Jan. 18, 1966 I. SHAYNE 3,229,790

TENSIONED FRAME STRUCTURE

Filed Jan. 30, 1961

Fig. 1.

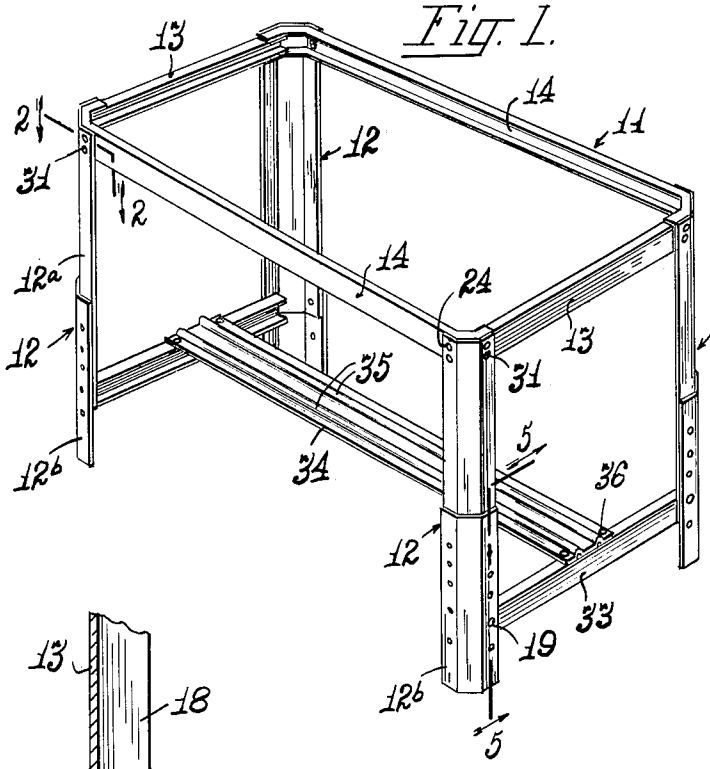
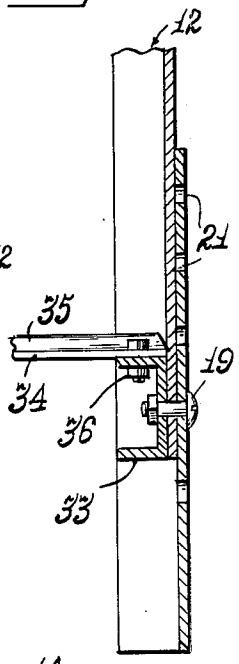


Fig. 5.



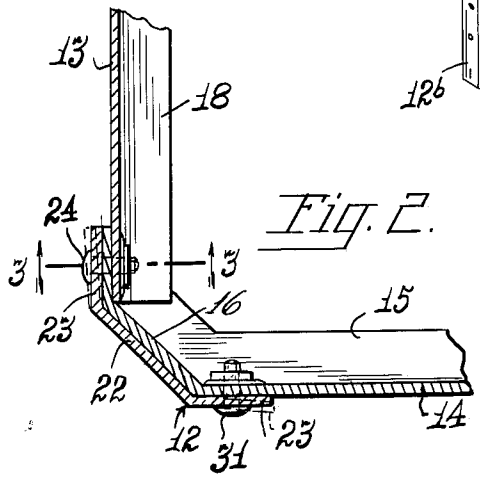


Fig. 2.

Fig. 3

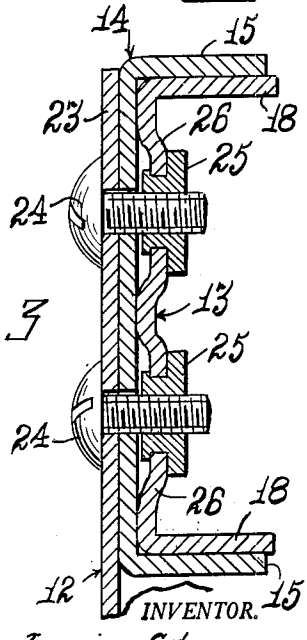
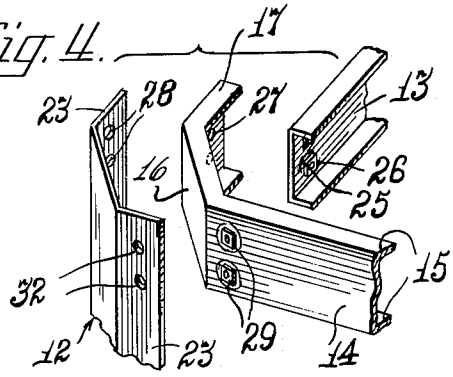


Fig. 4.



INVENTOR.

Irwin Shayne

United States Patent Office 3,229,790 Patented Jan. 18, 1966

3,229,790

TENSIONED FRAME STRUCTURE

Irwin Shayne, Glencoe, Ill., assignor to Morris Norian and Louis Hirsh, as tenants-in-common, both of Chicago, Ill.

Filed Jan. 30, 1961, Ser. No. 85,672
5 Claims. (Cl. 189—36)

This invention relates to improvements in frame structures, and is particularly concerned with a tension bolted frame structure comprised of few parts that are readily assembled and disassembled and which, when assembled, afford a sturdy and rigid structure useful, for example, as a base for a table or bench, or as a shelving frame, a rack or a tool stand.

Many types of frame structures useful for the purposes referred to hereinabove and for other purposes are frequently so bulky that it is difficult to store them compactly even when disassembled, and which, when assembled, do not afford the desired rigidity with minimum part assembly. The present invention has for its advantage the provision of novel structural characteristics adapted to insure utmost rigidity with minimum parts assembly and effort. Such rigidity is attained in the herein disclosed structure primarily in the construction of the corner assembly and leg mounting.

More particularly, the present structure affords means to insure rigidity to the leg mounting by securing the said legs directly to a common element of a knock-down frame assembly and in a manner to tension the parts thereof.

It is therefore an object of the invention to provide a novelly constructed and tensioned frame structure.

Another object is to provide a frame structure of the character referred to which has a rigid corner assembly affording a firm mounting for legs attached thereto.

Another object is to provide a frame assembly of the character referred to wherein horizontally extended frame elements are connected one to the other in a novel corner structure and with a vertically extending element or leg of novel construction.

Another object is to provide a leg structure embodying means to insure its being tensioned when secured to complemental elements so as to increase the rigidity of its securement to such elements.

Another object is to provide a rugged tensioned frame assembly of the character referred to which is not expensive to manufacture, is easy to assemble and disassemble, is very rigid when assembled and is highly efficient in its use.

Other and more detailed advantages and objects of the invention will appear more fully as this description proceeds, reference being made to the accompanying drawings wherein an exemplary form of the invention is shown. It should be understood however that the drawings and description are illustrative only and should not be taken as limiting the invention, except insofar as it is limited by the claims.

In the drawings:

FIGURE 1 is a perspective view of a representative frame structure embodying the features of the invention.

FIGURE 2 is an enlarged horizontal sectional detail view of one of the corner assemblies, taken substantially on line 2—2 of FIGURE 1.

FIGURE 3 is a vertical sectional view on an enlarged scale, taken along line 3—3 of FIGURE 2.

FIGURE 4 is an exploded view of a corner assembly, showing the parts in perspective.

FIGURE 5 is an enlarged detail sectional view taken on line 5—5 of FIGURE 1.

Referring to the exemplary disclosure of the invention in the accompanying drawings, the tensioned frame structure illustrated is comprised of a rectangular frame assembly 11 and a plurality of support legs 12. The frame assembly 11 is comprised of a pair of end frame elements 13 and a pair of connecting side frame elements 14, each fabricated from lengths of channel shaped material.

More specifically, each side frame element 14 has its upper and lower flanges 15 turned inwardly and has each end bent to provide an intermediate portion 16 disposed at an angle of 45° and a free end portion 17 bent substantially at right angles to the main portion of the frame element, as best illustrated in FIGURES 2 and 4. The end frame elements 13 also have their upper and lower flanges 18 turned inwardly and said elements 13 are of sufficient width as to permit their end portions to be nested in the respective free end portions 17 of side frame elements 14 when the frame elements are assembled in the rectangular form as shown in FIGURE 1. Means to be described in detail hereinafter are provided to secure the frame assembly.

The legs 12 are alike and the following description of one leg is equally applicable to all. As shown, each leg is comprised of an upper part 12*a* and a lower part 12*b* adjustably secured together as by bolt 19 which is selectively arranged in one of the several holes 21 provided in the lower part 12*b*.

Each leg 12 is fabricated in a manner to provide a cross section in all or at least a part of its length that responds substantially to the corner configuration of the frame assembly to which it is attached. Specifically, the leg includes a central or medial area 22 and two flat edge flanges 23 disposed substantially perpendicular to each other. Preferably, the angle of bend between the flat edge flanges and the medial area 22 is slightly less than 45° so that when the flat edge flanges are bolted to the frame assembly, as by bolts 24, and in a manner now to be described, said flanges are drawn up tightly against the frame assembly and placed in a tensioned condition.

Referring now particularly to FIGURES 3 and 4, each end of each end frame element 13 is provided with a pair of vertically spaced stake nuts 25 offset inwardly from the outside face of the frame element web by offsetting the web inwardly as shown in the drawings at 26. The associated free end portion 17 of the side frame elements 14 and the related flat edge flange 23 of the attached leg have spaced holes 27, 28, respectively, to receive the bolts 24 which when threaded into the respective nuts 25 and drawn up tightly, tension the leg flange as aforesaid and draw the nuts outwardly so as to afford the required tension to secure the parts and prevent unintended backing out of the bolts.

Each side frame element 14 is likewise provided adjacent to its bend ends with vertically spaced stake nuts 29 that also are offset inwardly by recessing the frame web so as to be tensioned when engaged by bolts 31, passing through holes 32 in the other flat edge leg flange 23 for securing the legs to the side frame elements 14.

When assembled, the legs are each attached at a plurality of places to the frame assembly and the whole is tensioned to avoid sway or scissoring. It should be obvious that the recess offsets in the frame elements can be bored and tapped so as to avoid the use of the stake nuts illustrated without impairing the utility or function of the tensioning effect of the bolts.

Additional leg stability can be attained by connecting rails or bars 33 bridging the legs at each end of the frame assembly and preferably connected thereto by the bolts 19 securing the adjustable leg portions 12*a* and 12*b* together. These rails or bars may be interconnected by a longitudinal extending plate 34 having stiffening ribs 35 therein and secured to said rails by suitable means, such as bolts 36.

The bolt tensioned frame structure herein disclosed is rigid, is easily knocked down for compact storage; and it

may be quickly assembled and adjusted for level and height. Also, although the exemplary assembly herein illustrated is specifically designed as a support base for a work table or bench, its structural details may be incorporated in other embodiments such as scaffolding, storage racks, with or without shelving, and as supports for various power tools requiring rigid supporting structures.

From the foregoing description, it is believed that the nature of my invention and the manner in which it is to be carried out will be readily apparent to those skilled in this art.

Having described my invention, what I claim as new and desire to secure by Letters Patent of the United States is the following:

1. In a tension bolted knock-down frame structure a pair of elongated channel frame elements of sheet metal arranged substantially at right angles to each other, said channel frame elements having their channel sections opening inwardly, an end portion on one of said frame elements extending at right angles thereto and nested over one end of the other frame element, an angularly disposed intermediate portion connecting said end portion to said one frame element, a leg member formed of sheet metal with flat edge flanges lying substantially perpendicular to each other and connected by an angularly disposed intermediate wall to substantially conform to the angular formation of said one frame element and lie in substantial face to face contact therewith, said flat edge flanges being normally inclined slightly away from the underlying one frame element, spaced nuts secured firmly to the webs of the channel frame elements and underlying the edge flanges of the leg member, said edge flanges and said overlying end portion of said one frame element having spaced apertures therein each in registering alignment with a nut, and bolts extended through said apertures and engaged in the respective nuts to draw the flat edge flanges tightly against the underlying frame element to secure the parts together under tension.

2. In a tension bolted knock-down frame structure, a pair of elongated frame elements of sheet metal each having an upper and lower opposed flange arranged substantially at right angles to each other, an end portion on one of said frame elements extending at right angles thereto and overlying one end area of the other element, an integral intermediate portion connecting said end portion to said one frame element and extending substantially at a 45° angle to said element, a leg member of sheet metal having a cross section at least along a portion of its length to substantially conform to the angular formation of said one frame element and lie in substantial face to face contact therewith, an edge of said leg member being normally inclined slightly away from the underlying one frame element, spaced nuts secured firmly to said frame elements and underlying the leg member, the leg member and said overlying end portion of said one frame element having spaced apertures therein each in registering alignment with a nut, and bolts extended through said apertures and engaged in the respective nuts to secure the parts tightly together, said nuts being offset inwardly from the face of the portion carrying same so as to tension the assembly when the bolts are drawn up tightly.

3. In a tension bolted knock-down frame structure, a pair of elongated frame elements of sheet metal arranged substantially at right angles to each other, an end portion of one of said frame elements extending at right angles thereto and overlying one end of the other element, an intermediate angularly disposed portion connecting said end portion to said one frame element, a leg member of sheet metal having a cross section at least at its upper extremity to substantially conform to the angular formation of said one frame element and lie in substantial face

to face contact therewith, an edge of said leg member being normally inclined slightly away from the underlying one frame element, spaced nuts secured firmly to said frame elements and underlying the leg member, the leg member and the said overlying end portion of said one frame element having spaced apertures therein each in registering alignment with a nut, and bolts extended through said apertures and engaged in the respective nuts to draw the leg member tightly against the frame elements to secure the parts together under tension.

4. A tensioned knock-down frame structure comprising a leg formed of sheet metal with flat edge flanges lying perpendicular to each other and connected by an integral angularly disposed intermediate wall, a pair of elongated channel frame elements each having an upper and lower opposed flange mounted with their channel sections opening inwardly and their webs and flanges lying at substantially the same angle to each other and their webs lying at substantially the same angle as the edge flanges of the leg, an extension on one of said frame elements lying at substantially the same angle as the intermediate leg wall and having its terminal end extending between a leg edge flange and the other channel frame element, said leg edge flanges being normally inclined slightly away from the underlying frame element, and a tension fastening connecting said frame elements and leg side flanges to draw all of the parts tightly together.

5. A tensioned knock-down frame structure comprising a leg formed of sheet metal with flat edge flanges lying perpendicular to each other and connected by an integral angularly disposed intermediate wall, a pair of elongated channel frame elements mounted with their channel sections opening inwardly and lying in part within one another, the webs of said channel sections lying at substantially the same angle to each other as the edge flanges of the leg, an extension on one of said frame elements lying at substantially the same angle as the intermediate leg wall and having its terminal end extending between a leg edge flange and the other channel frame element, said leg edge flanges being normally inclined slightly away from the underlying frame element, an embossment in the web of each channel frame element, a fastening member in each embossment spaced away from the web of the overlying channel frame element and the leg edge flange, said leg member and the web of the overlying channel frame element having spaced apertures therein in registering alignment with said fastening member, and a second fastening member adaptable to mate with said first fastening member through said apertures to draw the leg edge flanges tightly against the underlying frame elements and to secure the parts together under tension.

References Cited by the Examiner

UNITED STATES PATENTS

1,689,645	10/1928	Turk	108—111
1,820,660	8/1931	Gilbert	189—34
1,854,777	4/1932	Bales	211—126
1,872,385	8/1932	Andren	189—36
1,952,111	3/1934	Bales	108—107
2,588,818	3/1952	Franks	189—36
2,590,896	4/1952	Seele	189—36 X
2,628,873	2/1953	Bennett	248—151
2,721,106	10/1955	Chaney	108—147
3,009,516	11/1961	Albee	160—381

FRANK L. ABBOTT, *Primary Examiner.*

EARL C. DARSCH, RICHARD W. COOKE, JR., JACOB L. NACKENOFF, *Examiners.*