United States Patent [19]

Ewing

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[45] **June 3, 1975**

[54] **BUNK BED CONSTRUCTION**

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[22] Filed: **Sept. 17, 1973**

[21] Appl. No.: **398,217**

[52] **U.S. Cl.** ..... **5/8;** 5/9 R

[51] **Int. Cl.**[2] **A47C 13/38**

[58] **Field of Search** 5/8, 9, 10; 85/53, 54; 211/135; 312/265

[56] **References Cited**

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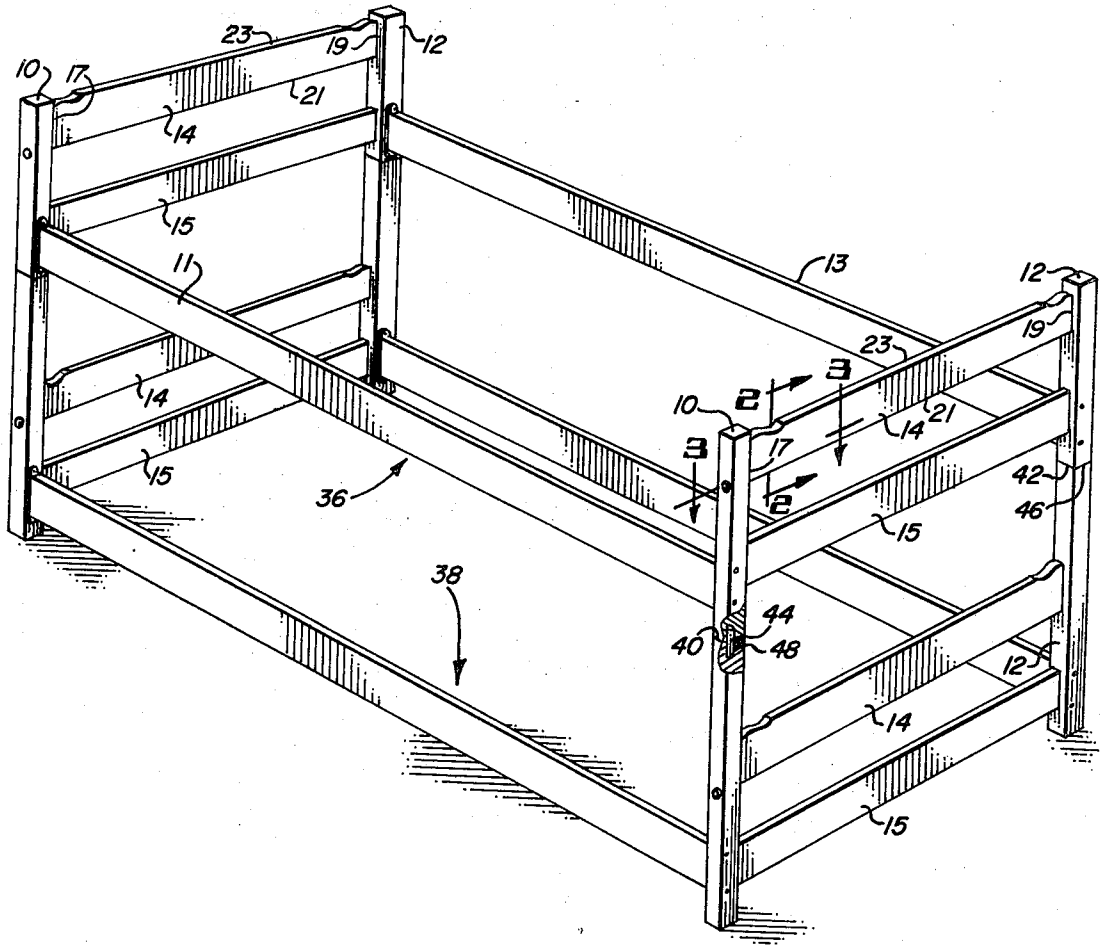
845,122	7/1949	Germany	182/216

Primary Examiner—Casmir A. Nunberg

[57] **ABSTRACT**

A bunk bed construction wherein cross-boards are abutted between vertical posts of the bunk bed frame and wherein lower edges of the cross-boards are recessed and a high tensil rod is disposed in the recess and extending longitudinally therethrough and into said posts wherein abutment or nut means is disposed for securing opposite ends of the rod in said posts whereby the nut means may be screw threadably tightened to place the rod in tension and the cross-board in compression between said posts.

6 Claims, 6 Drawing Figures



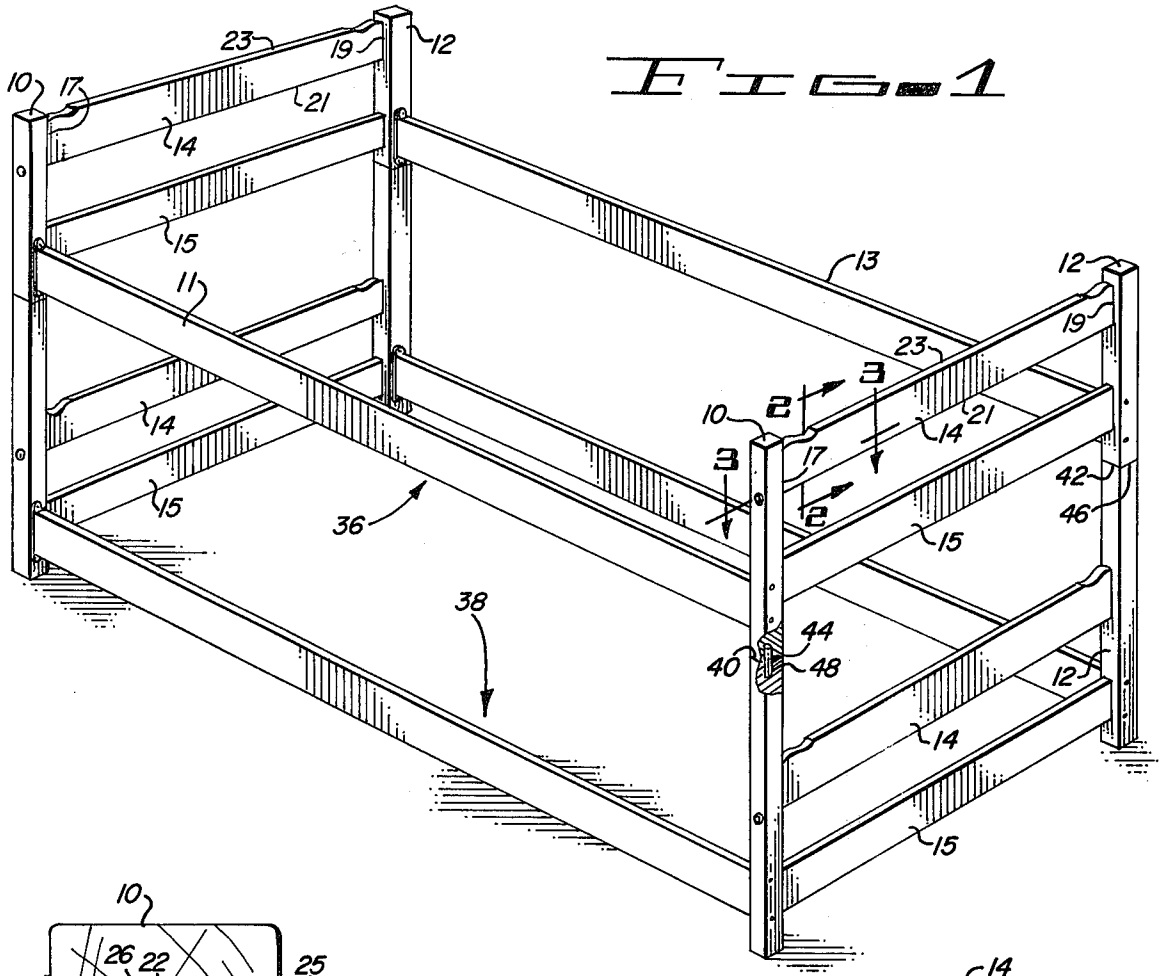


Fig-1

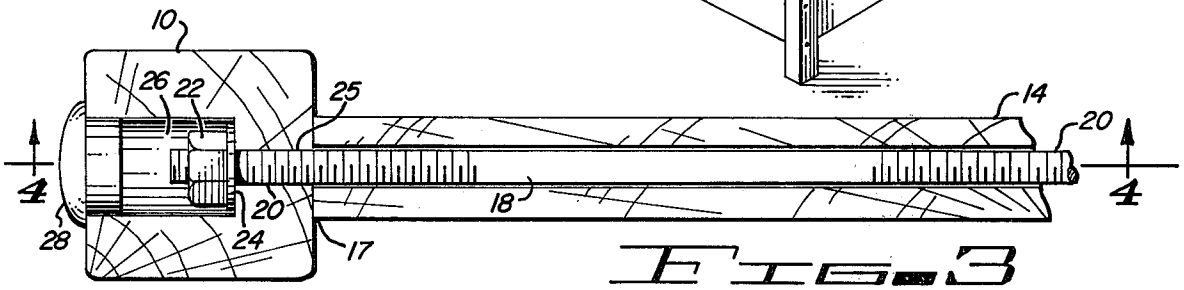


Fig-3

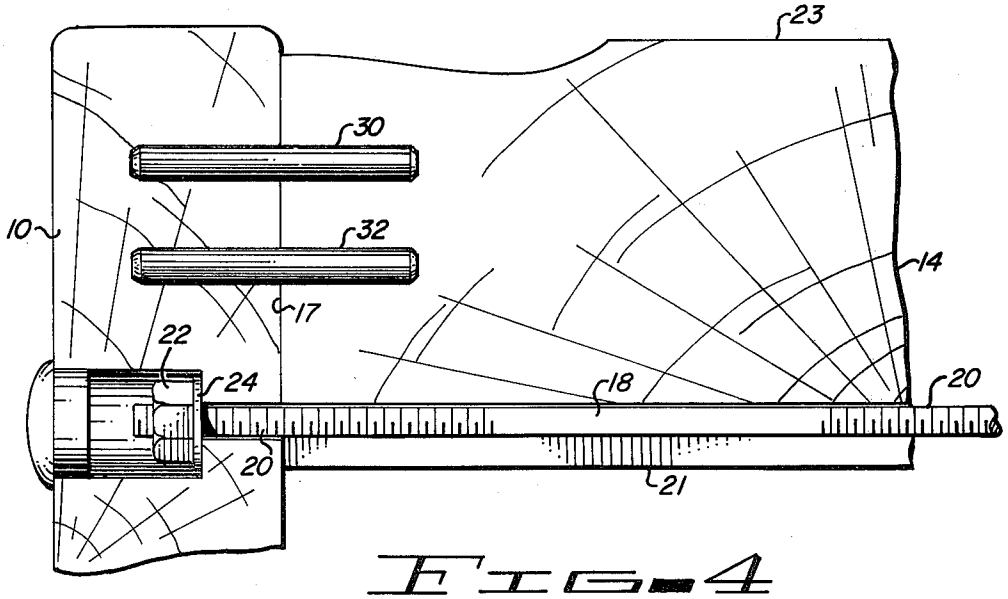


Fig-4

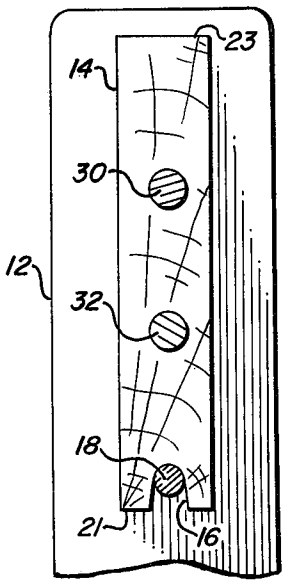


Fig-2

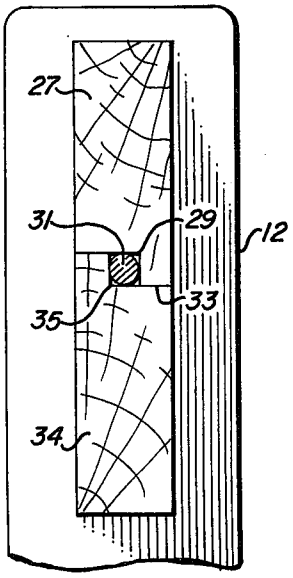


Fig-6

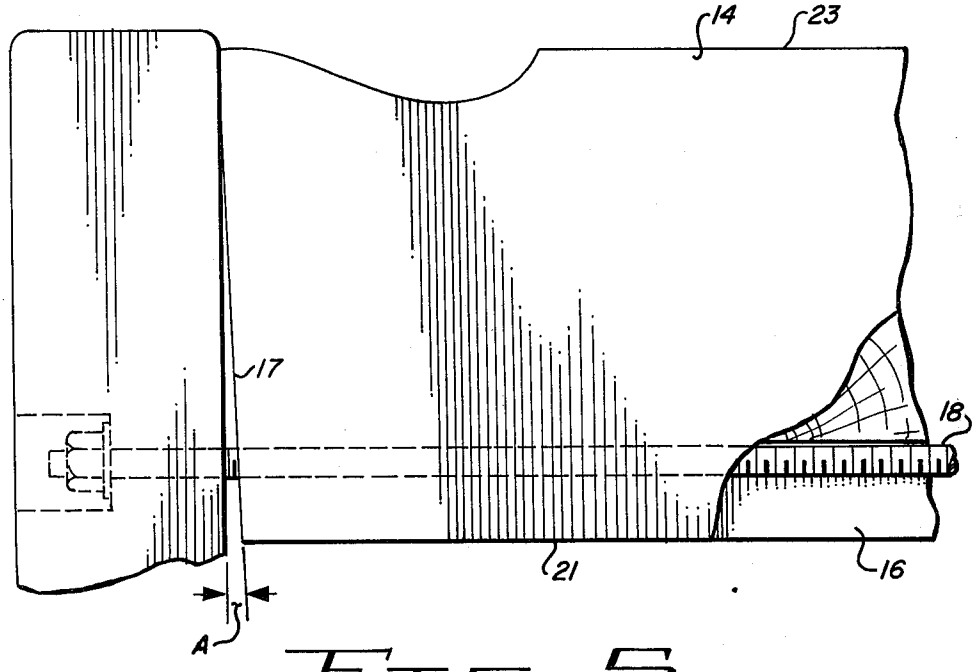


Fig-5

BUNK BED CONSTRUCTION

PRIOR ART

Prior art relating to furniture is as follows: U.S. Pat. No. 823,133 patented Aug. 7, 1906 by Putnam Morrison. U.S. Pat. No. 868,310 patented Oct. 15, 1907 by A. P. White, et al. U.S. Pat. No. 1,933,074 issued Oct. 31, 1933 by B. E. Richardson.

BACKGROUND OF THE INVENTION

Bunk beds have been very useful in providing compact sleeping facilities for a plurality of persons in a limited area. Bunk beds have been provided with superimposed frames and have heretofore been inherently dangerous due to the fact that the structural arrangement of bunk bed corner posts and headboard structure has come apart and allowed occupants and structure of an upper bunk to fall upon persons in a lower bunk. The connections of prior art bunk bed structures have included screws and/or glued joints or wooden dowels for connecting the head posts and the cross-boards and consequently these structures have become loose and very difficult to maintain and the principal problem has been leverage of the structures when the bunk beds are in superimposed position such that movement in the upper bunk has sufficient leverage to cause loosening of the various joints of the head posts and cross-boards of both of the superimposed bunk bed structures. With the prior art construction as hereinbefore described, the high leverage factor acting on the conventional glued joints or doweled joints or those utilizing screws has been sufficient to cause serious accidents and many companies have quit manufacturing such bunk beds due to the potential liabilities involved. Consequently the general public has been endangered by the prior art bunk bed structures and with such prior art structures it has been necessary heretofore to produce massive posts and cross-boards in order to obtain sufficient strength to render bunk beds safe. Consequently the cost of such massive structures, which are structurally safe, has been prohibitive to a great extent.

SUMMARY OF THE INVENTION

The present invention relates to a bunk bed construction wherein vertical posts are interconnected by a high tensil strength rod which is disposed in a grooved edge of a cross-board having opposite ends abutted between the posts and whereby tightening of the rod by a screw threaded means causes the rod to be placed in tension and the cross-board to be placed in compression between the posts thereby affording a very strong bunk bed construction wherein the posts and cross-boards may be made of wood or the like.

The invention also provides for maintenance adjustment of the aforementioned screw threaded means so that the rod may be additionally tightened to compensate for loosening attendant to the seasoning of wood or the like from which the bunk beds may be constructed.

The bunk bed construction according to the present invention provides a very strong, safe mechanical connection between the posts and the cross-boards so as to effectively prevent the unexpected collapse of bunk beds and thereby alleviating the possibility of injury to persons in the bunk beds.

The construction of bunk beds in accordance with the present invention affords simplicity of assembly of the cross-boards and the vertical posts thereby contributing to manufacturing economy.

Additionally the invention requires very simple machining of the wooden posts and cross-boards in combination with the high tensil connecting rods interconnecting the posts and crossboards thereby affording economy of production and consequently promoting a low retail price to the general public.

The invention also comprises a novel relationship between the cross-boards and the vertical posts as well as the tension rod interconnecting the posts wherein opposite ends of one of the cross-boards are finished at a slight angle at the ends such that tension of the interconnecting rod which interconnected the posts forces the posts against opposite ends of the adjacent cross-board to thereby maintain integrity of the bunk bed assembly including a pair of vertical posts and a pair of spaced apart or adjacent cross-boards at each end of the bunk bed construction of the invention. Additionally, the disposition of the tension rod inter-connecting the vertical posts is such that the rod is hidden in a slot or grooved edge in one of the cross-boards to maintain aesthetics of the bunk beds while at the same time affording simplicity of production and assembly of the bunk bed construction of the invention. Further the invention comprises the aforementioned combination of vertical posts, cross-boards and high tension interconnecting rods structure together with dowels or other fixtures at the ends of the cross-boards and engaging the posts so as to prevent rotative displacement of the cross-boards around the axis of the interconnecting tension rod structure whereby the cross-boards are maintained in proper vertical alignment with the vertical corner posts of the bunk bed construction.

Accordingly it is an object of the present invention to provide a bunk bed construction which is of simple mechanical arrangement yet very strong and safe as well as durable.

Another object of the invention is to provide a high tension rod interconnecting vertical posts of a bunk bed construction and placing cross-boards in compression and wherein screw threaded means on the interconnecting rod means provides for tightening adjustment of the posts against the opposite ends of the cross-boards so as to compensate for normal environmental shrinkage of the material such as wood or the like of which the bunk bed construction is manufactured.

Another object of the invention is to provide a bunk bed construction which is very compact, simple to manufacture and very simple and economical to assemble.

Another object of the invention is to provide a bunk bed construction which may be made of wood and of wooden parts which have nominal dimensions yet which are highly strengthened by a tension rod such as steel which interconnects the vertical posts and which places the cross-boards in compression.

A further object of the invention is to provide a novel high strength bunk bed construction wherein tension rod means interconnects vertical posts and is hidden in a slot or groove in the edge of a cross-board between the vertical posts.

Another object of the invention is to provide a construction such as set forth in the previous objects wherein the cross-boards are prevented from rotating about the axis of the tension rod interconnecting the vertical posts by means of dowels or other fixtures

which interconnect the cross-boards and vertical posts to prevent the cross-boards from rotating about the axis of the tension rods.

Further objects and advantages of the invention may be apparent from the following specification, appended claims and accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

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

FIG. 2 is an enlarged fragmentary sectional view taken from a line 22 of FIG. 1;

FIG. 3 is an enlarged fragmentary plane sectional view taken from the line 33 of FIG. 1;

FIG. 4 is a fragmentary sectional view taken from the line 44 of FIG. 3;

FIG. 5 is a diagramatic view showing one end of one of cross-boards of the invention and acute angular disposition of the cross-board end normal to its longitudinal axis; and

FIG. 6 is a fragmentary sectional view similar to FIG. 2 but showing a modification of the invention wherein a pair of cross-boards are disposed in adjacent relation to each other and having grooves straddling a tension rod which interconnects vertical posits of the bunk bed construction of the invention.

posts OF THE PREFERRED EMBODIMENTS

As shown in FIG. 1 of the drawings the bunk bed construction of the invention comprises an upper bunk bed frame assembly having two pairs of vertical posts **10** and **12** at opposite ends of the bunk bed construction. Interconnecting the posts **10** is a longitudinal frame member **11** and interconnecting the post **12** is a longitudinal frame member **13.** These longitudinal frame members **11** and **13** are provided with conventional removable fixtures at opposite ends thereof which are no part of the present invention.

Extending between each pair of posts **10** and **12** are cross-boards **14** and **15** which are spaced apart vertically. The cross-board **14** is provided with opposite ends **17** and **19** which abut against the respective vertical corner posts **10** and **12.** Likewise opposite ends of the cross-boards **15** are abutted against the posts **10** and **12.**

As shown in FIG. **5** opposite ends **17** and **19** of the cross-boards **14** are disposed at a slight angle as indicated in FIG. **5** whereby each lower edge **21** of each cross-board **14** is slightly shorter than a respective upper edge **23** thereof as for example the distance as indicated at A in FIG. **5** of the drawings may be one thirty-second of an inch so that the length of the cross-board **14** along its lower edge **21** may be one-sixteenth shorter than the cross-board is along its edge **23** from end to end.

The edge **21** is provided with a groove **16** therein shown best in FIGS. **2** and **5** of the drawings, thus the lower edge is grooved and this groove **16** provides a space in which a high tension connecting rod **18** is disposed. This connecting rod **18** extends through the longitudinal groove **16** from end to end of the cross-board **14** and opposite ends of the rod **18** are provided with externally screw threaded portions **20** which pass through a bore **25** in the respective posts **10** and **12** and the screw threaded ends **20** pass into an enlarged recess **26** wherein a transition is formed with the board **25** such as to support a large diametal washer **24** against which a screw threaded nut is engaged and screw threadably adjustable on the screw threaded portion **20** of the rod **18.** Thus tightening of the nut **22** places each rod **18** in tension and causes opposite ends **17** and **19** of each cross-board **14** to be placed in compression and abutted against respective inner sides of the posts **10** and **12** while the recesses **26** are open at outer sides of the posts in which removable ornamental plugs **28** are fitted to enclose the open ends of the recesses **26** so that access to the nuts **22** may be had for adjusting the tension of the rod **18** as may be desired due to shrinkage of the materials of the posts and cross-boards as for example wood may shrink from time to time and therefore tightening of the nuts **22** will allow tightening of the overall structure of the bunk bed construction.

When the rods **18** are in tension opposite ends **17** and **19** abutted against the posts **10** and **12** tend to force the posts **10** and **12** inwardly into abutted relation with opposite ends of the cross-boards **15.**

These cross-boards **15** are similar to the cross-boards **14** in general construction and are doweled at their opposite ends to the posts **10** and **12** in a similar manner to that shown in FIG. **4** of the drawings wherein the cross-board **14** and respective post **10** is shown with dowels **30** and **32** projecting into corresponding recesses in the cross-board **14** and post **10** to prevent rotation of the cross-board **14** about the axis of the tension rod **18.** Accordingly it will be understood that the opposite ends of the cross-boards **15** are secured by dowels similar to the dowels **30** and **32** in relation to the posts **10** and **12.**

In the modification as shown in FIG. **6** of the drawings, a cross-board **27** is provided with an L-shaped groove **29** disposed so as to receive a tension rod **31** and another cross-board designated **34** having an L-shaped groove **35** is in substantially contiguous relation to the lower edge **33** of the cross-board **27** and this modification provides for maintaining direct compression of the posts **10** and **12** against opposite ends of both the cross-boards **27** and **34** in a similar manner to that hereinbefore described.

The disposition of the high tensil connecting rod **18** in the slot **16** as shown in FIG. **2** of the drawings hides the rod and provides for aesthetic disposition of the rod **18** as it is hidden within the confines of the cross-board **14.**

It will be appreciated by those skilled in the art that the high tensil rod **18** may be made of steel while the vertical posts **10** and **12** and the cross-boards **14** and **15** may be of nominal dimension and constructed of wood or the like. Consequently, these parts may be light weight and economical as well as simple to assemble and very economical to manufacture. Furthermore, periodic tension adjustments may be made on the rod **18** to hold the cross-boards and vertical posts rigidly connected together.

As shown in FIG. **1** the bunk bed construction comprises an upper bunk bed frame **36** which includes two pairs of vertical posts **10** and **12** and two pairs of respective cross-boards **14** and **15** and longitudinal members **11** and **13.**

This bunk bed assembly is superimposed upon a lower bunk bed assembly **38** comprising similar posts **10** and **12** with similar cross-boards **14** and **15.** The upper assembly at lower ends **40** and **42** of the respective posts **10** and **12** rest upon respective upper ends **44** and **46** of the lower bunk bed assembly **38** and locating

pins **48** extend into the recesses in the upper ends of the lower posts and into lower ends of the upper posts so that the upper assembly **36** is positively located and securely disposed upon the posts of the lower assembly **38.** Thus the superimposed assemblies **36** and **38** may be substantially identical and it will be apparent to those skilled in the art that substantial lateral forces of active persons in the upper bunk may have a high leverage factor tending to stress the structure of the bunk beds, however the high tensil connecting rod **18** under tension as hereinbefore described, effectively tends to resist forces so applied with the high leverage attendant to someone moving in the upper bed and therefore the construction of the invention is very safe and durable and as hereinbefore described may be adjusted to compensate for loosening due to various causes.

It will be obvious to those skilled in the art that various modifications may be resorted to without departing from the spirit of the invention.

I claim:

1. In a bunk bed construction wherein there is a headboard assembly; a footboard assembly and a pair of longitudinal frame members interconnecting the headboard and footboard assemblies the combination of a pair of substantially vertical posts in each of said assemblies; at least one cross-board between each pair of posts; each cross-board having a lower edge and opposite ends said opposite ends abutted to respective ones of said posts; said cross-board having a groove in said lower edge; a high tensil strength rod in said groove; said rod having opposite ends extending into respective ones of said pair of posts and secured thereto, said rod having a nut screw threadably engaged with at least one of said ends of said rod, said nut abutted to a respective one of said posts and adapted to place said rod in tension and said cross-board in compression between said pair of posts; said posts are provided with inner and outer sides; said inner sides abutted against ends of said cross-boards; said outer sides of said posts having recesses about the ends of the respective rods; said recesses each adapted to contain one of said nuts; and a bore in each post through which said rod extends said bore being of smaller diameter than the respective one of said recesses; and a shoulder area at the juncture between said bore and respective recess; said nut being supported by said shoulder area.

2. The invention as defined in claim **1** wherein plug means is disposed in the outer end of said recess for enclosing said outer side of each post at said recess.

3. In a bunk bed construction wherein there is a headboard assembly; a footboard assembly and a pair of longitudinal frame members interconnecting the headboard and footboard assemblies the combination of a pair of substantially vertical posts in each of said assemblies; at least one cross-board between each pair of posts; each cross-board having a lower edge and opposite ends said opposite ends abutted to respective ones of said posts; said cross-board having a groove in said lower edge; a high tensil strength rod in said groove; said rod having opposite ends extending into respective ones of said pair of posts and secured thereto, said rod having a nut screw threadably engaged with at least one of said ends of said rod, said nut abutted to a respective one of said posts and adapted to place said rod in tension and said cross-board in compression between said pair of posts; dowels project into said posts and said cross-boards to prevent rotation of said cross-boards about respective rods; said posts are provided with inner and outer sides; said inner sides abutted against ends of said cross-boards; said outer side of said posts having recesses about the ends of said rod; each of said recesses adapted to contain one of said nuts; and a bore in each post through which said rod extends, said bore being of smaller diameter than the recess; and a shoulder area at a juncture between said bore and a respective recess; said nut being supported by said shoulder area; and plug means enclosing said recess at said outer side of each post.

4. In a bunk bed construction wherein there is a headboard assembly; a footboard assembly and a pair of longitudinal frame members interconnecting the headboard and footboard assemblies the combination of a pair of substantially vertical posts in each of said assemblies; at least one cross-board between each pair of posts; each cross-board having a lower edge and opposite ends said opposite ends abutted to respective ones of said posts; said cross-board having a groove in said lower edge; a high tensil strength rod in said groove; said rod having opposite ends extending into respective ones of said pair of posts and secured thereto, said rod having a nut screw threadably engaged with at least one of said ends of said rod, said nut abutted to a respective one of said posts and adapted to place said rod in tension and said cross-board in compression between said pair of posts; wherein each of said head and foot board assemblies is provided with a second board having opposite ends abutted to said posts; said second cross-board being spaced from said grooved edge of said first mentioned cross-board; said opposite ends of said first mentioned cross-board being slightly shorter at said grooved edge than at said opposite edge whereby tension of said rod tends to force said posts together against said opposite ends of said second cross-board.

5. In a bunk bed construction wherein: there is a head-board assembly; a footboard assembly and a pair of longitudinal frame members interconnecting the headboard and footboard assemblies, the combination of: a pair of substantially vertical posts in each of said assemblies; at least one crossboard between each pair of posts; each crossboard having first and second respective lower and upper edges and opposite ends, said opposite ends abuted to respective ones of said posts; a high tensile rod adjacent to one of said edges (said first edge); said rod having opposite ends extending into respective ones of said pair of posts and secured thereto, said rod having a nut screw threadably engaged with at least one of said ends of said rod, said nut abuted to a respective one of said posts and adapted to place said rod in tension (tnnsion) and said crossboard in compression between said pair of posts; said opposite ends of said boards between said lower and upper edges being abuted to said posts and thereby providing substantial lateral bracing of said posts.

6. In a bunk bed construction wherein there is a headboard assembly; a footboard assembly and a pair of longitudinal frame members interconnecting the headboard and footboard assemblies the combination of a pair of substantially vertical posts in each of said assemblies; at least one cross-board between each pair of posts; each cross-board having first and second edges and opposite ends said opposite ends abutted to respective ones of said posts; a high tensil strength rod adjacent to said first edge; said rod having opposite

ends extending into respective ones of said pair of posts and secured thereto, said rod having a nut screw threadably engaged with at least one of said ends of said rod, said nut abutted to a respective one of said posts and adapted to place said rod in tention and said cross-board in compression between said pair of posts; each of said head and footboard assemblies being provided with a second board having opposite ends abutted to said posts, said second cross-board being spaced from said first edge of said first mentioned cross-board; said opposite ends of said first mentioned cross-board being slightly shorter at said first edge than at said opposite edge whereby tension of said rod tends to force said posts together against said opposite ends of said second cross-board.

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UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 3,886,604 Dated June 3, 1975

Inventor(s) Tom Ewing

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

Claim 5 should appear as shown below:

In a bunk bed construction wherein: there is a headboard assembly; a footboard assembly and a pair of longitudinal frame members interconnecting the headboard and footboard assemblies, the combination of: a pair of substantially vertical posts in each of said assemblies; at least one crossboard between each pair of posts; each crossboard having first and second respective lower and upper edges and opposite ends, said opposite ends abuted to respective ones of said posts; a high tensile rod adjacent to one of said edges; said rod having opposite ends extending into respective ones of said pair of posts and secured thereto, said rod having a nut screw threadably engaged with at least one of said ends of said rod, said nut abuted to a respective one of said posts and adapted to place said rod in tension and said crossboard in compression between said pair of posts; said opposite ends of said boards between said lower and upper edges being abuted to said posts and thereby providing substantial lateral bracing of said posts.

Signed and Sealed this

sixteenth Day of *March 1976*

[SEAL]

Attest:

RUTH C. MASON
Attesting Officer

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Commissioner of Patents and Trademarks