

March 20, 1962

M. R. SCHULTZ
SOFA-BED CONSTRUCTION

3,025,534

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4 Sheets-Sheet 1

Fig. 1.

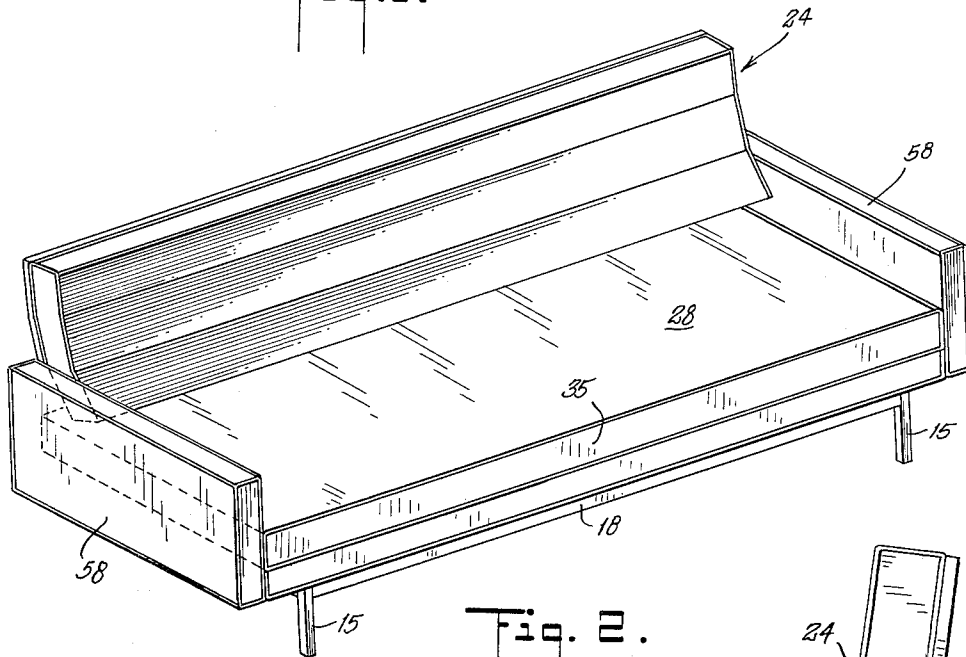
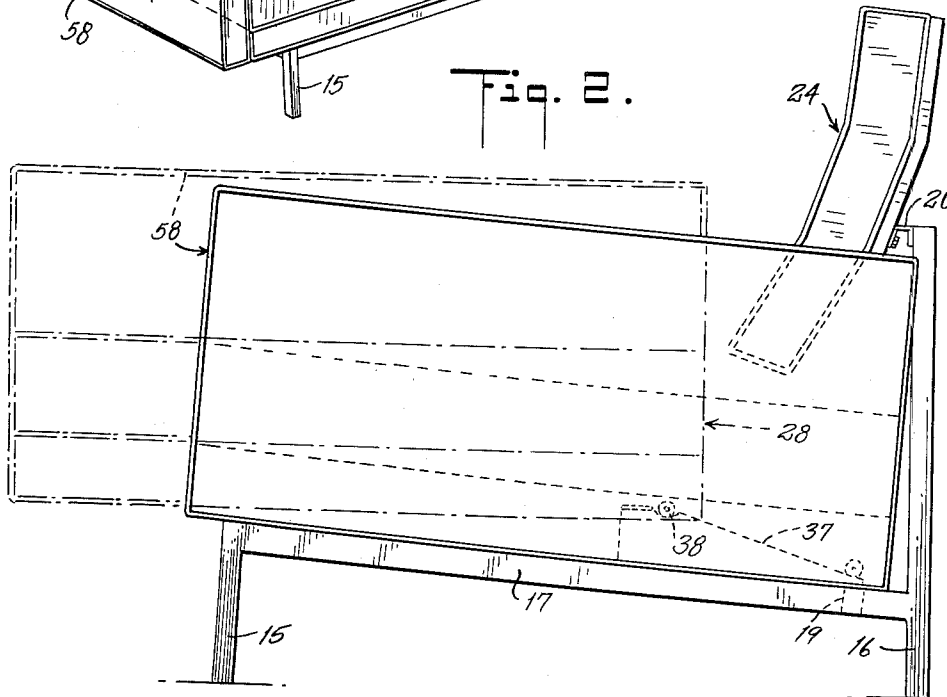


Fig. 2.



INVENTOR.
M. RICHARD SCHULTZ
BY *Robert H. Clark*
ATTORNEY

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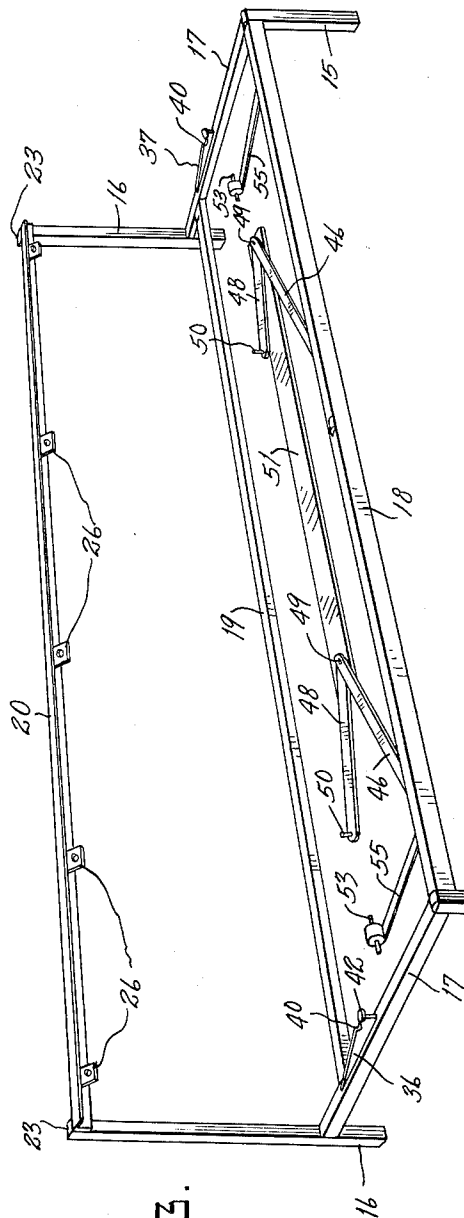
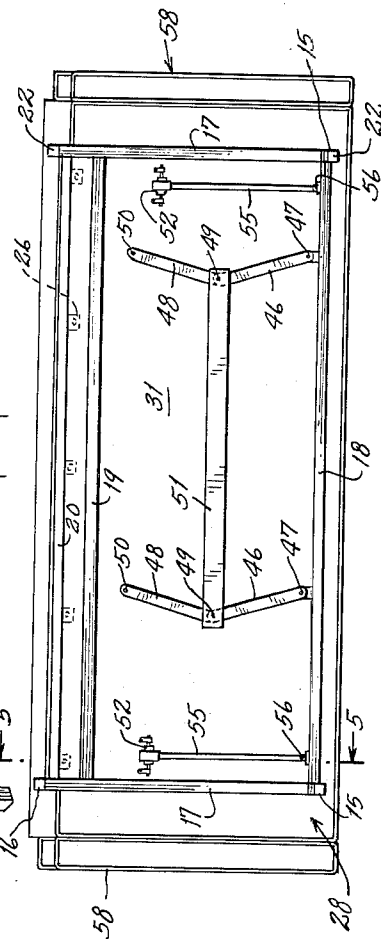


Fig. 3.

Fig. 4.



INVENTOR.
M. RICHARD SCHULTZ
BY *Peter W. Clark*
ATTORNEY

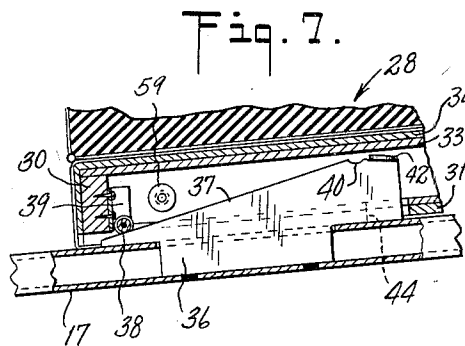
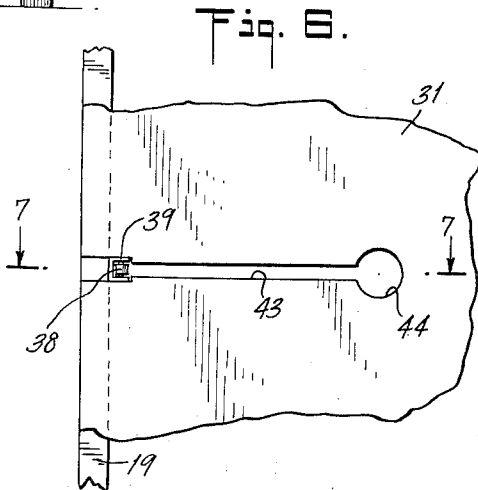
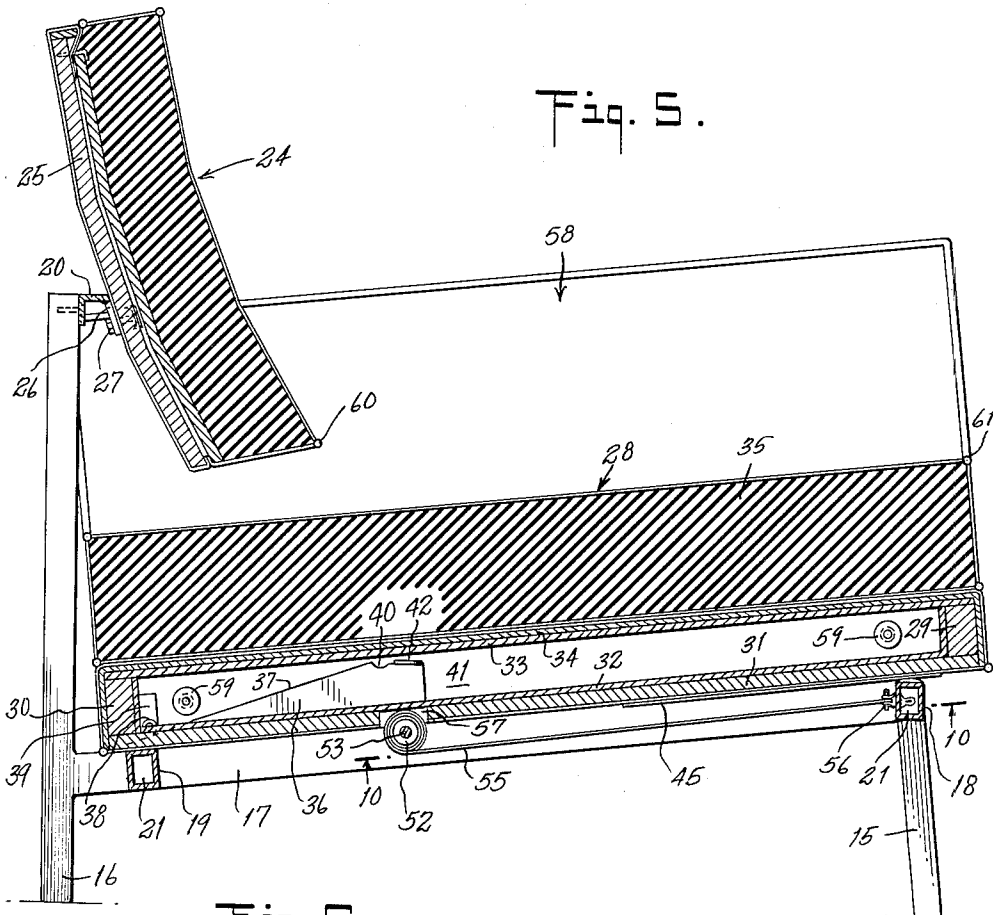
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INVENTOR.
M. RICHARD SCHULTZ
BY *Lester H. Clark*
ATTORNEY

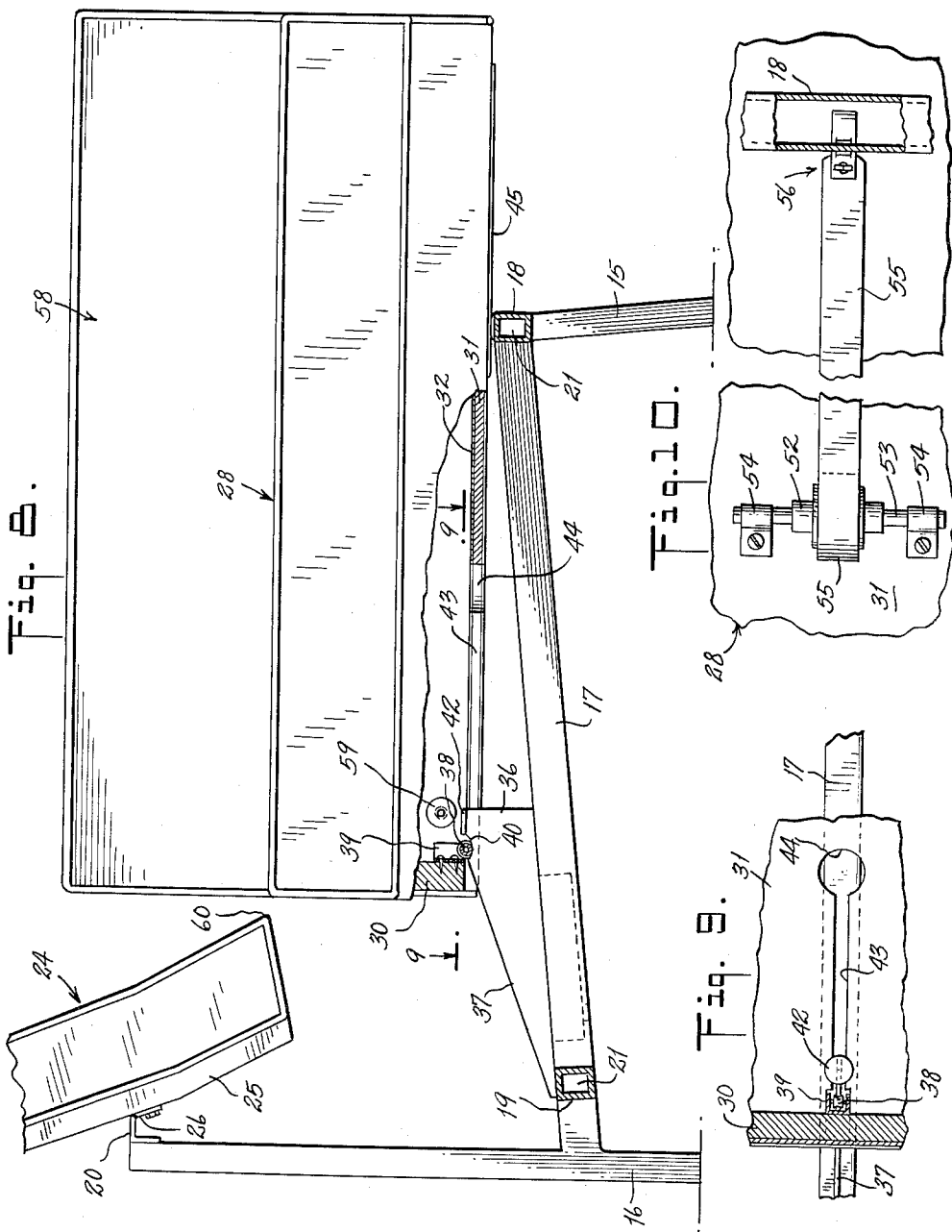
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M. R. SCHULTZ
SOFA-BED CONSTRUCTION

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INVENTOR.
M. RICHARD SCHULTZ
BY *Lester H. Clark*
ATTORNEY

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3,025,534

SOFA-BED CONSTRUCTION

Moses Richard Schultz, Barto, Pa., assignor, by mesne assignments, to Knoll Associates, Inc., a corporation of New York

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6 Claims. (Cl. 5-17)

The present invention relates to a sofa-bed construction and more particularly to such a construction which may serve alternatively as a sofa or as a single bed upon which a person may comfortably sleep.

Sofa-bed constructions of the folding type have gotten into quite common use. These constructions are, however, quite cumbersome, quite heavy and obviously bulky and in general do not have the attractive appearance which a single-purpose piece of furniture may be given, particularly if it is designed with good taste and with the experience of an interior decorator. It is recognized that this deficiency is substantially inherent in structures which are intended for use as double beds, wherein the seat portion must be pulled out and folded over or unfolded in such a way that the persons using it as a bed have their heads directed toward the back of the sofa and their feet directed away from such back. The present invention seeks to provide a sofa bed which may be converted from a sofa to a bed with the user, when lying on it, resting in a position parallel to the back of the sofa. As such, it is desired to provide a single bed only, so as not to involve the necessity for having large cumbersome and bulky portions to provide the necessary spring and/or mattress structure for using the device as a double bed. It is further desired, in accordance with the present invention, that the normal seat cushion construction shall serve as both the spring and mattress when the device is used as a bed.

It is recognized that many persons have used sofas or divans, as they are sometimes called, as a bed without changing the construction or altering the general arrangement, by merely lying down parallel to the back. Such a practice has involved the sacrifice of comfort for one or both uses. The device may be arranged to be relatively comfortable as a bed by reason of the seat cushion being disposed horizontal instead of inclined; or the device, if arranged to be comfortable as a sofa, is undesirable and/or uncomfortable as a bed by reason of the seat cushion being tilted to a position comfortable to those seated on it. In general, the two requirements are in conflict with each other, so that no single construction, without change, serves adequately and desirably for both purposes.

The present invention seeks to overcome this difficulty by providing a seat or bottom member which has two positions, comprising (1) a rearwardly inclined position when the device as a whole is being used as a sofa; and (2) a substantially horizontal position when the device is arranged for use as a bed.

Another difficulty which has been encountered in the use of non-varied devices for the dual purpose hereinabove discussed is that the seat cushion, if it be given the width desired even for a single bed, has an unduly wide dimension when used as the seat of a sofa. The present invention solves this problem also in that the seat cushion is arranged to extend beneath the rear cushion or back member when the device is being used as a sofa, so as not to present an unduly wide seat portion for the sofa; while this additional width, which had extended below the back cushion or back member, may come into use when the bottom member is moving forwardly in accordance with the present invention from a rear inclined position (as a sofa) to a forward substantially horizontal position (as a bed).

Suitable means are provided for mechanically guiding

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and controlling the movement of the bottom member or seat cushion between its two positions as aforesaid and particularly for providing an arrangement in which a roller rides up an inclined track; or conversely, the inclined track rides up with respect to a stationary roller, so as (in either case) to provide for a smooth movement of the bottom member between its two positions. Additional means are preferably provided for retaining the seat cushion or bottom member always parallel to the supporting frame for the device as a whole, so as to prevent undesired jamming thereof in moving it between its two positions as aforesaid. Further means are preferably provided for supplying a resilient force tending to assist a person moving the seat cushion or bottom member from its rear inclined position to its forward, substantially horizontal position and for damping and resiliently opposing the return movement thereof.

Other and detailed objects of the present invention will become apparent from a particular description of a preferred embodiment thereof and from the accompanying drawings in which this embodiment is illustrated.

In the drawings:

FIG. 1 is a view substantially in perspective of a sofa bed in accordance with the present invention;

FIG. 2 is a view of the structure of FIG. 1 as seen from the right or upper end thereof, parts being shown in the position as a sofa in full lines and in position as a bed in dotted lines;

FIG. 3 is a perspective view similar to FIG. 1 showing the metal frame only for the sofa bed of the present invention;

FIG. 4 is a bottom plan view of the device of the present invention showing the equalizing means and the spring or resilient means in their relations to the remainder of the construction;

FIG. 5 is a view in vertical section taken substantially on the line 5-5 of FIG. 4;

FIG. 6 is a fragmentary detailed view in bottom plan of a portion of the bottom member illustrating a roller carried thereby for cooperation with one of the inclined tracks carried by the supporting frame and showing the slot through which this track extends in the rear inclined position of the bottom member;

FIG. 7 is a fragmentary detailed view substantially in vertical section on the line 7-7 of FIG. 6;

FIG. 8 is a view similar to FIG. 5, but with the rear end of the sofa omitted and parts further broken away showing the parts in the position in which the device as a whole is arranged as a bed with the bottom member in its forward substantially horizontal position;

FIG. 9 is a view somewhat similar to FIG. 6, but taken along the line 9-9 of FIG. 8; and

FIG. 10 is a fragmentary detailed view in bottom plan and substantially on the line 10-10 of FIG. 5, illustrating the resilient or spring means for assisting in moving the bed to its forward position and for retarding its return movement.

A preferred embodiment of the present invention is illustrated in considerable detail in the accompanying drawings. This embodiment includes a rigid supporting structure which, in the present instance, comprises a metal frame and is shown best in FIG. 3. This supporting structure includes forelegs 15 and rear legs or uprights 16 connected together by a pair of end members 17 extending between the forelegs 15 and the rear legs or uprights 16 respectively, a transverse front member 18 extending between the upper end portions of the forelegs 15, a transverse rear member 19 substantially parallel to the member 18 and extending between rear portions of the end members 17, and an upper transverse member 20 extending between the upper ends of the uprights 16. The members 15 to 19, as best shown in FIG. 3, may be of

any desired construction; but in the present instance are shown as hollow and substantially rectangular metal members as seen in detail, for example, at 21 in FIG. 8. The lower ends of the legs 15 and 16 may be closed as indicated at 22 in FIG. 4. If desired, the upper member 20 may be an angle member instead of the rectangular hollow bar constructions which are used for the members 15-19 inclusive. These members may be and preferably are welded to one another at their intersections in a manner which is now conventional in this art. The tops of the rear legs or uprights 16 may also be closed as indicated at 23, FIG. 3, to give a pleasing and finished appearance to the structure.

An upholstered back member generally indicated at 24 is provided, this member being formed of a relatively rigid frame portion 25 in the rear thereof, which may be of any suitable construction including wood, metal or otherwise and which is sufficiently strong to enable it to be suitably secured as by brackets 26 or the like to the upper transverse member 20. Suitable bolts or the like as shown at 27 may be employed for securing the rigid frame portion 25 of the back member 24 to the brackets 26 as shown, for example, in FIG. 5. The type of upholstery and/or other construction within the back member 24 forms per se no part of the present invention and will not be further described in detail. It is contemplated, however, that any approved type of construction usable for this purpose is to be considered within the purview of the present invention including, for example, the use of foam rubber.

There is also employed, in accordance with the present invention, an upholstered bottom member generally indicated at 28, which serves as a seat member when the device is being used as a sofa and as a combined spring and mattress when the device is being used as a bed. The bottom member 28 includes in its lower portion a substantially rigid frame which may be of any desired construction including wood, metal, plastic or otherwise and which, as shown, includes a pair of front and rear members 29 and 30 respectively of wood or the like, which may be connected together at and/or intermediate their ends by one or more members substantially perpendicular to the members 29 and 30, these perpendicular members not being shown in the accompanying drawings. The members 29 and 30 may also be connected together by one or more sheet-like members 31 of plywood or the like and/or by one or more layers of material as shown at 32, 33 and 34, such layers being built up from synthetic or natural fibers. Here again the particular construction of the rigid frame for the bottom member is not per se a part of the present invention except insofar as it provides such a rigid frame and also provides for a hollowed-out portion for purposes hereinafter set forth as well as providing an adequate support for the resilient upholstered structure 35, which is disposed as an upper layer portion of the bottom member 28 and normally is fixed thereto. It will be understood that the structure 35 may be of any desired construction including, for example, one employing foam rubber. The outer or wearing surfaces of the bottom member 28 and of the back member 24 may be suitably upholstered in any desired type of fabric, synthetic or otherwise, in accordance with the design of the maker.

The bottom member 28 is shown in its rear inclined position in FIG. 5, in which it is in the position it occupies when the device is used as a sofa. In FIG. 8, the bottom member 28 has been moved to its forward and substantially horizontal position, which it occupies when the device is being used as a bed. It will be seen in both these positions that a forward portion of the bottom member is supported upon the upper ends of the legs 15 and particularly upon the transverse member 18 extending between the legs 15 as seen at the right in FIGS. 5 and 8. The rear of the bottom member is arranged to be supported, in the position of the part shown in FIG.

5, upon the transverse member 19 as shown, this member engaging the lower surface of the sheet-like member or panel 31 forming a part of the rigid frame of the bottom member 28.

Means are provided in accordance with this invention for enabling the bottom member 28 to be moved from its rear and rearwardly inclined position to a forward and substantially horizontal position. For this purpose, guide means are provided to provide some support for the rear portion of the bottom member 28 during its movement from one position to the other and also for supporting the rear portion of the member 28 at the forward horizontal position shown particularly in FIG. 8. For this purpose, a plurality of pairs of inclined tracks and rollers are provided, each of which pair (including one such track and a cooperating roller) is disposed, one on the rigid supporting frame shown in FIG. 3 and the other on the bottom member 28. The particular arrangement here shown is one in which the inclined tracks are each formed rigid with the supporting frame and the rollers respectively cooperating with these tracks are carried by rear portions of the bottom member 28.

As shown particularly in FIGS. 7 and 8, each inclined track is formed of a metal plate member 36 having an inclined ramp or trackway surface 37 arranged to cooperate with a roller 38. Each roller 38 is carried by a suitable bracket 39 secured, for example, to the rear member 30 by screws or the like, so that the roller 38 is freely rotatable upon an axis which is maintained perpendicular to the plane of the track member 36. As shown in FIG. 7, each member 36 has a portion which extends downwardly through a slot formed in the upper flange of the adjacent end member 17 and is suitably secured to the member 17 as by spot welding or the like. Adjacent to the upper end of the trackway 37 is a re-entrant portion or recess 40 in which the roller 38 is seated at the upper end of its movement and which holds this roller and thereby holds the rear portion of the bottom member 28 in a position such that the top thereof will be substantially horizontal as shown in FIG. 8. In this position, the bottom member 28 is arranged to serve as a bed. As shown, the upper track-forming part of each member 36 extends up into a hollow space 41 formed in the bottom of the member 28 between layers 32 and 33, as shown in FIG. 5. At the rear portion of the member 28 a suitable slot 43 (FIGS. 6 and 9) is formed in the panel 31 and in layer 32 to permit the entry of the plate member 36.

Suitable means are provided for preventing excessive movement in either direction of the bottom member 28. Thus, at the rear position of the bottom member, excessive movement of this member to the left as seen in FIG. 5 may be effectively prevented by engagement of the end members later to be described with the rear uprights 16 or may be provided for engagement of the rear portion of the structure 35 of the bottom member 28 with the rear uprights 16. Another means serving to this end is the resilient spring means hereinafter described.

Forward movement of the bottom member 28 beyond the desired position is prevented by providing a transversely disposed disc-like portion 42 at the upper end of the member 36 adjacent to the recess 40 which the roller 38 may engage as a stop. In order to permit assembly of the parts with the member 36 extending up into the hollow space 41 of the bottom member 28 through the slot 43 formed in the members 31 and 32 thereof, this slot is provided with an enlargement as shown at 44, FIGS. 6 and 9.

Another and very important function of the disc-like portion 42 is to prevent the bottom member 28 from tipping forwardly when it is at its forward or bed position shown in FIG. 8 and when, for example, someone sits on the outer edge thereof (at the right as seen in FIG. 8), so as to overbalance the weight of the bottom

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member 28 and thus tend to cause it to rotate clockwise as seen in FIG. 8 about the center of the transverse front member 18. This undesired action is prevented by the provision of the disc-like portion 42 secured to the upper end portion of the metal member 36. As will be seen in FIG. 8, when the bottom member 28 is moved forwardly (to the right as seen in FIGS. 5 and 8), the sides of the disc-like member 42 overlie the sides of the slots 43 and thereby prevent upward movement of the sheet-like member 31 forming a part of the rigid structure of the bottom member 28 with respect to the plate member 36, which is anchored to the metal frame of the device as aforesaid.

As the bottom member 28 is moved forwardly from its position shown in FIG. 5 to that in FIG. 8, the rollers 38 will ride up the inclined tracks 37 until the rollers sit in the recesses 40 in the FIG. 8 position of the parts. At the same time, the forward portion of the underside of the bottom member 28 will slide along the upper surface of the transverse member 18 of the frame. In order to prevent excessive wear of the sheet-like member or panel 31 forming the underside of the member 28 which contacts the member 18, a metal plate 45 may be secured to the undersurface of the panel 31 as shown in FIGS. 5 and 8 so as to provide a wear-resistant surface for engagement with the transverse member 18.

While the form of the invention shown in the drawings is one in which the inclined track 37 is carried by the rigid frame members 17 and the rollers 38 are carried by the bottom member 28, it will be understood that these relationships could be reversed, with the rollers carried by the frame members 17 and suitably disposed inclined track members carried by the lower portion of the member 28 and extending downwardly therefrom. In such an event, as will be obvious to those skilled in the art, the incline of the track would have to be downwardly from the forward toward the rear thereof, so that the wider portions of the track-forming members 36 would be disposed toward the rear and the recesses 40 or their equivalents extending downwardly and disposed toward the rear of the tracks. This is a mere reversal of parts calculated to attain the same results which generally constitute a part of the present invention. It is thought not necessary to illustrate this modification by reason of the obviousness thereof from the foregoing description.

Means are preferably provided for insuring that the movement of the bottom member shall be such that the forward edge thereof shall always remain parallel to the members 18 and 19 of the frame. For this purpose, two pairs of similar links are provided, each pair including a link 46 pivoted at 47 to a bracket carried by the member 18 and a link 48 pivoted at 49 to the outer end of the link 46. The rear ends of the links 48 are suitably secured at 50 to the underside of the panel 31 of the bottom member 28. There is also provided a rigid link 51 extending between the pivot points 49. These links provide a parallel-motion-type linkage as will be well known to those skilled in the art, insuring the maintenance of the bottom member so that the longer dimension thereof will always be parallel to the members 18 and 19. It will be understood that the linkage is sufficiently free, so as to accommodate the movement of the bottom member between its inclined position shown in FIG. 5 and its horizontal position shown in FIG. 6.

Means are also provided for resiliently assisting a person in moving the bottom member 28 from the rear inclined position of FIG. 5 to the horizontal position of FIG. 8 and for resiliently damping or retarding the return movement thereof to the position of FIG. 5. For this purpose, two or more resilient, specifically clock spring-type, devices may be provided, each of which comprises a roller 52 (FIGS. 5 and 10) carried by a shaft 53, which in turn is secured by brackets 54 to the underside of the member 28 and particularly to the panel 31 thereof. Each roller 52 has secured thereto and coiled thereabout a flat coil spring 55 similar to a clock spring, the spring nor-

mally tending to wind up on the roller 52 and being unrolled from its helical coiled position by tension applied thereto. The outer end of each spring 55 is suitably secured as generally indicated at 56 to a portion of the front member 18 of the frame. This securing means may, if desired, take the form of a Tinnerman clip, which is a well known device from the point of view of the present invention and is used merely as one type of means by which the spring members are anchored to the member 18. If desired, the bottom panel 31 may be provided with a suitable aperture as shown at 57 for receiving a portion of the coil of the spring 55 as best shown in FIG. 5. It will be seen that as the springs 55 tend always to roll up on the rollers 52, movement of the bottom member 28, by which these rollers are carried, from the position shown in FIG. 5 to that of FIG. 8, will permit the further rolling up of the springs, thus using the force of the springs to assist a person in moving the bottom member 28 from its rear to its forward position and particularly in moving the rear portion thereof to a higher elevation so as to bring it to a substantially horizontal position. At the same time it will be noted that the springs 55 will tend to oppose movement of the bottom member 28 from its forward to its rear position and thus will cushion the rearward and lowering movement thereof. These springs will also serve in effect to provide a resilient limiting means for movement of the bottom member toward the rear as generally suggested hereinabove. Two similar springs 55 as shown are provided, these springs being disposed symmetrically of the lateral center of the device.

The only portions of the structure shown in the drawings which have not been particularly described thus far are the end members shown at 58 which are optionally usable with a sofa bed structure of this type and may be omitted where desired. When used, these end members are preferably constructed in a manner more or less similar to that generally described for the back member 24 and the bottom member 28. The end members may be suitably secured to the bottom member by means of one or more securing means shown as bolts 59 or the like in FIG. 5.

It will be particularly noted by comparison of FIGS. 5 and 8 that in the FIG. 5 position a substantial portion of the rear part of the bottom member 28 lies below the back member 24 and rearwardly of its lower end so as to be in effect out of any operative or useful position at this position of the parts. This permits the use of a relatively wide bottom member 28 so as to afford a bed of reasonable and desired width when this member is used as the mattress and spring combination of a bed as shown in FIG. 8. At the same time, the dimension from the forward lower edge 60 of the back member 24, in the position of the parts in FIG. 5 to the forward upper edge 61 of the bottom member 28, is not so great as to discomfort a person seated on the device when it is in use as a sofa and is calculated to be in proportion to an average of the dimensions of persons likely to use it, particularly the dimension from the hips to the knees of such persons. As such, the position of the parts in FIG. 5 provides the maximum of comfort for those using the device as a sofa, while providing a bed of reasonable width and a reasonable maximum of comfort for persons using it as a bed in the position of FIG. 8.

While there is herein shown and described but one principal form of the invention and certain alternatives have been pointed out as the description proceeded, it is recognized that other alternatives and equivalents will suggest themselves to those skilled in the art from the foregoing description. I do not wish, therefore, to be limited except by the scope of the appended claims, which are to be construed validly as broadly as the state of the prior art will permit.

What is claimed is:

1. A sofa bed construction capable of serving alternatively as a sofa and as a bed, comprising a rigid rear-

wardly disposed upright support, a rigid forwardly disposed upright support, a horizontally disposed support extending between and supported by and rigidly connected to said rearwardly and forwardly disposed supports, an upholstered bottom member having a rigid lower portion and supported by said supports for movement of said bottom member forwardly and rearwardly between rearward and forward positions, the rearward edge portion of said bottom member in said rearward position being disposed adjacent said rearward upright support and the forward edge portion thereof being disposed adjacent said forward upright support, a track member providing a trackway inclined forwardly and upwardly and supported upon the rearward portion of said horizontally disposed support, an element carried by the rearward portion of said bottom member and engaging said inclined trackway for movement of said element along said trackway to effect raising and lowering of the rearward portion of said bottom member respectively in the forward and rearward movements of said bottom member, said bottom member in its rearward position being inclined upwardly and forwardly and in the forward position thereof being disposed substantially horizontally, a back rest supported by and in fixed relation to said rearwardly disposed upright support and providing a forward surface inclined rearwardly and upwardly from a lower forward corner of said back rest, said lower corner being disposed sufficiently close to the upper surface of said bottom member to provide adequate support for the back of a person in sitting position on said bottom member in its rearward position, the lower edge portion of said back rest from said corner rearwardly thereof being disposed above said bottom member sufficiently to provide for clearance with respect to said bottom member in the forward movement of said bottom member, the upper rear corner portion of said bottom member in the forward position thereof being disposed adjacent said lower forward corner of said back rest so that the full width of the bottom member is exposed for the surface of the bed, and interengaging means effective in the forward position of said bottom member for preventing upward movement of said bottom member with respect to said rigid support, said interengaging means comprising detent means carried by the upper end of said track member, said bottom member having a rigid lower wall provided with a slot extending in the forward and rearward direction through which said track member extends, said detent means overlying the portions of said wall along said slot.

2. A sofa bed construction capable of serving alternately as a sofa and as a bed which comprises a rigid support structure, a structure supported by said rigid support structure for movement thereof between rearward and forward positions, an element carried by said movable structure, a track member providing a trackway inclined forwardly and upwardly and supported by said rigid support structure, said element engaging said inclined trackway for movement of said element along said trackway to effect raising and lowering of the rearward portion of said movable structure respectively in the forward and rearward movements thereof, said movable structure providing a surface inclined upwardly and forwardly in the rearward position of said movable structure and disposed substantially horizontally in the forward position thereof, detent means supported by said rigid support structure, and detent engaging means carried by said movable structure and having an extent generally in the forward and rearward direction corresponding to the movement of said movable structure, said detent engaging means being disposed on said movable structure in relation to said detent means so that said detent engaging means engages said detent means in the forward position of said movable structure substantially to prevent upward movement and in positions thereof rearwardly of said forward position is adapted to engage said detent means to limit upward movement of the rearward portion of

said movable structure and in the rearward position of said movable structure is disengaged from said detent means to permit upward movement of the rearward portion of said movable structure to release said movable structure from said supporting structure.

3. A sofa bed construction as defined in claim 2 which comprises means connected between said rigid support structure and said movable structure to bias said movable structure for movement thereof in the direction from said rearward position toward said forward position.

4. A sofa bed construction as defined in claim 2 in which said track member comprises a plate disposed in the vertical plane and providing on its upper edge said trackway inclined forwardly and upwardly, said support structure comprising a tubular member extending forwardly and rearwardly along said trackway and provided with a slot extending along said tubular member in the wall thereof at the upper side thereof, said plate having a portion extending downwardly through said slot and engaging said tubular member at the lower wall thereof, and a weld securing said lower portion of said plate to the tubular member adjacent said lower wall.

5. A sofa bed construction capable of serving alternately as a sofa and as a bed which comprises a rigid support structure, a structure movable with respect to said rigid support structure and including a rigid bottom member, said movable structure being supported by said rigid support structure for movement of said bottom member between rearward and forward positions, an element carried by said movable structure, a track member providing a trackway inclined forwardly and upwardly and supported by said rigid support structure, said element engaging said inclined trackway for movement of said element along said trackway to effect raising and lowering of the rearward portion of said bottom member respectively in the forward and rearward movements of said bottom member, said bottom member in its rearward position being inclined upwardly and forwardly and in the forward position thereof being disposed substantially horizontally, said bottom member having a lower wall provided with a slot extending in the forward and rearward direction adjacent the rearward portion of said bottom member, said track member extending upwardly through said slot with a substantial portion thereof disposed above said wall in the rearward position of said bottom member and having a portion withdrawn below said wall as said element moves along said inclined trackway in the forward movement of said bottom member, and detent means carried by said track member adjacent the upper end of said inclined trackway and engaging said lower wall of said bottom member in the forward position of said bottom member for preventing upward movement of the rearward portion of said bottom member in said forward position thereof.

6. A sofa bed construction capable of serving alternately as a sofa and as a bed which comprises a rigid support structure, a structure movable with respect to said rigid support structure and including a rigid bottom member, said movable structure being supported by said rigid support structure for movement of said bottom member between rearward and forward positions, an element carried by said movable structure, a track member providing a trackway inclined forwardly and upwardly and supported by said rigid support structure, said element engaging said inclined trackway for movement of said element along said trackway to effect raising and lowering of the rearward portion of said bottom member respectively in the forward and rearward movements of said bottom member, said bottom member in its rearward position being inclined upwardly and forwardly and in the forward position thereof being disposed substantially horizontally, said bottom member having a lower wall provided with a slot extending in the forward and rearward direction adjacent the rearward portion of said bottom member, said track member extending upwardly

through said slot with a substantial portion thereof disposed above said wall in the rearward position of said bottom member and having a portion withdrawn below said wall as said element moves along said inclined trackway in the forward movement of said bottom member, said track member being provided with a portion extending transversely of the vertical plane adjacent the forward end of said track member, said lower wall of said bottom member being provided with an opening enlarged in relation to said slot at the forward end of said slot for passage of said transverse portion of said track member through said opening so as to provide for lifting of said bottom member from said support structure in the rearward position of said bottom member, said transverse portion of said track member being disposed above and extending over the upper surface of said wall along said slot to prevent upward movement of said rearward por-

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tion of said bottom member in positions thereof forwardly of said rearward position.

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