April 9, 1957 N. H. FRANKS 2,788,096

TENSION BOLTED FRAME CONSTRUCTION

Filed Nov. 30, 1953

Fig. 1

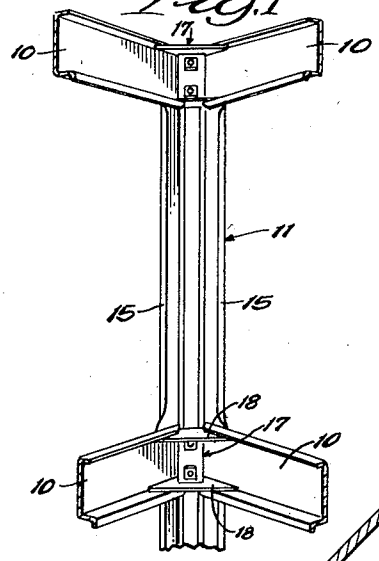
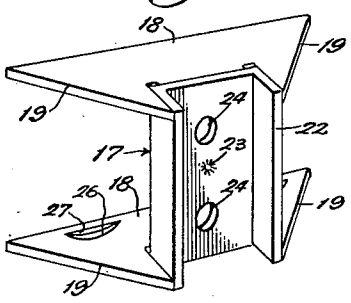


Fig. 2



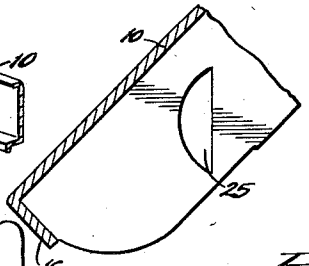


Fig. 3

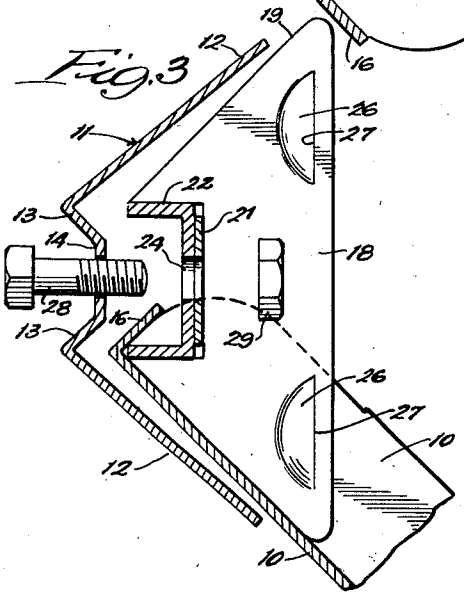


Fig. 4

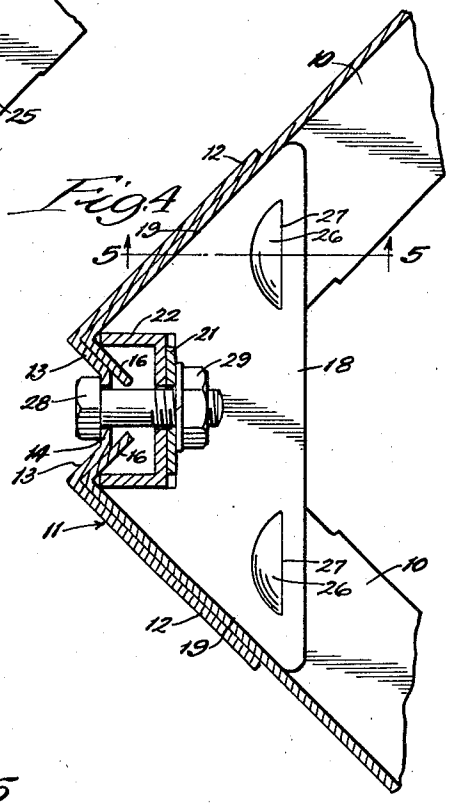
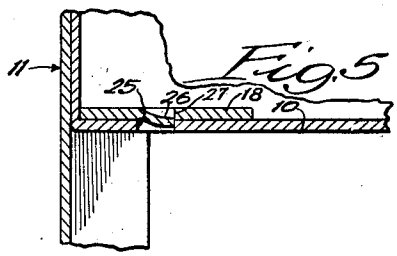


Fig. 5



INVENTOR:
Norwin H. Franks,
BY
Bair Freeman & Molinare
ATTORNEYS.

United States Patent Office 2,788,096 Patented Apr. 9, 1957

2,788,096

TENSION BOLTED FRAME CONSTRUCTION

Norvin H. Franks, Chicago, Ill.

Application November 30, 1953, Serial No. 395,172

5 Claims. (Cl. 189—36)

This invention relates to tension bolted frame constructions and more particularly to a frame construction which can be shipped or stored in completely disassembled condition and easily assembled into a rigid frame unit at the desired point of use.

Many types of units for both domestic and commercial use such as shelving, frames of various types for use as table bases or for tool supports or the like and various types of stands are so bulky that it is impractical to store or ship them in assembled condition. In my Patent 2,588,818 there is disclosed and claimed a tension bolted frame construction in which sheet metal legs can be easily and quickly secured to metal or like frames to provide a very rigid assembly. As shown in my said patent the frames themselves are pre-assembled as by connecting elongated side members together at the corners. The present invention has for one of its objects the provision of an improvement by which frame elements are rigidly connected to each other at the same time that the frame elements are connected to the legs.

Another object is to provide a construction in which a single tension fastening or set of tension fastenings simultaneously secure the frame elements to each other and to the legs.

The above and other objects and advantages of the invention will be more readily apparent from the following description when read in connection with the accompanying drawing, in which—

Figure 1 is a partial perspective view of an assembled corner of a frame construction embodying the invention;

Figure 2 is a perspective view of a corner fastening piece;

Figure 3 is a horizontal section through the corner showing the parts in disassembled condition;

Figure 4 is a similar view showing the parts in assembled condition; and

Figure 5 is a partial section on the line 5—5 of Figure 4.

As shown a frame of rectangular shape may be formed of elongated channel elements **10** connected to each other at a right angle and simultaneously connected to a vertical leg indicated generally at **11**. The leg **11** is of the same configuration as that disclosed in my Patent 2,588,818 and includes a pair of flat end flanges **12** lying at an angle to each other which is slightly less than the angle between the frame members **10**. For example with a rectangular frame the angle between the flanges **12** may be on the order of 87 degrees. A pair of integral flat shoulders **13** extend inwardly at right angles from the inner edges of the flanges **12** and the inner edges of the shoulders are connected by an integral flat panel **14**. Preferably the entire leg is formed of sheet metal rolled or otherwise shaped to the desired configuration and the legs, as will be understood, may be made to any preferred length depending upon the particular use to which the frame is to be put. Preferably additional flanges **15** are turned inward from the edges of flanges **12** between the

points at which the leg is connected to the frame elements **10** to stiffen the leg and give it a smooth edge.

Each of the elements **10** is formed at its end with a flat end plate **16** which may be formed by bending the end of the channel web inward over the ends of the flanges as shown. The flat end plates **16** are adapted to be seated against the flat shoulders **13** of the legs by fastening pieces as described hereinafter when the frame is assembled.

The parts are adapted to be held together by fastening pieces **17** at each point where the elements **10** meet each other and the legs. As shown in Figure 2, each of the fastening pieces is formed of fabricated sheet metal to provide end plates **18** which are parallel to each other and which are provided with edges **19** lying at the same angles to each other as the frame elements **10**. Preferably the end plates are joined by an intermediate integral strip **21** (Figure 3) and the corners of the end plates project beyond the strip to provide a space for receiving a channel **22**. The channel may be welded to the strip **21** as indicated at **23**, and the channel and strip are preferably formed with openings **24** through which tension fastenings such as bolts, may pass.

In order to hold the fastening pieces and the frame elements **10** initially assembled, the frame elements are preferably formed in their flanges with semicircular openings **25** spaced from the ends of the elements and having straight edges lying at an angle to the elements. One of the plates **18** is formed with resilient projections **26** to interfit with the openings **25** when the parts are assembled. As shown, the projections **26** are formed in the lower plate **18** by slitting it along straight lines **27** and pressing the material of the plate downward therefrom to form the projections **26**.

When the fastening pieces and frame elements are initially put together the resilient projections **26** will snap into the openings **25** resiliently to hold them assembled so that they can be handled more easily until the fastening bolts are inserted.

When the parts are assembled the edges of the flanges of channel **22** will engage the inner surfaces of the end plates **16** on the elements as seen at the lower part of Figure 3. The elements and fastening pieces which are then yieldingly held together by the resilient projections **26** are placed between the flanges **12** of the legs. At this time, tension fastenings such as bolts **28**, are inserted through openings in the center flat panels **14** of the legs and through the openings **24**. Nuts **29** are threaded on the bolts and may be drawn up tight to bring the parts to their fully assembled position as shown in Figure 4.

As the bolts are drawn up the flanges **12** of the legs will be pressed outward so that they engage the outer surfaces of the elements **10** with a tight yielding pressure. The edges of the channel strip **22** will press against the end plates **16** to force them into flat abutting relation with the shoulders **13** as seen in Figure 4. At this time the parts are all drawn tightly together with the flat end plates **16** abutting the flat shoulders **13** and with the flanges **12** pressing tightly against the outer surfaces of the elements **10** which are also engaged by the edges **19** of the end plates **18** to be securely held. The extension of the plates **18** over the flanges of the channel **22** reinforces and strengthens the channel so that it will not spread in response to the load applied thereto, and so that an extremely rigid structure is provided. It has been found that when the bolts are drawn up tightly the assembly is comparable in strength and rigidity to a welded assembly but can be completely disassembled for storage and shipping in small compact packages. Furthermore, the assembly operation is an extremely simple one which can be performed easily with the use of only a simple wrench.

While one embodiment of the invention has been

shown and described in detail, it will be understood that this is illustrative only and is not to be taken as a definition of the scope of the invention, reference being had for this purpose to the appended claims.

What is claimed is:

1. In a tension bolted frame construction, a leg formed of sheet metal, said leg comprising flat edge flanges lying at an angle to each other, integral flat shoulders projecting inward at right angles to the flanges at points spaced from the edges of the flanges, and an integral flat panel joining the inner edges of the shoulders, a pair of elongated frame elements lying at substantially the same angle to each other as the flanges and terminating in straight end plates at right angles to the outer surfaces of the elements to seat against the shoulders respectively with the outer surfaces of the elements against the inner flat surfaces of the flanges, a fastening piece having angularly related straight sides engaging the inner surfaces of the frame elements and an outwardly opening channel at the juncture of the sides to receive the end plates with the edges of the channel fitting respectively into the angles between the inner surfaces of the frame elements and the end plates, and a tension fastening connecting the flat panel to the fastening piece to draw all of the parts tightly together.

2. In a tension bolted frame construction, a leg formed of sheet metal, said leg comprising flat edge flanges lying at an angle to each other, integral flat shoulders projecting inward at right angles to the flanges at points spaced from the edges of the flanges, and an integral flat panel joining the inner edges of the shoulders, a pair of elongated frame elements lying at substantially the same angle to each other as the flanges and terminating in straight end plates at right angles to the outer surfaces of the elements to seat against the shoulders respectively with the outer surfaces of the elements against the inner flat surfaces of the flanges, a fastening piece including an outwardly opening channel to receive the end plates with the edges of the channel fitting respectively into the angles between the inner surfaces of the frame elements and the end plates and top and bottom stiffening plates secured to the ends of the channel and having angularly related straight sides engaging the inner surfaces of the frame elements, and a tension fastening connecting the flat panel of the leg to the fastening piece to draw all of the parts tightly together.

3. In a tension bolted frame construction, a leg formed of sheet metal with flat edge flanges lying at an angle to each other, integral flat shoulders projecting inward at right angles from the flanges, and an integral flat panel joining the inner edges of the shoulders, a pair of elongated frame elements channel shaped in section with the channels opening inward and lying at substantially the same angle to each other as the flanges, inwardly turned flat end flanges on the webs of the elements normal to their length to seat against the shoulders respectively with the outer surfaces of the webs against the inner surfaces of the leg flanges, a fastening piece including an outwardly opening channel to receive the end flanges on the elements with the edges of the channel fitting respectively into the angles between the sides of the frame elements and the end flanges and top and bottom stiffening plates secured to the ends of the channel and lying between and adjacent to the edge flanges on the elements and having

angularly related straight sides to engage the inner surfaces of the webs of the frame elements, and a tension fastening connecting the flat panel of the leg to the fastening piece to draw all of the parts together, and resiliently interengaging parts on one of the plates and one of the edge flanges of the elements to hold the parts assembled prior to mounting of the tension fastening.

4. A bolted frame construction comprising a leg formed of sheet metal with flat edge flanges lying at an angle to each other, integral shoulders projecting inward at right angles to the flanges at points spaced from the edges of the flanges, and an integral panel joining the inner edges of the shoulders, a pair of elongated frame elements lying at substantially the same angle to each other as the flanges and terminating in straight end plates at right angles to the outer surfaces of the elements and seating against the shoulders respectively with the outer surfaces of the elements against the inner flat surfaces of the flanges, a fastening piece of generally triangular shape having straight sides at the same angle to each other as the frame elements and engaging the inner surfaces of the frame elements, the fastening piece being notched at the apex of the triangular shape to provide a pair of outwardly facing edges near the juncture of the sides fitting respectively into the angles between the inner surfaces of the frame elements and the end plates, and fastening means extending through the leg and the fastening piece and drawing them togeiher with the frame elements between them.

5. A bolted frame construction comprising a leg formed of sheet metal with flat edge flanges lying at an angle to each other, integral shoulders projecting inward at right angles to the flanges at points spaced from the edges of the flanges, and an integral panel joining the inner edges of the shoulders, a pair of elongated channel section frame elements mounted with their channel sections opening inwardly and with their webs lying at substantially the same angle to each other as the flanges of the leg, straight end plates extending inwardly at right angles to the webs of the frame elements seating against the shoulders respectively with the outer surfaces of the webs fitting against the inner flat surfaces of the flanges of the leg, a fastening piece including top and bottom generally triangular members whose sides are at the same angle to each other as the frame elements and vertical means joining the top and bottom members said plates being notched at the apex to provide a pair of spaced edges, the fastening piece fitting into the channel shaped frame elements with said sides engaging the inner surfaces of the webs and said edges fitting into the angles between the inner surfaces of the webs and the end plates respectively, and fastening means extending through the leg and the fastening piece and drawing them together with the frame elements between them.

References Cited in the file of this patent

UNITED STATES PATENTS

2,304,481	Shannon	Dec. 8, 1942
2,307,126	Green et al.	Jan. 5, 1943
2,330,766	Walstrom	Sept. 28, 1943
2,588,818	Franks	Mar. 11, 1952

OTHER REFERENCES

Product Engineering, page 106, May, 1950.