

- [54] **CONVERTIBLE SEAT-BED**
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[58] Field of Search **297/317, 318, 342, 316, 297/322, 343; 5/17, 18 R, 37 R, 47, 48**

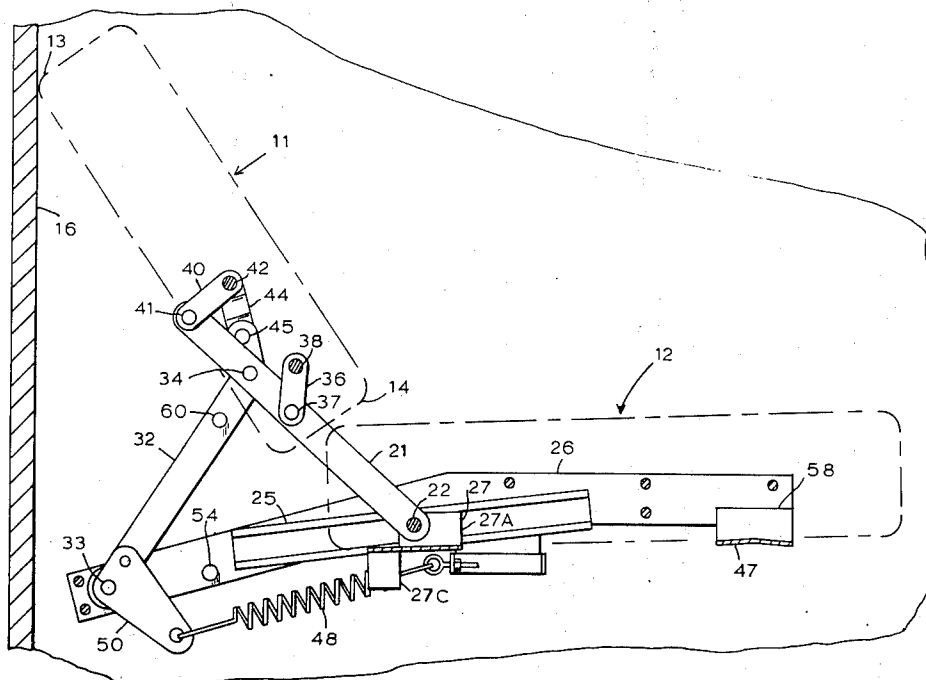
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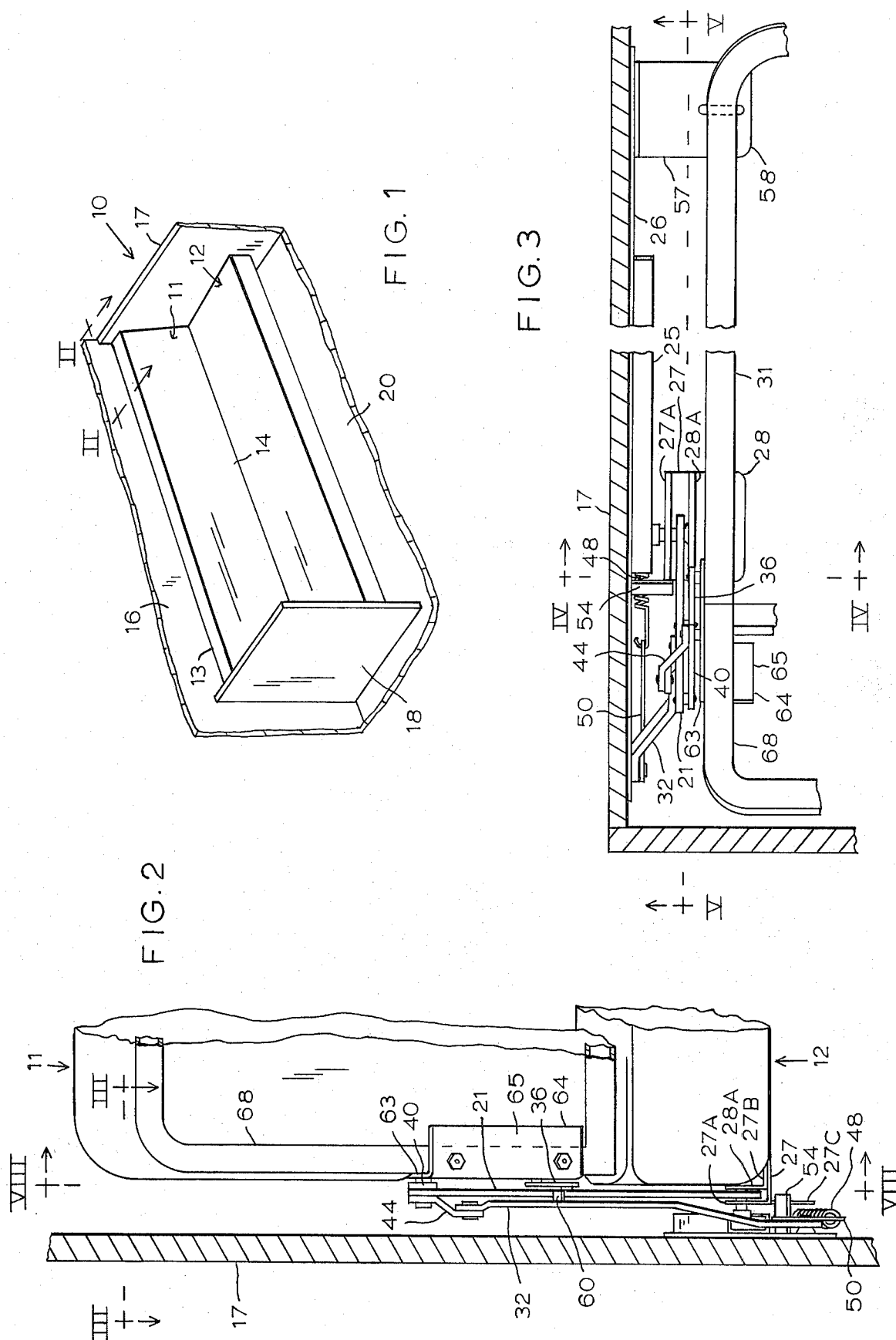
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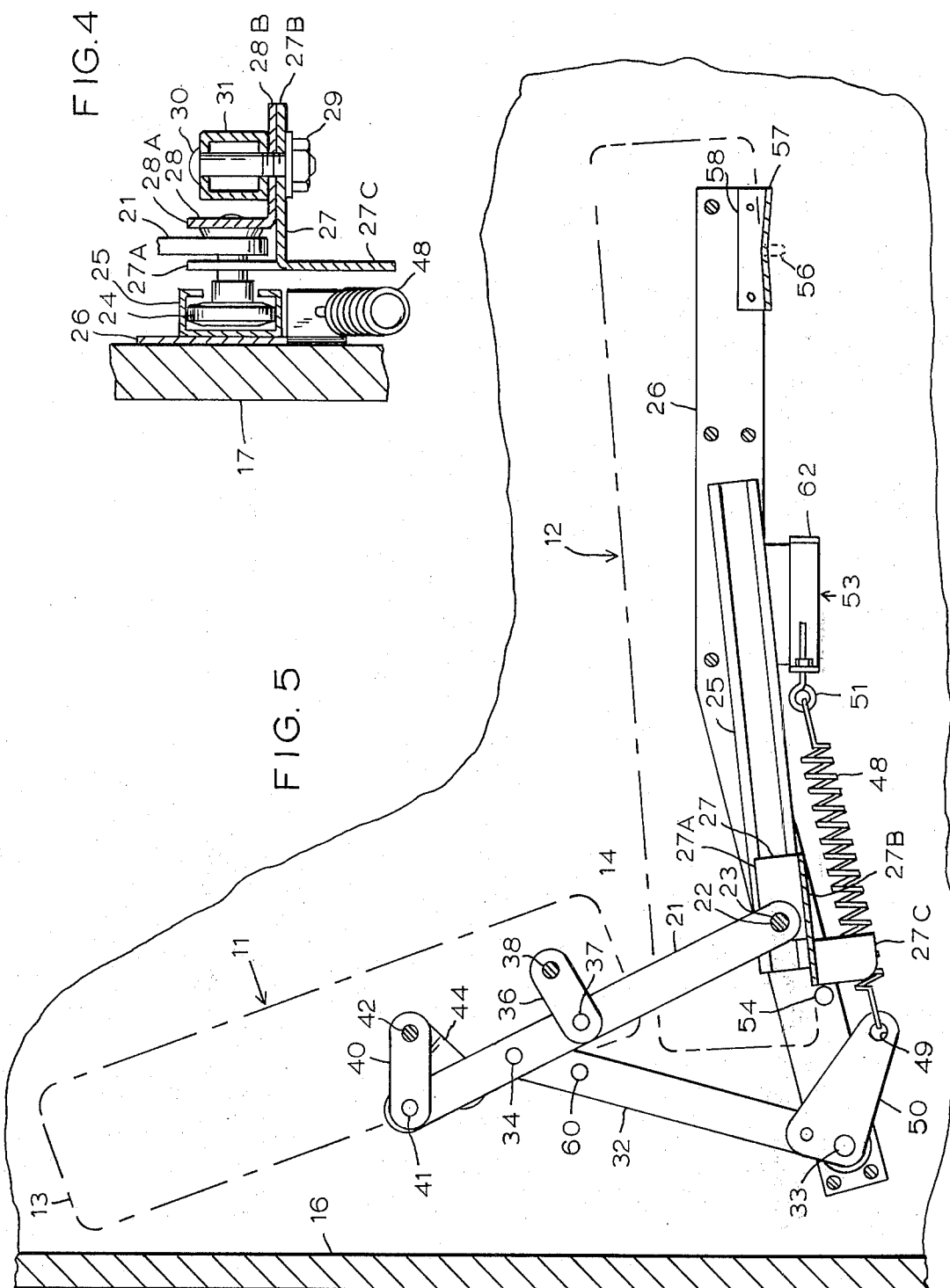
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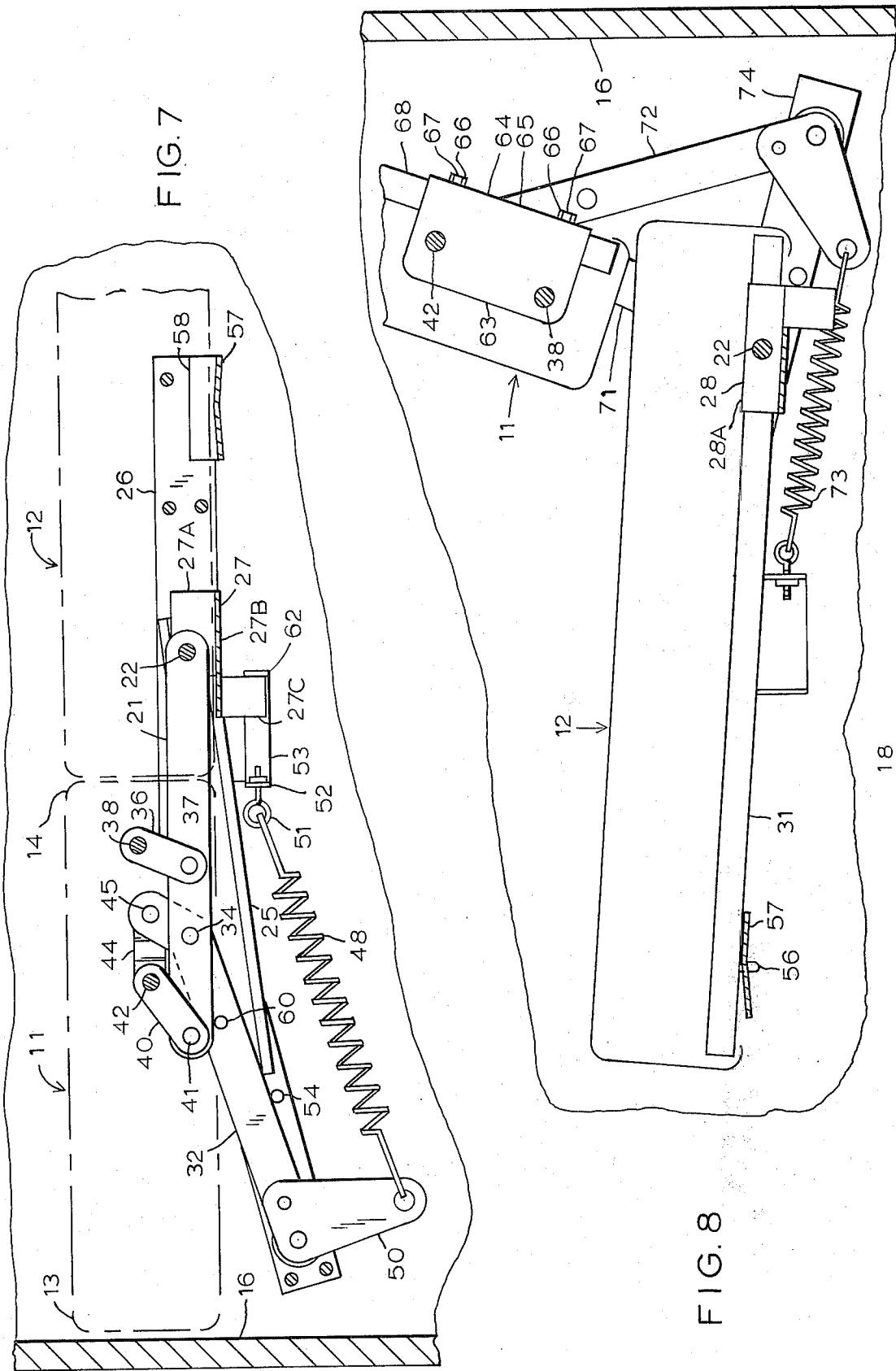
[57] **ABSTRACT**
Convertible seat-bed unit having a seat condition in which a back is inclined with one edge portion thereof disposed rearwardly and upwardly from an opposite edge portion disposed above and forwardly from the rearward edge portion of a seat, the one edge portion of the back being movable downwardly in a substantially vertical path to a position in which the opposite edge portion of the back is contiguous to the rearward edge of the seat, the unit being then in a bed condition. Linkage means are provided including first arm means having a lower portion connected to the seat and supported by roller means movable in an inclined track and including second arm means pivotal about a fixed horizontal axis and pivotally connected to the first arm means, a pair of links being provided between the first arm means and the back and an additional link being provided between the second arm means and the back. Spring means are provided assisting movement to the seat condition and support and locking means are provided for each condition.

11 Claims, 8 Drawing Figures









CONVERTIBLE SEAT-BED

BACKGROUND OF THE INVENTION

1. Field of the Invention

The invention relates to a convertible seat-bed unit and more particularly to a convertible seat-bed unit which is especially advantageous for use in campers or the like although having other applications. The unit of the invention is compact, utilizing a minimum amount of space, and is easily operable while being rugged in construction, highly reliable and readily and economically manufacturable.

2. Background of the Prior Art

Convertible seat-bed units of various constructions are well known in the prior art. In general, such units are complex and expensive in construction and/or are difficult to operate and subject to failure or breaking of parts. Various attempts have been made to simplify construction as by providing a construction in which the back of a unit is folded down to a flat position while the seat of the unit is moved forwardly, the seat and back then having upper surfaces in a common horizontal plane to form a bed. For example, the British Pat. No. 835,392 discloses a construction in which there is a pivotal connection between a seat and a back with an arm supporting a rearward portion of the seat. The Belgian Pat. No. 625,938 shows another construction in which there is a pivotal connection between a seat and a back with link means connecting the back and the support frame and with roller means supporting a rearward portion of the seat and movable in an inclined track. Such construction are comparatively simple but are not easily operable and are not entirely reliable especially with respect to the support of the seat and the back. Also, the edge portion of the back which is uppermost in the seat condition moves rearwardly a substantial distance relative to the support frame when the back is placed in the bed position. Thus when the unit is positioned with the back against a wall in the seating condition, the support frame must be moved forwardly in order to place the unit in the bed condition.

SUMMARY OF THE INVENTION

This invention was evolved with the general object of overcoming the disadvantages of prior convertible seat-bed constructions and of providing the unit which utilizes a minimum amount of space and which is rugged in construction and highly reliable and readily and economically manufacturable, while being easily operable.

Another object of the invention is to provide a convertible seat-bed unit which can be readily mounted in a camper or the like and having other applications.

According to this invention, a convertible seat-bed unit is provided having a seat condition in which a back is inclined with one edge portion thereof disposed rearwardly and upwardly from an opposite edge portion which is disposed above and forwardly from the rearward edge portion of a seat, support means being provided for supporting the back and seat from supporting frame members in a manner such that said one edge portion of the back is movable downwardly in a substantially vertical path to a position behind and in horizontal alignment with the opposite edge portion thereof which is positioned in contiguous relation to the rearward edge portion of the seat, the upper surfaces of the back and seat being then in a common horizontal plane

with the unit being then in a bed condition. With the one edge portion of the back being moved in a substantially vertical path, no forward movement of the supporting frame members is required in changing from the seat condition to the bed condition. This arrangement is especially advantageous in camper vehicles or the like in which the supporting frame members can be rigidly secured in fixed relation to the frame of the vehicle.

Specific features of the invention relates to the construction of the back and seat support means in a manner such as to obtain a high degree of reliability in operation and economy of manufacture. In particular, first and second arm means are provided with a portion of the first arm means being movable in a generally horizontal path between a rearward seat position and a forward bed position and with the second arm means being pivotal about a first horizontal axis spaced behind the rearward seat position of the portion of the first arm means, the first and second arm means being connected for a relative pivotal movement about a second horizontal axis which is spaced upwardly from the first horizontal axis and the said portion of the first arm means in the seat position thereof, means being provided for supporting the back from the first and second arm means.

In accordance with a specific feature, first and second linkage means are provided between the back and the first and second arm means, one of the linkage means, preferably the first linkage means, comprising a pair of link means and the other linkage means comprising a single link means.

Another specific feature relates to the provision of roller means mounted in inclined track means to guide the portion of the first arm means for movement, preferably with shaft means journalling on the roller means and carried by the seat.

Additional features relate to support and locking means for securely supporting and locking the back and seat in the seat and bed conditions of the unit.

Still further features relate to the provision of spring means acting on the second arm means to assist movement to the seat condition and to the mounting of the linkage and support means by means of side mount plates.

This invention contemplates other objects, features and advantages which will become more fully apparent from the following detailed description taken in conjunction with the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a perspective view of a convertible seat-bed unit constructed in accordance with the invention;

FIG. 2 is a sectional view, taken substantially along line II—II of FIG. 1, illustrating in rear elevation a portion of the mechanism of the unit at one end thereof;

FIG. 3 is a top plan view of the portion of the mechanism shown in FIG. 2 but with cushion portions of a seat in the back of the unit removed;

FIG. 4 is a sectional view taken substantially along line IV—IV of FIG. 3;

FIG. 5 is a sectional view taken substantially along line V—V of FIG. 3;

FIG. 6 is a view similar to FIG. 5, illustrating the position of parts when the unit is in a condition intermediate a seat condition and a bed condition;

FIG. 7 is a view similar to FIGS. 5 and 6, illustrating the position of parts with the unit in a bed condition; and

FIG. 8 is a sectional view taken substantially along line VIII—VIII of FIG. 2.

Reference numeral 10 generally designates a convertible seat-bed unit constructed in accordance with the principles of this invention.

The unit 10 includes a back 11 and a seat 12, means being provided for supporting the back 11 for movement between a first position as illustrated in FIGS. 1 and 5 in which one edge portion 13 thereof is in a first position spaced upwardly and rearwardly with respect to an opposite edge portion 14 thereof and a second position as illustrated in FIG. 7 in which the edge portion 13 is spaced rearwardly from and in horizontal alignment with the edge portion 14, the unit being in a seat condition and the first position of the back 11 and in a bed condition in the second position of the back 11. Means are provided for supporting the seat 12 for movement between a rearward seat position as illustrated in FIGS. 1 and 5 in which the rearward edge portion thereof is disposed below and behind the edge portion 14 of the back 11 and a forward bed position in which the rearward edge portion of the seat 12 is contiguous to the edge portion 14 of the back 11, as illustrated in FIG. 7, the upper surfaces of the back 11 and the seat 12 being then in a common horizontal plane. Preferably, the seat 12 is inclined in the seat position thereof, the rearward edge portion thereof being lower than the forward edge portion, for more comfortable seating.

A very important feature of the unit 10 is that the edge portion 13 of the back 11 is moved in a substantially vertical path in moving between the first and second positions thereof, so that the unit can be mounted close to a wall with no forward movement of the unit being required for converting from a seat to a bed. In this connection the unit 10 is especially designed for use in a camper type vehicle with the back 11 disposed against a vertical wall 12, the unit 10 being mounted between a pair of spaced walls 17 and 18 upstanding from a floor 20. It will be understood, however that units constructed in accordance with the invention may be used in homes, offices and other applications.

FIG. 2 is a sectional view illustrating in rear elevation the back and seat support means at one end of the unit, the back and seat support means at the other end of the unit having the same construction. The support means includes a first arm 21 having a lower end portion supported for generally horizontal movement between a rearward seat position and a forward bed position. In particular, a pin 22 extends through an opening 23 in the lower end portion of the arm 21 and a roller 24 is journaled on the end of the pin 22 and rides in a track member 25 which is secured to a side mount plate 26 secured as by screws to the wall 17. Track member 25 is preferably inclined so that the roller 24 moves upwardly as it is moved from the rearward end of the track member 25 to the forward end thereof.

Pin 22 is connected to the seat 12 and in particular, it extends through vertical like portions 27a and 28a of a pair of brackets 27 and 28 having horizontal like portions 27b and 28b spot welded together and secured by a pair of nuts 29 on the pair of stud bolts 30 which are welded to and projected downwardly from a generally tubular frame member 31 of the seat 12. The lower end

portion of arm 21 is disposed between a vertical leg portion 27a and 28a of brackets 27 through which the pin 22 extends.

The back and seat support means further includes a second arm 32 having a lower end portion journaled for movement about the horizontal axis of a pin 33 secured to the rearward end of the side mount plate 26. A pin 34 pivotally connects a portion of the first arm 21 spaced from the pin 22 to a portion of the second arm 32 spaced from the pin 33. In the position as illustrated in FIG. 5, pin 34 is in a vertical plane intermediate the axes of the pins 22 and 33 and as the pin 22 is moved forwardly, pin 34 moves downwardly and forwardly in an arc about the axis of the pin 33.

Linkage means are provided to support the back 11 from the arms 21 and 32 in a manner such as to obtain movement of the edge portion 13 of the back 11 in a substantially vertical path. In particular, a first link 36 is connected to the arm 21 by a pin 37 and to the back 11 by a pin 38 and a second link 40 is connected to the arm 21 by a pin 41 and to the back 11 by a pin 42. In the illustrated arrangement, the axes of the pins 22, 34, 37 and 41 are substantially in alignment, the axis of the pin 37 being between the axes of the pins 22 and 34 while the axis of pin 34 is between the axes of pins 37 and 41. The axes of pins 38 and 42 are in a plane which is generally parallel to the plane of the axes of the pins 32, 34, 37 and 41, being disposed forwardly therefrom in the seat condition of the unit and upwardly therefrom in the bed condition of the unit. Another link 44 is provided which is connected to the arm 32 by a pin 45 and to the back 11 by the pin 42. In the illustrated arrangement and in the seat condition of the unit, the axis of pin 45 is between an axes of pins 34 and 41.

The action of the linkage is shown in FIGS. 5, 6 and 7. In the seat condition as shown in FIG. 5, the edge portion 13 of the back 11 is close to the wall 16. As the seat 12 is moved forwardly, moving the roller 24 forwardly in the track 25, the arm 32 rotates in a clockwise direction and the arm 21 rotates in a counter-clockwise direction relative to the arm 32. Link 44 rotates in a counter-clockwise direction relative to the arm 32. Initially, links 36 and 40 rotate in a counter-clockwise direction relative to the arm 21 until the intermediate condition illustrated in FIG. 6 is reached, an axis of the pin 45 being in a plane through the axes of pins 34 and 42. In this intermediate condition, the edge portion 13 of the back 11 remains close the wall 16. With further forward movement of the seat 12 to the bed position of FIG. 7, links 36 and 40 pivot in a clockwise direction relative to the arm 21, effecting movement of the back 11 toward the pin 22 and maintaining the portion 13 of the back 11 close to the wall 16. In the final position of FIG. 7, the edge portion 14 of the back 11 is contiguous to the rearward edge portion of the seat 12 and the upper surfaces of the back 11 and the seat 12 are in a common horizontal plane, thereby providing a bed.

The linkage is urged toward the seat condition illustrated in FIG. 5 by means of a coiled tension spring 48 having a rearward end hooked into an opening 49 in an arm 50 which is fixedly secured to the arm 32 and having a forward end hooked into an eye-bolt 51 carried by a portion 52 of a bracket 53 which is secured to the side mount plate 26.

In the seat condition, (FIG. 5), rearward movement of the seat is limited by engagement of a pin 54 with the

rearward edge of a depending vertical leg portion 27c of the bracket 27. Also, as shown in FIG. 8, a pin 56 projecting downwardly from the seat frame member 31 adjacent the forward end thereof engages in an opening in a generally horizontal leg 57 of a bracket 58 which is secured to the forward end of the side mount plate 26. The leg 57 of bracket 58 provides support for the seat frame member 31 and it is noted that the forward end portion of the leg 57 is inclined downwardly and forwardly to facilitate sliding movement of the pin 56 thereon until the seat condition is reached, whereupon the pin drops into the opening in the leg 57.

To operate the unit to the bed condition, the forward end of the seat 12 is lifted slightly to move the pin 56 out of the opening in the leg 57 of bracket 58 and the seat 12 is then pulled forwardly. When the bed condition is reached, as shown in FIG. 7, clockwise movement of the lever 32 is limited by engagement with the pin 54 and, at the same time, the lever 21 engages a pin 60 on the lever 32, thereby providing firm support for the back 11. Also, the depending vertical leg portion 27c of bracket 27 engages a portion 62 of bracket 53 to limit forward movement of the seat 12. Frame member 31 engages the leg 57 of bracket 58 which provides vertical support for the seat 12. In moving out of the bed condition of FIG. 7 and back to the seat condition, the forward end of the seat 12 is initially lifted and the point of engagement between the portion 27c of the bracket 27 and the portion 62 of bracket 53 provides a fulcrum point about which the pin 22 rotates, facilitating the initial rearward movement of the pin 22 after which the seat 12 is pushed rearwardly to move the mechanism to the seat condition with the assistance of the spring 48.

FIG. 8 shows the support of the pins 38 and 42 from the back 11, pins 38 and 42 being secured to one leg portion 63 of an L-shaped bracket 64 having a second leg portion 65 secured by nuts 66 on stud bolts 67 welded to a generally tubular frame member 68 of the back 11. FIG. 8 also shows portions of the support means at the other end of the unit which has the same construction as that described above, including an arm 71 corresponding to the arm 21, an arm 72 corresponding to the arm 32, a spring 73 corresponding to spring 48 and a side mount plate 74 corresponding to side mount plate 26 and secured to the wall 18.

It will be understood that modifications and variations may be effected without departing from the spirit and scope of the novel concepts of this invention.

I claim as my invention:

1. In a convertible seat-bed unit, a generally rectangular back having generally parallel opposite top and bottom edge portions, back support means supporting said back for movement between an inclined position in which said top edge portion thereof is in a first position spaced upwardly and rearwardly with respect to said bottom edge portion thereof and a position in which said top edge portion thereof is in a second position spaced rearwardly from and in horizontal alignment with said bottom edge portion thereof, a generally rectangular seat having generally parallel forward and rearward edge portions, seat support means supporting said seat for movement between a rearward seat position in which said rearward edge portion thereof is disposed below and behind said bottom edge portion of said back when said back is in said first position and a forward bed position in which said rearward edge por-

tion thereof is contiguous to said bottom edge portion of said back with the upper surfaces of said back and seat then being in a common horizontal plane, said back support means being arranged for effecting movement of said top edge portion of said back in a substantially vertical path between said first and second positions thereof, said back support means comprising first arm means, means supporting a portion of said first arm means for generally horizontal movement between a rearward seat position and a forward bed position, second arm means, first pivot means supporting said second arm means for pivotal movement about a first horizontal axis in a fixed position spaced rearwardly from said rearward seat position of said portion of said first arm means, second pivot means interconnecting said first and second arm means for relative pivotal movement about a second horizontal axis spaced upwardly from and in a vertical plane intermediate said first horizontal axis and said rearward seat position of said portion of said first arm means, said second horizontal axis being moved forwardly and downwardly in an arc about said first horizontal axis in response to forward movement of said portion of said first arm means from said rearward seat position to said forward bed position, and means supporting said back from said first and second arm means comprising first linkage means between said back and said first arm means and second linkage means between said back and said second arm means, said first linkage means comprising first link means pivotally connected to said first arm means on a third horizontal pivot axis and pivotally connected to said back means on a fourth horizontal pivot axis and second link means pivotally connected to said first arm means on a fifth horizontal pivot axis and pivotally connected to said back on a sixth horizontal pivot axis, and said second linkage means comprising third link means pivotally connected to said second arm means on a seventh horizontal pivot axis and pivotally connected to said back on an eighth horizontal pivot axis.

2. In a unit as defined in claim 1, said sixth and eighth axes being a common axis.

3. In a unit as defined in claim 1, stop means supported in fixed relation to said first and second horizontal axis and disposed in the path of movement of said second arm means for limiting movement of said second arm means in response to forward movement of said portion of said first arm means.

4. In a unit as defined in claim 3, interengaging stop means on said first and second arm means for limiting relative pivotal movement of said first and second arm means to limit forward movement of said portion of said first arm means.

5. In a unit as defined in claim 1, said means supporting said portion of said first arm means comprising shaft means connected to said portion of said first arm means, roller means on said shaft means, and track means receiving said roller means.

6. In a unit as defined in claim 5, said shaft means being connected to a rearward portion of said seat.

7. In a unit as defined in claim 6, said track means being inclined upwardly and forwardly.

8. In a unit as defined in claim 1, tension spring means connected to said second arm means to urge said unit toward a seat condition.

9. In a unit as defined in claim 6, side mount plate means carrying said first pivot means and said track means.

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10. In a unit as defined in claim 9, seat support means carried by said side mount plate means for engaging and supporting a forward portion of said seat in the seat condition of said unit.

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11. In a unit as defined in claim 10, pin means carried by said seat and lockingly engagable with said seat support means in said seat condition of said unit.

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