Feb. 24, 1948. M. C. BINENKORB 2,436,546

CONVERTIBLE STUDIO BED AND COUCH

Filed Sept. 5, 1944 4 Sheets-Sheet 1

Fig. 1.

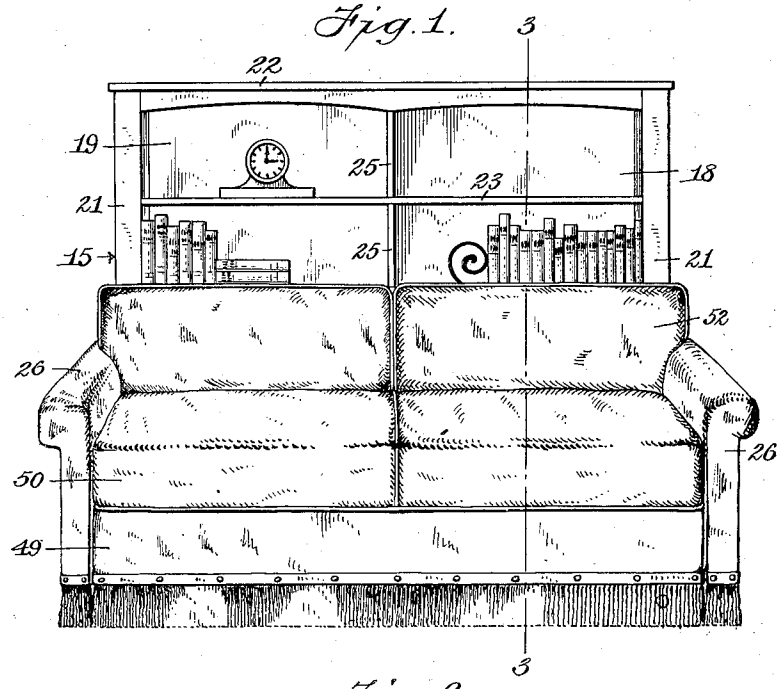
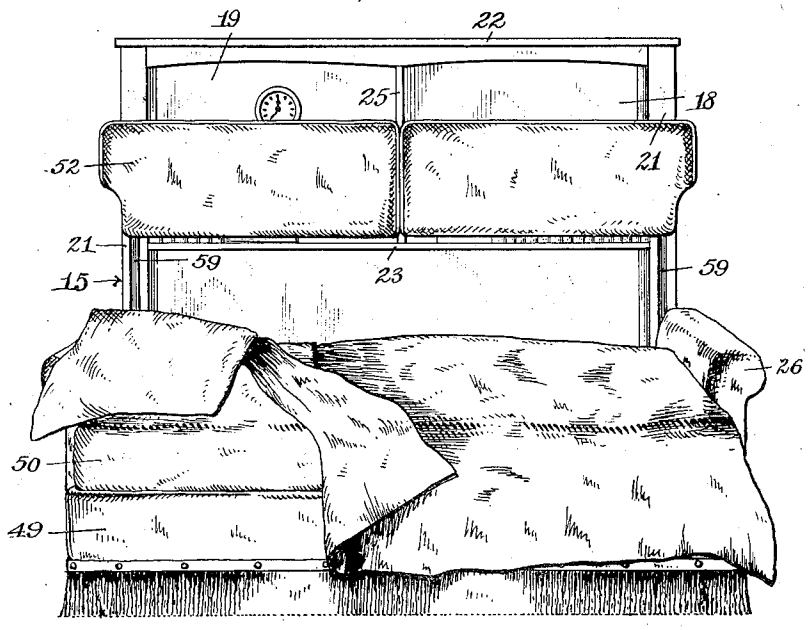


Fig. 2.



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CONVERTIBLE STUDIO BED AND COUCH

Filed Sept. 5, 1944 4 Sheets-Sheet 2

Fig. 3.

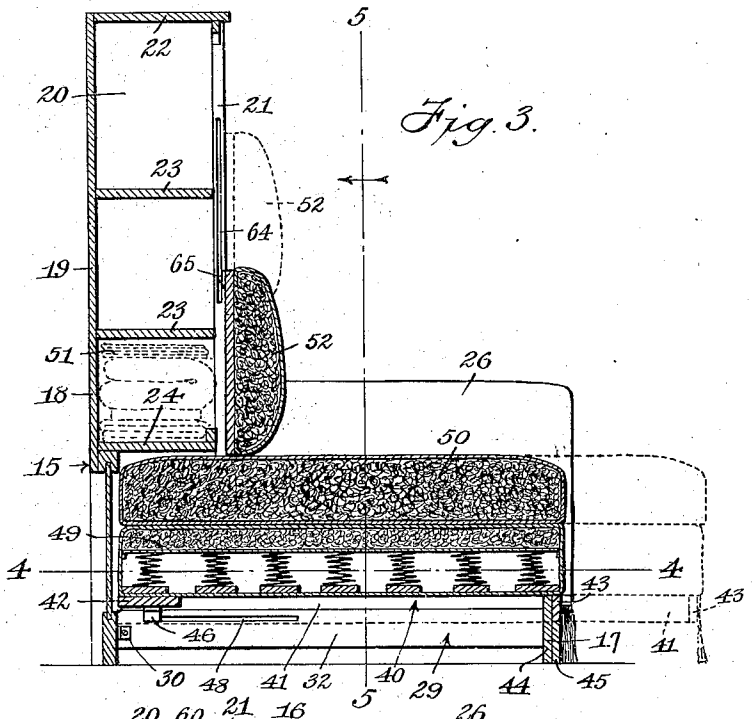
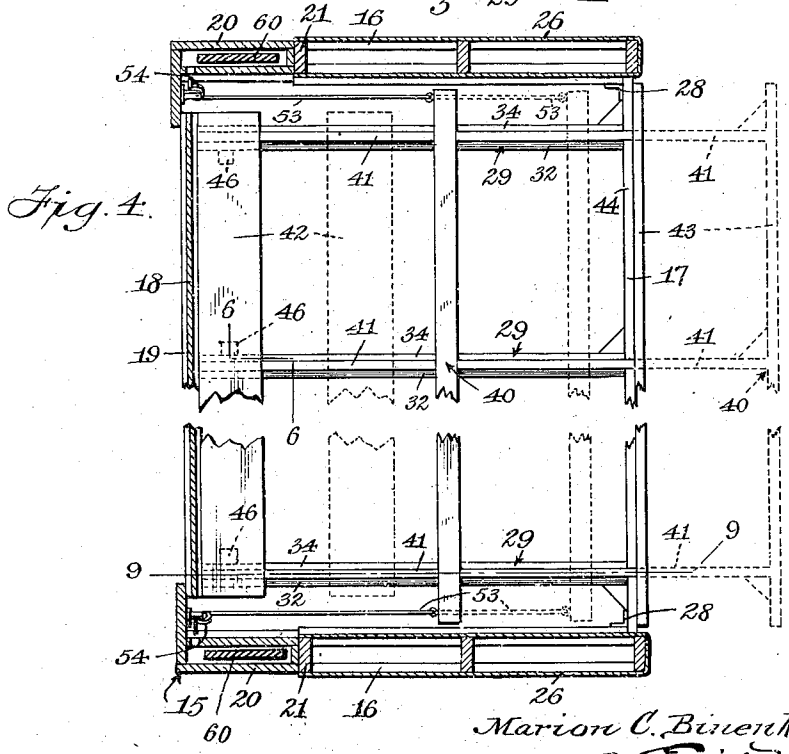


Fig. 4.



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CONVERTIBLE STUDIO BED AND COUCH

Filed Sept. 5, 1944 4 Sheets-Sheet 3

Fig. 5.

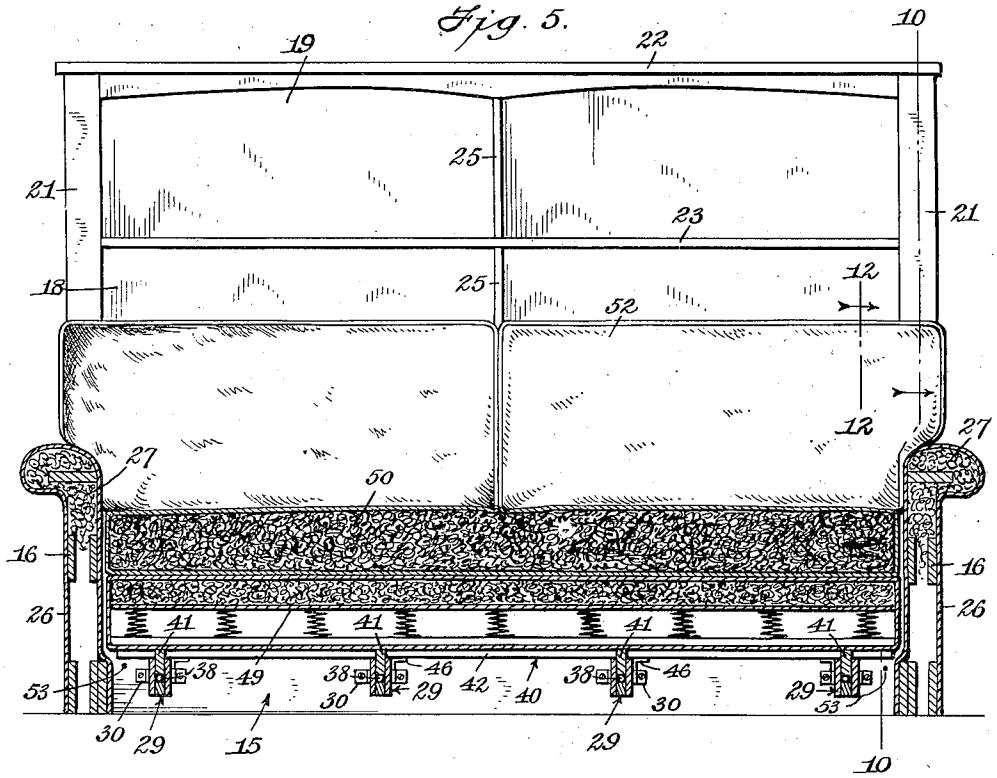


Fig. 6.

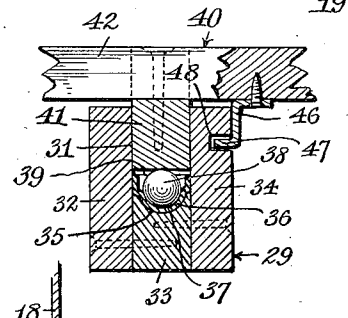


Fig. 7.

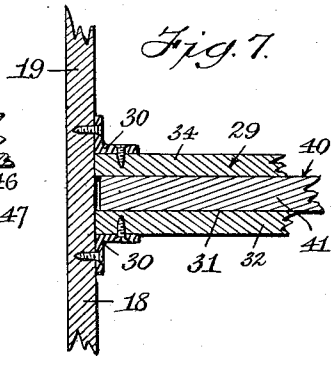


Fig. 8.

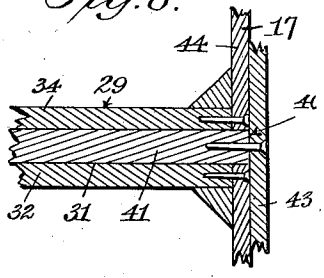
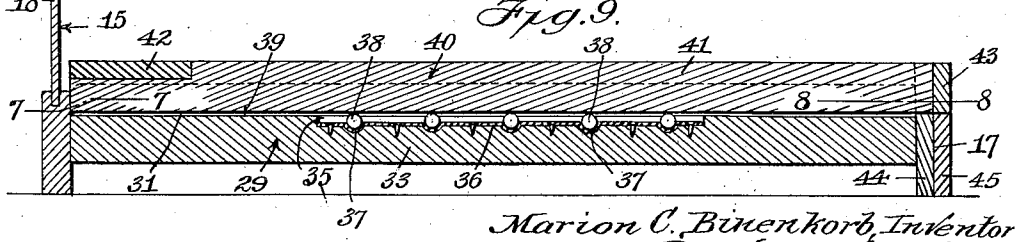


Fig. 9.



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Feb. 24, 1948. M. C. BINENKORB 2,436,546

CONVERTIBLE STUDIO BED AND COUCH

Filed Sept. 5, 1944 4 Sheets-Sheet 4

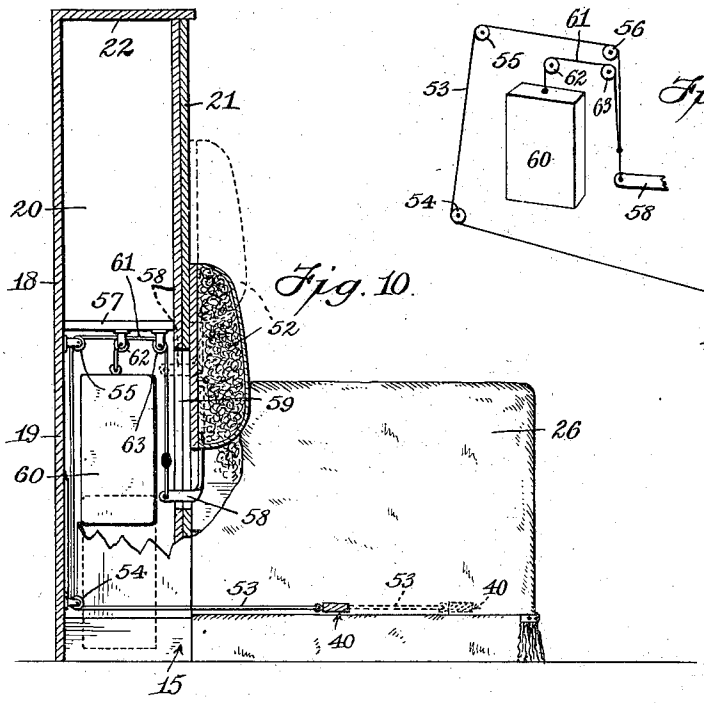


Fig. 10.

Fig. 11.

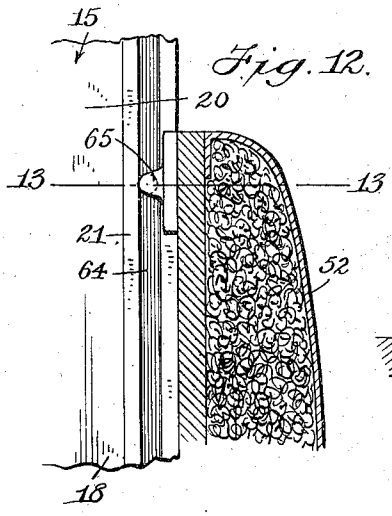


Fig. 12.

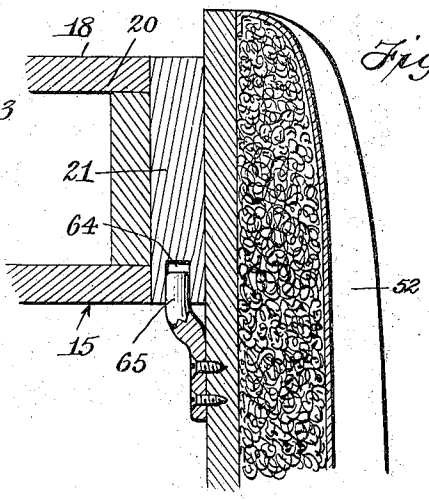


Fig. 13.

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UNITED STATES PATENT OFFICE

2,436,546

CONVERTIBLE STUDIO BED AND COUCH

Marion C. Binenkorb, Middletown, N. Y.

Application September 5, 1944, Serial No. 552,791

2 Claims. (Cl. 5—18)

1

My invention relates to a convertible studio couch and bed of the type used as a couch during the day and converted at night into a widened bed.

One of the objects of my invention is to associate the couch or bed with an article of furniture, preferably a book case, from the front of which the couch or bed structure extends with certain portions thereof fitted into the book case or other article of furniture when converted into a couch.

Another object of my invention is to provide a main frame in which a spring-support is movable and on which is placed a conventional bed-spring and a surmounting mattress, preferably covered with tapestry or other material usually employed as covering material for couches; the mattress serving as the seat for the couch and said spring-support being associated with a vertically movable back-support or rest raised and lowered to conform to the movement of the spring-support.

A further object of my invention is to provide a convertible studio couch and bed having all the comfort qualities of a regulation bed by reason of employing a box-spring and a mattress having as covering, material of the type usually employed in ordinary couches intended for living-room use, the material matching the end arms and the back-support of the couch structure.

A still further object of my invention is to provide a convertible studio couch and bed having the usual end arms, seat, and back-rest when used as a couch and having said seat horizontally movable and connected with the back-rest so that when drawn forwardly or outwardly to be utilized as a bed, the back-rest will be elevated to provide space underneath the same for a person desiring to occupy the inner or rear portion of the bed.

A still further object of my invention is to provide a convertible studio couch and bed of the type last mentioned, wherein provision is made for counter-balancing the movable parts of the structure so that conversion of the couch into a bed, or vice versa, can be easily effected by a delicate individual.

In the drawings:

Fig. 1 is a front elevation of my improved studio couch showing the same associated with a book-case.

Fig. 2 is a similar view showing the couch converted into a bed.

Fig. 3 is a transverse section taken on line 3—3, Fig. 1, the parts being in the positions shown when converted into a couch.

2

Fig. 4 is a horizontal section, taken on line 4—4, Fig. 3, the box-spring and mattress or couch seat being removed to illustrate the construction of movable spring-support and the view being broken lengthwise.

Fig. 5 is a vertical longitudinal section, taken on line 5—5, Fig. 3, looking in the direction of the arrow crossing said line.

Fig. 6 is an enlarged cross section through one of the transverse frame members and one of the members of the spring-support, taken on line 6—6, Fig. 4, looking in the direction of the arrow crossing said line.

Fig. 7 is an enlarged horizontal section taken on line 7—7, Fig. 9.

Fig. 8 is an enlarged horizontal section taken on line 8—8, Fig. 9.

Fig. 9 is an enlarged transverse section taken on line 9—9, Fig. 4.

Fig. 10 is a transverse section, taken on line 10—10, Fig. 5, looking in the direction of the arrow crossing said line.

Fig. 11 is a diagrammatical view of the counter-balancing means employed at opposite ends of the couch or bed, showing the same connected to a portion of the back-rest or support and a portion of the spring-support of the structure.

Fig. 12 is an enlarged vertical section through a portion of the back-rest or support, taken on line 12—12, Fig. 5.

Fig. 13 is a horizontal section taken on line 13—13, Fig. 12.

For convenience in describing, the convertible studio couch and bed, it may at times hereinafter be referred to as an article of furniture in the form of a couch convertible into a bed, or vice versa, and in preferred form it includes a frame built in part to represent two articles of furniture, one a distinct article of furniture in front of which the other, the couch or bed, is placed.

Since a preference has been shown by purchasers of the products of my invention to have the frame built in part as a book-case, I have shown such a structure in the drawings, but merely as an exemplification. The rear portion of the frame representing a distinct article of furniture, such as a book-case, is designed to permit the back-rest or support of the couch to be elevated and lowered, so that the rear portion of the frame will receive into it the rear portion of the couch seat, which also serves as the spring and mattress of the bed and the support for such bed elements when the couch is converted into a bed and which shall also receive the pillows, bed

linen, and counterpane or other bedding, when the structure is converted into a couch.

The frame, broadly considered, is designated by the numeral 15 and it includes end members 16, a front member 17 tying the end members 16 together at their front ends, and a rear member 18 to which the end members 16 are secured and which may be a structure, preferably representing a definite article of furniture. In the form shown as an exemplification of this rear member, I have illustrated a book-case extending a considerable distance above the end members 16; but if desired, this structure may be in the form of some other article of furniture or be otherwise constructed so long as it is chambered beneath its upper end. In the form shown, the rear member or book-case 18 comprises a rear wall 19, which may be of any construction, chambered or hollow end walls 20 having guide strips 21 applied to their front edges, a top wall 22, book shelves 23, and a bedding storage shelf 24, situated a distance beneath the lower book shelf 23. The book shelves 23 may be divided lengthwise by vertical separating pieces 25, the book shelves 23 and the bedding storage shelf 24 extending from hollow end wall to hollow end wall. The end members 16 are removably secured to the hollow end walls 20 of the rear member or book-case and the front member 17 has its connections to the end members 16 detachable so that when transporting the structure from its place of sale to its place of use, the book-case will be a unit, each of the end members 16 a separate unit, and the front member 17 also a separate unit, taken with other parts to be presently described. This permits the structure to be "knocked-down" so as to enable the same to be easily transported from place to place.

Each of the end members 16 is a separate frame covered with material 26 which is to serve as the covering material for the couch and it is padded as shown at 27, to serve as the usual arm rests at opposite ends of the couch.

The front member 17 is connected at opposite ends to the frames of the end members 16 by brackets 28 which can be loosened from either said frames or from the front member so that the latter can be disconnected from said end members, and this front member has the front ends of spaced-apart transverse frame members 29 secured thereto, the rear ends of which are detachably secured to the lower end of the rear member or book-case 18, brackets 30 being provided for this purpose. Thus by loosening the brackets 28 and 30, the front member 17 and the transverse frame members 29 may be removed as a unit from the remaining portions of the frame. The transverse frame members 29 are provided with upwardly-opening grooves 31 for a purpose to presently appear. I preferably construct each of said frame members 29 of three strips of wood 32, 33, and 34, arranged side by side and secured together in any approved manner, the intermediate strip 34 being narrower than the side strips 32 and 33 so as to form the upwardly-opening groove 31. Each of these grooves is deepened along its medial portion, as at 35, and applied to the bottom of the deepened portion thereof is a channel-shaped metallic ball-retainer 36, having spaced apart parti-spherical depressions 37 in which anti-friction balls 38 are placed and which are adapted to rotate in said depressions. These anti-friction balls extend upwardly above the level of the normal bottom 39 of the grooves 31 and in the grooves of the several frame members 29, parts of a slidable frame 40 are arranged.

Said slidable frame comprises transverse members 41 which are connected together at their rear ends by a longitudinal member 42, notched into said transverse members and at their front ends they are connected together by a longitudinal facing member 43. The front member 17 of the main frame, or frame structure as it may be termed, is constructed of two pieces of wood 44, 45 fastened together in any approved manner, the inner piece 44 being wider than the outer piece 45 and this front member is notched at several places along its length to receive the transverse members 41 of the slidable frame 40. The outer piece of wood 45 has the longitudinal facing member 43 fastened to the front ends of the transverse members 41 resting thereon when the parts of the complete structure are in normal or what I term "couch-forming" positions, as clearly shown in Fig. 9.

The transverse members 41 of the slidable frame have their lower regions entered in the grooves 31 formed in the transverse frame members 29, and when the parts are in the positions shown in Figs. 1 and 3, which may be considered normal positions of the various parts, the transverse members 41 receive support along a considerable distance from the anti-friction balls 38 and at their front ends they receive support from the lower walls of the notches formed in the front member 17 and from the upper edge of the outer piece of wood 45. The slidable frame may be referred to as the bed support, and the longitudinal member 42 at the rear end of the bed support is preferably provided with angular retainers 46 secured to its underside adjacent two or more of the transverse frame members 29 and these retainers have inwardly-directed toes 47 entered in grooves 48 formed in said frame members, as best shown in Fig. 6.

As so constructed, the slidable frame or bed support is arranged to be slid into the main frame of the structure, as shown in full lines in Figs. 3 and 4, and this main frame may be said to comprise the rear member or book-case 18, the end members 16, and the front member 17 with its fixed transverse frame members 29 or said slidable frame or bed support may be drawn forwardly or outwardly to the position shown in dotted lines in Figs. 3 and 4.

Due to the use of anti-friction devices between the frame members 29 and the transverse members 41 of the bed support, the latter can be moved rearwardly or forwardly without much effort and when drawn forwardly, as shown by dotted lines in Figs. 3 and 4, downward tilting movement of the front end of the bed support under the weight of an occupant, will be prevented by the angular retainers 46.

In order that the comforts of a conventional bed stead may be had, I employ a box spring 49 which rests upon the transverse members 41 of the bed support and the front edge portions, and the top, bottom and ends adjacent the front edge are covered with the finishing material used to cover the end members or couch arms 16, since this front edge is exposed to view. If desired, the entire box spring may be covered with such material. On the box spring a mattress 50 is placed and this mattress is also covered with material to match the covering material applied to the end arms 16 and the front exposed edge of the box spring.

Since this mattress is used selectively as the

couch seat and the mattress of the bed, the bed-support is normally forced entirely into the main frame of the structure so that the rear portion thereof is entered in the lower portion of the book-case or other rear-member structure which may be employed, and since the box spring 49 and mattress 50 cover the entire bed support, the rear portions of the box spring and mattress are also entered into the lower portion of the book-case or other hollow structure, serving as an article of furniture which may be used.

When the slidable frame or bed support and the box spring and mattress mounted thereon are positioned wholly within the main frame of the structure, the upper surface of the mattress is slightly beneath, or in contact if desired, with the underside of the bedding shelf 24.

When the structure is converted into a bed couch by drawing out the bed-support and the box spring and mattress mounted thereon, the usual bed linen is applied thereto, such as the sheets, blankets, counterpane, pillows and other objects used as bedding, as shown in Fig. 2.

When the bed, so arranged, is to be converted into a couch, the bed linen is removed and stored within the book-case or other hollow rear member of the structure, as shown by dotted lines 51, Fig. 3, so that the linen is always easily accessible for use.

When the slidable frame or bed support with the box spring and mattress thereon is thrust into the main frame of the structure so that these parts assume the positions shown in full lines in Fig. 3, only so much of the top surface of the mattress 50 is exposed as the area of a seat in a conventional couch or settee. With this in view I provide a back-rest or support 52 and utilize the same to determine the depth of the couch seat.

This back rest or support closes the lower portion of the book-case, or as it may be termed, the combined book and linen case, so referred to because the lower book shelf 23 determines the lower region of the book space and the upper region of the bedding or linen space, while the bedding shelf 24 determines the lower region of said bedding or linen space. This back-rest or support when in normal position, shown in full lines in Fig. 3, completely conceals the bedding or linen stored on the bedding shelf 24 and may, as shown, cover the lower region of the book space directly above the lower book shelf 23. This, however, is a matter of design and may be varied, so long as the linen space is fully concealed when the back-rest is in the position required for couch use.

It will be apparent that when the parts are in normal positions, in which the structure is converted into a couch, only so much of the mattress or couch seat 50 as is exposed can be utilized and I, therefore, provide means for elevating the back-rest or support, as shown by dotted lines in Fig. 3, and this change in position of the back-rest or support is accomplished simultaneously with the forward or outward movement of the bed support and the box spring and mattress thereon, which three elements may for convenience be referred to as the bed structure.

To accomplish this, I fasten one end of a chain or cable 53 to each end of the bed support and pass these chains or cables around pulleys 54 secured to the rear wall 19, over pulleys 55 also secured to said rear wall within the hollow end walls 20 and over pulleys 56 secured to the underside of carrier pieces 57 fastened within said hollow end walls and finally fasten the opposite ends

to arms 58 extending downwardly from the back-rest or support and thence rearwardly so as to pass through slots 59 formed in the guide strips 21 and the front wall members forming part of said end walls.

A counter-weight 60 is employed in each of the hollow end walls and it is attached to one end of a cable 61 passed around a pulley 62 secured to the carrier piece 57 and thence around a second pulley 63 with its other end splined or otherwise secured to the chain or cable 53 near the point of the latter's attachment to the arm 58.

The guide strips 21 are provided at their inner edges with guide grooves 64 along portions of their lengths and secured to the rear face of the back-rest or support 52 at opposite ends thereof and near its upper edge are outwardly extending guide trunnions 65, which enter the guide grooves 64 and thus guide the back-rest or support in its vertical movements.

It will be apparent, therefore, that when the bed structure is inserted fully within the main frame of the structure, the back-rest or support will be in its lowered position and in the exemplification of my invention shown, the structure will have the appearance of a couch positioned in front of a book case, the upper portion of which latter is exposed to view above the back-rest or support. When it is desired to convert the couch into a bed, the bed structure may be drawn outwardly from the main frame and for convenience in accomplishing this, loops constructed of the covering material may be applied to the front member of the slidable frame bed support.

On drawing the bed structure outwardly, the chains or cables 53 will ride over the pulleys 54, 55 and 56, causing an upward pull on the arms 58 extending from the back-rest or support downwardly and rearwardly into the hollow end walls 20 and to aid in this movement of the bed structure and back-rest or support, the weight 60 gravitates due to the upward movement of that end of the chain or cable 53 to which the cable 61 is secured, thus serving as a means to counterbalance the weight of the back-rest or support and overcome any resistance offered by the movement of the guiding trunnions 65 in the guide groove 64 and friction created by the bed support 31 while riding in contact with other parts of the structure.

This action results in the bed structure and the back-rest or support assuming the positions shown in dotted lines in Figs. 3 and 4. At such times, the back-rest or support is elevated a distance so that the rear marginal portion of the mattress is positioned directly beneath the back-rest or support with sufficient space between the lower end of the back-rest or support and the upper surface of the mattress to enable a person lying on the rear portion of the mattress to have freedom in action without coming in contact with the back-rest or support.

When the parts are thus positioned, the bed linen and other material required may be conveniently removed from their storage space and the bed thus arranged made up in the same manner as a conventional bed; the same space being provided as is furnished by a conventional double bed.

When the bed is to be converted into a couch, the linen, coverings, and pillows are removed, folded and placed on the bedding shelf 24; force is then applied to the front end of the bed structure, causing the bed support, and box spring and mattress to be forced inwardly or rearwardly

so that the rear portion thereof lies beneath the bedding shelf. This slackens the chains or cables **53** and the weight of the back-rest or support is then relied upon to cause it to gravitate into its couch-forming position, which is that shown in full lines in Fig. 3. Since this back-rest or support is counter-balanced by the weights **60** within the hollow end walls **20**, only slight downward force is required to move the backrest or counter-support into position.

In the event that the counterweights should fail by reason of overloading the bed structure, movement of the bed structure and back-rest or support may be accomplished simultaneously if two persons are available. If, however, the bed structure is first forced into its inner or rear position, the chains or cables **53** may become slackened and when the back-rest or support is then lowered, all slackness in these chains or cables will be taken up.

From the foregoing it will be apparent that by the use of counter-balancing means of the type shown and described, or other counter-acting means employed, the movable parts of the structure will be free in action and a child be able to convert the couch into a bed, or vice versa.

It is, of course, understood that the results obtained by use of the details and combination of parts shown and described may be varied without departing from the spirit of my invention or sacrificing any of the advantages thereof and that the book case **18** is utilized for embellishment while serving as a hollow or open article of furniture forming a part of the main frame of the structure and adapted to receive into it a portion of the bed structure and to store bed linen, pillows, counterpanes, etc. when the structure is converted into a couch.

In the exemplification of my invention shown and described, this structure may be referred to as a combination book case, couch and bed and such a combination is designed to be placed in front of a wall giving the appearance of the book case positioned against a wall and the couch or bed, depending on its conversion, placed in front of the book case.

The combination book case, couch and bed are merely illustrative, and the couch and bed structure may be combined with any other article of furniture so long as it has space within itself to receive the rear portion of the bed structure and permit of moving the back-rest or support into a position away from the mattress of the bed structure so that the entire area of the mattress will be available for use as a bed and so that when converted into a couch, only a predetermined depth of the mattress will be employed as a seat and the parts of the couch exposed will conform in area to the seat of a conventional couch or settee.

Having thus described my invention what I claim is:

1. In a convertible bed and couch, a main frame including fixed transversely-disposed grooved members, a bed support having slidable members connected together so that they move in unison, said slidable members being slidable within the grooves of said fixed members, anti-friction means between said fixed members and said slidable members, a bed member carried by said bed support and movable therewith, a back-rest normally vertically-disposed and extending upwardly from said bed member with the rear portion of the latter concealed, flexible elements connecting said back-rest with said bed support, and pulleys over which said flexible elements are passed, said flexible elements serving to elevate the back-rest when moving said bed support forwardly with said bed member thereon so that the entire bed structure may be available for sleeping purposes and so that the bed member will be moved rearwardly when lowering said back-rest.

2. An article of furniture in the form of a convertible bed and couch, comprising a main frame having a book case at its rear end, a slidable frame movable completely into said main frame so that its rear portion extends into the lower end of said book case and adapted to be drawn partly out of said main frame so that its front end extends a distance beyond the front end of said main frame, bedding supported on said slidable frame, a back-rest disposed at an angle to the upper surface of said bedding in front of said book case and adapted for vertical movement, means for guiding said back-rest along said book case, flexible connections between opposite ends of said slidable frame and corresponding ends of said back rest, pulleys secured to said main frame over which said flexible connections pass, said flexible connections serving to cause said back-rest to be moved upwardly when partly withdrawing said slidable frame from said main frame and for causing said slidable frame to be moved inwardly when lowering said back-rest, and counter-weight mechanism connected to said flexible connections to assist in the movements of said slidable frame and back-rest.

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