movement outward away from the wall, and means to support the outer edge of said upper berth framework when in horizontal berth-forming position with its brackets in engagement with said first two pins.

9. In an upper and lower berth arrangement, a lower berth framework incorporating a marginal tubular member, an upper berth framework incorporating a marginal tubular member, means supporting the rear edge of the upper berth framework independent of the lower berth framework, struts interengageable between the front tubular member of the upper berth framework and the front tubular member of the lower berth framework, each such front member being provided with a slot adjacent to a strut end, a spade-shaped head formed on each strut end and receivable in the adjacent slot of a framework's front tubular member, each strut being rotatable to turn its framework engaged spade-shaped heads within the slotted tubular members to displace the plane of each head from the plane of its slot, and thus to lock each strut end to the marginal member of a framework engaged thereby.

10. A convertible seat and berth arrangement for aircraft, comprising a first framework, including a marginal frame and a sheet supported therein, said framework being supported below seat level and constituting a lower berth and also the lower portion of a seat frame, an independent and separable similar framework, also including a marginal frame and a sheet supported therein, shaped similarly to the first framework to rest thereon and constituting the upper portion of a seat frame, means to removably secure the second framework in such seat-forming position, to complement and strengthen the first framework, a set of seat cushions of a size and shape in the aggregate to rest upon and to cover the second framework, and to constitute the seat of the arrangement, or to rest upon the sheet of one of the said frameworks to constitute a mattress therefor, a set of loose back cushions of a size and shape in the aggregate to rest upon the sheet of the other framework to constitute a mattress therefor and in seat-forming position of the frameworks to rest upon and to be supported above the second framework in inclined position, to constitute the back of the seat arrangement, and means to support the second framework elevated above the first, to constitute an upper berth.

11. In a convertible seat and berth arrangement for aircraft, a seat, comprising a composite framework including a lower framework supported below seat level and including linear marginal members and a downwardly curved transverse strut spaced from the ends, an upper framework also including linear marginal members and a downwardly curved transverse strut spaced from the ends to define a plurality of seats, said upper framework being so shaped as to rest upon the lower framework, in inverted position, with its transverse strut curved upwardly, means to removably secure the upper framework in such position, to complement and strengthen the first framework, to complete the said composite seat framework, a set of loose seat cushions individually sized and shaped to rest upon the upper portion of the composite framework and to conform to the seating spaces defined by the said transverse struts, and of a size and shape in the aggregate to cover one of the frameworks to constitute a mattress therefor, a set of loose back cushions to rest upon and be supported in an inclined position from the said seat cushions, in seat-forming position to constitute the back of the seat arrangement and of a size and shape to cover one of said frameworks as a mattress, and means to support said upper framework elevated above the lower framework to define a lower and upper berth arrangement.

12. In a convertible seat and berth arrangement for aircraft, a seat frame including a lower rectangular framework having two parallel coplanar marginal tubular members and a transverse curved tubular strut connecting said parallel members, an upper framework of substantially the same size and shape as said lower framework including two parallel coplanar marginal tubular members and a transverse curved tubular strut, similarly connecting the parallel members, the upper frame, in seat-forming position, being removably secured in position upon the lower frame with its parallel members resting upon the parallel members of the said lower frame and with its curved strut directed upwardly, a web stretched over the coplanar members of each of said lower and upper frameworks, seat cushion means of a size and shape to form mattress means for one such framework, and in seat-forming position to cover and to rest upon the upper framework and to be additionally supported by the said webs, and back cushion means of a size and shape to form mattress means covering the other such framework, and to rest upon said seat cushion means to constitute a back for the seat, and means to support said upper framework elevated above the lower framework.

13. A berth arrangement for aircraft comprising a framework, brackets projecting rearwardly beyond the rear edge of the framework and having sockets opening at an angle to the plane of the framework, means including pivot pins secured to a rear wall and disposed for reception in the sockets only when the framework is advanced toward the wall in a position at an angle to a horizontal plane, said framework being swingable about such pivot pins when received in the sockets into horizontal position, and said brackets and said pivot pins thus interengaged cooperating to restrain movement of said frame away from the wall while in such horizontal position, and means to support the outer edge of the framework in horizontal position.

14. A seat convertible into a berth comprising a frame disposed substantially at seat level, a second similar frame adapted to rest upon the first frame, pins spaced above the first frame, and slotted brackets upon the rear edge of the second

frame, supportingly and pivotally engaged with said pins when the second frame is tilted downwardly and forwardly, to prevent movement of the second frame in its own plane when swung back to horizontal, means disposed to engage the top of the brackets, when the second frame is horizontal, to prevent upward movement of the frame's rear edge, and disengagement of the brackets from their pins, either by relative vertical or horizontal movement, and strut means interengageable between the forward edges of the frames to prevent downward swinging of the second or upper frame.

15. A seat convertible into a berth comprising a frame disposed substantially at seat level, a second similar frame adapted to rest upon the first frame, pins spaced above the first frame, and slotted brackets upon the rear edge of the second frame, supportingly and pivotally engaged with said pins when the second frame is tilted downwardly and forwardly, to prevent movement of the second frame in its own plane when swung back to horizontal, means disposed to engage the top of the brackets, when the second frame is horizontal, to prevent upward movement of the frame's rear edge, and disengagement of the brackets from their pins, either by relative vertical or horizontal movement, strut means interengageable between the forward edges of the frames to prevent downward swinging of the second or upper frame, and releasable means to lock the strut means, at each end, to the engaged frames, to prevent relative separation of the forward edges of such frames.

16. A convertible seat and berth arrangement for aircraft, comprising a first framework, said framework being supported below seat level and constituting a lower berth element and also the lower element of a seat frame, an independent and separable similar framework, shaped similarly to the first framework to rest thereon, and constituting the upper element of a seat frame to complement and strengthen the first framework, seat cushion means of a size and shape to rest upon and to cover the second framework, and to constitute the seat of the arrangement, or to rest upon one of the said frameworks to constitute mattress means therefor, loose back cushion means of a size and shape to rest upon the other framework to constitute mattress means therefor and in seat-forming position of the frameworks to rest upon and to be supported above the second framework in inclined position, to constitute the back of the seat arrangement, and means to support the second framework at will elevated above the first, to constitute an upper berth element.

17. In combination with an approximately level seat and an upright support at the rear of the seat, a wide cushion section and a narrow cushion section hingedly connected, the narrow section, and likewise the wide section, when the hinged connection rests upon the seat, being each inclined upward for abutment of their free edges against the support, such inclination of the sections being at a greater or lesser angle from the horizontal depending upon the spacing of the hinged connection from the support, and the lower end of the inclined wide section being braced and definitely spaced from the support by the interengagement of the narrow section between the wide section's lower edge and the support.

18. In combination an upright support, an approximately level seat extending from said support forward, a back unconnected to either the support or the seat, disposed wholly above said seat and adjacent the support, and supported by and upon the rear portion of such seat's upper surface inclined against the support, comprising a wider padded section, a narrower padded section, and hinge means joining one edge of said narrower section permanently to one adjacent edge of said wider section, for disposition of said sections in coplanar relation to form a continuous cushion, or, in backforming position, for relative angular displacement of said two sections in varying degrees, the free edge of each section in such position abutting the support and the hinged edges being spaced at different intervals from the support corresponding to different relative angular relationships of said sections and different inclinations of the wider section relative to the upright support, the narrower section being received in the triangular space between the wider section, the seat, and the support, and abutting the latter to restrain movement of the lower edge of said wider section toward the support in its different inclined positions.

19. In a convertible seat and berth arrangement, a lower cushion supporting frame including marginal tubes, leg means supporting said frame from the floor below seat level to constitute a lower berth element and also a lower seat framework element, an independent and separable upper cushion supporting frame including marginal tubes coinciding with and directly and contiguously engaging the marginal tubes of said lower frame, and constituting an upper seat framework element to complement said lower seat framework element, and means to support said upper frame at will elevated above said lower frame, to constitute an upper berth element.

20. In a seat arrangement, a seat structure adjacent to and extending along a wall, an arm rest adapted to divide said seat structure into a plurality of seat spaces including a generally horizontal, rearwardly extending arm, and a front generally upright arm, means mounted on the wall releasably supporting the rearward end of said first arm, and means on said seat structure releasably receiving the lower end of said second arm, for retaining said arm rest in seat dividing position but readily removable therefrom.

21. A berth framework comprising two sections assembled in edge-to-edge relationship, and releasable means carried by and interconnecting the adjacent edges of said two sections to constitute a unitary frame, engageable and disengageable only when said sections are tilted with respect to each other, and operable after engagement and after disposition of said sections in parallel, substantially coplanar relationship to support the edge of one section directly from and solely by the adjacent edge of the other section connected thereto.

22. A berth framework comprising two sections assembled in edge-to-edge relationship, a socket member upon one end of the edge of one section adjacent to the other section, a complemental member carried upon the corresponding end of the adjacent edge of the other section engageable with and releasable from said socket member only when said sections are tilted with respect to each other, said engaged members, after disposition of said sections in substantially parallel coplanar arrangement, restraining all relative nonrotative movement of such ends of the adjacent edges, and interengageable means carried by the other ends of the adjacent edges of said sections operable, with said members, to support the edge of one section directly from and

solely by the adjacent edge of the other section, thus to constitute a unitary frame.

23. A berth framework comprising two sections assembled in edge to edge relationship, a member having therein a keyhole socket opening upwardly carried by the edge of one section adjacent to the other section, and a flat pin projecting from the adjacent edge of such other section for edgewise engagement in and removal from said keyhole socket only by relative movement of said sections in relatively tilted position, and said pin being of a width to rotate within the circular portion of said keyhole socket for relative rotation of said sections from relatively tilted into substantially coplanar relationship, to lock them against relative displacement thereafter in a direction perpendicular thereto to constitute a unitary frame.

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