May 7, 1929. C. HULTGREN 1,712,145

SOFA BED

Filed Nov. 20, 1925 3 Sheets-Sheet 1

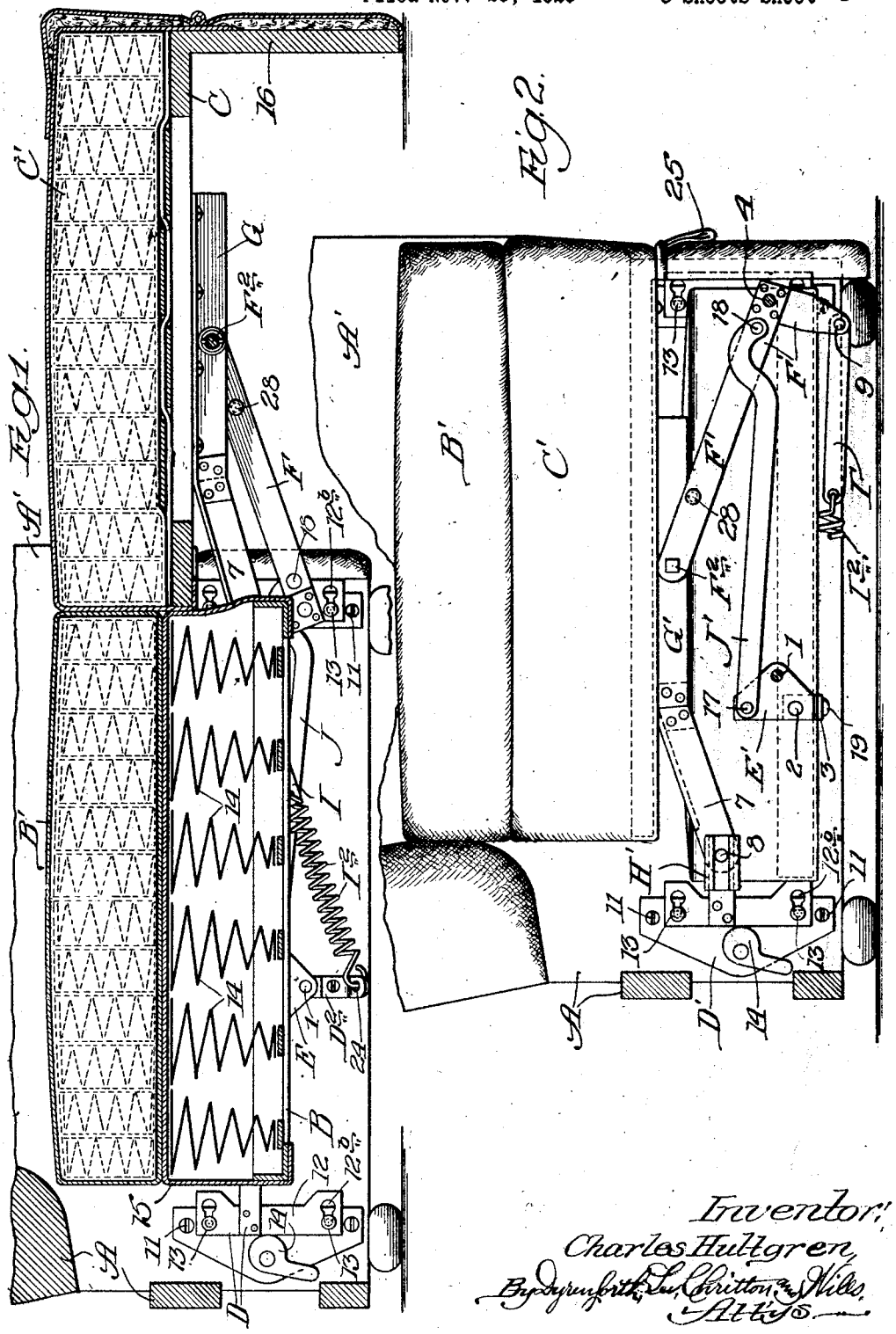


Fig. 1.

Fig. 2.

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May 7, 1929. C. HULTGREN 1,712,145

SOFA BED

Filed Nov. 20, 1925 3 Sheets-Sheet 2

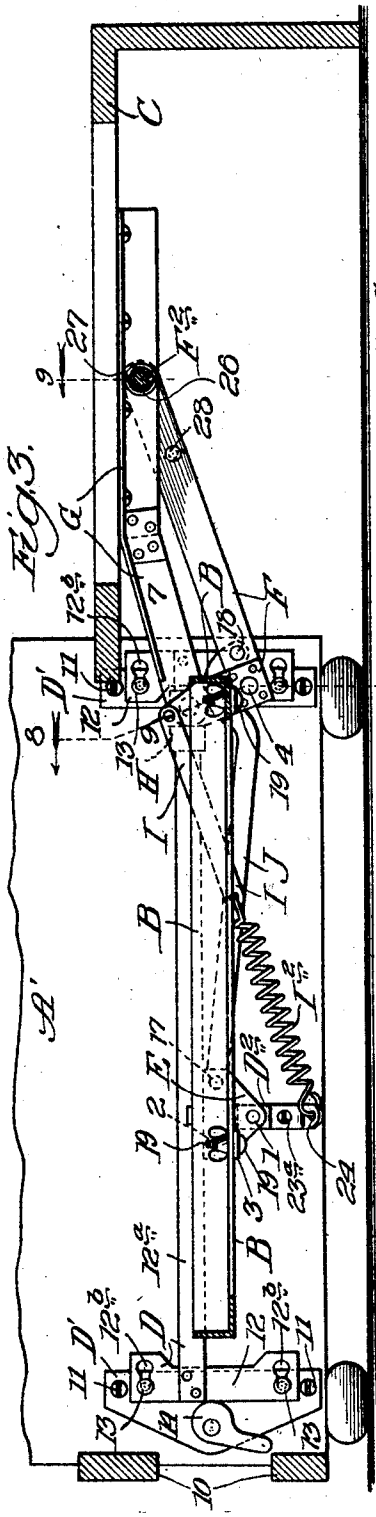


Fig. 3.

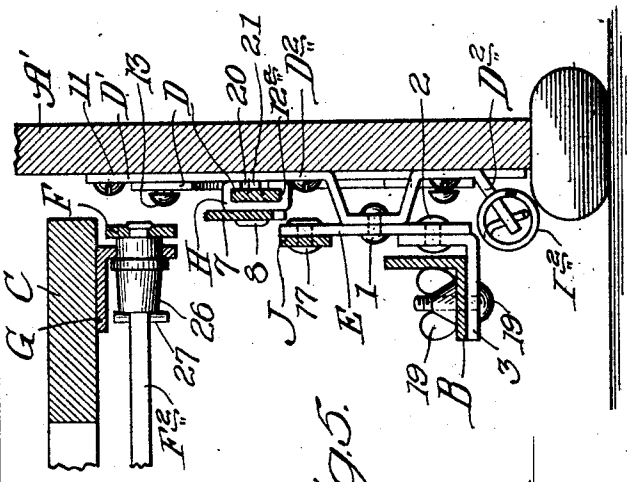


Fig. 5.

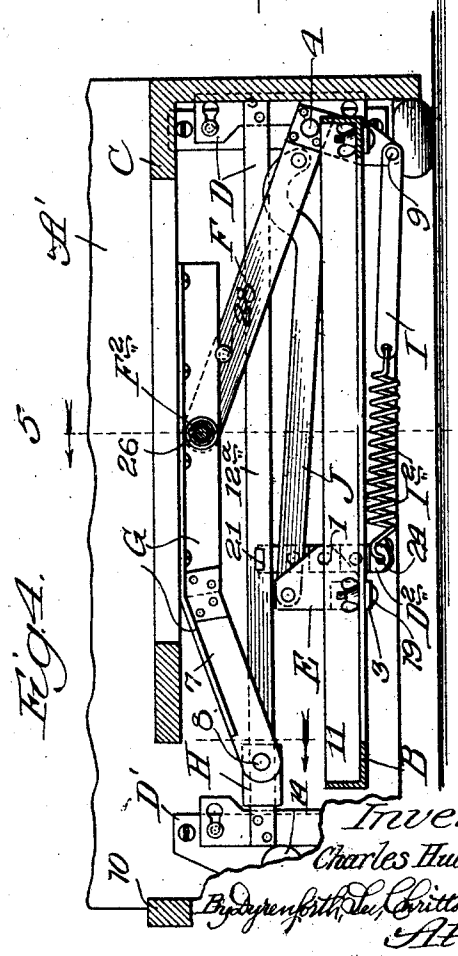


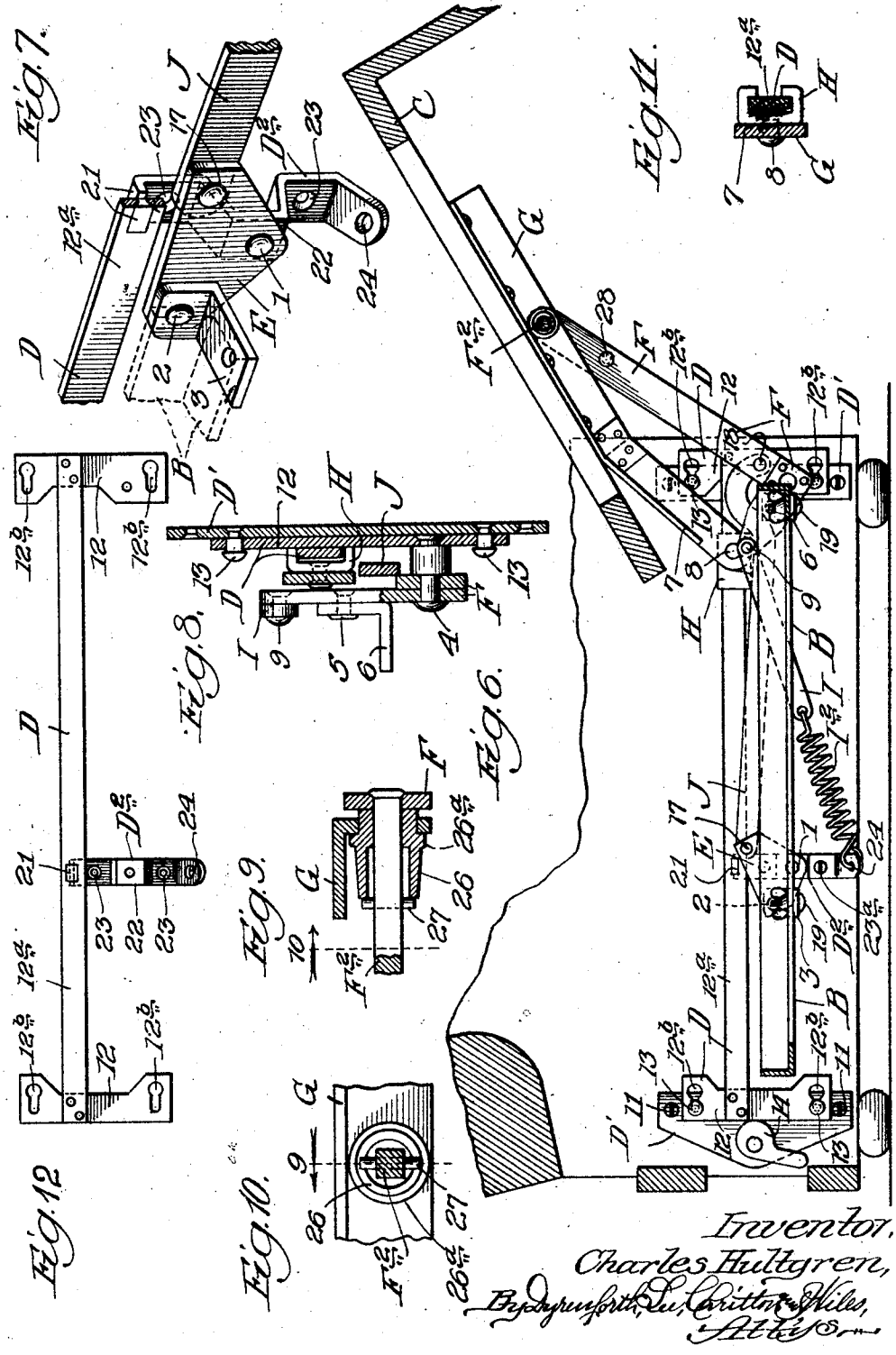
Fig. 4.

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May 7, 1929. C. HULTGREN 1,712,145

SOFA BED

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Patented May 7, 1929. 1,712,145

UNITED STATES PATENT OFFICE.

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SOFA BED.

Application filed November 20, 1925. Serial No. 70,276.

This invention relates particularly to sofa-beds of the type in which the front bed-section is superposed over the rear bed-section when the structure is in sofa-form.

The primary object is to provide an improved construction of this type which is staunch, durable and readily convertible from sofa-form to bed-form and vice versa.

The invention is illustrated in its preferred embodiment in the accompanying drawings, in which—

Fig. 1 represents a broken vertical sectional view of the improved sofa-bed in extended condition; Fig. 2, a broken view of the structure in folded condition with one end of the main frame and certain attendant parts removed, the longitudinal member of the main frame being shown in cross-section; Fig. 3, a view similar to Fig. 1 with the cushions and spring structure removed; Fig. 4, a broken sectional view corresponding with Fig. 3, but showing the structure in folded condition; Fig. 5, a broken vertical sectional view taken as indicated at line 5 of Fig. 4; Fig. 6, a view corresponding with Fig. 3, but showing the structure during the process of folding; Fig. 7, a broken perspective view showing a detail of the means for supporting the rear bed-section; Fig. 8, a detail vertical sectional view taken as indicated at line 8—8 of Fig. 3; Fig. 9, a broken sectional view taken as indicated at line 9 of Figs. 3 and 10; Fig. 10, a broken sectional view taken as indicated at line 10 of Fig. 9; Fig. 11, a sectional view taken as indicated at line 11 of Fig. 4; and Fig. 12 is a view of one of the demountable bed supports.

In the preferred embodiment of the invention which is illustrated in the drawings, A designates the main frame of the sofa-bed; B, a rear bed-section equipped with a removable cushion B′ which is adapted to be superposed above the front bed-section when the structure is in sofa-form; C, a front bed-section which is equipped with a cushion, or mattress, C′, which may be permanently upholstered upon the frame of the front bed-section; D, a pair of demountable bed-supports (one shown) which are mounted on standards D′ secured to the lower portions of the end standards A′ of the main frame; E, E′, a pair of short triangular levers (in effect, bell-crank levers) mounted on pivots 1 carried by depending arms D^2 forming portions of the bed-supporting devices D, said levers E and E′ having connected therewith by pivots 2 stirrups 3 which support the rear portion of the rear bed-section; F, F′, bell-crank levers supported at their elbows on pivots 4 carried by the bed-supports D, as will be understood from Figs. 6 and 8, the short arms of the levers F having connected therewith by pivots 5 stirrups 6 which carry the front portion of the rear bed-section, and the long arms of the levers F being rigidly connected together by means of a longitudinal bar F^2, upon which the central portion of the front bed-section is pivotally carried; G, G′, angle bars, or arms, upon which the front bed-section is mounted, said arms having rearwardly and downwardly turned extensions 7; H, H′, slides mounted on the horizontal bars forming portions of the bed-supports D, said slides being connected with the arms 7 by pivots 8; I, I′, links connected with the short arms of the large bell-crank levers F and F′ by means of pivots 9, the rear ends of said links being connected by coil springs I^2 with the members D^2; and J, J′, links connecting the bell-crank levers F and F′ with the rear levers E and E′, respectively.

The main frame A may be of any suitable construction. In the illustration given, it comprises end standards A′ (one shown), connected at their lower rear portions by longitudinal members 10.

The members D′ consist preferably of metal plates which are secured, by screws 11, to the inner surfaces of the end standards A′. It will be understood that the metal standards D′ are duplicated at the two ends of the sofa-bed structure.

Each bed-supporting member D, in the illustration given, consists of a pair of vertical plates 12 connected by a horizontal bar 12^a. The plates 12 are provided with horizontal T-slots 12^b which are engaged by headed studs 13 which project inwardly from the standard-plates D′. Upon each rear standard-plate D′ is mounted a cam-lever 14 which engages the rear plate 12 of the bed-supporting device D. By means of these cam-levers, the members D may be forced forwardly and locked, the studs 13 then engaging the narrow portions of the T-slots 12^b. Thus, the devices D are demountable or removable from the main frame of the sofa-bed.

The bed-section B is shown as compris-

ing an angle frame supporting upholstery springs 14, covered by fabric 15 and supporting the loose cushion B'.

The bed-section C may comprise a wooden frame equipped with a front board 16 and having the cushion, or mattress, C', upholstered on the frame.

The small rear levers E and E' are connected with the rear ends of the links J and J' by means of pivots 17, and the front ends of the links J and J' are connected with the long arms of the levers F and F' by means of pivots 18. The front end portions of the levers J' are curved edgewise to enable the links to clear the pivots 4 of the large bell-crank levers F when the structure is in the extended condition.

The rear bed-section B is shown secured to the stirrups 3 and 6 by means of bolts 19 which are provided with winged nuts.

The slides H and H' are in the form of loops which engage the guide-bars 12^a. These loop-form slides are open at one side, thus affording a space 20 which accommodates the shank portion 21 of the depending member D^2, permitting the slide to pass said member. The shank portion 21 extends through an opening in the guide bar 12^a and is riveted therein, so that the member D^2 is rigidly attached to the guide-bar. This will be understood from Figs. 5 and 9. As shown in Fig. 7, the member D^2 is so bent as to provide a boss 22 which carries the pivot 1 of the lever E. The member D^2 is provided with perforations 23 which receive screws 23^a which serve to secure the member to the end standard A' of the main frame. The member D^2 further is provided with a perforation 24 which is engaged by the rear end portion of the spring I^2.

If desired, the front bed-section may be provided with a loop 25 which may be used in opening and closing the bed.

The manner in which the bars G and G' which carry the front bed-section are mounted on the free ends of the long arms of the levers F and F' is illustrated in Figs. 9 and 10. The longitudinal bar F^2 which connects the free ends of the long arms of the levers F and F' may be of square cross-section. Its ends are riveted in square perforations with which the arms of the levers are provided. Fitted on the end portions of the connecting bar F^2 are bearings 26 which pass through circular perforations in the vertical flanges of the members G and G'. The member 26 has a flange 26^a which is spaced with relation to the lever and the vertical flange of the angle G, or the angle G', as the case may be, is confined between the lever arm and said flange. The bearing 26 is secured in position by means of a pin 27.

From the description given, the operation will be readily understood.

Assuming the structure to be in the sofa-form illustrated in Fig. 2, it may be changed to the bed-form shown in Fig. 1 by lifting upwardly and pulling forwardly on the loop 25. This causes the large bell-crank levers F and F' to turn about the pivots 4 and carry the front bed-section forwardly somewhat as illustrated in Fig. 6. In this movement the slides H and H' move forwardly on the guide bars 12^a and guide and control the movement of the front bed-section. In this movement, the front bed-section tilts upwardly and forwardly and finally drops to a horizontal position, as illustrated in Fig. 1. In the initial movement of unfolding the structure, the springs I^2 assist in lifting the front bed-section and carrying it forward. In the final portion of the movement, the springs are put under tension so as to be in readiness to assist in converting the structure from bed-form to sofa-form, it being understood that the short arms of the bell-crank levers F and F' move through nearly half a circle in the operation of converting the structure from one form to another.

When the front bed-section is carried forwardly, the stirrups 6 which are pivotally mounted on the intermediate portion of the short arms of the levers serve to raise the front portion of the rear bed-section. At the same time, the links J and J' actuate the short levers E and E' which carry the rear portion of the rear bed-section, and thus the rear bed-section is elevated by parallel movement. When the bed has been opened, the cushion B' is thrown upon the rear bed-section, thus giving to the front and rear bed-section the same level.

In converting the structure from bed-form to sofa-form, a movement the reverse of that just described occurs. The cushion B' is first placed upon the mattress C', and the front bed-section is then carried in an obvious manner to a superposed position above the rear bed-section, the rear bed-section being lowered during this operation.

The long arms of the levers F and F' are equipped a short distance from the connecting bar F^2 with studs 28 which are adapted to serve as stops for the mounting-bars G and G' of the front bed-section, assuming the structure to be in folded condition. These stops may be so disposed, if desired, as to permit the front bed-section to rest upon the rear bed-section when the structure is in folded condition. In this manner, advantage may be taken of the spring structure afforded by the upholstered springs 14 and the sofa seat will have, in addition to the resilience afforded by the cushions B' and C', a resilient support on the springs 14. On the other hand, the stops 28 may, if desired, be so located as to hold the upper bed-section sufficiently elevated to permit space for bedclothes.

The improved construction is simple,

staunch and durable and is capable of being readily converted from bed-form to sofa-form and vice versa. The bed-structure may be readily removed from the main frame by turning the cams 14 out of the way and sliding the bed-supporting devices D rearwardly so as to permit disengagement from the studs 13 carried by the standard plates D'.

The foregoing detailed description has been given for clearness of understanding only, and no unnecessary limitations should be understood therefrom, but the appended claims should be construed as broadly as permissible in view of the prior art.

What I regard as new, and desire to secure by Letters Patent, is:

1. In combination: a main frame, a pair of levers mounted in the lower front portion thereof, a front bed-section having its medial portion pivotally mounted on both of said levers, sliding guide connections between the front bed-section and said main frame, a pair of rear levers pivotally supported on said main frame, and a depressible and liftable, bodily movable rear bed-section mounted on both of said pairs of levers, said rear bed-section being bodily lowered in the operation of moving the front bed-section to a position overlying the rear bed-section in converting the structure to sofa-form and being bodily lifted in the operation of converting the structure from sofa-form to bed-form.

2. In combination: a main frame, a pair of bell-crank levers mounted in the lower front portion thereof, a front bed-section having its medial portion pivotally mounted on said levers, a longitudinal bar rigidly connecting said levers, guiding connections between said front bed-section and said main frame, a pair of rear levers pivotally supported on said main frame, a rear bed-section mounted on said pairs of levers, and links connecting the front levers with the rear levers.

3. In combination; a frame equipped with guides extending from front to rear, a pair of bell-crank levers pivotally mounted on said frame below said guides and provided with long and short arms, a front bed-section having a medial portion pivotally supported on the long arms of said levers, connections between the rear portion of said front bed-section and said guides, a pair of short rear levers pivotally mounted on said frame, and a rear bed-section having pivotal connections with the short arms of said first-named levers and with said second-named levers.

4. In combination: a frame equipped with guides extending from front to rear, a pair of bell-crank levers pivotally mounted on said frame below said guides and provided with long and short arms, a front bed-section having a medial portion pivotally supported on the long arms of said levers, connections between the rear portion of said front bed-section and said guides, a pair of short rear levers pivotally mounted on said frame, a rear bed-section having pivotal connections with the short arms of said first-named levers and with said second-named levers, and links connecting the front and rear levers.

5. In combination: a main frame having end standards equipped at the inner sides of their lower portions with guides extending from front to rear, a pair of bell-crank levers having their elbow portions pivotally supported near the front lower corners of said end standards, said levers having long arms and short arms, a front bed-section having a medial portion pivotally mounted on the long arms of said levers, arms rigid with said front bed-section and having sliding connection with said guides, a short pair of rear levers pivotally mounted at the inner sides of said end standards, a rear bed-section mounted on said rear levers and the short arms of said front levers, and links connecting said levers.

6. In combination: a main frame having end standards equipped at the inner sides of their lower portions with guides extending from front to rear, a pair of bell-crank levers having their elbow portions pivotally supported near the front lower corners of said end standards, said levers having long arms and short arms, a front bed-section having a medial portion pivotally mounted on the long arms of said levers, arms rigid with said front bed-section and having sliding connection with said guides, a short pair of rear levers pivotally mounted at the inner sides of said end standards, a rear bed-section mounted on said rear levers and the short arms of said front levers, links connecting said levers, and counterbalancing springs connecting the main frame and the short arms of said bell-crank levers.

7. In a sofa-bed: a main frame equipped with guides, a pair of front levers having elbow portions pivotally mounted near the lower front corners of said frame, said levers being provided with long arms and short arms, a pair of short rear levers, a rear bed-section mounted on the short arms of the front levers and upon the rear levers, counterbalance springs connected with the short arms of the long levers, a front bed-section having a medial portion pivotally mounted on the long arms of the front levers, arms rigid with said front bed-section and having slidable connection with said guides, and links connecting the front levers with the rear levers.

8. In combination in a sofa-bed: a main frame provided with end standards equipped at their front and rear portions with standard-plates, a bed-support at each end of the structure comprising a pair of plates provided with T-slots engaging studs with which said standard-plates are equipped and a con-

necting guide member joining said second-mentioned plates, a pair of short rear levers pivotally carried on said bed-supports, a pair of front bell-crank levers pivotally carried by said bed-supports, links connecting said levers, a rear bed-section mounted on said levers, and a front bed-section having a medial portion mounted on said front levers and having guide connections with said guides.

9. In combination in a sofa-bed structure: a main frame provided with end standards, bed-supports demountably carried by said end standards, and a bed-structure mounted on said bed-supports comprising a pair of short rear levers and a pair of front levers having long and short arms, a rear bed-section mounted on said rear levers and the short arms of the front levers, links connecting the front and rear levers together, a front bed-section pivotally mounted on the long arms of the front levers, and guide connections between the rear portion of said front bed-section and said bed-supports.

10. In combination in a sofa-bed: a main frame provided with end standards, a pair of short rear levers mounted at the lower intermediate portions of said end standards, a pair of front bell-crank levers having elbow portions pivotally mounted near the lower front corners of said end standards and having long arms and short arms, a bar rigidly connecting the extremities of said long arms, a rear bed-section carried by said rear levers and the short arms of said front levers, a front bed-section having a medial portion pivotally supported at the junction of said bar with the long arms of said levers, and sliding guide connections between the rear portion of said front bed-section and the end standards of said frame.

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