Sept. 27, 1960 P. FLEISCHER 2,953,792

FOLDING BED

Filed Oct. 1, 1959

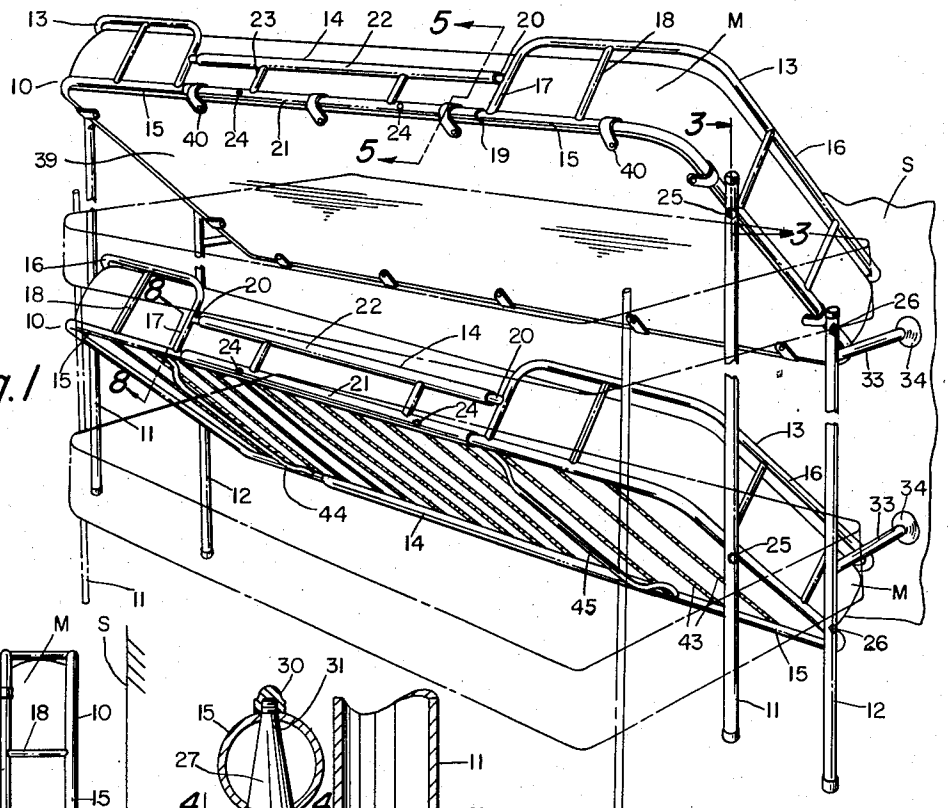


Fig. 1

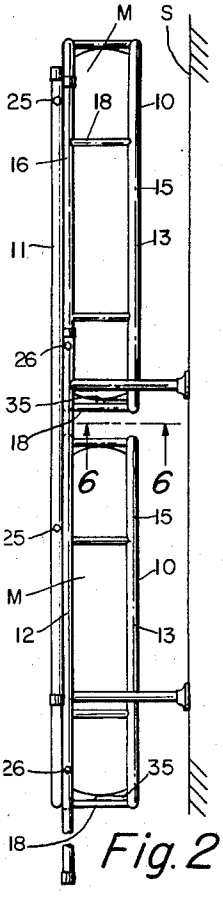


Fig. 2

Fig. 3

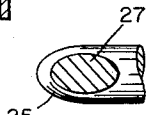


Fig. 4

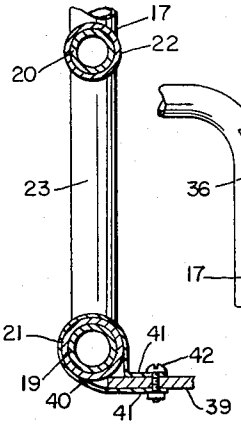


Fig. 5

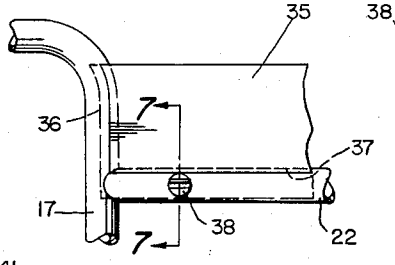


Fig. 6

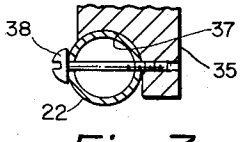


Fig. 7

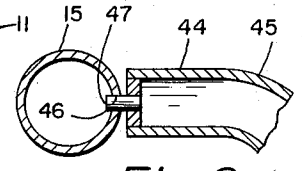


Fig. 8

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FOLDING BED

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10 Claims. (Cl. 5—9)

This invention relates generally to folding beds or bunks and more particularly to certain improvements in the structure for supporting and folding one or more of such beds arranged in a vertically spaced or tiered relationship.

It is a primary object of my invention to provide an improved tiered bed arrangement which is foldable against a wall when it is not in use.

Another object of my invention is to provide a folding bed structure incorporating counter-balance means for easy manipulation of the bed to its respective positions of use and non-use.

A further object of my invention is to provide a folding bed structure which is easily dissassembled for purposes of economical packaging and transport.

Still another object of my inveniton is to provide an improved pivotal arrangement for the support members of a folding bed structure.

Other objects and advantages of my invention will be apparent during the course of the following description.

In the accompanying drawings forming a part of this specification and in which like numerals are employed to designate like parts throughout the same:

Fig. 1 is a perspective view of a double-decker folding bunk structure embodying the features of my invention.

Fig. 2 is a side elevation of the bunks of Fig. 1 in closed or folded position.

Fig. 3 is a fragmentary cross-sectional view taken on line 3—3 of Fig. 1 and showing details of the pivotal arrangement.

Fig. 4 is a fragmentary cross-sectional view taken on line 4—4 of Fig. 3.

Fig. 5 is a cross-sectional view taken on line 5—5 of Fig. 1 and showing elements of the telescopic tubular structure.

Fig. 6 is a fragmentary view in elevation of the rear of the bunk frame, as indicated by line 6—6 on Fig. 2, showing the counter-balancing member.

Fig. 7 is a cross-sectional view taken on line 7—7 of Fig. 6.

Fig. 8 is a cross-sectional view taken on line 8—8 of Fig. 1 showing the mounting of the swivel support bars.

Referring to the drawings, I have shown a bed frame **10** pivotally supported on ground-engaging standards or posts **11** and **12** which may be sufficient length or height to support an upper frame **10** above the lower frame to provide a double-decker bunk. Additional frames **10** can be mounted at still higher levels, but, the structure and principles of my invention can be readily understood by reference to only two such frames, although the invention is not limited to such number.

The frame **10** is made up of tubular members; this being desirable both from the standpoint of decreasing weight and for purposes of ready assembly and disassembly. However, other forms of frame members, such as bars, angles, channels, and the like of wood, metal or resin might also be used if desired. The tubular members are integrated into four assembly units consisting of two like end assemblies **13** and two like side assemblies **14**. Each end unit **13** is of symmetrical generally U-shaped configuration and includes a bottom rail **15**; a parallel top rail **16** having the ends **17** thereof bent downwardly into abutment with the rail **15** and secured thereto, as by welding; and a plurality of reinforcing elements **18** extending between the rails **15** and **16** and secured thereto, as by welding. The ends **19** of the lower rail **15** project somewhat beyond the point where the ends **17** of the upper rail **16** are secured thereto. A short stub or dowel **20** is welded to an intermediate portion of each bent end **17** and extends parallel to and substantially coextensive with the end **19** of the lower rail **15**.

I prefer that the upper rail **16** be slightly outboard of the vertical plane of the rail **15** so that a moderate taper is provided from the top of the bottom of the end unit **13**.

Each side unit **14** includes a lower rail **21**, an upper rail **22** parallel thereto and coextensive therewith, and reinforcing elements **23** extending between the rails **21** and **22** and secured thereto, as by welding. The tubular lower rail **21** has an internal diameter or bore of sufficient size to slidably receive the ends **19** of the rail **15** at the opposite ends thereof. The tubular rail **22** has an internal diameter or bore of sufficient size to slidably receive the stubs **20** of the rail **16** at the opposite ends thereof.

The frame **10** is assembled by sliding first one end unit **13** and then the other end unit **13** into the pair of side units **14**. Apertures **24** are provided on the lower rail **21** and on the ends **19** of the rail **15** through which any suitable fasteners, such as self-tapping screws, can be inserted, if desired, to prevent relative disengaging movement of the units **13** and **14**. However, the fixed posts **12** prevent such movement and the inter-engagement of the telescoping portions is of sufficient length so that such auxiliary securement is ordinarily not necessary, but could be used if the length of the frame is extended by sliding adjustment of the telescoped portions of the assembled units.

The length of the individual units **13** and **14** is preferably made approximately the same so that, in packaging the frame for shipment, the disassembled frame units will conveniently fit in a small carton or box, thus reducing packaging, handling and transportation costs. It will be noted that the end units **13**, by reason of the tapered form thereof, can be nested for shipment thus further considerably decreasing the volume of the shipping carton so that the packaged disassembled frame will occupy approximately one-third of the space that would be necessary if the frame **10** were to be shipped as a complete assembly.

The lower rail **15** of each end unit **13** has secured thereto a pair of spaced pivot pnis **25** and **26** for rotatable engagement with the supporting posts **11** and **12** respectively. The form of pivot pin **25** which is provided for the front posts **11** is best shown in Figs. 3 and 4 of the drawings. It includes an upright shank **27** which is of non-circular cross-section, here shown as elliptical (Fig. 4) and tapered. The lower portion of the shank is bent at 90° and terminates in a stud portion **28** of circular cross-section and reduced diameter, thus providing an abutment or shoulder **29**. The stud **28** diametrically traverses the supporting post **11** and is rotatably secured therein by means of a nut **30** secured to the threaded end of the stud.

The upper end of the shank **27** extends diametrically through the rail **15** and is secured therein by a nut **30** secured to the threaded end of the shank. The rail **15** is provided with aligned openings **31** and **32** to accommodate the shank and retain it against axial movement relatively

to the rail **15**. The pivot pin **25** thus is free to rotate in the post **11** but is secured against rotation in the rail **15**. The shoulder **29** serves to space the post **11** outwardly of the frame, and the tapered shank **27** serves to elevate the frame and maintain it in predetermined spaced relationship to the axis of rotation defined by the stud portion **28**.

The pivot pin **26** is in the form of a stud which traverses the rail **15** and the rear post **12** and provides a common axis of rotation diametrically through the elements **12** and **15**. Nuts **30** are used to secure the studs **26** in position.

The posts **12** are provided with transverse arms **33** and mounting plates **34** for fixedly securing the posts **12** in spaced relationship to a wall S or other vertical surface adjacent to which the bunks are located.

A heavy plate, of cast iron or the like, which serves as a counter-weight **35**, is mounted on the rear side rail unit **14**, as shown in Figs. 6 and 7. The counterweight **35** has grooved or recessed ends **36** which conform to shape and curvature of the ends **17** of rails **16** so that the weight is slidable onto the ends **17** and is thereby retained against movement in a horizontal plane relatively to the frame **10**. The lower edge of the weight **35** is also grooved or recessed as at **37** to conform to and rest upon the upper rail **22** of the side unit **14**. One or more screws **38** may extend through the rail **22** and into threaded engagement with the weight **35** to prevent inadvertent vertical displacement thereof, although the recesses are adequate to prevent any displacement during normal operation and use. It will be noted (Fig. 2) that the counterweight **35** is so located that it is still in an unstable position when the bunks are folded to their closed position, so that the weight **35** continues to urge the frames to the limit of their closed position and thus, in effect, stabilizes the frames in the closed position.

A mattress M is placed within the frame **10**. If this mattress is of the inner-spring variety, it may be supported by a rigid underlying support surface, here shown on the upper frame **10** as a pressed wood sheet **39**. The sheet **39** is secured to the lower rails **15** and **21** of the frame **10** by means of clamps **40** which extend partially around the rails and have their free ends **41** extending to the opposite faces of the piece **39** where they are secured by a suitable fastener **42**.

If the mattress is to be spring-supported, as indicated in the lower frame **10**, a series of spring elements **43** may be stretched across the bottom of the frame and hooked onto the lower rails **15** and **21** to provide a resilient mattress support. As a safety measure, it is also advisable to provide underlying rigid support bars **44** which are removably and pivotally secured to and extend between the rails **21** of the side units **14**.

In order to avoid discomfort to the sleeper, the bars **44** are each provided with a central offset portion **45** which is spaced downwardly from the plane of the bottom of the mattress. This spacing accommodates the normal sag in the mattress when it is in use so that the support bars are not sensed by the sleeper. However, in the event of accidental failure of the spings **43** due to overloading or other causes, the mattress will be supported by the bars **44** and thus injury to the sleeper or user can be avoided.

In order that the offset portions **45** of the support bars **44** shall not project beyond the plane of the bed frame when the bunks are in the closed position of non-use, the rods **44** are adapted to be rotated from the projecting position shown in Fig. 1 to a position in which the offset portion **45** rests against the spring elements **43** and thus lies substantially in the plane of the frame rails **15** and **21**.

As shown in Fig. 8, the ends of each rod **44** are provided with short studs or pins **46** which are journalled in apertures **47** provided therefor in the frame member **15**. The rods **44** can then be manually rotated about the axis of the pins **46** to their inward or closed position when the bunks are in the closed or folded position. The offset portions **45** are free to swing down to the position shown in Fig. 1 when the bunks are lowered to the open position of use. However, if for some reason, the safety bars **44** do not swing freely, the weight of a sleeper and the consequent sag of the mattress will cause the bars to rotate.

The open position of the bunks is shown in phantom outline in Fig. 1. In this position, the frames **10** are supported horizontally on the spaced posts **11** and **12** which engage the ground or floor level. The weight of the bunks forward of the pivots **26** is slightly greater than the weight or moment of that portion of the bunks which lies rearward of the pivots **26**, so that there is no tendency for the bunks to rotate upwardly when they are in the open position. This weight differential, which is established by the counter-weight **36**, is of a relatively small value, e.g. one-half pond, so that only a very slight force is required to raise the beds when they are to be closed.

When the bunks are not in use, they may be raised to a position of parallelism with the adjacent wall surface. Due to the parallelogram linkage arrangement, all the connected bunks will rotate simultaneously in response to the movement of any one bunk. As the frames are rotated upwardly, they are supported by the rear posts **12**. The front posts **11** are elevated and move into abutment with the rear posts **12**, as shown in Fig. 2. The offset pivot pins **25** on the posts **11** compensate for the axial spacing between the posts **11** and **12** so that when the posts are abutting, the frames **10** of the lower and upper bunks are all aligned in the same vertical plane in parallelism with the wall surface S.

During the upward pivotal movement of the bunks about the axis of the pivot pin **26**, the distribution of the weight of the bunk is gradually changed so that the rear portion of the bunk carrying the counterweight **35** urges the bunk into the closed position and maintains it in such position due to the still unstable condition of the weight **35** when the posts **11** and **12** are abutted. There is thus no tendency for the bunks to oscillate in the closed position and no need for latching devices or the like to secure the bunks against downward rotation.

When the rigid sheet **39** is utilized, it may be painted or otherwise decorated to provide an ornamental effect when the bunks are in the closed position.

It is to be understood that the form of my invention, herewith shown and described, is to be taken as a preferred example of the same, and that various changes in the shape, size and arrangement of parts may be resorted to, without departing from the spirit of my invention, or the scope of the subjoined claims.

Having thus described my invention, I claim:

1. In a tiered folding bed structure, the combination of a plurality of generally rectangular bed frames, a first support post pivotally connected to each end of each of said frames inwardly of the sides of said frames and providing an axis of rotation for each frame, a second support post, means pivotally connecting said second post to each end of each frame in parallel spaced relationship to said first support post to support said frames in tiered horizontal planes, said second posts being movable into parallel abutment with said first posts in response to upward rotation of one side of each of said frames about its axis of rotation, and a counterweight carried by each frame adjacent the other side thereof, said counterweight being of a predetermined mass sufficient to over-balance said frame when said frame is rotated to the limit of movement defined by the abutment of said posts and said mass being insufficient to over-balance said frame when said frame is counter-rotated to said horizontal plane.

2. A combination as defined in claim 1, wherein said counterweight is slidably mounted on said other side of said frame.

3. A combination as defined in claim 1, wherein each of said bed frames is provided with side rails and said

counterweight is slidably mounted on said side rails on said other side of said frame.

4. A combination as defined in claim 1, wherein each of said bed frames is provided with side rails and said counterweight is provided with recesses for slidable engagement with said side rails.

5. A combination as defined in claim 1, wherein each of said bed frames is provided with an end rail and said means comprises a pivot pin having a first portion journalled in said second post, said pivot pin having a second portion offset from said first portion and secured to said end rail.

6. A combination as defined in claim 5, wherein said second portion is disposed normal to said first portion and is secured against axial rotation relatively to said end rail.

7. A combination as defined in claim 6, wherein said first portion is of circular cross-section, said second portion is of non-circular cross-section, and said end rail is apertured to conform to the cross-section of said second portion and receive said second portion.

8. In a folding bed structure, the combination of a plurality of frame units, connecting means for removably securing said units to each other to provide a generally rectangular frame, a first support post pivotally connected to each end of said frame inwardly of the sides of said frame and providing an axis of rotation therefor, a second support post pivotally connected to each end of said frame in parallel spaced relationship to said first support post, said second posts being movable into parallel abutments with said first posts in response to upward rotation of one side of said frame about its axis of rotation, and a counterweight carried by said frame adjacent the other side thereof, said counterweight being of a mass sufficient to overbalance said frame when said

frame is rotated to the limit of movement defined by the abutment of said posts.

9. A combination as defined in claim 8, including a safety bar pivotally connected to opposite sides of said frame in underlying relationship thereto, said safety bar having a portion offset from its axis of rotation, and said safety bar being rotatable out of the plane of said frame in response to counter-rotation of said frame from said upward limit of movement thereof.

10. In a folding bed structure, the combination of a generally rectangular frame, a first support post pivotally connected to each end of said frame inwardly of the sides of said frame and providing an axis of rotation therefor, a second support post pivotally connected to each end of said frame in parallel spaced relationship to said first post, means for limiting the upward rotation of one side of said frame about said axis of rotation, and a counterweight carried by said frame adjacent the other side thereof, said counterweight being of a mass sufficient to over-balance said frame in response to upward rotation of said one side to the limit of movement defined by said means.

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