F. M. DAVIS.

SOFA BED.

APPLICATION FILED JULY 15, 1915.

1,270,384.

Patented June 25, 1918.

4 SHEETS—SHEET 1.

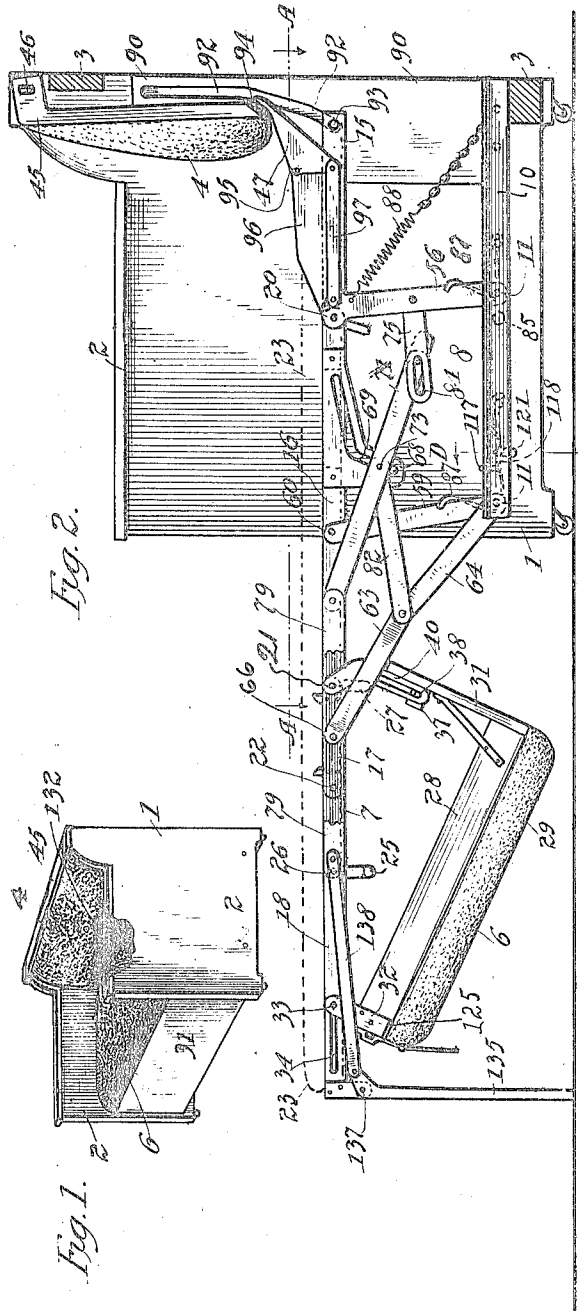


Fig. 2.

Fig. 1.

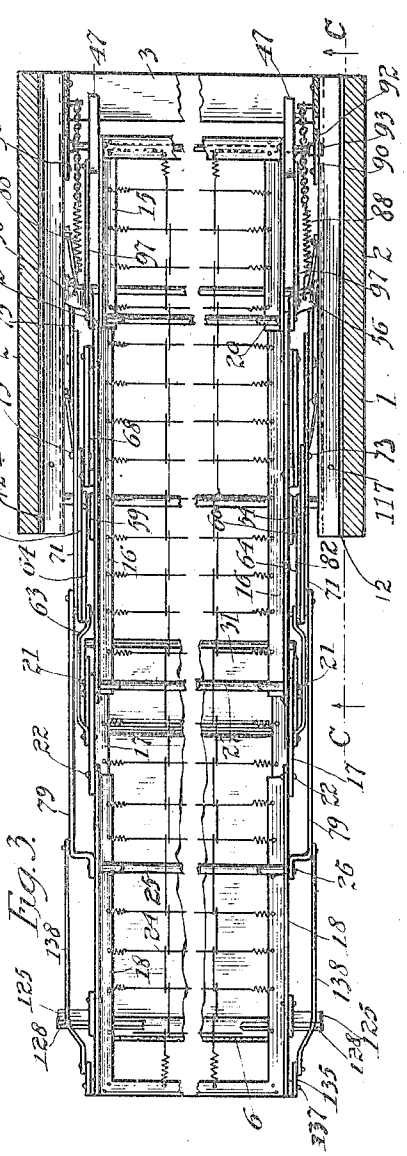


Fig. 3.

Witness

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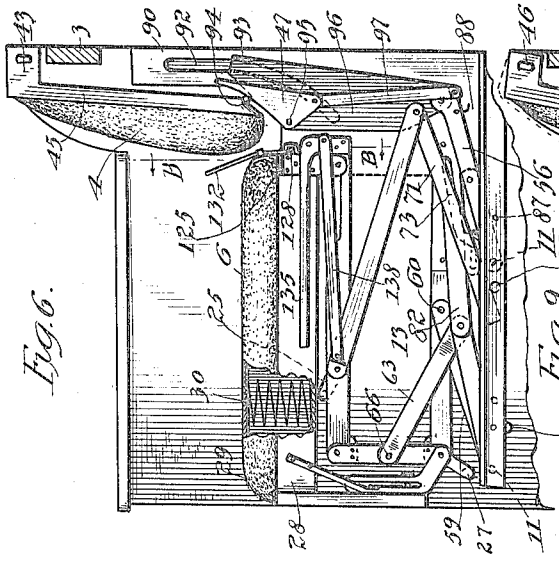


Fig. 6.

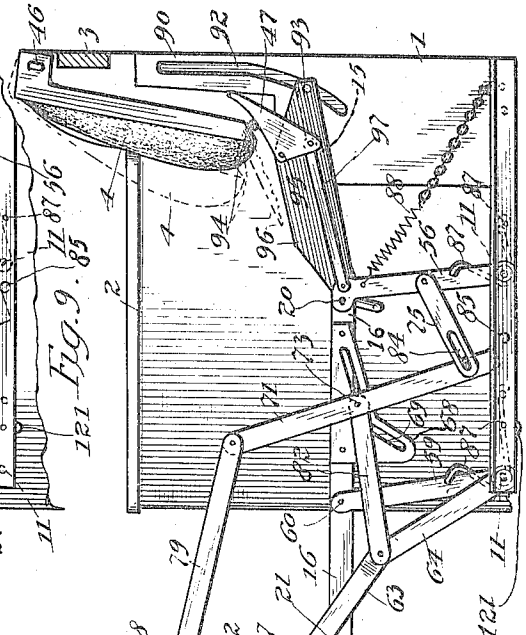


Fig. 9.

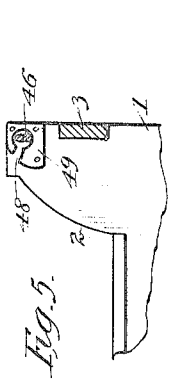
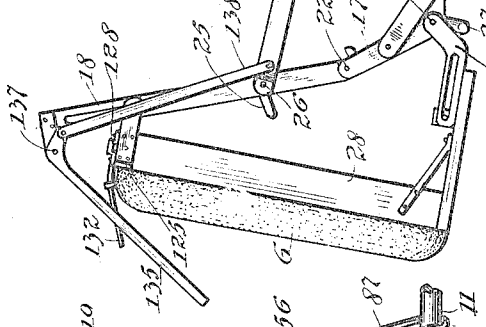


Fig. 5.



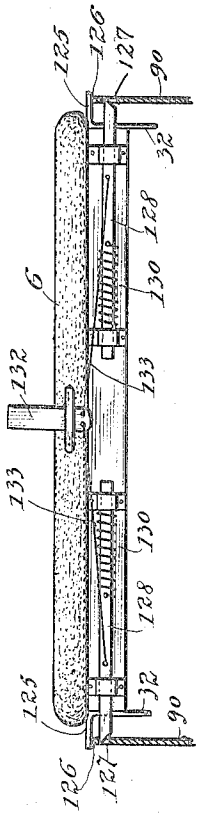


Fig. 4.

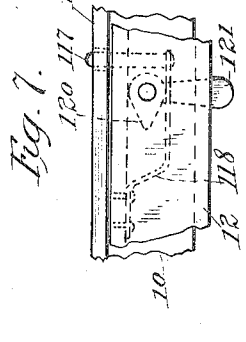


Fig. 7.

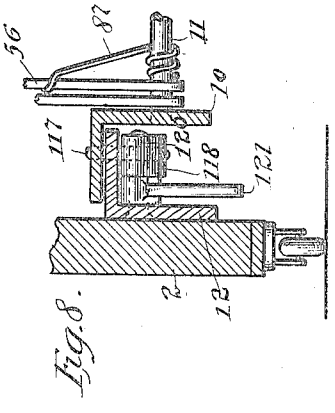


Fig. 8.

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4 SHEETS—SHEET 3.

Fig. 10

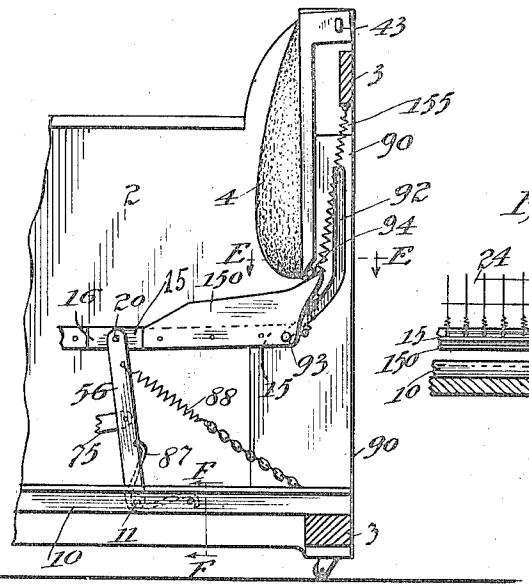


Fig. 12.

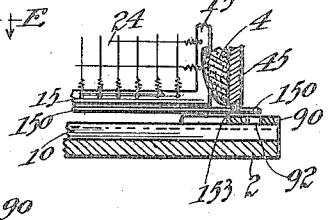


Fig. 11.

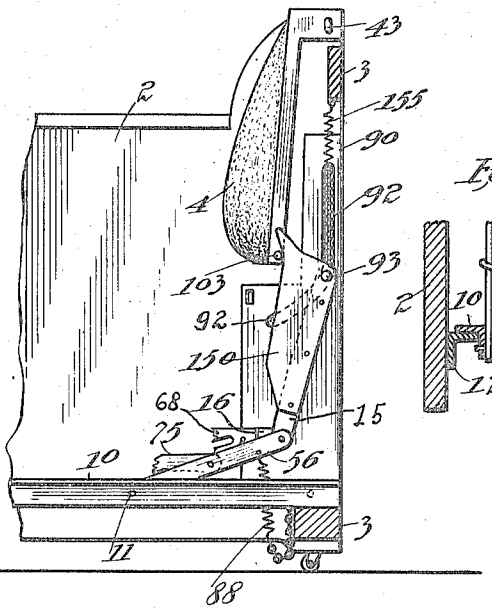


Fig. 13.

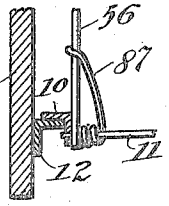


Fig. 14.

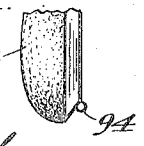


Fig. 15



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4 SHEETS—SHEET 4.

Fig. 16.

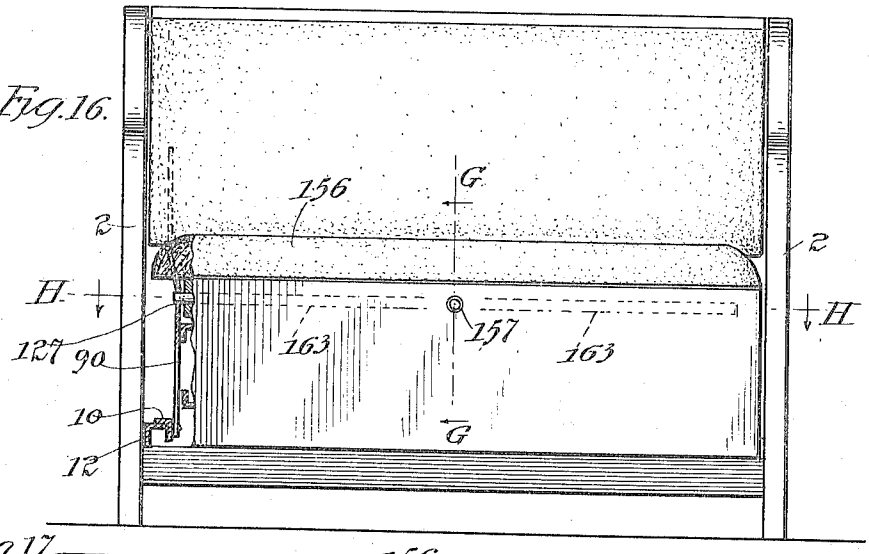


Fig. 17

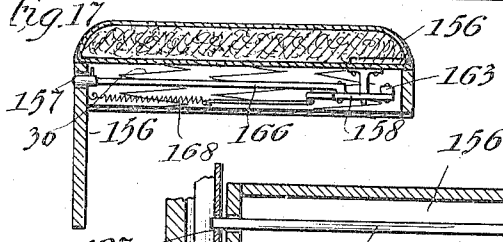


Fig. 18.

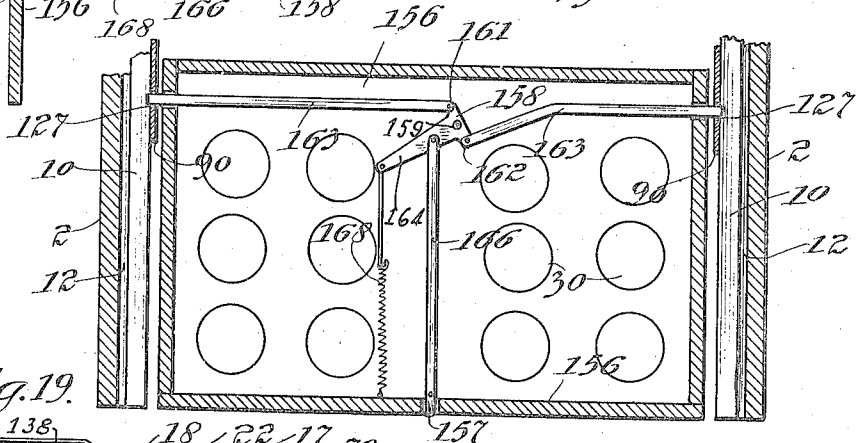


Fig. 19.

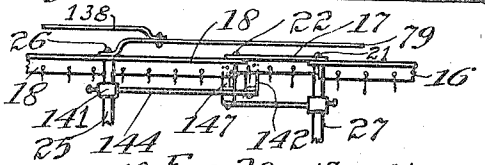


Fig. 20.

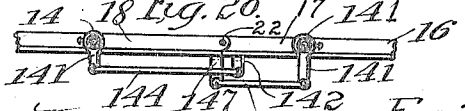


Fig. 21.

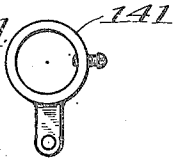


Fig. 22.

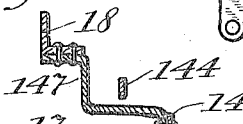


Fig. 23.



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SOFA-BED.

1,270,384. Specification of Letters Patent. Patented June 25, 1918.

Application filed July 15, 1915. Serial No. 39,997.

To all whom it may concern:

Be it known that I, FRED M. DAVIS, a citizen of the United States of America, and a resident of Chicago, county of Cook and State of Illinois, have invented certain new and useful Improvements in Sofa-Beds, of which the following is a specification.

This invention relates to sofa beds of the one-motion type, particularly those in which the bed bottom is extensible lengthwise, transversely of the sofa frame.

The main objects of this invention are to provide an improved form of sofa bed of the character stated, in which a bed bottom of usual standard length may be folded back of and beneath the seat and sofa back when the device is to be used as a sofa, and which may be converted to its bed form by a single operation or movement by the operator, as by grasping and swinging a suitable handle or part of the movable mechanism; to form and arrange the sections so as to permit of mounting the bed bottom in a sofa frame of a size not substantially larger than frames used for ordinary sofas, and particularly which shall be shallow in depth from front to back, and in which such depth shall be less than is usual in sofa beds; to attach the back turnably and demountably; to provide for making a bed bottom in four sections foldable to provide a storage receptacle for bedding in made-up form, mainly beneath the seat, and in which the head section shall project upwardly behind the back and seat in sofa position; and to provide means for swinging the back automatically so as to give clearance for said head section and the bedding thereon in moving to and from its sofa position; to provide for causing the back to assume a retracted or rearward position when the sections are unfolded, so as to increase the head room of the bed; and to provide improved locking means for securing the device in folded position.

Illustrative embodiments of this invention are shown in the accompanying drawings, in which—

Figure 1 is a small perspective view of a complete sofa bed with part of the sofa frame broken away to show a handle member.

Fig. 2 is a side view of the sofa bed unfolded, the near end of the sofa frame being removed.

Fig. 3 is a cross-section on the line A—A of Fig. 2 and shows mainly a plan of the bed bottom unfolded.

Fig. 4 is a cross-section on the line B—B of Fig. 6, and shows an automatic lock.

Fig. 5 is an inner side view of the farther frame end of Fig. 6, and shows the form of the back-pivot and bearing plate therefor.

Fig. 6 shows the same embodiment as Fig. 2 in its sofa position.

Fig. 7 is a fragmentary cross-section on the line C—C of Fig. 3, showing a side view of the coacting side rails and locking means therefor.

Fig. 8 is a fragmentary cross section on the line D—D of Fig. 2, showing the mounting rails and lock therefor.

Fig. 9 shows the same embodiment as Fig. 6 partly unfolded.

Fig. 10 is a fragmentary side view of a modified embodiment in bed position, showing the head section arranged to coact directly with the back, the near end of the sofa frame being removed.

Fig. 11 shows the same embodiment as Fig. 10, but in its sofa position.

Fig. 12 is a fragmentary plan of one corner of the head section and associated parts with some of the members in cross section on the line E—E of Fig. 10.

Fig. 13 is a fragmentary cross section on the line F—F of Fig. 10, showing the mounting frame and one of the lifting springs for the bed bottom.

Fig. 14 is a side view of the lower part of the back of the device shown in Fig. 2.

Fig. 15 is a fragmentary rear elevation of the back illustrated in Fig. 14, and shows one of the bearing rollers.

Fig. 16 is a front elevation of a sofa bed having a push button for releasing the latch which locks the device in sofa position.

Fig. 17 is a fragmentary cross section on the line G—G of Fig. 16.

Fig. 18 is a fragmentary cross section on the line H—H of Fig. 16.

Fig. 19 is a fragmentary plan showing automatic folding means for the bed bottom spacing bars.

Fig. 20 is a fragmentary longitudinal section substantially on the line on which

the spacing bars are shown broken in Fig. 19.

Fig. 21 shows a crank arm for attaching to a spacing bar.

Figs. 22 and 23 show brackets comprised by the control means for the spacing bars.

In the construction shown in Figs. 1 to 4 inclusive, the device comprises a sofa frame 1 having ends 2 and connecting members 3 in combination with a back 4 preferably attached to the frame demountably, and a removable member including a seat 6, a foldable bed bottom 7 and supporting means 8.

The back 4 is mounted turnably on the frame 1 for swinging both forwardly and rearwardly, so as to give clearance for the bed bottom in folding and unfolding, and to make head room for the bed when the device is unfolded.

Said supporting means 8 comprises lifting mechanism and a frame having side angle bars 10, to which said mechanism is attached. Cross-bars 11 hold said angle bars rigidly in spaced relation. Angle bars 12 are attached to the frame ends 2 for coaction with said bars 10 to support the member 5 demountably. The seat 6 is carried by said bed bottom in movable relation thereto as hereinafter described.

The bed bottom 7 comprises a series of sections, preferably four, arranged to fold to form a box-like receptacle 13 of substantially rectangular shape, including in order a head section 15, a main section 16, a connecting section 17, and a foot section 18 attached one to another turnably at their adjacent edges respectively as at 20, 21, and 22. The head section 15 projects up behind both the seat and the lower edge of the back in spaced relation thereto, and is spaced apart from the inwardly turned edge of the foot section so as to provide for the bedding 23.

The joints for section 17 are formed to limit the opening to 180 degrees. The head section joint is preferably formed likewise. The joints 21 and 22 are formed to limit closing to about 90 degrees.

The bed bottom includes a continuous yielding fabric 24, as for instance woven wire or the like, attached to the frame members of the sections, as illustrated in Fig. 3. A spacing bar 25, bent downwardly between its ends, is provided for the foot section, and is pivoted to the side rails near the joint 22 but preferably spaced therefrom, as at 26. Another spacing bar 27 of similar character is provided for the main section 16, and is preferably located at or near the joint 21. Another such bar is provided at the joint 20. Said spacing bars are adapted to give clearance for the bed spring 24, and are preferably provided with automatic retracting means to fold the same substantially into alinement with the bed bottom when the device is folded, for which purpose retracting links may be attached in the manner illustrated in Figs. 19 and 20.

The seat member 6 is of unitary character and comprises a frame 28 formed to give clearance for the bed spring 24, an upholstered part 29 including springs 30, and a front panel 31. The rear part of the seat is mounted operatably on the foot section, as by means of a bracket 32 having a shoulder 33 formed to coact with a slot 34 in the side rail of said section. The front of the seat is secured to the bed bottom by means of a bracket 37 on the lower part of panel 31, which bracket is provided with a shoulder 38 arranged to coact with a slotted link 40 pivoted to the bed bottom preferably at the joint 21.

The back 4 comprises a frame 45 with upholstering thereon, said frame being swingably connected to the upper part of the sofa frame as by means of pivots 46 secured to the ends 2, the lower part of the back being swingable both forwardly and backwardly from its sofa position, and being held in its sofa and bed positions by the head section 15, or more specifically by the means 47 carried thereby, as hereinafter described. The pivots are formed to permit of readily demounting the back and are flattened to pass through the notches 48 in the pivot bearing plates 49 when the back is swung up to about a horizontal position.

The mechanism for swinging the bed sections from one position to the other consists mainly of links and levers disposed in like manner on each side of the bed. The main section 16 is carried by legs or links front and rear on each side. Each rear link 56 is pivoted at its lower end to a medial part of the bar 10 adjacent to its rear end, as at the point where the rear cross-bar 11 is attached. The upper end of link 56 is pivoted to the main section at or adjacent to the joint 20. The front link 59 is pivoted at its upper end to the medial part of the main section, as at 60, and at its lower end to the front part of the bar 10, as at the point where the front cross bar 11 is connected.

Toggle links 63 and 64 are provided, one pair on each side of the bed bottom, one of the toggle links being turnably connected to an intermediate part of the connecting section as at 66, and the other to the front part of the bar 10, preferably at 11. Guide means are provided on each end of the main section 16, preferably in the form of plates 68 each having a cam slot 69.

An operating lever 71 has a shoulder 73, intermediate of its ends, formed for coaction with said guide, said shoulder preferably being in the form of a headed pivot or stud, fitting in said cam slot 69. The lower end of lever 71 is connected by a link 75 to a medial part of the rear link 56, and

the upper end is connected by a link 79 to a medial part of the foot section adjacent to its rear edge, as at 26.

A toggle actuating link 82 has one end connected to the coacting ends of said toggle links, and the other end to a medial part of the operating lever, preferably where the cam-engaging shoulder 73 is located.

The link 75 has a longitudinal slot 84 at one end so as to provide for limited independent movement of the operating lever with respect thereto. Because of such freedom of movement the section joint 22 is the first to straighten in unfolding the bed, and is the first to fold in restoring to sofa form. The length of slot 84 determines the relative position of the foot section to the other sections in unfolding, and by adjusting the length and position of said slot when the device is made and assembled, the proper balancing of the movable parts for ease of operation may be provided for. Fig. 9 shows the relative position of the parts 71 and 75 in folding the bed. In unfolding the bed the lever 71 coacts with the inner end of slot 84.

The lower end of lever 71 extends beyond its connection with the balance lever 75, and coacts at times with a bearing roller 85 secured to the bar 10. Said roller is effective during that part of the operation in which the bed bottom is nearly folded, as shown in Fig. 6, the link 75 at such time having no effect. Each cam plate 68 is secured at its ends to the side rail of the main section 16 and is spaced therefrom somewhat so as to provide clearance for the coacting shoulder 73.

Lifting springs 87 are arranged for urging the bed bottom upward to its bed position. These are disposed upon the cross bars 11 and have their ends secured to the links 56 and 59 and to the rails 10 respectively. Retracting springs 88 to assist in folding the bed are arranged to be effective mainly when the bed is unfolded almost to its bed position, and are connected, for instance, to the rear links 56 and the rear part of the sofa frame. As the bed swings back toward its balanced or half-way position, the tension on the springs 88 diminishes and in the latter part of the movement, said springs are inoperative.

A rigid support or cam leg 90 is fixed on the rear end of each mounting bar 10 for guiding and supporting the rear part of the head section in folding and unfolding the bed bottom. Said cam leg is plate-like and is provided with a slot 92 having a vertical part and an inclined part extending downwardly and forwardly at the lower end of the vertical part. Shoulders 93 on the head section coact with said slots and in bed position rest in the front ends of the diagonal parts.

In unfolding the bed the guide shoulder travels upwardly and back and then downwardly and forwardly to its sofa position. In folding the bed the guide shoulder travels first diagonally and then directly upward to the highest point of said slot, and then downwardly to its normal or intermediate position in said slot.

The head section 15 serves also as a link connecting the main section 16 and the upright 90, and limits the forward swing of the bed bottom when swung outward to its bed position.

In the embodiment shown in Fig. 2, the back is provided with a roller-bearing 94 at its lower rear edge on each side to coact with the edges of the guides on the sides of the head section. Each guide plate 47 is mounted turnably at 95 on the head section, being pivoted to a plate 96 fixed to the head section side-rail. Each plate 47 is arranged to project diagonally upward and backward when the bed is unfolded, providing a rest or stop for the lower edge of the back in its retracted position. In sofa position, the guide 47 lies lengthwise of the side rail and guide plate 96 and holds the back at its intermediate or sofa position. In folding the bed the lower edge of the back travels forward on the upper edge of the movable members 47 and guides 95. Said member 47 is swung automatically by the link 97 pivoted to the lower part of plate 47 and to link 56, or in equivalent manner to effect such operation of plate 47. The plates 96 prevent the back from swinging against the bed bottom proper and provide clearance for the bedding when folding and unfolding with the bedding in made-up form.

The coacting rails 12 and 10 of the sofa frame 1 and demountable part 5 respectively, are angular in shape each with one flange disposed vertically and the other disposed horizontally and resting slidably one upon the other as shown in Figs. 7 and 8. Locking means are provided for securing the rails 10 in position, comprising a stud 117 carried by a yielding member preferably in the form of a leaf spring 118, the coacting rail flanges being perforated to register when assembled. This lock includes a rotary cam 120 and is provided with a handle 121 arranged for turning by the operator to withdraw the stud 117 to release the demountable part 5.

Stop means 125 on the rear part of the seat frame coact with upwardly facing shoulders 126 on the stationary uprights 90 when the device is folded, and thereby support the seat in its sofa position as shown in Fig. 4. Automatic locking means on the seat frame adjacent to said stop means coact with the apertures 127 in the uprights 90, said means comprising a pair of plungers or latches 128 urged outwardly by suitable means as springs 130, said plungers being beveled on

their under sides to coact with the edges of the uprights 90 so as to be retracted as the seat swings into sofa position. The apertures 127 are disposed to register with said plungers when the seat comes to rest on said shoulders and the springs move said plungers outwardly into engagement with said uprights. A handle 132 mounted on the rear edge of the seat is arranged for limited movement. Said plungers are connected by means 133 to the lower end of said handle in such manner that when the handle is pulled upwardly, the plungers 128 are retracted. By continuing the pull on said handle, the seat and head section are swung forward bodily to their sofa position. When the seat is restored the latches 128 automatically lock the seat in sofa position.

Automatic legs 135 support the foot section. Each leg is turnably connected adjacent to its upper end to the side of the foot section adjacent to its free end, a downwardly projecting bracket preferably being provided, carrying a pivot 137 on which said leg is secured. The upper end of each leg is connected by means of a link 138 to a rearwardly disposed member having relative movement with respect to said foot section in folding and unfolding, and is preferably connected to the link 79 adjacent to the pivotal point 26. Said leg and link are formed and arranged to clear the adjacent end of the seat and the bracket 32.

The control means for the spacing bars at 20 and 26 consist of a bracket 141 on the pivoted bar near its end, a bracket 142 on the near end of the next section, and a link 144 connecting the free ends of said brackets. Bar 27 is controlled by means of like character, but the frame bracket 147 therefor is formed so that it will clear the link 144, as shown in Figs. 19, 20 and 22.

The operation for converting the device from a sofa to a bed is as follows:

The operator grasps the handle or strap at the rear edge of the seat and pulls diagonally forward and upward, thereby swinging the seat to its bed position, the hinge 22 straightening first and then hinge 21. In so doing, the foot section, bottom section, and connecting section are raised ad carried forward to their bed position. The head section is first thrust upward behind the back and then swung forward at its lower end, thereby swinging the back on the cam guides 47 and 96 sufficiently to permit of said movement, and then is drawn forward and downward to its bed position, the back being permitted to swing rearwardly by gravity to its retracted or bed position.

The operation for restoring the device to its sofa position is as follows:

The operator grasps the free end of the foot section and swings the same with the seat attached thereto back to their sofa position, thereby substantially reversing the movement of the several members and causing the head section to slide upward behind the back, at the same time swinging the latter forward to give clearance for such movement, the head section then swinging backward and downward to normal upright position. The hinge 22 folds first and then hinge 21. The bedding is carried by the bed bottom in made-up form during the folding and unfolding operations, suitable means for retaining the foot end of the same in place being provided as understood in the art.

In the embodiment shown in Figs. 10 and 11, the lateral guide members 150 are rigid on the head section and are formed with projecting parts extending diagonally upward and rearward in their bed position, answering substantially the same purpose as the guide levers 47 shown in Fig. 2. In Fig. 10 the back 4 is provided with shoulders or rollers 153 one on each end to coact with said guides 150, which guides overlap the ends of the back, as shown in Fig. 11. A tension spring 155 is connected to the upper part of the sofa frame and to the rear edge of the head section and is effective initially both in folding and unfolding the device.

In the embodiment shown in Figs. 16, 17 and 18, the locking latches for the seat 156 are releasable by a push-button 157 mounted preferably on the front panel of the seat. The operating mechanism includes a T-shaped member 158 turnably mounted at 159 and having its two opposite arms 161 and 162 turnably connected to the latch plungers 163 in such manner that when the third arm 164 is pushed inwardly, said plungers will be retracted. Said push-button is mounted on the outer end of a plunger rod 166, the inner end of which is pivoted to said arm 164. Said T member is urged yieldably as by means of a spring 168 to throw the plungers normally outward.

In the embodiment of Fig. 16, the lifting springs are adjusted to overcome the weight of the folded parts, and when the locking latches 163 are released, the seat swings upward automatically to an angle of about 45 degrees. When the seat and foot section have swung upward as far as the lifting springs alone will carry them, the operator grasps the rear edge and swings them to their bed position. In folding the device, the operator merely swings the seat and foot section backward and down into sofa position, where secured by the automatic latches 163, more or less downward pressure being applied to overcome the final opposition of the lifting springs.

Although the invention is illustrated by certain embodiments herein shown, it is to be understood that no attempt has been made to set forth specifically all useful embodiments, and that some of the details of the

constructions shown may be altered or omitted without departing from the spirit of this invention as defined by the following claims.

I claim:

1. In a device of the class described, a frame, a back having its upper part turnably connected thereto, a foldable sectional bed bottom mounted in said frame and comprising a long section disposed horizontally, a pair of links disposed one in front of the other whereon said section is swingably mounted, and a short section joined to said long section, said frame and short section having coacting guide means arranged and adapted to control the relative movement of said sections in folding and unfolding, and said short section having cam means movable upward therewith for coacting with the lower part of said back and serving to swing the back clear of the bed bottom in changing the device to and from its bed form, said cam means including a guide track part with which said back part coacts reciprocatably, the cam track part being so formed and inclined as to effectually urge the back forward in folding and unfolding the device.

2. A sofa bed comprising a frame, a foldable sectional bed bottom carried thereby, mechanism for swinging the sections backwardly and forwardly in folding and unfolding the bed bottom respectively, a seat carried by the foot section, stop means on each side of said frame for arresting the folding of the foot section and seat, outwardly movable plungers on the rear part of the seat for engaging said frame when the device is folded, yielding means urging said plungers outward, a push button on the front of said seat and connecting means for said push button and plungers whereby the latter may be retracted manually when the device is to be unfolded.

3. A sofa frame having a back mounted swingably adjacent to its upper edge in combination with a foldable sectional bed bottom including a foot section, a head section, and intermediate sections, a seat carried on the reverse side of said foot section, said head section being short and slidably mounted on said frame adjacent to its rear edge for sliding upward behind the lower part of the back in folding, and lateral cam guide means on the head section for swinging the back clear of the bedding in folding and unfolding said sections, and said bed bottom, when folded forming a clothes receptacle for bedding in made up form.

4. In a sofa bed a substantially stationary frame, a foldable sectional bed bottom, and a swinging back each mounted on said frame in co-active relation to each other and the former having link connection to said frame, said bed bottom including a head section and an adjacent section, parallel links disposed on each side of the latter section on which it is bodily swingable upwardly and forwardly in unfolding the device, said frame having lateral guide means rigid therewith and inclined rearwardly and upwardly from the bed position of the rear part of said head section, which section co-acts with said guide means in folding and unfolding, said back having its lower part disposed substantially always in co-active cam relation to said head section whereby the back is swung forward to give clearance for said head section in folding and unfolding the bed bottom.

5. In a sofa bed a frame, a back having its upper part turnably connected to said frame and its lower part being swingable, a bed bottom section swingable from an upright position back of and partly below said back, guide means and carrying means for the rear and front parts of said section respectively, a lateral cam guide member disposed rigidly on said section for holding and guiding the back away from said section, and a supplementary cam member pivoted to said fixed cam member near the rear end of the latter, and a link for swinging the pivoted cam member backward in folding and forward in unfolding the device, said cam members co-acting successively with the lower part of the back to hold the latter spaced away from said section in folding and unfolding the device, said rigid and supplementary cam members co-acting with the back to hold the same in its forward or sofa position and in its retracted or bed position respectively.

6. In a sofa bed, the combination with a frame, a folding bed bottom mounted thereon, means for swinging the parts or sections of the bed bottom to and from their bed position in unfolding and folding the device respectively, a seat carried by one of the sections, and stop means on said frame for limiting the folding of the device, of automatic locking means adapted for manual release, comprising latch means mounted movably on the seat, and manual control means disposed accessibly on or adjacent to the normally front part of said seat and communicating operatively with said latch means.

Signed at Chicago this 13th day of July, 1915.

FRED M. DAVIS.