

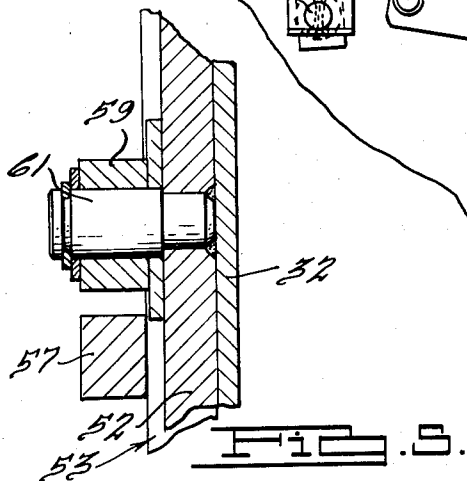
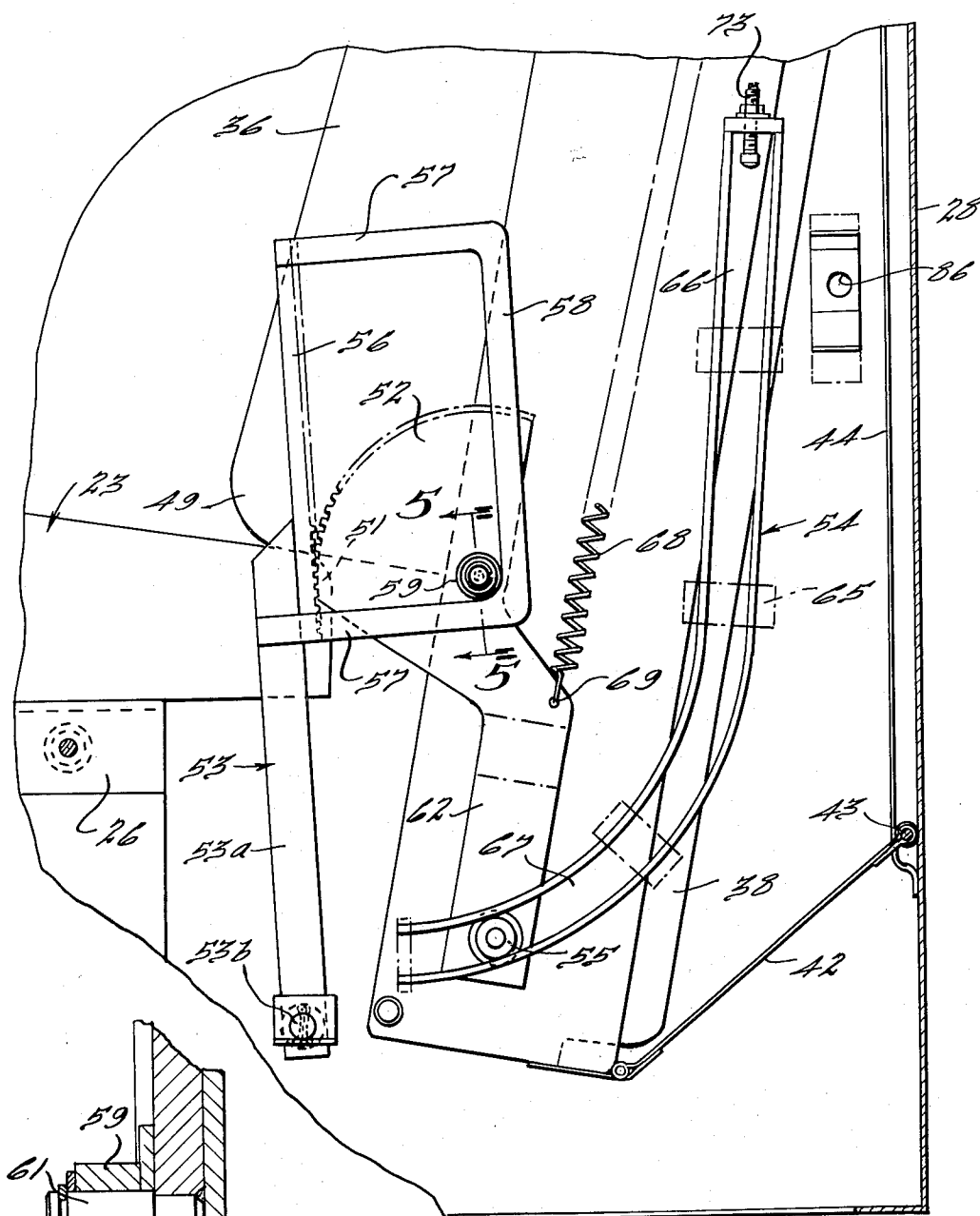
May 1, 1956

R. G. CUDINI
FOLDABLE BERTH

2,743,463

Filed April 16, 1952

4 Sheets-Sheet 2



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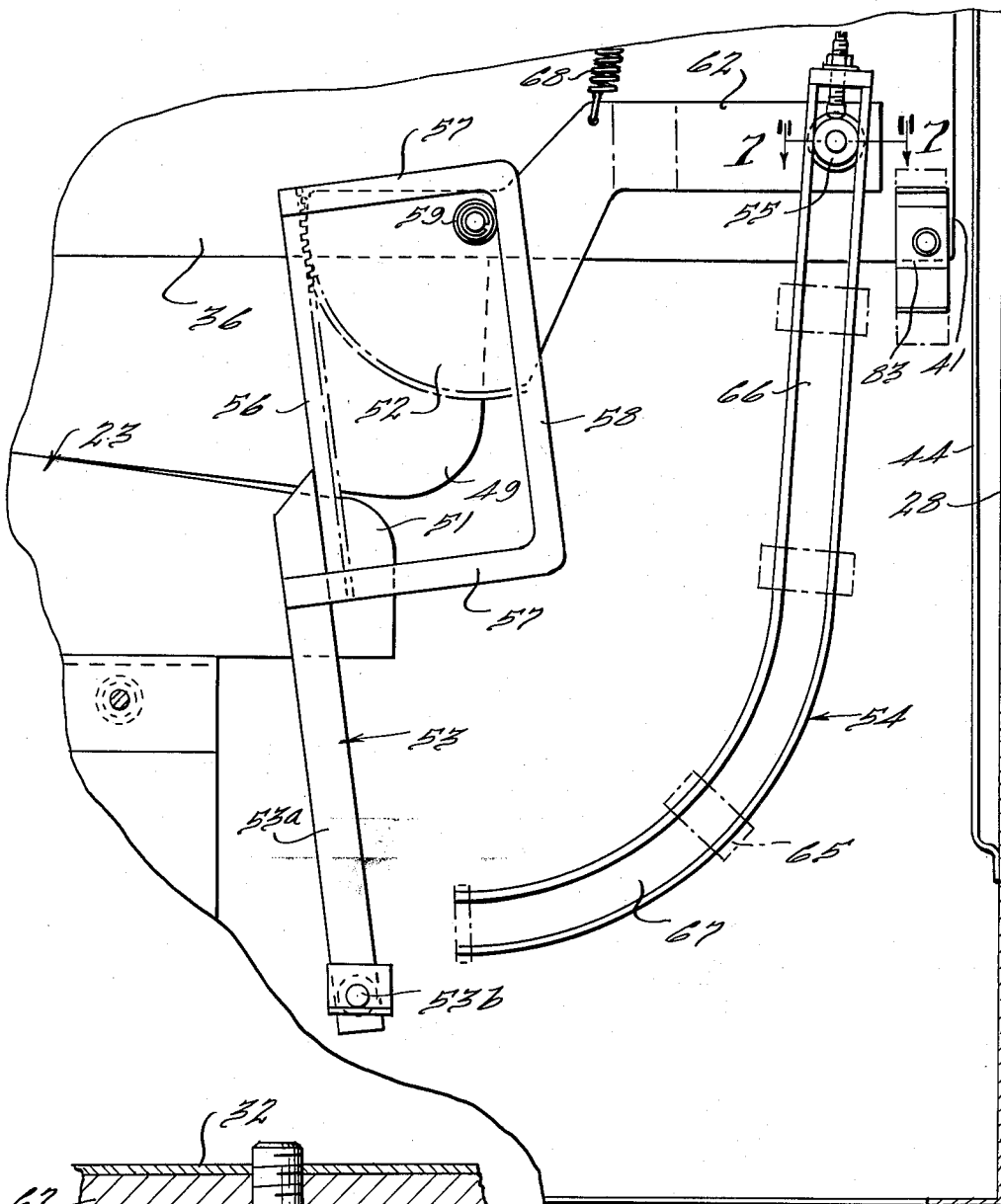


FIG. 6.

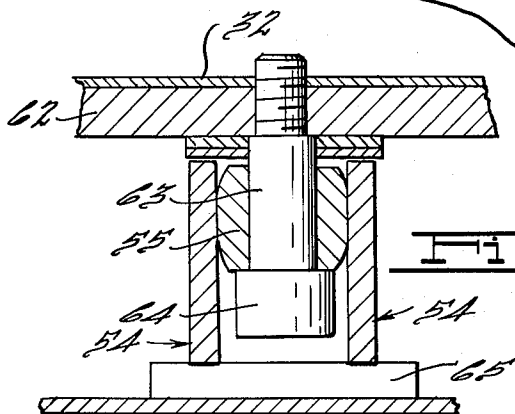


FIG. 7.

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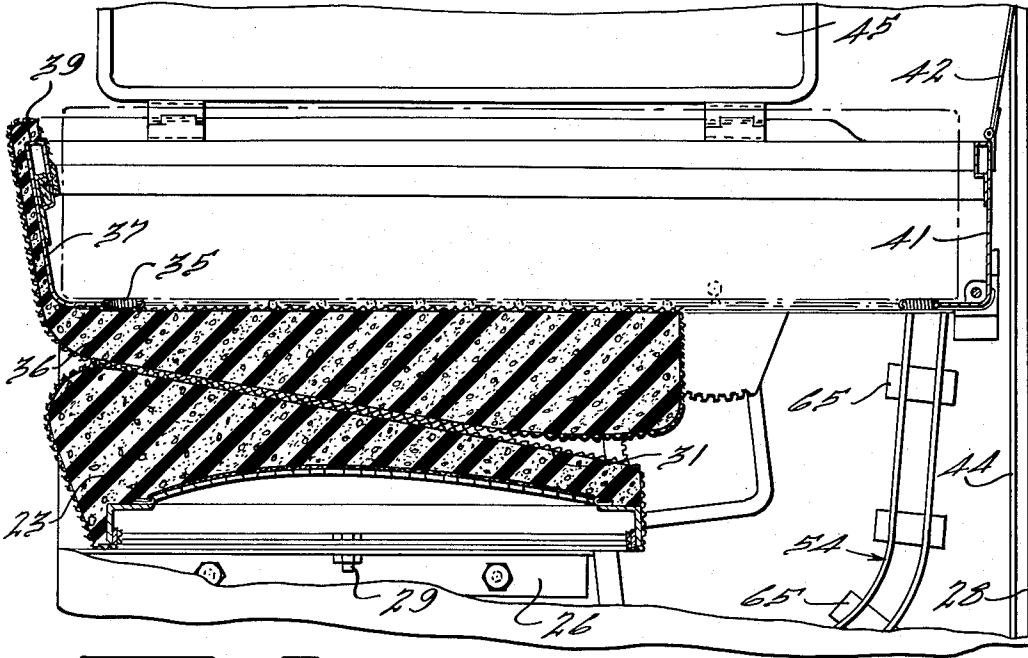


FIG. 8

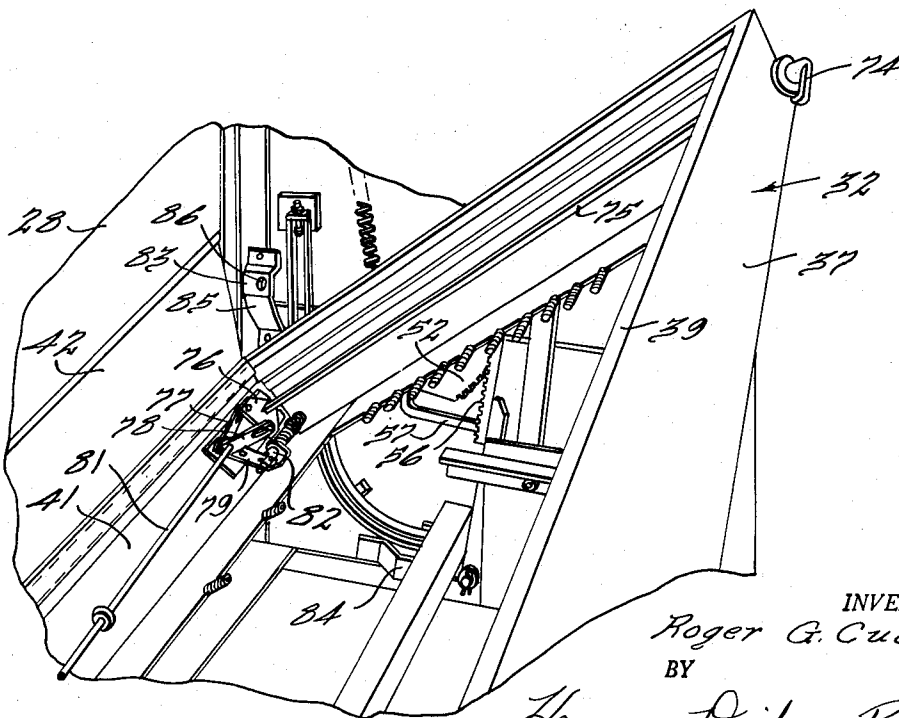


FIG. 9

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2,743,463

FOLDABLE BERTH

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14 Claims. (Cl. 5—43)

This invention relates to furniture units and more particularly to furniture designed for installation in confined quarters such as ships, railroad trains, etc., wherein a structural unit will serve alternately as a sofa and as a berth.

It is an object of this invention to provide a furniture unit which is convertible to use either as a sofa or as a berth and wherein the unit may be installed in quarters having a minimum of space without detracting from the appearance or efficiency of the unit.

It is another object to provide a combination sofa and berth as described above wherein the portion of the unit which is used as a berth will be hidden from view when the unit is used as a sofa, and wherein the sofa portion will not be exposed when the unit is used as a berth.

It is a further object to provide a furniture unit as described in which an inclined back cushion may be used as part of the sofa and wherein this back portion will be foldable downwardly when the unit is converted to a bed without interfering with the seat cushion or with any other portion of the unit. More particularly, it is within the contemplation of this invention to provide a unit having a movable assembly which carries both the berth and the back cushion of the sofa, and means for imparting a novel movement to this assembly so as to guide either element into its proper position when desired.

Other objects of the invention will become apparent from the following specification, the drawings relating thereto, and from the claims hereinafter set forth:

In the drawings:

Fig. 1 is a perspective view of the furniture unit in its sofa position, showing the shape of the cushions and other elements of the construction;

Fig. 2 is a perspective view similar to Fig. 1 showing the unit in its berth position;

Fig. 3 is a perspective view with the cushions and mattress removed and other parts being broken away for clarity, showing the operating elements in an intermediate position;

Fig. 4 is a fragmentary side view, partly in cross-section, showing the operating elements in the sofa position;

Fig. 5 is a fragmentary cross-sectional view taken along the line 5—5 of Fig. 4 and showing one of the gear retaining rollers and its associated parts;

Fig. 6 is a fragmentary side view similar to Fig. 4 but showing the elements in the berth position;

Fig. 7 is a fragmentary cross-sectional view taken along the line 7—7 of Fig. 6 and showing a guide roller and its associated parts;

Fig. 8 is a cross-sectional view taken along the line 8—8 of Fig. 2, and showing the relation of the cushions and mattress to the remainder of the unit; and

Fig. 9 is a fragmentary perspective view showing the operating elements of the unit with the mattress frame in partly raised position.

The furniture unit comprises in general a stationary assembly 21 and a movable assembly 22 mounted thereon. The assembly 21 comprises a framework of plates

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and angle members which together form a support for an upholstered sofa seat 23, upholstered side arms 24 at either end of the seat, and the movable assembly 22. In particular, assembly 21 has side plates 25 having angle members 26 attached thereto and supporting seat cushion 23. Plates 25 support the side arms 24 which are preferably upholstered, and these plates also have attached thereto the various operating elements of the unit which will be later described in detail. Vertical angle members 27 extend upwardly from plates 25, and a back 28 is supported thereby. The seat 23 is of upholstered construction and is secured to angle members 26 by means of bolts 29. The top surface 31 of the seat cushion is preferably inclined downwardly and rearwardly so as to enhance the comfort of the seat.

The movable assembly 22 comprises a substantially rectangular frame 32 having four upturned flange portions 33 on one side thereof, as shown in Fig. 3. A mattress supporting spring 34 is attached to flange sections 33 and extends across the opening formed by the flanges. This spring 34 may be of any desired shape but is preferably constructed with a plurality of outer coil springs 35 attached to flanges 33 and a plurality of steel bands in web formation connecting the coil springs. A sofa back cushion 36 is mounted on the side of frame 32 having the flanges 33, as shown in Fig. 8, the upholstery of the sofa back cushion preferably extending across the outer end wall 37 of frame 32 and partially across the side of the frame. The frame is constructed so as to receive therein a mattress 38, the depth of the frame being preferably such that the mattress will extend slightly above the upper edge 39 of the frame when in its horizontal position. Hingedly mounted on the upper edge of inner end wall 41 of the frame 32 is a pillow retainer plate 42. As seen best in Figs. 3 and 8, the opposite edge of pillow retainer plate 42 rests against back 28, the outer corners of the pillow retainer plate having pins 43 which are guided by tracks 44 vertically mounted on opposite sides of back 28. A head board 45 is hingedly mounted at one side wall 46 of frame 32, so that the head board may be moved between an inoperative position folded down against mattress 38, and an operative position, shown in Fig. 2, in which a pivot bar 47 extending from within the head board engages a latch 48 on side arm 24, thus locking the head board in an operative position substantially normal to mattress 38.

It will be seen from the structure thus far described that when the frame 32 is in its upper position, the mattress 38 will be in facing relation with back 28 and will thus be completely hidden from view, and that seat 23 and back 36, being in substantially normal relation, will together form a sofa. When in this position, the lower forward corner 49 of back 36 will, as seen in Fig. 4, be pressed against upper rear corner 51 of seat 23, thus providing a sofa having no gap between the seat and back portions. When the frame 32 is moved to its lower position, it will be seen that interference by the corners 49 and 51 must be avoided while the frame is being moved. It is also necessary to insure that during this movement the frame 32 will move sufficiently forwardly so that the inner end wall 41 thereof will not interfere with back 28.

The novel mechanism provided for insuring the required movement of assembly 22 comprises in general a pair of gear sectors 52 secured to the opposite side walls of frame 32, a pair of rack frames 53 rockably mounted on stationary assembly 21 adjacent the gear sectors and cooperating therewith, and a pair of guide tracks 54 secured to the stationary assembly adjacent the rack frames 53 and cooperating with a pair of rollers 55 on frame 32. The rack frames 53 each comprise a post 53a pivotally mounted at its lower end to plate 25 by means of a pin 53b. The upper end of post 53a has secured thereto a

gear rack 56 extending upwardly in substantial alignment with the post, and a retainer having end portions 57 secured to and extending transversely from opposite ends of rack 56, an intermediate portion 58 of the retainer connecting portions 57 and extending in spaced parallel relation with the rack. A retainer roller 59 is secured to each sector 52, the position of roller 59 being such that the radial distances from the roller to all points on the toothed periphery of the sector are equal. It will thus be seen that when gear sector 52 is in meshing engagement with rack 56, roller 59 will remain a constant distance from rack 56 as sector 52 rolls therealong. The normal distance of retainer portion 58 from rack 56 is such that roller 59 will be in constant rolling engagement with the retainer portion, and the retainer thus serves to prevent gear sector 52 from being disengaged from rack 56. As shown in Fig. 5, roller 59 may be rotatably secured to gear sector 52 by means of a stub shaft 61 secured to and extending outwardly from the gear sector.

Guide rollers 55 are secured at the inner end corners of frame 32 and, for this purpose, each may be mounted directly to an extension piece 62 of sector gear 52. As shown in Fig. 7, the mounting means for roller 55 may comprise a stub shaft 63 threadably secured to extension piece 62 and having a head portion 64 which holds the roller in position. Guide tracks 54, within which guide rollers 55 move, are preferably secured to the inner surfaces of plates 25 by means of spaced clips 65, each of these guide tracks having an upper portion 66 which extends substantially vertically and blends into a lower portion 67 which is curved forwardly and downwardly. The upper portion 66 is spaced forwardly from back 28 so that when frame 32 is in its lowered position the rear 41 thereof will be spaced slightly forwardly from the back 28. The lower portion 67 of the guide track is so shaped as to allow the rear 41 of the frame 32 to move slightly forwardly when the frame is moved to its upper position. As a result of this motion, the movable assembly 22 will assume a slight rearward inclination when in its upper position as shown in Fig. 4. A tension coil spring 68 is secured at its lower end 69 to each gear sector 52 and at its upper end 71 to a bracket 72 extending forwardly from angle member 27. It will be seen that the action of these tension springs is such as to urge movable assembly 22 into its lower position, since the force exerted by springs 68 on frame 32 is to the right of the meshing gear teeth, as seen in Figs. 3, 4 and 6. The final lowered position of this movable assembly is determined by a pair of stop screws 73 at the upper ends of tracks 54, the stop screws being adjustable to achieve a horizontal position of the mattress 38.

The operation of the mechanism thus far described may perhaps best be illustrated by a description of the action at one side of the unit during the movement of assembly 22 from its raised to its lowered position. In the raised position, shown in Fig. 4, the sector gear 52 meshes with the lower teeth of rack 56. The retaining roller 59 is disposed at the lower end of retainer 58 and the roller 55 is held between guide tracks 54 at the lower end 67 thereof. It will be observed that, in this position, assembly 22, which is supported by the meshing gear teeth, has a moment of force around its supporting point tending to move it in a clockwise position thus retaining it in its raised position, with mattress 38 concealed from view and pillow retainer 42 preventing pillows (not shown) or other appurtenances from dropping down below the unit. When the assembly 22 is manually or otherwise moved in a counterclockwise direction, as shown in Fig. 4, it will cause gear sector 52 to travel upwardly along rack 56, the sector and rack being held in meshing engagement by the action of retaining roller 59 against retainer 58. Simultaneously with this action, roller 55 will travel rearwardly and upwardly guided by track 54, thus guiding the rear 41 of the frame 32 up-

wardly and rearwardly in such manner as to move the frame to its rearmost position. The traveling movement of gear sector 52, as well as the guided movement of roller 55, will thus impart a translatory movement to the movable assembly 22 in addition to a rotational movement and will result in a rocking motion of rocker assembly 53 around its pivot 53b. Figs. 3 and 9 show frame 32 in its partially lowered position, and it will be seen that the line of support for assembly 22, which is determined by the position of the meshing teeth, will be close to the midpoint of the frame. It will thus be seen that only slight effort will be required in lowering or raising the assembly 22, and springs 68 will further assist in attaining this equilibrium. As the frame 32 is lowered, the lifting action caused by the meshing gears will allow the lower corner 49 of the back cushion 36 to clear the rear corner 51 of seat cushion 23. In its final position, frame 32 will be substantially horizontal and roller 55 will abut adjustable stop screw 73 mounted at the upper end of track 54, with mattress 38 in operative horizontal position and back cushion 36 in facing relation with seat 23. During the lowering movement, pillow retainer 42 will slide upwardly guided by tracks 44 carrying with it the pillows or other appurtenances, and when the assembly 22 is in its final lowered position head board 45 may be lifted and latched in its operative position.

In order to secure the movable assembly 22 in either its raised or lowered position, locking means are provided which are controllable by a rotatable locking handle 74 mounted on and extending forwardly from frame 32. Handle 74 rotates a shaft 75 which extends within a side wall of frame 32 to the inner end wall 41 thereof. A pivot plate 76 is secured to the rear end of shaft 75 and two links 77 and 78 are joined by slotted connections at opposite ends of pivot plate 76. Links 77 and 78 are pivotally connected to one end of a crank 79 which is pivoted at an intermediate point to inner end wall 41 of the frame 32. Two retractible plunger rods 81 and 82 are pivotally connected to opposite ends of crank 79 and extend through the opposite side walls of frame 32, being spring-urged to their extended position. It will be seen, therefore, that upon rotative movement of handle 74 in either direction from its neutral position, plunger rods 81 and 82 will be simultaneously retracted within the confines of frame 32, and that upon release of handle 74 these plunger rods will be spring-urged into an extended position from the side walls of frame 32. A pair of locking brackets 83 and 84 may be secured at each end of the stationary assembly 21 in such position that brackets 83 will be adjacent the plunger rods 81 and 82 when movable assembly 22 is in its lowered position, and brackets 84 will be adjacent the plunger rods when the movable assembly is in its raised position. These brackets may have inclined cam surfaces 85 which will cam the plunger rods inwardly as they approach their final position, and locking apertures 86 to receive the plunger rods in final position. To unlock the movable assembly, it is therefore merely necessary to rotate handle 74, thus withdrawing the plunger rods from their respective apertures 86.

While it will be apparent that the preferred embodiment of the invention herein disclosed is well calculated to fulfill the objects above stated, it will be appreciated that the invention is susceptible to modification, variation and change without departing from the proper scope or fair meaning of the subjoined claims.

What is claimed is:

1. In a furniture unit, a stationary frame, a seat member supported by said stationary frame, a movable frame, a back member and a berth member supported on opposite sides of said movable frame, the movable frame being adjustable between an upper position in which said seat and back are in cooperative relation to form a sofa and a lower position in which said berth member is in operative position; and means supporting said movable

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frame on said stationary frame for movement between its two positions, said means comprising a first member fixed to one of said frames and a second member pivoted to the other frame, said second member extending upwardly from said pivot and supporting said first member for rolling movement along said second member so that said first member engages said second member at varying distances from the pivot point of said second member, whereby rotational movement of said movable frame will simultaneously impart translatable movement thereto in a substantially vertical direction, the locus of points of engagement of said members having an angular displacement about the pivot axis of said second member.

2. In a combination berth and sofa construction, a base frame adapted to support a seat member, a movable frame adapted to support a back member and a berth element on opposite sides thereof, said movable frame being adjustable between an upper position in which only one side of said frame is exposed and a lower position in which only the other side is exposed; and means for supporting said movable frame on said base frame for operative movement between its two positions, said means comprising an elongated supporting member rockably mounted on one of said frames and extending upwardly from its rocking mount, and a curved member rigidly attached to the other of said frames and supported by said supporting member for rolling movement therealong so as to vary the distance between said curved member and the rockable mounting of said supporting means, whereby simultaneous rotary and substantially vertical translatable movement may be imparted to said movable frame, the locus of points of engagement of said members having an angular displacement about the rocking axis of said elongated member.

3. In a foldable furniture unit, a base frame having a seat cushion supported thereby, a movable frame having a back cushion supported thereby, said movable frame being adjustable between a raised position in which said back cushion is substantially normal to said seat cushion and a lowered position in which the two cushions are in facing relation; and means for allowing movement of said movable frame between its two positions, said means comprising a pair of vertically extending rack members pivotally mounted on opposite sides of said base frame and a pair of gear sectors rigidly mounted on opposite sides of said movable frame and supported by said rack members for rolling movement therealong, whereby rotative movement of said movable frame toward its lowered position will cause upward movement of said gear sectors, the locus of points of engagement of said rack members and gear sectors having an angular displacement about the pivot axes of said rack members.

4. The combination according to claim 3, said base frame being further provided with a pair of guide tracks on opposite sides thereof, the upper ends of said guide tracks being disposed above the level of said seat cushion, the lower portions of said tracks being curved downwardly and forwardly, the lower ends thereof being disposed below said seat cushion, and a pair of guided elements on said movable frame and in operative engagement with said tracks.

5. The combination according to claim 3, said movable frame being further provided with a berth member, said back cushion extending partially across one side of said frame, said berth member extending substantially across the entire opposite side of said frame.

6. In a foldable berth construction, a base frame adapted to be secured to a stationary support, a back on said base frame, a movable frame mounted on said base frame, a berth member retained in said movable frame, the movable frame being adjustable between a raised position in which said berth member is in facing relation with said back and a lowered position in which the berth member is in operative horizontal position, a headboard hingedly mounted at one end of said movable frame, said

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headboard being movable between a folded position overlying said berth member and an operative position substantially normal to the berth member; and means for supporting said movable frame on said base frame for operative movement between its two positions, said means comprising an elongated supporting member rockably mounted on one of said frames and extending substantially vertically, and a curved member fixedly attached to the other of said frames and supported by said supporting member for rolling movement therealong, whereby simultaneous rotary and translatable movement may be imparted to said movable frame, the locus of points of engagement of said members having an angular displacement about the rocking axis of said elongated member.

7. In a foldable berth construction, a base frame adapted to be secured to a stationary support, a back on said base frame, a movable frame mounted on said base frame, a berth member retained in said movable frame, the movable frame being adjustable between a raised position in which said berth member is in facing relation with said back and a lowered position in which the berth member is in operative horizontal position, a retaining plate having one edge hingedly mounted to the rear of said movable frame, track means on said back for slidably retaining the opposite edge of said retaining plate; and means for supporting said movable frame on said base frame for operative movement between its two positions, said means comprising an elongated supporting member rockably mounted on one of said frames and extending substantially vertically, and a curved member rigidly attached to the other of said frames and supported by said supporting member for rolling movement therealong, whereby simultaneously rotary and translatable movement may be imparted to said movable frame, the locus of points of engagement of said members having an angular displacement about the rocking axis of said elongated member.

8. In a foldable furniture unit, a base frame having a seat cushion supported thereby, a movable frame having a back cushion supported thereby, said movable frame being adjustable between a raised position in which said back cushion is substantially normal to said seat cushion and a lowered position in which the two cushions are in facing relation; and means for allowing movement of said movable frame between its two positions, said means comprising a pair of rack members pivotally mounted on opposite sides of said base frame and extending substantially vertically, a pair of gear sectors rigidly mounted on opposite sides of said movable frame and supported by said rack members for rolling movement therealong, the locus of points of engagement of said rack members and gear sectors having an angular displacement about the pivot axis of said rack member, and a pair of spring members connecting said base frame and said movable frame, said spring members urging said movable frame into its lowered position.

9. In a furniture unit, a base frame, means on said base frame for supporting a seat member, an adjustable frame, means on said adjustable frame for supporting a back member and a bed member on opposite sides thereof, said adjustable frame being movable between a raised position in which only one of said sides is exposed and a lowered position in which only the other side is exposed; and means for supporting and guiding said adjustable frame for operative movement between its two positions, said means comprising an elongated toothed member pivotally mounted on said base frame, and a curved toothed member rigidly attached to said adjustable frame and meshing with said elongated member, whereby said curved member will travel along said elongated member when said adjustable frame is moved between its operative positions, the locus of points of engagement of said toothed members having an angular displacement about the pivot axis of said elongated toothed member, said elongated member being substantially vertical, whereby rotative movement of said ad-

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justable frame in one direction will cause a simultaneous upward travel of said curved tooth member.

10. The combination according to claim 9, said curved toothed member being secured intermediate the front and rear edges of said adjustable frame, the weight of said frame on one side of said toothed member being at least partially counterbalanced by the weight on the opposite side thereof.

11. In a furniture unit, a base frame, means on said base frame for supporting a seat member, an adjustable frame, means on said adjustable frame for supporting a back member and a bed member on opposite sides thereof, said adjustable frame being movable between a raised position in which only one of said sides is exposed and a lowered position in which only the other side is exposed; and means for supporting and guiding said adjustable frame for operative movement between its two positions, said means comprising an elongated toothed member pivotally mounted on said base frame, a curved toothed member rigidly attached to said adjustable frame and meshing with said elongated member, whereby said curved member will travel along said elongated member when said adjustable frame is moved between its operative positions, the locus of points of engagement of said toothed members having an angular displacement about the pivot axis of said elongated toothed member, and retaining means for holding said toothed members in operative engagement, said retaining means comprising a retainer member in parallel spaced relation with said elongated toothed member and a retaining element secured to said adjustable frame and substantially equidistant from the teeth on said curved tooth member, said retaining element being slidably engageable with said

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retainer member to thereby retain said teeth in mesh with the teeth on said elongated member.

12. The combination according to claim 2, further provided with a guide track on said base frame and a guided element spaced from said curved member on said movable frame and operatively engageable with said guide track.

13. The combination according to claim 12, said guide track having a substantially vertically portion and a curved portion therebelow.

14. The combination according to claim 12, said curved member being disposed intermediate the front and rear edges of said movable frame, said guided element being disposed adjacent the rear edge of said movable frame.

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