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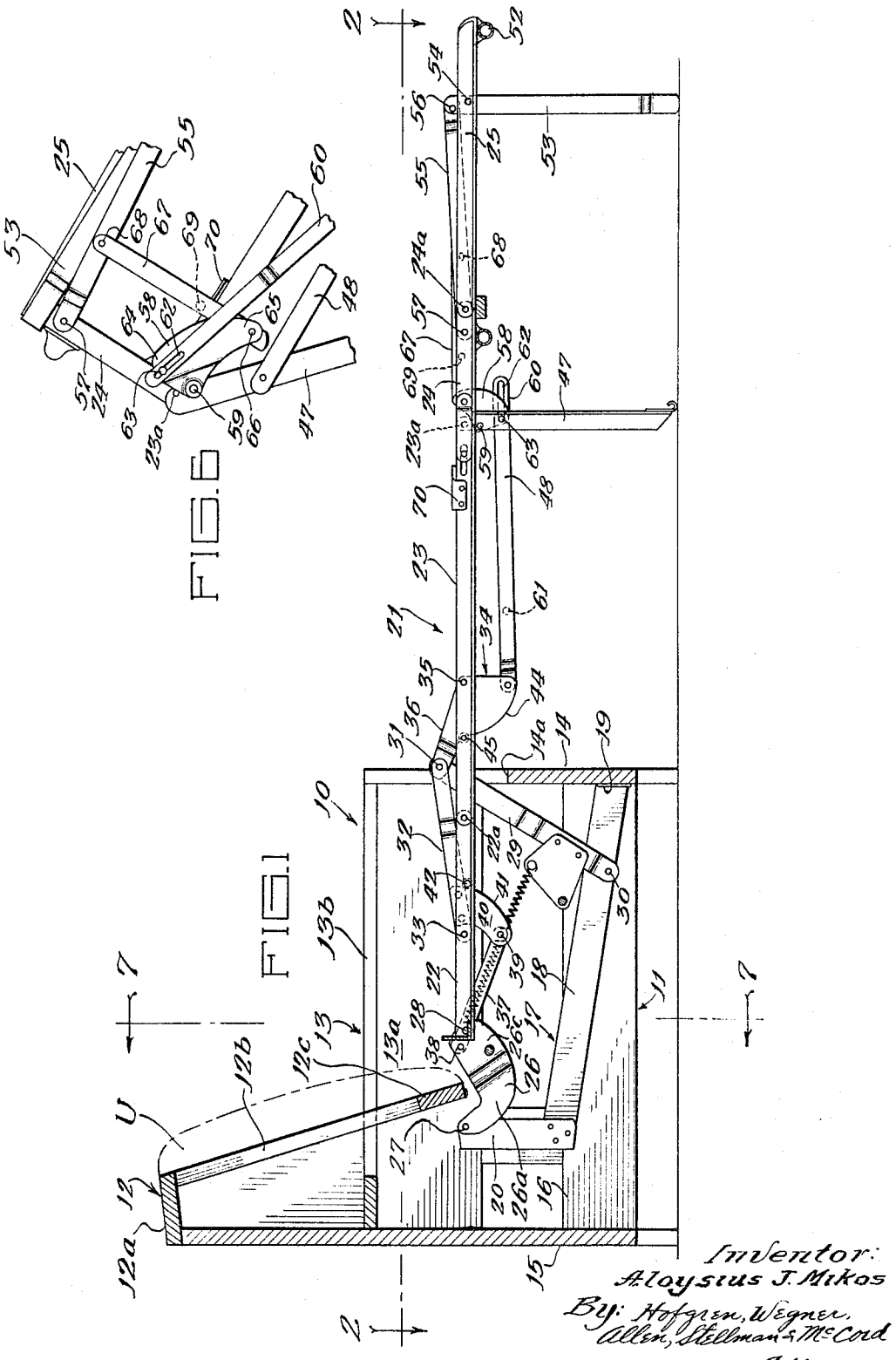


FIG. 6

FIG. 1

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FIG. 2

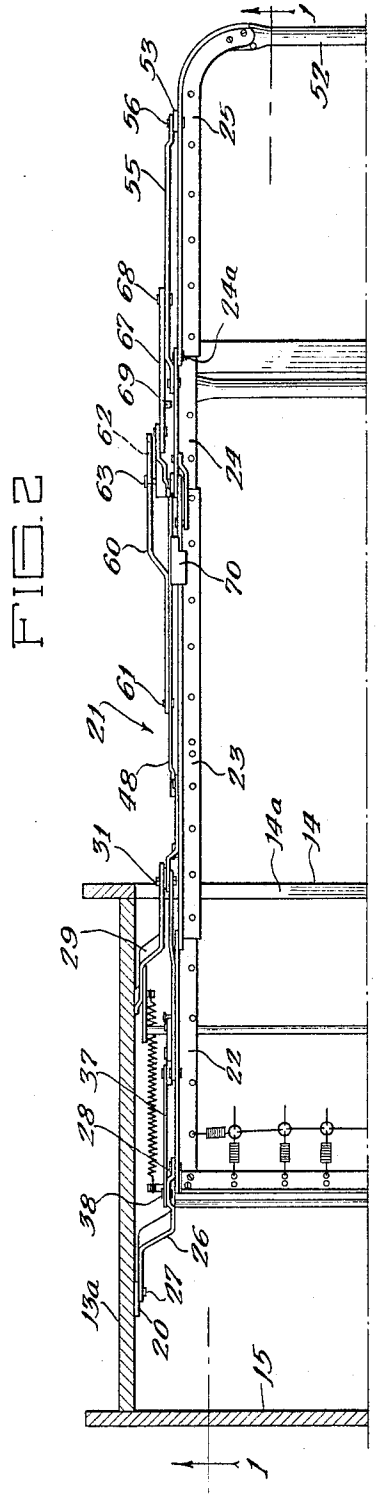
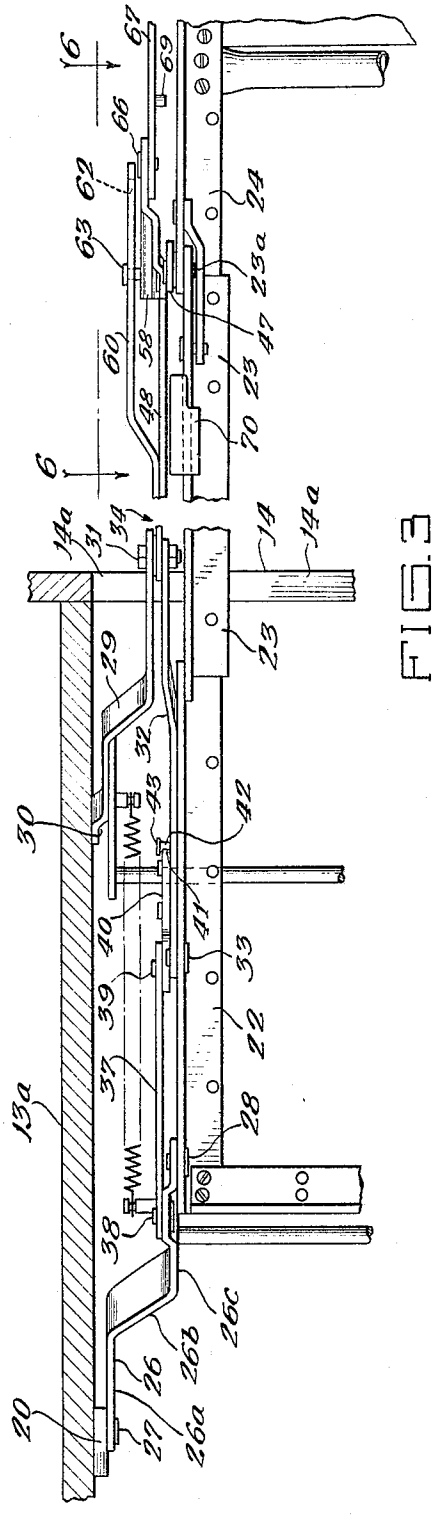


FIG. 3



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FIG. 4

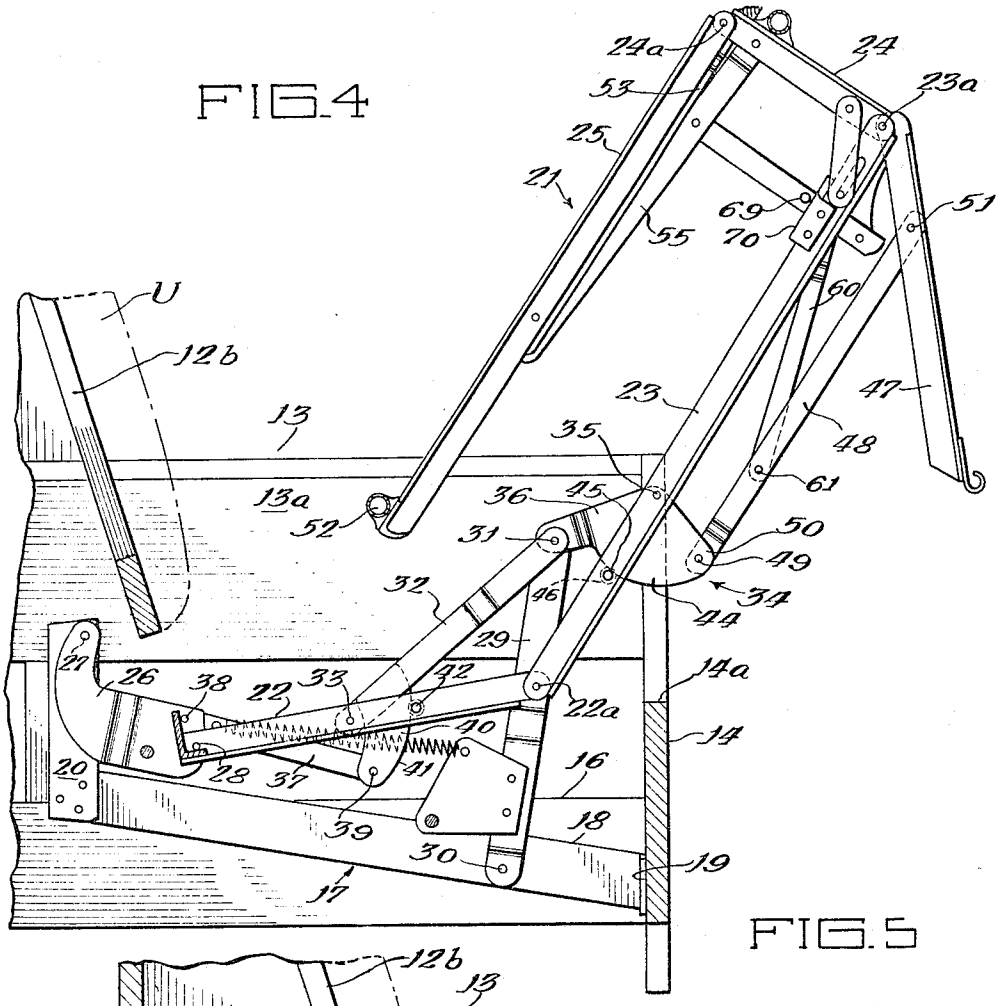
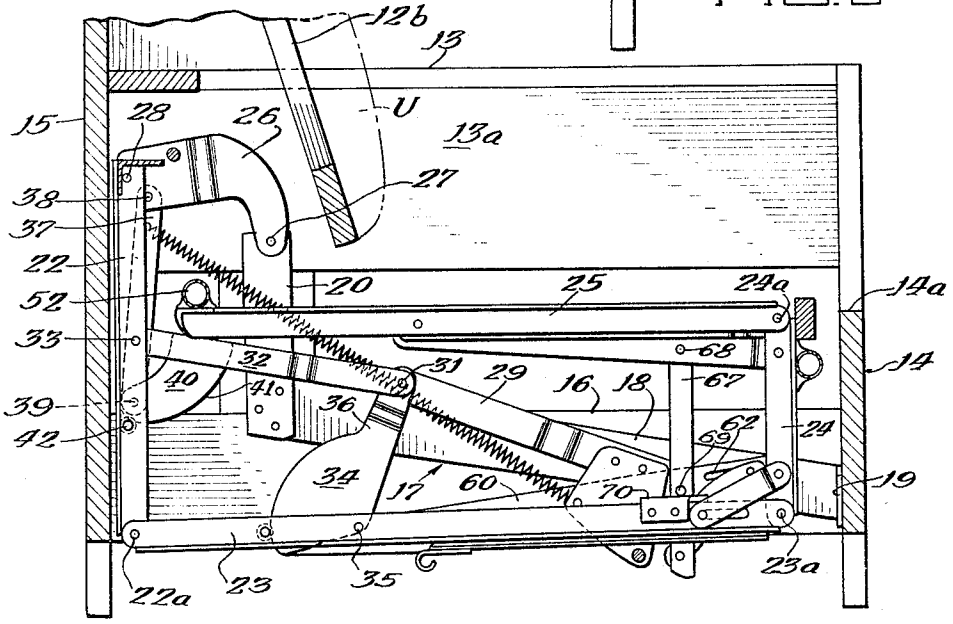


FIG. 5

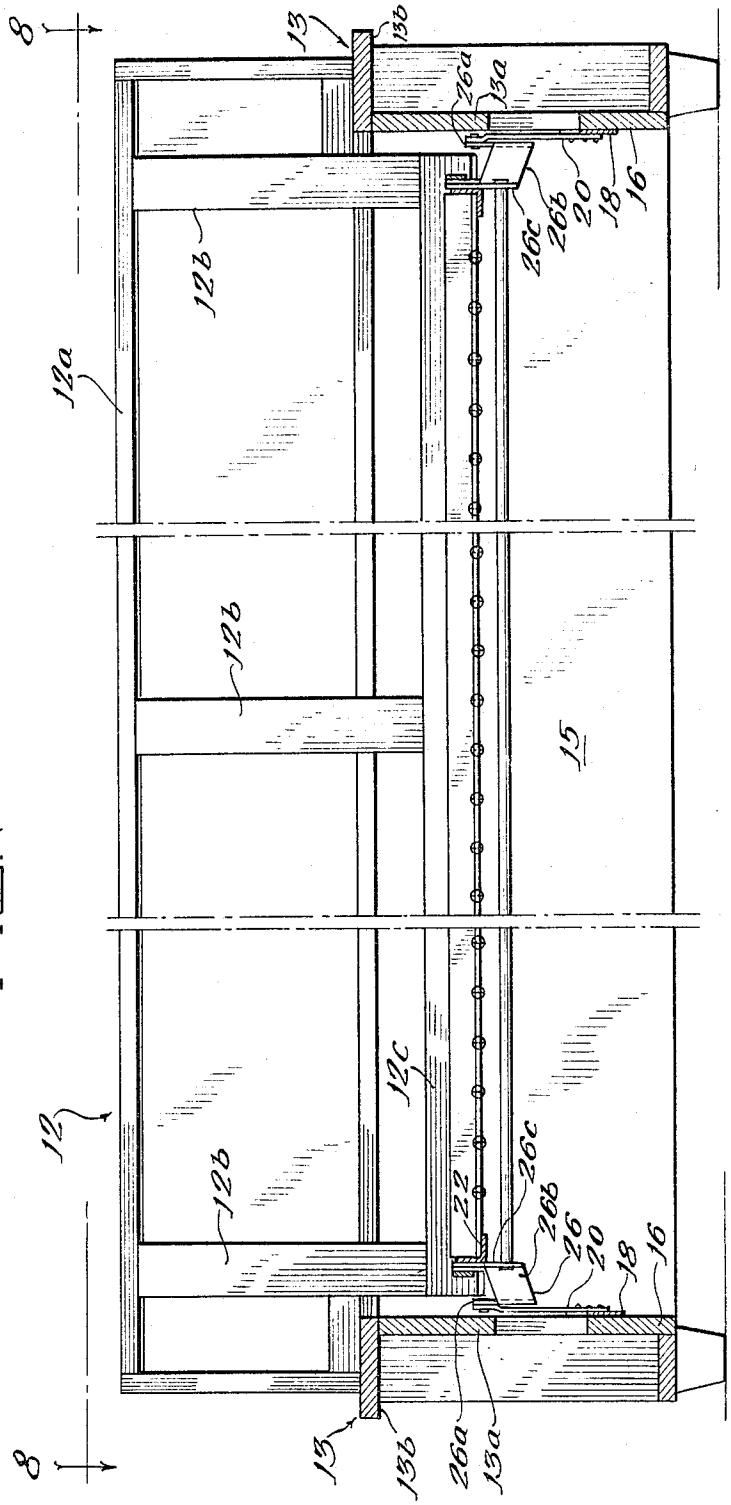


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FIG. 7



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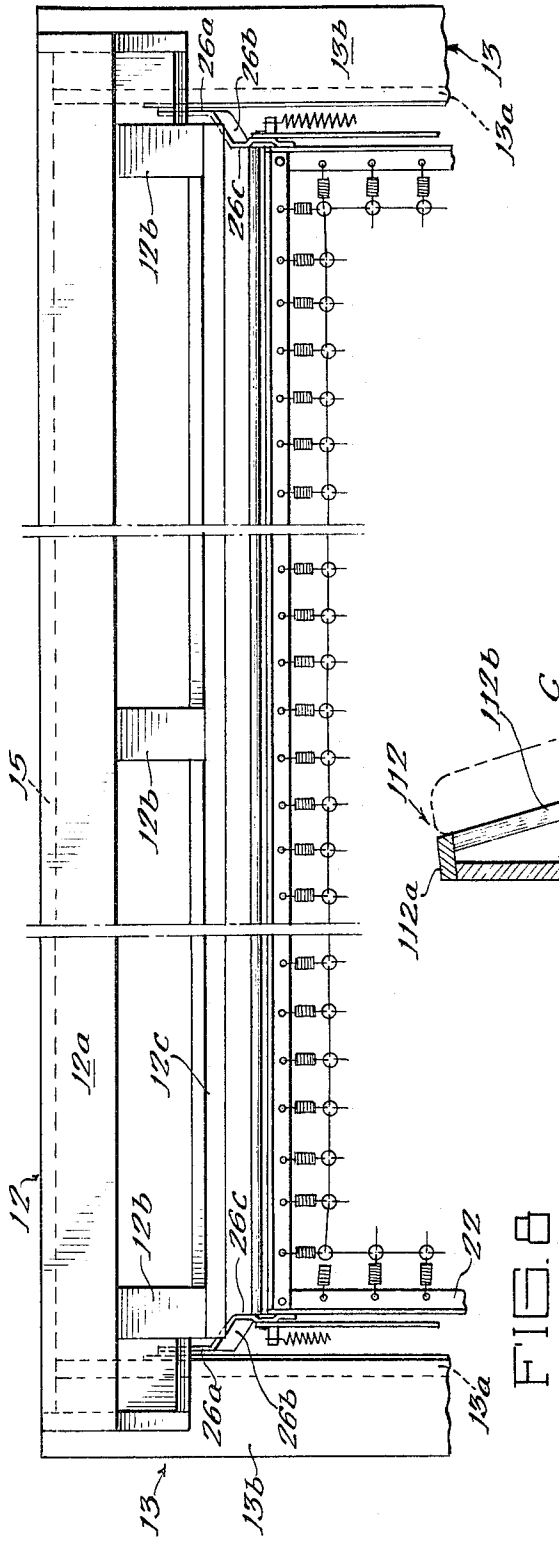


FIG. 8

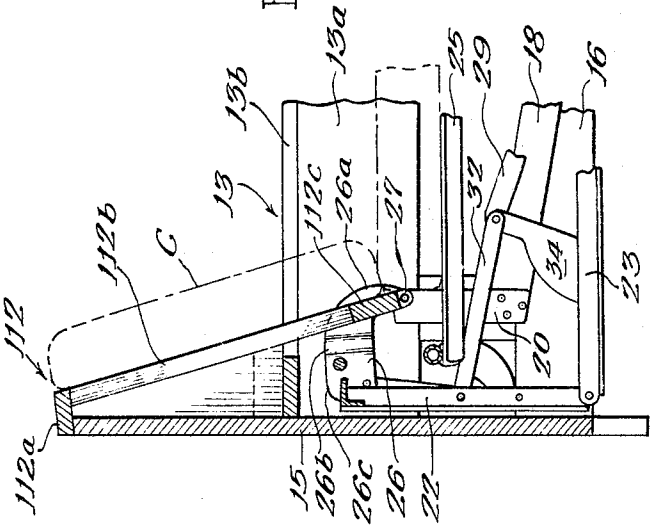


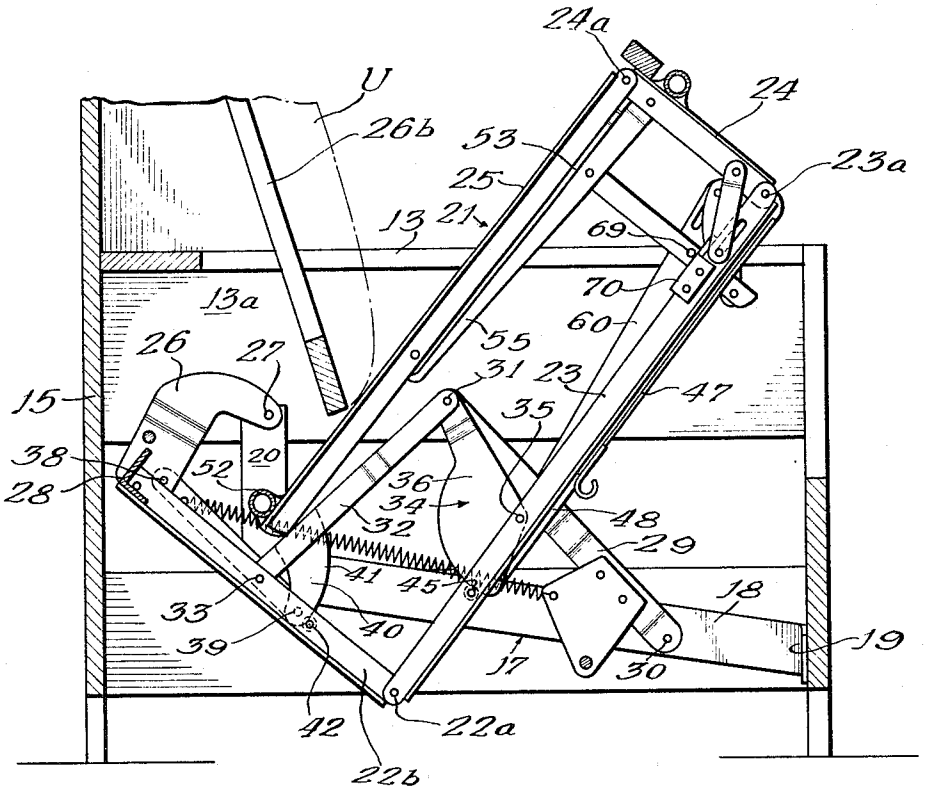
FIG. 9

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FIG. 10



United States Patent Office 3,284,814 Patented Nov. 15, 1966

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DAVENPORT BED

Aloysius J. Mikos, Skokie, Ill., assignor to The Seng Company, a corporation of Delaware

Continuation of application Ser. No. 314,113, Oct. 7, 1963. This application Oct. 20, 1965, Ser. No. 506,420
18 Claims. (Cl. 5—31)

This application is a continuation of copending application Serial No. 314,113 filed October 7, 1963, for a Davenport Bed, now abandoned.

This invention relates to an improved davenport bed, and in particular it relates to a davenport bed in which the folding bed mechanism is concealed entirely behind a one-piece fixed front rail on the base of the davenport, and in which a novel mechanism is provided for pulling an uppermost folded bed section substantially into parallelism with a bed section beneath it when the bed structure is folded into the frame.

A major object of furniture manufacturers is to produce convertible furniture, and especially davenports and sofas, which look no different from standard sofas or davenports, and which completely conceal the fact that they contain a folding bed structure. This was not a serious problem in the early days of convertible furniture because davenports were styled with a relatively high, square appearance; and there was plenty of room behind a davenport front rail to conceal a folding bed structure that folded in four sections to a position above the davenport frame and was then merely rolled over to drop into a position behind the front rail. Such four section structures were also practical at that time because the innerspring mattress was a relative novelty, and people were satisfied with convertible furniture that had a relatively thin cotton padding or hair mattress that could be rolled up in such a fashion.

However, with the changes in furniture styling that have produced relatively massive, low and deeply upholstered pieces, and with the changes in sleep equipment that have produced a demand for more comfortable beds, it has become increasingly difficult to design a folding bed structure that can be mounted in a davenport frame and fold satisfactorily into the frame with an innerspring mattress and bedding left on the folded bed. The most commercially acceptable folding bed structures of the type in which the bed unfolds with the foot extending outwardly from the sofa frame have been those in which the head, or inner bed section, occupies a generally upright folded position within the sofa back, so that it is necessary to fold only the three remaining sections of the bed into the space beneath the seat cushions. With this type of folding bed structure, there has heretofore been no attempt to fold them over a fixed front rail on the davenport frame, and instead a trim board has been secured to a portion of the bed frame in such a manner as to provide an upward extension of the upholstered davenport front rail when the bed is folded. Accordingly, the fact that a piece of furniture does contain a folding bed has always been quite apparent with this type of structure because of the longitudinal split in the front rail when the unit is in use as a davenport.

Furthermore, the manner of suspending the head bed section of such folding beds in the back frame of the davenport base made it impossible to produce a convertible davenport bed using loose back cushions instead of an upholstered back, known in the trade as a "tight upholstered back." This was because the mounting brackets for the head suspension arms, and the arms themselves, occupied so much space at the ends of the back frame that the depth of the latter from front to rear left insufficient space for loose cushions. It is obvious that if a davenport is to have loose cushions and still have a standard seat depth, the back frame must be much shallower from front to rear than where a tight upholstered back is used. The design of the mounting brackets and the head suspension arms has heretofore required a depth in the back frames that prohibited the use of loose cushions; and accordingly furniture designers have been unable to style loose cushioned convertible davenports.

Accordingly, the principal object of the present invention is to provide an improved folding bed structure for a davenport bed which permits improved styling and versatility of design in convertible furniture.

Another object of the invention is to provide a folding bed structure which folds into the frame in such a way that the uppermost portion of the folded bed structure is entirely below the top plane of a fixed front rail of the davenport base.

A further object of the invention is to provide a folding bed structure which bears such a relationship to the davenport base that a davenport using the bed structure may be styled either for a tight upholstered back or for loose back cushions.

Still another object of the invention is to provide an improved linkage by means of which the uppermost bed section in bed position is drawn downwardly toward, and into substantial parallelism with an inner bed section which is at the bottom of the folded structure.

Yet another object of the invention is to provide a folding bed structure in which links that are subjected to substantial longitudinal compressive forces during folding or unfolding of the bed structure are reinforced by engagement of parts of said links with fixed elements on the folding bed structure so as to prevent bowing of the links while not interfering with the free movement of the structure between folded and unfolded positions.

The invention is illustrated in a preferred embodiment in the accompanying drawings in which:

FIG. 1 is a longitudinal vertical sectional view of a davenport bed embodying the invention, the section being taken substantially as illustrated along the line 1—1 of FIG. 2, and the device being illustrated with the back frame for a tight upholstered back, and with the upholstery illustrated in dot-dash lines;

FIG. 2 is a horizontal sectional view taken substantially as illustrated along the line 2—2 of FIG. 1;

FIG. 3 is a fragmentary view similar to FIG. 2, on an enlarged scale, illustrating particularly the supporting mechanism for the bed structure and the pulling mechanism for the outer, or foot bed section;

FIG. 4 is a fragmentary section on an enlarged scale, showing the bed structure in an intermediate position;

FIG. 5 is a view like FIG. 4, but showing the bed structure in its fully folded position;

FIG. 6 is a fragmentary side elevational view of the bed structure substantially in the position of FIG. 4, and taken substantially from the location illustrated by the line 6—6 of FIG. 3;

FIG. 7 is a fragmentary section taken substantially as illustrated along the line 7—7 of FIG. 1;

FIG. 8 is a fragmentary plan view taken substantially as illustrated along the line 8—8 of FIG. 7;

FIG. 9 is a fragmentary section similar to FIG. 4, but on a reduced scale, illustrating the back frame structure used for a loose cushion style of davenport, with the loose cushions illustrated in dot-dash lines; and

FIG. 10 is a view similar to FIGS. 4 and 5, but showing the bed structure in an inclined partially folded position between the positions of FIGS. 4 and 5.

Referring to the drawings in greater detail, and referring first to FIGS. 1 and 7, the davenport bed of the

present invention is provided with a wooden davenport frame, indicated generally at **10**, the frame including a base **11**, a back structure indicated generally at **12**, and arm structures indicated generally at **13**. The base portion includes a fixed front rail **14** having a planar top surface **14***a*, a fixed back panel **15**, and fixed end rails **16**. The back structure **12** includes a slightly inclined top member **12***a* that extends forwardly from the back panel **15**, and at the forward edge of the top member **12***a* are a plurality of inclined front frame bars **12***b*, the lower ends of which are connected by a bottom cross member **12***c*. The lower end of cross member **12***c* terminates in a plane which is spaced above the plane of the top surface **14***a* of front rail **14** by a distance which is only a small fraction of the height of the front rail. It will become evident from a description appearing hereinafter of the folding bed structure that the relationship between the top of the fixed front rail and the bottom cross bar of the back rest provides a very restricted space within which the bed structure must move between a fully folded position within the base of the frame and a partially unfolded position with certain portions of the bed structure disposed above the plane of the upper surface of the front rail. Heretofore, those skilled in the art did not think it was possible to utilize a fixed front rail of the height shown in the drawings with a folding bed structure of the type hereafter described. The inclined frame bars **12***b* occupy the proper position with respect to a vertical plane to afford a comfortable back position; and conventional upholstering U, illustrated in dot-dash lines in FIG. 1, is secured to the upright frame bars **12***b* and the bottom cross member **12***c*. The arm structures **13** include end panels **13***a* and horizontal top rails **13***b* which are upholstered in the finished davenport unit.

Since the mechanism at both sides of the folding bed structure is identical, only the complete mechanism at one side of the structure is illustrated in the drawings, and it is to be understood that the side of the bed structure not shown in the drawings has an identical set of elements with those illustrated in the drawings and here described.

The folding bed mechanism includes a pair of mounting bracket means indicated generally at **17**, each said means including a main bracket **18** which is secured to one of the base end rails **16** and has a transverse flange **19** secured to the inner face of the base front rail **14**. At the rear of main bracket **18** is an integral, substantially planar, upright bracket member **20** that is secured to the base end rail **16** and has its upper end portion inset only enough from the end panel **13***a* of the arm **13** so as to provide space for the heads of mounting pivots.

The folding bed structure, indicated generally at **21**, includes a head bed section **22** having side rails **22***b*, an inner bed section **23**, a hinge bed section **24**, and an outer or foot bed section **25**, which are foldably connected to one another by means of pivots **22***a*, **23***a* and **24***a*. The folding bed structure is supported in the davenport frame for movement between the bed position of FIG. 1 and the davenport position of FIG. 5 by means of inner support arms, or hanger links **26** that are pivoted at **27** on the upper ends of the brackets **20**, and the lower ends of the arms **26** are pivotally connected at **28** to the head bed section side rails **22***b* which thus act as connecting links between the inner support arms **26** and the inner bed section **23**. As best seen in FIGS. 7 and 8, the support arms **26** have planar attaching portions **26***a* that are parallel to the brackets **20** and swing in the plane of narrow slots between the outermost inclined back frame bars **12***b* and the arm panels **13***a*. The support arms **26** also have inwardly inclined portions **26***b*, and outer end portions **26***c* which are parallel to the fastening portions **26***a* and receive the pivots **28** by means of which the head bed section **22** is connected to the support arms. The reason for this particular construction of the brackets **20** and support arms **26** will be described in more detail, particularly

in connection with the loose cushion davenport frame structure illustrated in FIG. 9.

Also supporting the bed structure **21** in the sofa frame are forward support arms **29** which are pivoted at **30** on the bracket **18** and have pivots **31** at their upper ends; and head suspension links **32** are connected to the pivots **31** at one end and to the head bed section at the other end by means of pivots **33**. Bell crank levers **34** are pivotally connected at **35** to the inner bed section **23** and have arms **36** that are also pivotally connected to the upright supporting arms **29** at the pivots **31**. Finally, the suspension means for the bed structure **21** includes guide links **37** that are pivoted at **38** on the support arms **26** and at **39** on rigid downward extension arms **40** of the head suspension links **32**.

Operation of the folding bed structure places relatively heavy compressive forces upon the links **32** and bell crank lever **34**, and accordingly it is desirable to reinforce said links and levers. To do so, the rigid arms **40** of the head suspension links **32** have edges **41** that are arcs of circles struck about the pivots **33**, and headed studs **42** on the head bed section have flanges **43** (FIG. 3) which overlie said arcuate edges and prevent bending of the legs **32** by confining the arcuate edges of the rigid extensions **41** between the flanges **43** and the adjacent portions of the head bed section **22**. Likewise, as seen in FIG. 1, the head suspension links **32** rest upon the headed studs **42** in bed position, and thus lock the bed sections **22** and **23** against upward movement past the horizontal at the pivot **22***a* when weight is concentrated near the head of the bed, as by a person sitting up in bed leaning against the upholstered back.

Similarly, the bell crank levers **34** have arcuate edges **44** centered on the bell crank pivot **35**, and headed studs **45** on the inner bed section **23** have flanges **46** that overlie the arcuate edges **44** of the bell crank levers to confine said levers between the flanges and the adjacent portions of the inner bed section **23**.

As is customary in four-section folding beds, the bed first unfolds from the sofa position of FIG. 5 through the partially folded position of FIG. 10 and the intermediate position of FIG. 4 to a further intermediate position (not shown) in which the head bed section **22** and the inner bed section **23** are coplanar and extend forwardly over the fixed front rail **14**, while the hinge bed section **24** is still substantially at right angles to the inner bed section **23** and the outer bed section **25** is inverted above the inner bed section **23**. In this position, and in the bed position of FIG. 1, intermediate legs **47** which are carried on the bed section pivots **23***a* occupy an upright supporting position with respect to the inner bed section **23**, and movement of the intermediate legs **47** between their folded and supporting positions is produced by intermediate leg actuating links **48** which are pivotally connected at **49** to second arms **50** of the bell cranks **34**, and which are pivotally connected at **51** to the intermediate legs **47**.

Comparison of FIGS. 1, 5 and 10 shows that in moving from folded position to bed position the pivots **28** that connect the support arms **26** with the head bed frame **22** move from a position to the rear of and substantially above the pivots **27**, to a position forward of and substantially coplanar with said pivots **27**. This differs substantially from prior art folding bed structures of the same type, in which the pivotal connection between the support arms and the head bed section has commonly been a substantial distance below the pivot between the arm and the mounting brackets in bed position. The location of the pivot **28** with respect to the pivot **27** in bed position and in intermediate position makes it essential that the coordinating link **37** be connected directly from the hanger arm **26** to the link **32**, and more especially that pivotal connection **39** between the coordinating link and the link **32** shall be a substantial distance below the pivotal connection **33** of the link **32** with the head bed

section 22. Without this relationship of parts, the inner end of the head bed section, and the top edge of a mattress supported on the folding bed structure, cannot be caused to clear the lower edge of the back frame bottom cross member 12*c* during movement of the bed structure between intermediate position and davenport position.

It will be noted that when moving from the fully folded position shown in FIG. 5 to the partially folded position shown in FIG. 10, the bed sections 22–25 swing as a unit about hanger arms 26 and forward support arms 29, and there is no relative movement between the bed sections 22–25, so that they occupy the same relative relationship in the partially folded position of FIG. 10 as in the fully folded position of FIG. 5. The length of hanger arms 26 is related to the length of forward support arms 29 in such a manner that the locus of pivot 23*a* connecting sections 23 and 24 is substantially vertical in moving from the fully folded position of FIG. 5 to the partially folded position of FIG. 10. The relationship of the length of hanger arms 26 to the length of forward support arms 29 enables the bed structure 21 to move to the steeply inclined position shown in FIG. 10 without interference with the fixed front rail 14 or the back rest cross bar 12*c*. Additionally, it will be noted that bell crank 34 occupies the same position relative to inner bed section 23 in both FIGS. 5 and 10, so that the unfolding of the intermediate legs 47 is not initiated until after the bed structure 21 reaches the position of FIG. 10. This is an important feature of applicant's invention, in that the unfolding of legs 47 is delayed until the bed structure 21 is moved to a position where the unfolding of legs 47 will not interfere with the fixed front rail 14.

When the bed structure 21 is in the intermediate position wherein the head bed section 22 and the inner bed section 23 are coplanar and extend forwardly over the fixed front rail 14, while the hinge bed section 24 is substantially at right angles to the inner bed section 23, it may be further converted to bed position by grasping a foot rail 52 at the free end of the outer bed section 25 and turning said bed section and the hinge bed section 24 outwardly to the bed position of FIG. 1, in which they are coplanar with the other bed sections. As best seen in FIG. 1, in bed position the outer bed section 25 is supported by outer legs 53 that are pivoted at 54 on said bed section, and folding or unfolding of the legs 53 is accomplished by links 55 that are pivotally connected at 56 to said outer legs and at 57 to the hinge bed section 24.

Finally, the present folding bed structure is provided with an improved pulling linkage which draws the outer bed section downwardly into substantial parallelism with the inner bed section 23 as the folding bed structure is moved from its intermediate position, through the position illustrated in FIG. 4, the partially folded position of FIG.10, and to the folded sofa position of FIG. 5. Some mechanism for drawing down the foot bed section 25 with respect to the inner bed section 23, and locking it down, is absolutely essential to proper functioning of any folding bed structure, since it is necessary to compress the mattress and bedding in order to afford a solid and stable deck for the sofa cushions. The pulling and locking linkage of the present invention is best seen in FIG. 6, and includes pulling bell crank levers 58 that are pivoted at 59 on the intermediate legs 47. Pivotal movement of the bell crank levers 58 as the bed structure is folded or unfolded is produced by pulling links 60 that are connected at 61 to the intermediate leg operating links 48, and that have longitudinal slots 62 in their outer ends that are impaled by headed studs 63 on first arms 64 of the bell cranks 58, so that there is a lost motion connection between the links 60 and the bell cranks 58. Second arms 65 of the bell cranks 58 have pivots 66 for locking links 67 which are also pivotally connected at 68 to the actuating links 55 for the outer legs 53. As best seen in FIG. 5, when the outer bed section 25 is in its fully folded position studs 69 on the links 67 bear upon flanges 70 that are riveted to the inner bed section 23 so as to provide positive support for the outer, or foot bed section 25 in its inverted sofa position.

When the structure is in the bed position of FIG. 1, the pulling links 60 lie alongside the intermediate leg actuating links 48 and the locking links 67 lie alongside the outer leg actuating links 55. When the foot bed section and hinge bed section are moved to their intermediate position the relative pivotal movement of the hinge section 24 and the foot section 25 about the pivot 24*a* causes the links 55 to fold the outer legs 43, and this movement also places the pulling links 67 and pulling bell crank 58 substantially in the position of FIG. 6. However, the folded mattress and bedding (not shown) cause the outer bed section 25 to be inclined upwardly from its pivot 24*a*, so that the studs 69 are not resting on the flanges 70, and the pulling bell cranks 58 are rotated slightly counterclockwise from the position illustrated in FIG. 6, the extent of such rotation being dependent upon the thickness of the mattress and the bedding.

As the structure is moved from the intermediate position, through the positions of FIGS. 4 and 10 to the fully folded position of FIG. 5, the suspension arms 26 turn about their mounting pivots 27 and the supporting arms 28 turn about their mounting pivots 30; and the action of the links 37 and 32 folds the head bed section 22 and inner bed section 23 about their pivotal connections 22*a*. Relative movement of the bed sections and the supporting arms 29 rocks the bell cranks 34 about their mounting pivot 35 in a clockwise direction and this movement of the bell cranks pulls the intermediate leg operating links 48 inwardly to fold the intermediate legs 47. This action also draws the pulling links 60 inwardly until the outer ends of the slots 62 engage the studs 63 of the pulling bell cranks 58 and rock said bell cranks counterclockwise as seen in FIG. 4 (clockwise as seen in FIG. 6); and this motion of the pulling bell cranks acts through the locking links 67 and leg actuating links 55 to pull the outer bed section 25 into parallelism with the inner bed section 23 and seat the studs 69 upon the flanges 70. Thus, in sofa position the outer bed section 25 is locked down on the flanges 70 by the pulling links 60, pulling bell cranks 58 and locking links 67.

FIG. 9 of the drawings, which illustrates the back structure required when a back with loose cushions is to be used, also illustrates plainly why the extension arms 26 must be constructed with the offset central portions 26*b*, as heretofore described.

The sofa frame structure illustrated in FIG. 9 is identical with that in FIGS. 1 to 8, except that an upper cross member 112*a* of the back structure 112 is very much narrower than the upper cross member 12*a* as seen in FIG. 1; and as a result the pivotal connections 27 of the suspension arms 26 with the rear brackets 20 are directly beneath, and almost in the plane of the back structure bottom cross member 112*c*. Accordingly, in folded position the portions 26*a* of the suspension arms 26 actually cut through the plane of the back structure inclined members 112*b* and the lower cross member 112*c*; so the slots between the back structure and the arm panels 13*a*, heretofore referred to, are absolutely essential to receive the suspension arms 26. The bed frame must be substantially narrower than the length of the davenport frame in order to accommodate the heavy supporting arms 29 and the links that connect those supporting arms to the bed frame, and if the hanger arms 26 did not have the offset construction, the space between the back structure and the arm panels would be so wide that it could not possibly be concealed by a loose cushion such as the cushion C illustrated in FIG. 9 in dot-dash lines.

The foregoing detailed description is given for clearness of understanding only and no unnecessary limitations should be understood therefrom, as modifications will be obvious to those skilled in the art.

I claim:

1. In a folding davenport bed, in combination: a base;
a folding bed structure including an inner bed section, a hinge bed section, and an outer bed section pivotally connected end to end, said bed sections being adapted to occupy a folded position within the base with the inner section lowermost, the hinge section generally upright at the front, and the outer section inverted above the inner section;
supporting means mounting said bed structure on the base for movement between said folded position within the base and an intermediate position above the base with said inner, hinge, and outer sections occupying substantially the same positions with respect to one another;
means mounting said outer bed section for pivotal movement relative to said hinge bed section when said bed structure is in said intermediate position;
means for pulling the outer section generally into parallelism with the inner section as the bed structure moves toward folded position, said pulling means including a pair of levers pivoted adjacent the connection between the inner section and the hinge section, first linkage means connection said levers to the supporting means to rotate the levers downwardly with reference to the inner section as the bed structure moves toward folded position, and second linkage means connecting the free ends of said levers to the outer bed section so that rotation of the levers pivots said outer bed section relative to said hinge bed section to pull said outer section downwardly, there being a lost motion connection between each of said levers and one of said linkage means;
and a pair of folding intermediate legs pivoted at the outer end of the inner section, said levers being pivoted on said legs below the pivotal connection between the legs and the inner section, whereby the first linkage means folds said legs as it pivots said levers.

2. In a folding davenport bed, in combination: a base;
a folding bed structure including an inner bed section, a hinge bed section, and an outer bed section pivotally connected end to end, said bed sections being adapted to occupy a folded position within the base with the inner section lowermost, the hinge section generally upright at the front, and the outer section inverted above the inner section;
supporting means mounting said bed structure on the base for movement between said folded position within the base and an intermediate position above the base with said inner, hinge, and outer sections occupying substantially the same positions with respect to one another;
means mounting said outer bed section for pivotal movement relative to said hinge bed section when said bed structure is in said intermediate position;
and means for pulling the outer section generally into parallelism with the inner section as the bed structure moves toward folded position, said pulling means including a pair of levers pivoted adjacent the connection between the inner section and the hinge section, first linkage means connecting said levers to the supporting means to rotate the levers downwardly with reference to the inner section as the bed structure moves toward folded position, and the second linkage means connecting the free ends of said levers to the outer bed section so that rotation of the levers pivots said outer bed section relative to said hinge bed section to pull said outer section downwardly, there being a lost motion connection between each of said levers and one of said linkage means, said second linkage means including a pair of folding outer legs pivoted on the outer bed section, leg actuating links for folding said legs as the outer bed section and the hinge bed section are moved from a bed position coplanar with the inner bed section to the intermediate position, and pulling links connecting said leg actuating links with the levers.

3. In a folding davenport bed, in combination: a base;
a folding bed structure including a head bed section, an inner bed section pivoted on the outer end of the head section, a hinge bed section pivoted on the outer end of the inner bed section, and an outer foot bed section pivoted on the outer end of the hinge section, said hinge and outer sections being movable between a coplanar bed position and a partially folded position with the hinge section generally upright and the outer section inverted above the inner section;
means mounting said outer bed section for pivotal movement relative to said hinge bed section when said bed structure is in said partially folded position;
bed supporting means including a pair of hanger links supporting the inner end of the head bed section adjacent the rear of the base, a pair of support arms pivoted adjacent the front of the base, suspension link means connecting the free end of each support arm to the head bed section, and a pair of support bell cranks pivotally mounted on the inner bed section, each support bell crank having a first arm drivingly connected to the free end of one of said support arms and having a second arm, said bed supported means being swingable to move said head and inner sections between a coplanar bed position and a folded position with the head section generally upright at the rear of the frame and the inner section within and at the bottom of the frame;
a pair of intermediate legs pivoted on the bed structure at the outer end of the inner section;
a pair of intermediate leg operating links each connecting one of said legs to the second arm of a support bell crank to fold said intermediate legs as the bed supporting means folds the head and inner sections;
a pair of outer legs pivoted on the foot bed section;
an outer leg link connecting each outer leg with the hinge section to fold said legs as the hinge and foot sections are folded;
and pulling linkage means including a pulling bell crank pivotally mounted on each intermediate leg and having first and second arms, a first pulling link providing a lost motion connection between one of the intermediate leg operating links and a first arm of each pulling bell crank, and a second pulling link connecting each outer leg link to a second arm of each pulling bell crank to pivot the foot section relative to the hinge section and draw the same substantially into parallelism with the inner section as the bed is folded into the base.

4. The combination of claim 3 in which each suspension link includes a fixed arm generally perpendicular to the inter-pivot line of the link, and in which a coordinating link connects each said arm with one of the hanger links.

5. The combination of claim 3 in which each second pulling link has a transverse stud adjacent the pulling bell crank, and in which a fixed flange on the inner bed section provides a stop for the pulling link in folded position.

6. In a folding davenport bed, in combination, a base;
a folding bed structure including a head bed section, an inner bed section pivoted on the outer end of the head section, a hinge bed section pivoted on the outer end of the inner bed section, and an outer foot bed section pivoted on the outer end of the hinge section, said hinge and outer sections being movable between a coplanar bed position and a partially folded position with the hinge section generally up-

right and the outer section inverted above the inner section;

bed supporting means including a pair of hanger links supporting the inner end of the head bed section adjacent the rear of the base, a pair of support arms pivoted adjacent the front of the base, suspension link means connecting the free end of each support arm to the head bed section, each suspension link including a fixed arm generally perpendicular to the inter-pivot line of the link, a coordinating link connecting each fixed arm with one of said hanger links, each fixed arm having a curved front surface that is an arc of a circle centered on the pivotal connection between the suspension link and the head bed section, a pair of headed studs on the head section each having a flange overlying the curved surface of one of said fixed arms, and a pair of support bell cranks pivotally mounted on the inner bed section, each support bell crank having a first arm drivingly connected to the free end of one of said support arms and having a second arm, said bed supporting means being swingable to move said head and inner sections between a coplanar bed position and a folded position with the head section generally upright at the rear of the frame and the inner section within and at the bottom of the frame;

a pair of intermediate legs pivoted on the bed structure at the outer end of the inner section;

a pair of intermediate leg operating links each connecting one of said legs to the second arm of a support bell crank to fold said intermediate legs as the bed supporting means folds the head and inner sections;

a pair of outer legs pivoted on the foot bed section;

an outer leg link connecting each outer leg with the hinge section to fold said legs as the hinge and foot sections are folded;

and pulling linkage means including a pulling bell crank pivotally mounted on each intermediate leg and having first and second arms, a first pulling link providing a lost motion connection between one of the intermediate leg operating links and a first arm of each pulling bell crank, and a second pulling link connecting each outer leg link to a second arm of each pulling bell crank to draw the foot section substantially into parallelism with the inner section as the bed is folded into the base.

7. The combination of claim **6** in which each support bell crank has a curved rear surface that is an arc of a circle centered on the bell crank pivot, and in which a pair of headed studs on the inner bed section each has a flange overlying the curved surface of one of said bell cranks.

8. In a folding davenport bed, in combination: a base;

a folding bed structure including a head bed section, an inner bed section pivoted on the outer end of the head section, a hinge bed section pivoted on the outer end of the inner bed section, and an outer foot bed section pivoted on the outer end of the hinge section, said hinge and outer sections being movable between a coplanar bed position and a partially folded position with the hinge section generally upright and the outer section inverted above the inner section;

bed supporting means including a pair of hanger links supporting the inner end of the head bed section adjacent the rear of the base, a pair of support arms pivoted adjacent the front of the base, suspension link means connecting the free end of each support arm to the head bed section, and a pair of support bell cranks pivotally mounted on the inner bed section, each support bell crank having a first arm drivingly connected to the free end of one of said support arms and having a second arm, each support bell crank further having a curved rear surface that is an arc of a circle centered on the bell crank pivot, and a pair of headed studs on the inner bed section each having a flange overlying the curved surface of one of said bell cranks, said bed supporting means being swingable to move said head and inner sections between a coplanar bed position and a folded position with the head section generally upright at the rear of the frame and the inner section within and at the bottom of the frame;

a pair of intermediate legs pivoted on the bed structure at the outer end of the inner section;

a pair of intermediate leg operating links each connecting one of said legs to the second arm of a support bell crank to fold said intermediate legs as the bed supporting means folds the head and inner sections;

a pair of outer legs pivoted on the foot bed section;

an outer leg link connecting each outer leg with the hinge section to fold said legs as the hinge and foot sections are folded;

and pulling linkage means including a pulling bell crank pivotally mounted on each intermediate leg and having first and second arms, a first pulling link providing a lost motion connection between one of the intermediate leg operating links and a first arm of each pulling bell crank, and a second pulling link connecting each outer leg link to a second arm of each pulling bell crank to draw the foot section substantially into parallelism with the inner section as the bed is folded into the base.

9. In a folding davenport bed, in combination: a base having a fixed rear rail, a pair of fixed end rails, and a fixed front rail with a planar top surface;

a folding bed structure including a head bed section, an inner bed section pivoted on the outer end of the head section, a hinge bed section pivoted on the outer end of the inner section, and an outer bed section pivoted on the outer end of the hinge section, said hinge and outer sections being movable between a coplanar bed position and a partially folded position with the hinge section generally upright and the outer section inverted above the inner section;

bed supporting means including a pair of hanger links supporting the inner end of the head bed section on the end rails near the rear rail, a pair of support arms pivoted on the end rails near the front rail, a pair of head suspension links connecting the free ends of the support arms to the head section, each head suspension link having a generally perpendicular fixed arm having a curved surface that is an arc of a circle centered on the pivotal connection between the head suspension link and the head bed section, a pair of headed studs on the head section each having a flange overlying the curved surface of one of said fixed arms, means including a pair of intermediate suspension links connecting the free ends of said support arms to the inner section, and a pair of coordinating links connecting the hanger links to the head suspension links, said bed supporting means being swingable to move the head and inner sections between a coplanar bed position and a folded position with the head section generally upright at the rear of the base and the inner section within and at the bottom of the base;

and a pulling linkage actuated by swinging movement of the bed supporting means to pull the outer section substantially into parallelism with the inner section as the bed is folded into the base, said bed supporting means and said pulling linkage being coordinated to position said outer section wholly beneath the plane of the top surface of the base front rail in folded position.

10. In a folding davenport bed, in combination: a base having a fixed rear rail, a pair of fixed end rails, and a fixed front rail with a planar top surface;

a folding bed structure including a head bed section, an inner bed section pivoted on the outer end of the head section, a hinge bed section pivoted on the outer

end of the inner section, and an outer bed section pivoted on the outer end of the hinge section, said hinge and outer sections being movable between a coplanar bed position and a partially folded position with the hinge section generally upright and the outer section inverted above the inner section;

bed supporting means including a pair of hanger links supporting the inner end of the head bed section on the end rails near the rear rail, a pair of support arms pivoted on the end rails near the front rail, a pair of head suspension links connecting the free ends of the support arms to the head section, means including a pair of intermediate suspension links connecting the free ends of said support arms to the inner section, each intermediate suspension link having a curved surface that is an arc of a circle centered on the pivotal connection between said suspension link and the inner bed section, a pair of headed studs on the head section each having a flange overlying the curved surface of one of said intermediate suspension links, and a pair of coordinating links connecting the hanger links to the head suspension links, said bed supporting means being swingable to move the head and inner sections betwen a coplanar bed position and a folded position with the head section generally upright at the rear of the base and the inner section within and at the bottom of the base;

and a pulling linkage actuated by swinging movement of the bed supporting means to pull the outer section substantially into parallelism with the inner section as the bed is folded into the base, said bed supporting means and said pulling linkage being coordinated to position said outer section wholly beneath the plane of the top surface of the base front rail in folded position.

11. In a folding davenport bed, in combination:

a frame comprising a base having a fixed front rail with a planar top surface, a pair of fixed end rails, a fixed rear panel, and a back structure having parts that extend forwardly and downwardly with respect to the top of the rear panel, said back structure having ends that are spaced inwardly a short distance from the end rails to provide narrow slots between the back structure and the end rails;

a folding bed structure including a head bed section, an inner bed section pivoted on the outer end of the head section, a hinge bed section pivoted on the outer end of the inner section, and an outer bed section pivoted on the outer end of the hinge section, said hinge and outer sections being movable between a coplanar bed position and a partially folded position with the hinge section generally upright and the outer section inverted above the inner section;

bed supporting means including hanger links pivoted on the end rails near the rear panel and having portions that swing in said narrow slots and having inwardly offset portions pivotally connected to the head bed section, said links swinging around the lower end of the back structure between a bed position in which the head and inner sections are coplanar and a folded position in which they are substantially at right angles within the frame with the head section upright at the rear and the inner section at the bottom of the base, a pair of support arms pivoted on the end rails near the front rail, linkage means connecting said support arms to the head and inner bed sections, and coordinating links connecting the hanger links with said linkage means;

and means actuated by the bed supporting means during movement of the bed to folded position to pull the outer section substantially into parallelism with the inner section, said bed supporting means and said last named means being coordinated to position said outer section wholly beneath the plane of the top surface of the base front rail in folded position.

12. The combination of claim **11** in which the forwardly and downwardly extending portion of the back structure has its lower end substantially aligned with the pivotal connections of the hanger links to the end rails, and in which the portions of said hanger links that are in the slots intersect the plane of said forwardly and downwardly extending portion of the back structure in folded position.

13. In a folding davenport bed, in combination: a base having a fixed rear rail, a pair of fixed end rails, and a fixed front rail with a planar top surface;

a folding bed structure including a pair of connecting links, an inner bed section pivoted on the outer end of the connecting links, a hinge bed section pivoted on the outer end of the inner section, and an outer bed section pivoted on the outer end of the hinge section, said bed sections being movable from a fully folded position in which the connecting links are upright immediately inside the rear rail, the inner section is generally horizontal at the bottom of the base, the hinge section is generally upright immediately behind the front rail, and the outer section is inverted substantially parallel to the inner section and below the top surface of the front rail, through an inclined, partially folded position in which all the bed sections are in substantially the same relationship to each other as in said folded position and the inner section is partially above the top of the front rail, to an intermediate position in which the connecting links and the inner section are coplanar and the hinge section and foot section occupy substantially the same positions as when fully folded;

bed supporting means including a pair of hanger links supporting the inner ends of the connecting links on the end rails near the rear rail, a pair of support arms pivoted on the end rails near the front rail and having free ends, a pair of first suspension links connecting the free ends of the support arms to the connecting links, means including a pair of intermediate suspension links connecting the free ends of said support arms to the inner section, and a pair of coordinating links connecting the hanger links to the first suspension links, the arc of movement of said hanger links being related to the arc of movement of said support arms in a manner such that said first suspension links and coordinating links retain said intermediate suspension links from effective pivotal movement as said bed structure is moved between said folded and said partially folded positions to enable said bed structure to move as a unit to said partially folded position;

and means for pulling the outer section substantially into parallelism with the inner section, said bed supporting means and said last named means cooperating to position said outer section wholly beneath the plane of the top surface of the base front rail in folded position.

14. In a folding davenport bed, in combination: a base having a fixed rear rail, a pair of fixed end rails, a fixed front rail with a planar top surface, and a back frame that includes a fixed cross bar forward of the rear rail and in a horizontal plane that is above the plane of said top surface by a distance which is only a small fraction of the height of said front rail;

a folding bed structure including a pair of connecting links, an inner bed section pivoted on the outer end of the connecting links, a hinge bed section pivoted on the outer end of the inner section, and an outer bed section pivoted on the outer end of the hinge section, said bed sections being movable from a fully folded position in which the connecting links are upright immediately inside the rear rail and behind the cross bar, the inner section is generally horizontal at the bottom of the base, the hinge section is generally upright immediately behind the front rail, and the

outer section is inverted substantially parallel to the inner section and below the top surface of the front rail, through an inclined partially folded position in which all the bed sections are in substantially the same relationship to each other as in said folded position and the inner section is partially above the top of the front rail, to an intermediate position in which the connecting links and the inner section are coplanar and the hinge section and foot section occupy substantially the same positions as when fully folded;

bed supporting means including a pair of hanger links supporting the inner ends of the connecting links on the end rails near the rear rail, a pair of support arms pivoted on the end rails near the front rail and having free ends, a pair of first suspension links connecting the free ends of the support arms to the connecting links, means including a pair of intermediate suspension links connecting the free ends of said support arms to the inner section, and a pair of coordinating links connecting the hanger links to the first suspension links, the connection between said coordinating links and said first suspension links being disposed generally vertically below the connection between the hanger links and the connecting links when said bed structure is in the folded position, the arc of movement of said hanger links being related to the arc of movement of said support arms in a manner such that said first suspension links and coordinating links hold said intermediate suspension links against pivotal movement as said bed structure is moved between said folded and said partially folded positions to enable said bed structure to move as a unit to said partially folded position;

and linkage means for pulling the outer section substantially into parallelism with the inner section.

15. In a folding davenport bed, in combination: a base having a fixed rear rail, a pair of fixed end rails, a fixed front rail with a top surface, and a backframe that includes a fixed cross bar forward of the rear rail and in a horizontal plane that is above the plane of said top surface by a distance which is only a small fraction of the height of said front rail;

a folding bed structure including a pair of connecting links, an inner bed section pivoted on the outer end of the connecting links, a hinge bed section pivoted on the outer end of the inner section, and an outer bed section pivoted on the outer end of the hinge section, said bed sections being movable from a fully folded position in which the connecting links are upright immediately inside the rear rail and behind the cross bar, the inner section is generally horizontal at the bottom of the base, the hinge section is generally upright immediately behind the front rail, and the outer section is inverted substantially parallel to the inner section and below the top surface of the front rail, through an inclined partially folded position in which all the bed sections are in substantially the same relationship to each other as in said folded position and the inner section is partially above the top of the front rail, to an intermediate position in which the connecting links and the inner section are coplanar and the hinge section and foot section occupy substantially the same positions as when fully folded;

bed supporting means including a pair of hanger links supporting the inner ends of the connecting links on the end rails near the rear rail, a pair of support arms pivoted on the end rails near the front rail and having free ends, a pair of first suspension links connecting the free ends of the support arms to the connecting links, means including a pair of intermediate suspension links connecting the free ends of said support arms to the inner section, and a pair of coordinating links connecting the hanger links to the first suspension links, the arc of movement of said hanger links being related to the arc of movement of said support arms in a manner such that said first suspension links and coordinating links restrain said intermediate suspension links from effective pivotal movement as said bed structure is moved between said folded and said partially folded positions to enable said bed structure to move as a unit to said partially folded position;

and linkage means for pulling the outer section substantially into parallelism with the inner section.

16. In a folding davenport bed, in combination: a base having a fixed rear rail, a pair of fixed end rails, a fixed front rail with a planar top surface, and a back frame that includes a fixed cross bar forward of the rear rail and in a horizontal plane that is above the plane of said top surface by a distance which is only a small fraction of the height of said front rail;

a folding bed structure including a pair of connecting links, an inner bed section pivoted on the outer end of the connecting links, a hinge bed section pivoted on the outer end of the inner section, and an outer bed section pivoted on the outer end of the hinge section, said bed sections being movable from a fully folded position in which the connecting links are upright immediately inside the rear rail and behind the cross bar, the inner section is generally horizontal at the bottom of the base, the hinge section is generally upright immediately behind the front rail, and the outer section is inverted substantially parallel to the inner section and below the top surface of the front rail, through an inclined partially folded position in which all the bed sections are in substantially the same relationship to each other as in said folded position and the inner section is partially above the top of the front rail, to an intermediate position in which the connecting links and the inner section are coplanar and the hinge section and foot section occupy substantially the same positions as when fully folded;

bed supporting means including a pair of hanger links supporting the inner ends of the connecting links on the end rails near the rear rail, a pair of support arms pivoted on the end rails near the front rail and having free ends, a pair of first suspension links connecting the free ends of the support arms to the connecting links, means including a pair of intermediate suspension links connecting the free ends of the support arms to the inner section, and a pair of coordinating links connecting the hanger links to the first suspension links, said arms and all of said links cooperating with said inner bed section to provide a complex constrained linkage having a plurality of instantaneous centers of rotation which cause the outer end of the inner section to move substantially vertically behind the front rail from said folded position substantially to said partially folded position, said constrained linkage causing said bed structure to move as a unit from the folded position to the partially folded position;

and linkage means for pulling the outer section substantially into parallelism with the inner section.

17. In a folding davenport bed, in combination: a base having a fixed rear rail, a pair of fixed end rails, a fixed front rail with a planar top surface, and a back frame that includes a fixed cross bar forward of the rear rail and in a horizontal plane that is above the plane of said top surface by a distance which is only a small fraction of the height of said front rail;

a folding bed structure including a pair of connecting links, an inner bed section pivoted on the outer end of the connecting links, a hinge bed section pivoted on the outer end of the inner section, and an outer bed section pivoted on the outer end of the hinge section, said bed sections being movable from a fully folded position in which the connecting links are

upright immediately inside the rear rail and behind the cross bar, the inner section is generally horizontal at the bottom of the base, the hinge section is generally upright immediately behind the front rail, and the outer section is inverted substantially parallel to the inner section and below the top surface of the front rail, through an inclined partially folded position in which all the bed sections are in substantially the same relationship to each other as in said folded position and the inner section is partially above the top of the front rail, to an intermediate position in which the connecting links and the inner section are coplanar and the hinge section and foot section occupy substantially the same positions as when fully folded;

bed supporting means including a pair of hanger links supporting the inner ends of the connecting links on the end rails near the rear rail, a pair of support arms pivoted on the end rails near the front rail and having free ends, a pair of first suspension links connecting the free ends of the support arms to the connecting links, means including a pair of intermediate suspension links connecting the free ends of the support arms to the inner section, and a pair of coordinating links connecting the hanger links to the first suspension links, said support arms being substantially one and one half times the length of the first suspension links, and the length of the intermediate suspension links being substantially more than one half the length of said first suspension links, said intermediate suspension links being restrained from effective pivotal movement as said bed structure is moved between said folded and said partially folded positions to enable said bed structure to move as a unit to said partially folded position;

and linkage means for pulling the outer section substantially into parallelism with the inner section.

18. The combination of claim **17** in which the first suspension links have portions which, in folded position, extend below the pivotal connection between said first suspension links and the connecting links, and in which the coordinating links are pivotally connected to said portions of the first suspension links at points which are generally vertically below said last named pivotal connections in folded position.

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