Jan. 7, 1941. H. P. GLASS 2,227,855

CONVERTIBLE SOFA-BED

Filed March 15, 1940 2 Sheets-Sheet 1

Fig. 1.

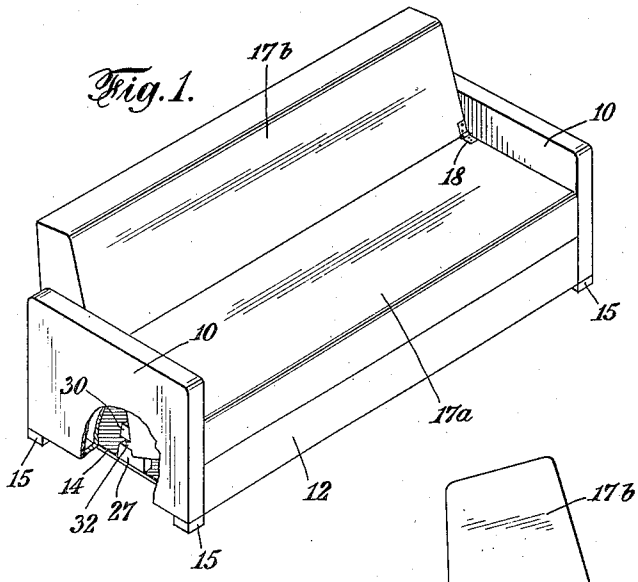


Fig. 2.

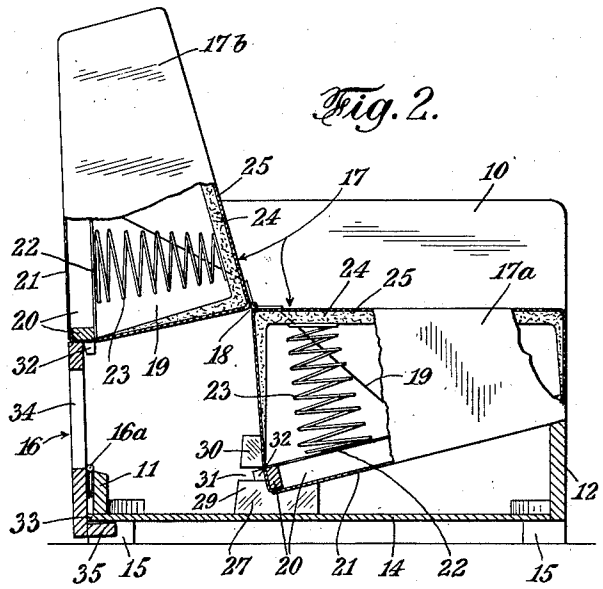
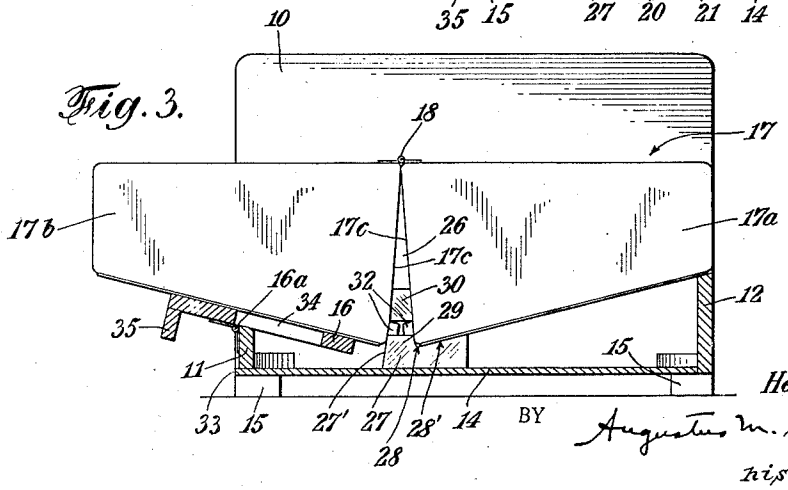


Fig. 3.



INVENTOR,
Henry P. Glass,
BY
Augustus M. Henry
his Attorney.

Jan. 7, 1941. H. P. GLASS 2,227,855

CONVERTIBLE SOFA-BED

Filed March 15, 1940 2 Sheets-Sheet 2

Fig. 4.

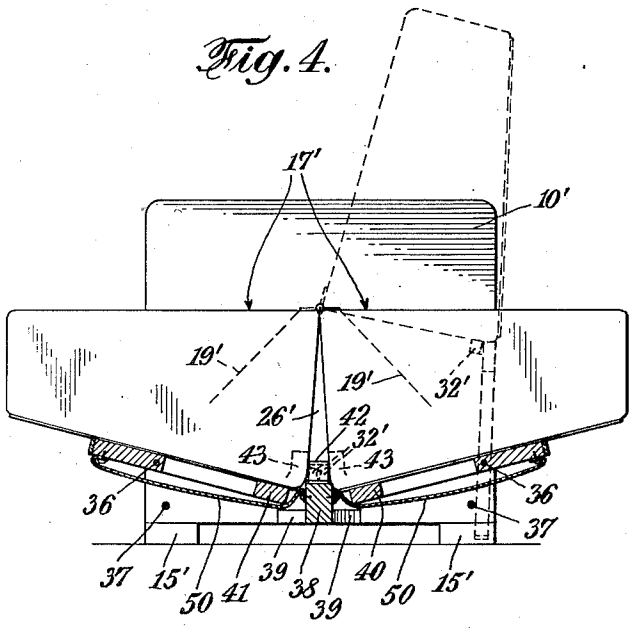


Fig. 5.

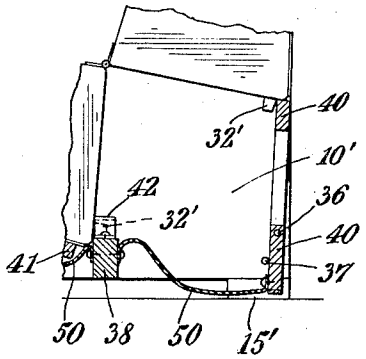
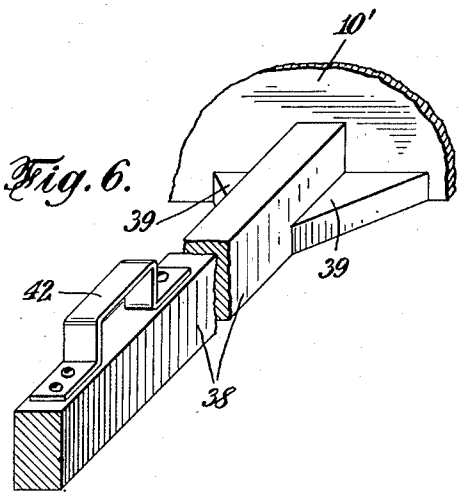


Fig. 6.



INVENTOR,
Henry P. Glass,
BY Augustus M. Henry
his Attorney.

Patented Jan. 7, 1941 2,227,855

UNITED STATES PATENT OFFICE

2,227,855

CONVERTIBLE SOFA-BED

Henry P. Glass, New York, N. Y.

Application March 15, 1940, Serial No. 324,099

8 Claims. (Cl. 5—37)

This invention relates to convertible furniture, and more particularly, aims to provide a new and improved sofa-bedstead.

The invention embodies a frame having fixed and movable parts, the latter disposed in one way when a sofa is to be provided and in another way when a bed is to be provided; a mattress having inter-hinged sections; and means for holding the mattress securely locked on the frame and in proper support thereon when a bed of any desired width, or a sofa having a cushioned seat and back, is established.

In my copending application Ser. No. 302,797, filed November 4, 1939, I have disclosed and claimed improvements in a sofa-bed as above, and one wherein, as here, a feature of the invention is a mattress including two like sections, each having its swinging edge at an opposite side of the bed when the parts are arranged to provide a bed, and each in cross section shaped substantially like the frustum of a triangle.

The aim of the present invention is to provide, in combination with a mattress as above, novel interlocking means between the mattress and the frame which like the novel interlocking means disclosed in my said copending application are simple and inexpensive but highly reliable, yet which are structurally different from the latter and in a way to provide certain special features and advantages.

One feature of the present invention is a simplification of the central bottom support for the mattress as described in my said copending application, in which application this support is disclosed as constituted by a pair of end rests defining shallow V's, with each such rest preferably including a pair of rails or ledges downwardly converging toward a point midway of the width of the mattress.

As in the invention of my said copending application, the present invention employs, inside the frame, interlocking means between the mattress and the frame other than ones including pivotally mounted or pivotally connected parts; and here, as there, the frame along a side thereof carries a leaf which is pivotally mounted. A feature of the present invention, however, is that the pivotally mounted leaf or leaves employed function differently, and in a way to permit elimination of the aforesaid rails or ledges, as well also as in a way to give other advantages as will be below explained.

All the various features and advantages of the present invention, those already referred to and others, will be fully understood from the following description of an embodiment of the invention as now preferred, and as shown, by way of example and not limitation, in the accompanying drawings.

In these drawings:

Fig. 1 is a perspective view, partially broken away at an end, showing said embodiment arranged as a sofa.

Fig. 2 is a transverse vertical section, on a somewhat enlarged scale, and showing the mattress partially in end elevation.

Fig. 3 is also a transverse vertical section, but showing the mattress wholly in end elevation, with the sofa converted into a bed.

Fig. 4 is a view similar to Fig. 3, but showing a modification, and illustrating in full lines the arrangement of the parts to provide a bed, and, in broken lines, the rearrangement of some of said parts to provide a sofa.

Fig. 5 is a fragmentary view, similar to Fig. 4, and showing in full lines rearrangement of all the parts in providing a sofa.

Fig. 6 is an enlarged detail perspective view, showing certain of the parts of Figs. 4 and 5.

Referring first to the exemplifying structure shown in Figs. 1, 2 and 3, a frame is provided comprising a pair of end walls **10**, a lower side wall **11**, a higher side wall **12** on the opposite side of the frame, a bottom wall **14**, and feet **15** at the four corners of the bottom wall; all rigidly secured together.

Attached by a line of hinges **16***a* to the top of side wall **11** is a leaf **16**.

The mattress is marked generally **17**, and comprises two sections **17***a* and **17***b* hinged together at their upper inner edges as indicated at **18**. To have these hinges entirely out of the way, they are desirably at the extreme ends of the mattress. Each mattress-section is shown as including a rigid skeletal carrier made up of a pair of end members **19** upstanding from a quadrilateral bottom frame **20**. These parts are desirably of wood, and so the plates of the hinges **18** are conveniently screwed to the tops of the end members **19**. Each mattress section as shown also has a bottom wall **21**, strips **22** overlying and secured to the frame **20**, coil springs **23** extending upward from said strips, a cushion **24** held in place over the springs, and a cover **25** of upholstery or other suitable fabric for thus holding the cushion and attached to the frame. The mattress shown, therefore, is of the inner-spring type. It is always preferably of this type, and it can

be constructed in any of the ways well known in the mattress and upholstery art.

As will be noted, the formation of the mattress sections is such that each has a cross-section shaped substantially like a truncated triangle.

It is also pointed out that each mattress section, when both are arranged to provide a bed, has a portion of its bottom inwardly downwardly inclined, and (note Fig. 3) each section is also so shaped that its inner side 17c is downwardly outwardly inclined to provide a chamber 26.

Inside the frame, supports or rests for the mattress are provided at the opposite ends of the frame. These supports are the same at each end of the frame, as will be seen from a comparison of Fig. 1 with Fig. 2 or 3. Referring more particularly to Fig. 3, each of said supports comprises an upstanding projection 27, suitably secured to the adjacent end wall 10 of the frame; the same being a shaped block carrying a V-shaped pocket 28, with the V a part-lazy one, that is, having a bottom wall 28' downwardly inclined—this inclination in the general direction of downward inclination of the bottom of the mattress section 17a. The upper wall of the V is extended in conformity with the direction of extension of the wall of said section forming a wall of the chamber 26. The end 27' of the projection 27 to the left in Fig. 3 is similarly conformed to the shape of the chamber 26; thereby to provide a mattress-centering plug 29.

Above the plug 29, at each end of the frame, and suitably secured to the adjacent end wall 10, is a block 30. The two side walls of this block are also conformed to the shape of the chamber 26, but the block is spaced above the plug to provide a cavity, marked 31 in Fig. 2. Thus the block and the plug combine to form, at each end of the frame, a structure which is shaped from top to bottom, except for said cavity, to conform with the chamber 26.

Consequently, in order permanently properly to center the mattress in the frame, it is merely necessary to lower the mattress with both sections substantially horizontal, but swung relatively so as to enlarge the chamber 26 somewhat beyond its normal size, until the lower inner portion of the section 17a settles itself into the pocket 28; and then release the hold upon both sections, whereupon one or both sections become settled squarely in place, to form a sofa or a bed.

In the form of the invention shown in Figs. 1 through 3 now being described, only a mattress section at one particular side of the frame is raised to form a back to convert the bed into a sofa. As the parts are shown, this section is the section 17b. Nevertheless, if it is desired to make the section 17a the raisable one, as when excessive wear in certain parts of the upholstery makes this advisable, all that is required is to remove the mattress from the frame, turn it horizontally through 180°, and reset it in the frame as above described.

Accordingly, in this form of the invention, the center rests or supports including the parts 29 and 30 are preferably laterally offset from the longitudinal center line of the frame, as shown, so as to have what would always be the front side of a sofa made up of two more or less flush surfaces, that of the front side of the mattress section forming the sofa seat, and that of a side wall of the frame below said section.

The wall last-mentioned is here the wall 12. This wall is rigidly fixed in place on the frame, as there is no need for it ever to have movement on the frame. For fullest and safest support of the front side of the section overlying this wall, the top edge of the latter is bevelled in agreement with the inward downward inclination of the bottom of said section, as illustrated.

Projections 32 are carried by the mattress sections, these desirably being wooden blocks secured to the wooden frames 20 of the sections. One of the uses of the one or more such projections on the mattress section which is raised to form a sofa back, is to form an interlock with the leaf 16 pivotally mounted on the side wall 11 of the frame; regardless of which of the sections is the raisable one to form a sofa back, that is, regardless of how the mattress is placed on the frame.

The top edge of wall 11 has a bevel like that of the wall 12 except that the direction of downward inclination is reversed; and the leaf 16 is of such a width, relative to the height of the wall 11, and to the level of the hinges 16a, that when said leaf is as in Fig. 2, its top supports the raised section 17b in the proper position to provide a comfortable sofa back, and when said leaf is as in Fig. 3 it flatwisely supports the bottom of the section 17b in the proper position for converting the sofa into a bed.

Furthermore, as will be noted, the line along which the leaf 16 is hinged to the wall 11 is sufficiently spaced from both the top and bottom of said leaf that extended portions of the leaf are, at both sides of said line, below the section 17b when lowered to form a bed. In other words, the weight of this section is distributed all over the flat of the leaf, and the leaf automatically adjusts its flat to the inclination of the section bottom as the inner bottom portion of this section settles flat against the structure 29—30. This arrangement gives a firm and dependable support for the section 17b, comparable with that provided for the section 17a by the fixed wall 12, the structure 29—30, and the fairly long bottom wall 28' of the pocket 28.

The leaf 16 is suitably weighted at or near its bottom, that is, below the hinges 16a as said leaf is seen in Fig. 2, so that on raising a mattress section to form a sofa back the leaf automatically swings to the position shown in Fig. 2. Merely by first raising said section a trifle higher than necessary, and then, following swinging of the leaf into vertical position, lowering said section, the sofa is established, and the sofa parts are securely locked together.

This locking is accomplished by the one or more projections 32 on the section 17b coming opposite the inner upper side of the vertically arranged leaf 16. Now the top of this leaf cannot be swung in, beyond such a projection, nor can it be swung in the opposite direction, due to engagement of a lower part of the leaf with a stop suitably provided on the frame. Such stop is here shown as constituted by a marginal extension 33 of the bottom 14, extended beyond the side wall 11.

With a duplex mattress support or rest as above described, that is, with a structure 29—30 or an equivalent at both ends of the frame, and where each mattress section, as is desirable, has two of the projections 32, one at each end of each section, the cavity 31 is important, to provide a housing for the projection or projections of the one or both mattress sections lowered to form part of a bed or sofa, as shown in Figs. 2 and 3—each cavity at an end of the frame serving the projection or projections on a mattress section

or the mattress sections, at the end of said section or sections nearest the cavity. Also, the interengagement of these projections with the structures 29—30 increases the security of interlock of all the parts inside the frame, whether a sofa or a bed is provided.

Weighting of the flap or leaf 16 is very desirable, for the reason already pointed out. Nor does its weighting interfere with placing of the mattress on the frame, as for a reversal of the mattress. Before applying the mattress to the frame, the leaf 16 can be preliminarily held in the position shown in Fig. 3 by temporarily placing a suitable object under that part of the leaf projected beyond the frame. Or the mattress can be arranged as in Fig. 2, and after being centered on the structures 29—30, and with the section 17b lifted enough to have its projections 32 clear the top of the leaf, the leaf can be swung down somewhat toward the position shown in Fig. 3 and there held with one hand, while the other hand lowers the section 17b until it comes down on the leaf—after which further lowering of the section 17b automatically causes arrangement of the parts as in Fig. 3.

Weighting of the leaf 16 can be done in a number of suitable ways; for instance, as here shown,—where the line of pivotal mounting of the leaf is considerably nearer the bottom than the top of the leaf,—by making the leaf partially skeletal to provide a line of lightener openings one of which is indicated at 34, and by mounting at the lower end of the leaf an extension 35 of some heavy metal, as lead.

Referring now to the modification shown in Figs. 4, 5 and 6, the arrangement there shown, in view of what has been said, can be briefly described, as follows:

The mattress 17' is precisely like the mattress 17, except as hereinafter pointed out.

Instead of the end walls 10' of the frame being connected by fixed side and bottom walls, the last-mentioned walls are omitted, and the end walls are tied together by two tie-rods 36, two tie-rods 37, and a relatively massive bar 38; said bar desirably of wood, and said rods desirably of metal. For a more rigid structure, the bar 38 is shown as strongly buttressed at opposite ends by triangular bracing blocks 39 as shown in Fig. 6.

The elements 36 are pintle elements for hingedly mounting leaves, corresponding to the leaf 16, but with one leaf here on each side of the frame. Therefore, these elements 36 may be taken in the drawings as representing pintles suitably fixed to the end walls 10' of the frame, aligned in two pairs one pair at each side of the frame and coacting with aligned pintle receptors or sockets in the ends of the two leaves, marked 40 and 41. The elements 37 are for providing stops to limit inward swing of the bottoms of the leaves 40 and 41. Therefore, these elements 37 may be taken in the drawings as representing short studs suitably projecting from the end walls 10' of the frame.

In the arrangement of Figs. 4, 5 and 6, the upper portion of the bar 38 provides an equivalent for the plug 29 of the projection 27; except that here such equivalent extends the entire length of the frame and engages both mattress sections, at their inner sides, along the entire length of the mattress.

Here, however, the interlocking, between a projection on a mattress section and a hinged leaf, to form a sofa back, or between said projection and a central support or rest within the frame, is not by means of two projections on the mattress section and at opposite ends of the frame, but between a single projection on a mattress section and a cooperant element at a point midway along the length of the frame. That is, each section has a single projection 32', substantially halfway along its length, but otherwise arranged on the mattress section as is a projection 32.

When the mattress is arranged as a bed on the frame, the two projections 32' on the two mattress sections enter a cavity provided by a U-shaped metal strap 42 having terminal flanges by which it is secured as shown, in inverted U-fashion, to the top of the bar 38. As will be understood, a projection 32' on one mattress section is offset relatively to the projection 32' on the other section, so that they will lie in said cavity, one projection alongside the other, when both sections are arranged to provide a bed.

The structure 38—42, it will be noted, corresponds to the structure 29—30, in coacting with the chamber 26', corresponding to the chamber 26, between the mattress sections when arranged to provide a bed; especially when, as shown in broken lines in Fig. 4, the end pieces 19', corresponding to the end pieces 19, are joined by a bar as indicated at 43, as one forming a long side of the frame, corresponding to the frame 20, which joins said end pieces within the mattress sections, as in Figs. 1, 2 and 3.

The leaves 40 and 41 are preferably weighted, in any suitable way, so as to act as described above in connection with the leaf 16.

When the parts are arranged as in Fig. 4, to have the mattress provide a bed, it is supported at both sides on the flats of the leaves 40 and 41, in the same way as the leaf 16 acts in regard to the mattress section forming half of such bed.

When the parts are arranged as in Fig. 5, the mattress section providing a sofa back, is supported just as securely by the leaf 40 or 41 therebelow as is the mattress section 17b of Fig. 2; the projection 32', the leaf 40, and the stop 37, corresponding in cooperative action with the projections 32, the leaf 16 and the stop 33.

A flexible sheet 50 of duck or some other suitable material is provided in association with each leaf 40 and 41. These sheets at their inner sides are attached as shown to the bar 38, while the outer side of one sheet is attached to the leaf 40, and the outer side of the other sheet is attached to the leaf 41 as shown. Thereby, although these sheets allow both leaves to be arranged as in Fig. 4, when either leaf is arranged as is the leaf 40 in Fig. 5, the sheet 50 attached to the former leaf forms a hammock like floor to provide a storage compartment as for bed clothes or the like.

In using this feature of the invention, it may be desirable, where the leaves 40 and 41 have lightener openings as indicated, to close these by thin sheets of pliofilm, aluminum, thin plywood or some other suitable material of very light weight, as barriers against dust. And, with the same idea, it may be desirable similarly to close the lightener openings 34.

As already stated, the constructions above described are forms of the invention as now favored. The scope of protection contemplated is defined in the claims following. Anything shown in the drawings, as well as anything said in the foregoing specification, is to be taken in an illustrative sense only and not by way of limitation. Variations and modifications are possible within

the scope of said claims, and parts of the improvements can be used without others.

For instance, while it is desirable in most cases to have each mattress section a reversed duplicate of the other, as to cross-sectional shape, it is also within the invention to have both sections like sections only in the sense that both have the cross-section of a truncated triangle, regardless of whether these triangles are dissimilar or similar, as, for example, one with a difference in width, or bottom inclination, or depth at any point, relative to the other. Furthermore, it is within the invention to have only one of the mattress sections of truncated triangular cross-section.

I claim:

1. In a sofa-bed, the combination, with a frame, of a mattress including two sections pivotally connected along the length of the mattress, each of said sections having a cross-section substantially in the shape of a truncated triangle to provide a mattress bottom having inwardly downwardly inclined portions at opposite sides of said bottom, the inner sides of said sections having portions downwardly outwardly inclined to provide a chamber in the mattress bottom; means for locking the mattress against lateral shift on the frame including a structure having a part shaped for upward projection into said chamber; and means for closing a side of the frame below a mattress section when swung up to form a back to convert the bed into a sofa and for then supporting said section as said back along a line remote from the pivotal connection between the sections, said means also for supporting said section when lowered to convert the sofa into a bed, said means including a leaf horizontally pivotally mounted on the frame along a line spaced sufficiently from both the top and bottom of the leaf to cause the weight of the section, with the leaf inwardly downwardly inclined for flatwise support of said inclined portion of the bottom of said section, to be borne by portions of the leaf located outwardly and inwardly of said line.

2. A sofa-bed as in claim 1, in which said leaf is of greater weight on one side of said line than on the other, so that the leaf will naturally turn about its line of pivotal mounting to locate a prevised side at its bottom on swinging up the overlying mattress section to convert the bed into a sofa.

3. A sofa-bed as in claim 1, in which said locking means includes a reduced extension on each mattress section which, when said section is lowered for flatwise support by its underlying leaf as last described, is adjacent to but spaced above the inner bottom edge of said section and directed substantially horizontally away from the inner side of said section, to provide between the underside of said extension and the part of the inner side of said section therebelow a recess for engaging said projection at the top and side portions thereof.

4. A sofa-bed as in claim 1, in which said locking means includes a reduced extension on each mattress section which, when said section is lowered for flatwise support by its underlying leaf as last described, is adjacent to but spaced above the inner bottom edge of said section and directed substantially horizontally away from the inner side of said section, to provide between the underside of said extension and the part of the inner side of said section therebelow a recess for engaging said projection at top and bottom portions thereof, said extension being so spaced above said edge, and said line of pivotal mounting of the underlying leaf being so located relative to the frame and the width of the leaf, that when a section and its underlying leaf are both swung up to convert the bed into a sofa, said projection engages said leaf at its top and faces a portion of one of the sides of the leaf adjacent to its top.

5. A sofa-bed as in claim 1, in which said projection has a V-shaped pocket, and a mattress section has, at its edge which is its inner bottom edge when said section is lowered for flatwise support by its underlying leaf as last described, a portion shaped to enter said pocket, said pocket having a bottom wall downwardly inclined in the general direction of inward downward inclination of the bottom of said section.

6. A sofa-bed as in claim 1, in which said locking means includes a part fixed on the frame and spaced above said projection to provide a cavity, and in which said locking means also includes a reduced extension on each mattress section which, when said section is lowered for flatwise support by its underlying leaf as last described, is adjacent to but spaced above the inner bottom edge of said section and directed away from the inner side of said section to provide therebelow and at the inner side of said section a means for engaging top and side portions of said projection, said extension being so located on said section as to enter said cavity.

7. A sofa-bed as in claim 1, in which a flexible sheet element is extended under said section, to provide a bottom for a storage compartment below said section when the latter is lowered to convert the sofa into a bed, said element being attached at its inner side to the frame and attached at its outer side to the leaf underlying said section.

8. In a sofa-bed, the combination, with a frame, of a mattress including two sections pivotally connected along the length of the mattress, one of said sections having a cross-section substantially in the shape of a truncated triangle to provide a mattress bottom portion which is inwardly downwardly inclined, the inner side of said section having a portion downwardly outwardly inclined to provide a chamber in the mattress bottom; means for locking the mattress against lateral shift on the frame including a structure having a part shaped for upward projection into said chamber; and means for closing a side of the frame below said section when swung up to form a back to convert the bed into a sofa and for then supporting said section as said back along a line remote from the pivotal connection between the two sections, said means also for supporting said section when lowered to convert the sofa into a bed, said means including a leaf horizontally pivotally mounted on the frame along a line spaced sufficiently from both the top and bottom of the leaf to cause the weight of the section, with the leaf inwardly downwardly inclined for flatwise support of said inclined portion of the bottom of said section, to be borne by portions of the leaf located outwardly and inwardly of said line.

HENRY P. GLASS.