Jan. 24, 1967 B. G. BLISE ETAL 3,299,446

SOFA BED

Filed Jan. 18, 1965 2 Sheets-Sheet 1

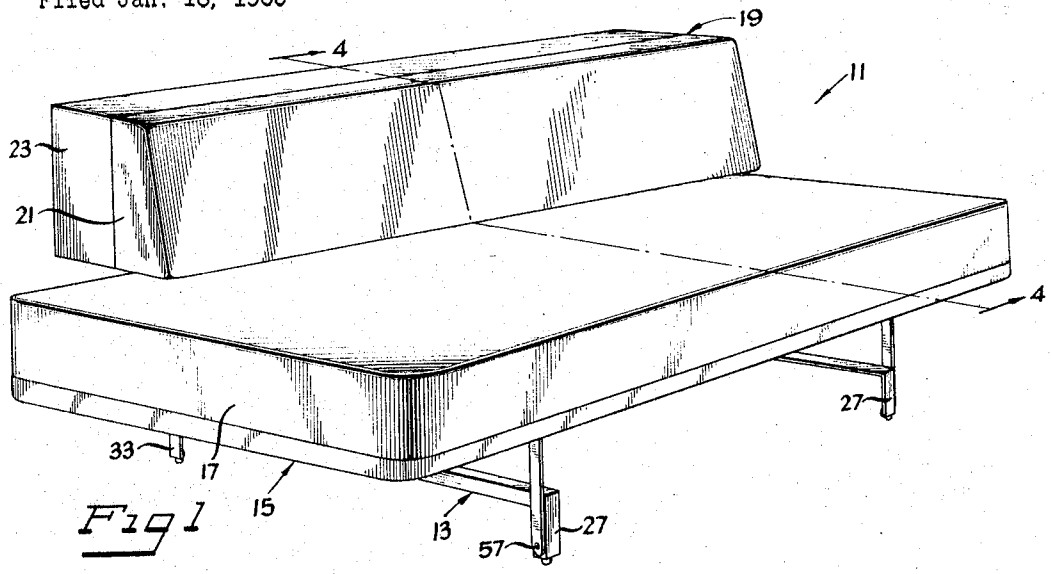


Fig 1

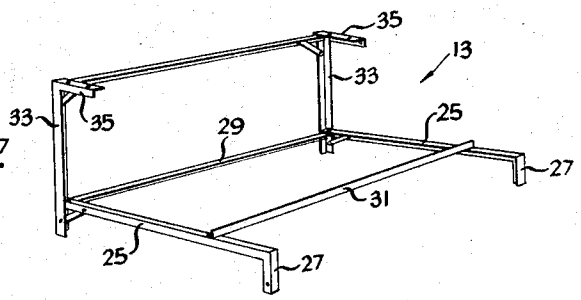
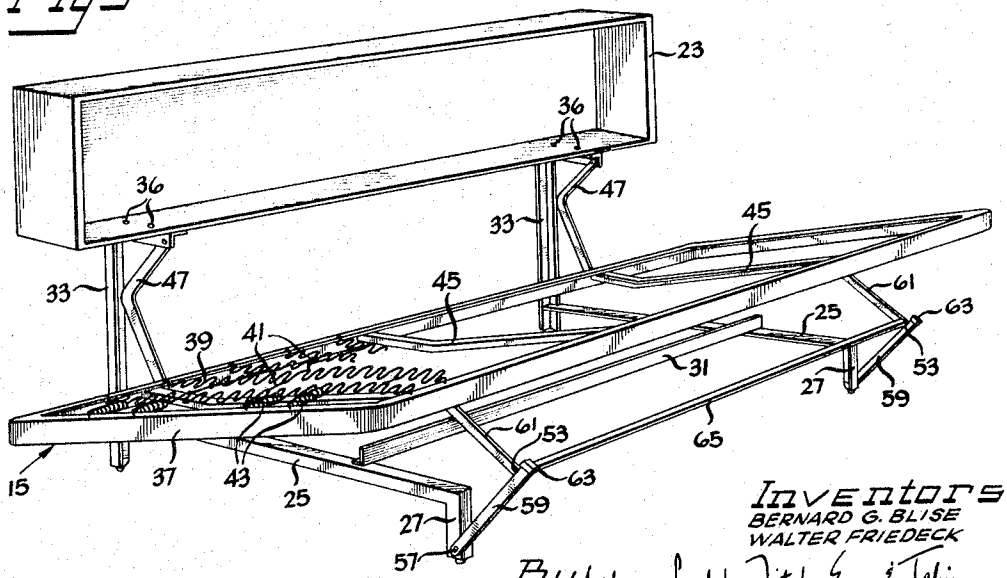


Fig 2

Fig 3



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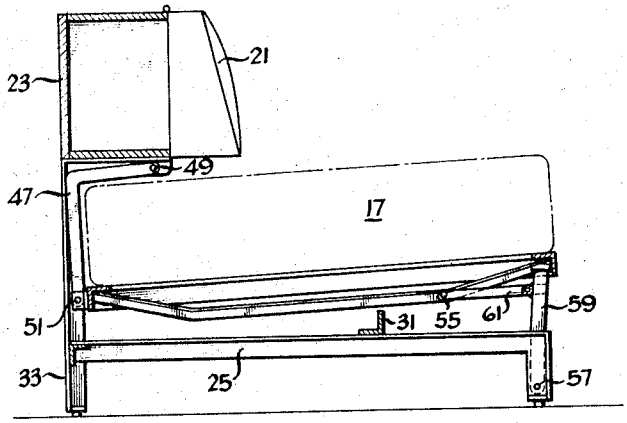


Fig 4

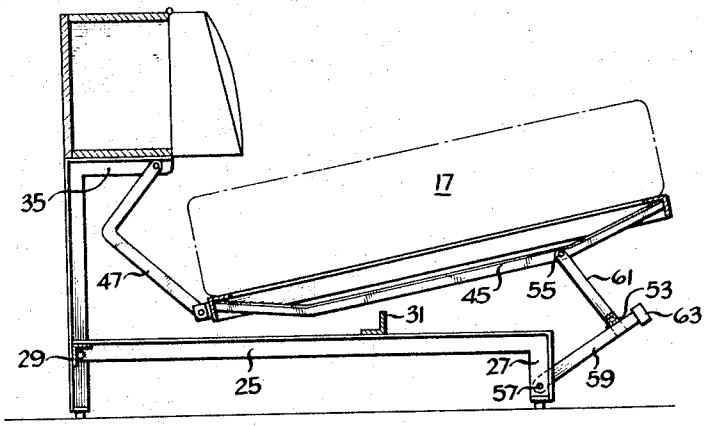


Fig 5

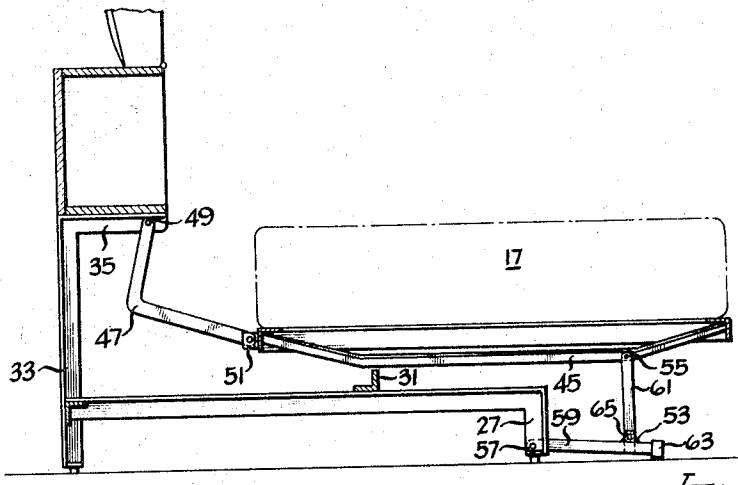


Fig 6

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3,299,446

SOFA BED

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This invention relates to furniture and particularly to a sofa bed.

Dual purpose furniture has a number of advantages in making efficient use of space and, accordingly, has become popular in hotels, in other like institutions, and even in private homes. To be acceptable both as a bed and as a sofa or lounge, a convertible piece of furniture should incorporate features which people have begun to expect in each. A bed is too wide to be comfortably used as a sofa seat, and a lounge seat is too narrow to prove comfortable as a bed. To alleviate this inherent inconsistency, it has become popular to provide mechanism in sofa beds by which a sofa seat can be pulled outward from a sofa position, wherein the rear portion of the seat is disposed beneath a back rest or bolster, to a position wherein the full width of the sofa seat is exposed and may serve as a bed.

Additionally, whereas it is desirable that the sleeping surface of a bed be horizontal, it is likewise desirable that the cushion surface for a sofa be slightly pitched or tilted rearward. Accordingly, it is also desirable that the mechanism which controls the shift of the seat cushion between positions also accomplish the backward pitch of the seat cushion in sofa position.

It is a primary object of this invention to provide an improved sofa bed. It is another object to provide a dual purpose furniture unit which incorporates simple operating mechanism for transforming the unit from a lounge to a bed and vice versa. It is a further object to provide a sofa bed in which the seat cushion may be moved from sofa position to bed position without having to move the sofa bed out from the wall nor remove the bolster. It is a still further object to provide improved guide mechanism, simple in operation and economical in construction, which is designed to move the rear of a seat cushion forward, out from under an overlying bolster, to a stable horizontal bed position. Still another object is to provide improved mechanism for supporting the front portion of a sofa bed in a stable position upon the floor whether it be in bed position or in sofa position. These and other objects of the invention are more particularly set forth in the following detailed description and in the accompanying drawings wherein:

FIGURE 1 is a perspective view of a sofa bed embodying various of the features of the invention;

FIGURE 2 is a perspective view, reduced in size, of the base frame employed in the sofa bed shown in FIGURE 1;

FIGURE 3 is a perspective view of the sofa bed of FIGURE 1 shown in an intermediate position between sofa position and bed position, with certain parts removed;

FIGURE 4 is a sectional view with certain parts removed, taken generally along line 4—4 of FIGURE 1;

FIGURE 5 is a view similar to FIGURE 4 with the sofa bed shown in an intermediate position between sofa position and bed position; and

FIGURE 6 is a view similar to FIGURES 4 and 5 with the sofa bed shown in bed position.

Referring first to FIGURES 1 through 3, the sofa bed **11** comprises a stationary or base frame **13** and a movable frame **15** which carries an upholstered seat cushion or mattress **17**. Mounted atop the rear of the base frame **13** is a back rest or bolster **19** which supports the user's back in the sofa position. The bolster **19** comprises a front cushion **21** hinged at its top to a bedding box **23** in which bedding materials can be conveniently stored when the unit is being used as a sofa. The front cushion **21** swings upward to an out-of-the-way position (FIG. 6) affording easy access to the bedding box **23**. The movable frame **15** is so supported upon the base frame **13** to be shiftable between the sofa position (FIGS. 1 and 4) and the bed position (FIG. 6), as will be hereinafter described in detail.

As best seen in FIGURE 2, the base frame **13** comprises a pair of forwardly and rearwardly extending, angle iron side rails **25**, the front ends of which are turned downward to serve as front legs **27**. The side rails **25** are interconnected via a rear cross bar **29** and an intermediate cross bar **31**, the connections being suitably made, as by welding or riveting.

The intermediate cross bar **31** is mounted atop the two side rails **25** where it also serves as a support for the movable frame **15** in the bed position, as hereinafter more fully described. A pair of vertically extending back legs **33** are attached to the rear ends of the side rails **25**. The back legs **33** extend well above the plane of the side rails **25** and have their upper ends overturned to provide a pair of forwardly extending supporting arms **35**. It is upon this pair of supporting arms **35** that the bolster bedding box **23** is suitably mounted, as by bolts **36**.

The illustrated movable frame **15** comprises a rectangular angle iron border frame **37** across which are mounted a plurality of sinuous wire springs **39** which run front-to-back, the ends of the springs **39** being anchored in holes in the border frame **37**. Cross links **41** interconnect adjacent springs to provide a unitary spring structure. Helical springs **43** connect the outermost springs **39** to the border frame **37**, thus integrating the spring and frame. The movable frame **15** includes three speader bars **45**, running front to back, which strengthen the border frame **37**. The spreader bars **45** are bowed so that their mid-portions are displaced below the plane of the frame **37**, providing clearance below the wire spring so that the sinuous springs **39** do not "bottom out" when supporting a load.

The movable frame **15** has about the same width as the base frame **13** but is substantially longer, being supported in a centered location relative to the base frame **13**, overhanging it equidistantly on both sides. The back of the movable frame **15** is hung from the supporting arms **35** by a pair of L-shaped links **47**. The upper ends of the links **47** are pivotally connected near the front of the supporting arms **35**, as by pins or rivets **49**. The lower ends of the rear links **47** are pivotally attached to brackets **51** carried on the rear vertical face of the border frame **37**. The L-shape of the rear links **47** provides clearance for the upholstered seat cushion **17** when the unit is in the sofa position (see FIG. 4). The relative lengths of the two arms of the links **47** provide the rearwardly pitched attitude for the movable frame **15**, in the sofa position.

The front end of the movable frame **15** is carried from the sofa position to the bed position by another pair of generally L-shaped links **53**, alternate arms of which may serve respectively as supporting struts for the front end of the movable frame when the sofa bed **11** is in the sofa or the bed position. The upper ends of the front links **53** are pivoted, as by pins or rivets **55**, to the two outermost reinforcing bars **45** at locations spaced rearwardly from their front ends, best seen in FIGURES 4 to 6. The lower ends of the front links **54** are pivoted to the front legs **27** of the base frame **13**, as by shoulder bolts **57**. During the shifting of the movable frame **15** from sofa to bed position and vice versa, the front links **53** serve as walkover links. In the illustrated embodiment, the front links **53** comprise arms **59** made of sections of rectangular tubing that are pierced to accept the ends of

arms 61, made of bar stock. A welded connection makes the joint rigid. The arms 59 extend past the joints with the arms 61, and protective rubber or plastic tips 63 cap the extensions. A torsion bar 65 interconnects the two links 53 for unison in movement.

The actual function of the front links 53 and rear links 47 is best described with reference to the shifting of the movable frame 15 from one position to another. The series of three illustrations shown in FIGURES 4 to 6 depict the shifting of the sofa bed 11 from sofa position (FIG. 4) to bed position (FIG. 6). To accomplish this shift in position, it is only necessary for one to grasp the front rail of the border frame 37 and pull upward and outward.

As the movable frame 15 is pulled forward, the front links 53 pivot and cause the front of the border frame 37 to be elevated until the links 53 have passed "over-center," i.e., whereat the two pivot points 55, 57 are vertically aligned. As the front end of the border frame 37 traces this forward and upward path, its rear end traces a forward and slightly downward path, controlled by the configuration of the L-shaped rear links 47. The downward component of this movement is sufficient to compensate for the upward movement of the front end of the border frame 37, i.e., to assure that the top of the seat cushion 17 (which in sofa position rests generally adjacent the bottom surface of the bolster 19) clears the bolster during this shifting operation.

After the front links 53 have passed over center, as illustrated in FIGURE 5, gravity will complete the shifting operation. During the final portion of this shifting movement, the rear links 47 guide the rear end of the border frame 37 forward and upward until the frame reaches the bed position shown in FIGURE 6. In unloaded bed position, the three spreader bars 45 are spaced about ⅛ inch above the intermediate cross bar 31. When loaded, the movable frame 15 is displaced downward so the bars 45 rest upon the top of the cross bar 31, providing support for the rear end of the frame 15.

Support for the front of the movable frame 15 is supplied by the arm 61 of the front link, which arm extends generally vertically and is now loaded in compression. The arm 61 thus serves as a strut between the upper pivot point 55 and the floor, with which extension tips 63 are now in actual contact. The length of the arm 61 is proportioned such that the border frame 37 is horizontal when the spreader bars 45 are resting atop the intermediate cross bar 31.

To shift the sofa bed 11 from bed position to sofa position it is merely necessary to lift the front edge of the movable frame 15. The L-shaped front links 53 cause the front edge of the movable frame 15 to trace an upward and rearward path until the links reach their center points, i.e., pivot points 55, 57 are in vertical alignment. Afterward, the path of the front edge of the movable frame 15 is downward and rearward. From the initiation of lifting, the rear edge of the movable frame 15 traces somewhat the opposite movement. The links 47 cause the rear edge of the movable frame 15 to follow a path that is first downward and rearward, providing clearance for the seat cushion 17 below the bolster 19. The end of the path of travel is upward and rearward until the top surface of the seat cushion 17 is generally adjacent the bottom of the bolster 19.

The front and rear links 53, 47 are so proportioned that in the sofa poistion (FIG. 4) the movable frame 15 is not horizontal but is pitched slightly rearward, a comfortable sitting position. In this position, the tubular arms 59 are generally vertical with each of the protective tips 63 engaging the underside of the horizontal flange of the adjacent angle iron spreader bar 45, supporting the front of the border frame 37. Thus, in the sofa position, the arms 59 serve as struts, being loaded in compression between the movable frame 15 and the pivot points 57 near the bottom of the front legs 27.

As the movable frame 15 approaches the sofa position, the front links 53 are well over center. Gravity and any other downward force applied to the movable frame 15 cause it to be thrust rearward until the upper ends of the arms 59 of the front links 53 engage the underside of the border frame. During this movement, and at the sofa position, the rear of the movable frame 15 is supported from the rear links 47.

A very simple, yet extremely effective and trouble-free, mechanism is thus provided for shifting the movable frame of a dual purpose furniture unit between sitting and sleeping positions. In each instance, conversion is effected merely by pulling up on the front edge of the movable frame 15. Force need be exerted only until the forward walkover links 53 pass their center points, after which time gravity completes the shift. In both sofa position and bed position, the front portion of the movable frame is stably supported by the front L-shaped links 53, the arms of which serve in turn as supporting struts. The rear links 47 permit the compact design of a sofa bed wherein the seat cushion 17 is longer than the bolster 19.

In sofa position, the links 47 are stored out of the way against the back legs 33 where they do not interfere with the seat cushion 17. Moreover, the cooperation between the front and rear links is such that the sofa bed 11 is very stable in sofa position, the front links 53 being well over center so that load on the cushion 17 increases the bearing force of the border frame 37 on the strut-arms 59 of the front links 53.

Various changes and modifications such as would be obvious to one skilled in this art may be made to the illustrated structure without deviating from the scope of the invention which is defined in the claims. Various of the features of the invention are set forth in the following claims.

What is claimed is:

1. A sofa bed comprising a normally stationary frame having a back rest, a movable frame adapted to support a seat cushion, means shiftably mounting said movable frame on said stationary frame for movement between a rearward sofa position disposed partially beneath said back rest and a bed position forward of said back rest, said mounting means including linkage means interconnecting the front portion of said movable frame and said stationary frame and defining the path of movement of said front portion of said movable frame in shifting between said positions, said linkage means including strut means which supports said front portion of said movable frame in said bed position.

2. A sofa bed comprising a normally stationary frame having a back rest, a movable frame adapted to support a seat cushion, means shiftably mounting said movable frame on said stationary frame for movement between a rearward sofa position disposed partially beneath said back rest and a bed position forward of said back rest, said mounting means including linkage means interconnecting the front portion of said movable frame and said stationary frame and defining the path of movement of said front portion of said movable frame in shifting between said positions, said linkage means including strut means which supports said front portion of said movable frame in said sofa position and in said bed position.

3. A sofa bed comprising a normally stationary frame having a back rest, a movable frame adapted to support a seat cushion, means shiftably mounting said movable frame on said stationary frame for movement between a rearward sofa position disposed partially beneath said back rest and a bed position disposed forward of said back rest, said mounting means including a pair of walkover links which also serve as struts to support the front end of said movable frame in the bed position and which define the path of movement of said front end in shifting between said positions, said walkover links being pivoted

at the upper ends thereof to said movable frame and pivoted at the lower ends thereof to said stationary frame.

4. A sofa bed comprising a normally stationary frame having a back rest, a movable frame adapted to support a seat cushion, means shiftably mounting said movable frame on said stationary frame for movement between a rearward sofa position disposed partially beneath said back rest and a bed position disposed forward of said back rest, said mounting means including a pair of first L-shaped links pivoted at the upper ends thereof to said stationary frame and pivoted at the lower ends thereof to the rear of said movable frame, said mounting means also including a pair of second L-shaped links which serve as struts to support the front end of said movable frame in the bed position, said second L-shaped links being pivoted at the upper ends thereof to said movable frame and pivoted at the lower ends thereof to said stationary frame and defining the path of movement of said front end in shifting between said positions.

5. A sofa bed comprising a normally stationary frame having a back rest, a movable frame adapted to support a seat cushion, means shiftably mounting said movable frame on said stationary frame for movement between a rearward sofa position disposed partially beneath said back rest and a bed position disposed forward of said back rest, said mounting means including a pair of first L-shaped links pivoted at the upper ends thereof to said stationary frame and pivoted at the lower ends thereof to the rear of said movable frame, said first L-shaped links providing support for said rear of said movable frame in said sofa position, said mounting means also including a pair of second L-shaped links which serve as struts to support the front end of said movable frame both in the sofa position and in the bed position, said second L-shaped links being pivoted at the upper ends thereof to said movable frame at points spaced rearward from the front edge thereof and pivoted at the lower ends thereof to said stationary frame and defining the path of movement of said front end in shifting between said positions.

6. A sofa bed comprising a normally stationary frame having front and rear pairs of legs, each of said rear legs extending above the height of said front legs and having forwardly extending arms, a back rest mounted on said arms, a movable frame adapted to support a seat cushion, a seat cushion disposed on said movable frame, means

shiftably mounting said movable frame on said stationary frame for movement between a rearward sofa position disposed partially beneath said back rest and a bed position disposed forward of said back rest, said mounting means including a pair of first L-shaped links pivoted at the upper ends thereof to said forwardly extending arms and pivoted at the lower ends thereof to the rear of said movable frame at points intermediate the side ends of said movable frame, the arms of said links which are pivoted to said movable frame being longer than the height of said seat cushion, said mounting means also including a pair of second L-shaped links which serve as struts to support the front end of said movable frame both in the sofa position and in the bed position, said second L-shaped links being pivoted at the upper ends thereof to said movable frame at points spaced rearward from the front edge thereof and pivoted at the lower ends thereof to said front legs.

7. A sofa bed of the type comprising a normally stationary frame adapter to rest on a floor and having thereon a back rest, a movable frame adapted to support a seat cushion, and means movably mounting the said movable frame on the stationary frame for movement between a sofa position disposed partially beneath said back rest and a bed position forward of said back rest in which the said mounting means includes, at the front of the sofa bed, a link pivoted at one of its ends to the stationary frame and at its other end to the movable frame so as to give said movable frame a gravity-bias tending to urge said movable frame from an unstable "over-center" position toward either of said sofa or bed positions, said link being formed to engage the floor, and to extend as a strut from the floor to the movable frame, when the latter is in bed position.

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