Sept. 20, 1932. T. A. LUCY 1,878,281

BAR JOIST

Filed Nov. 15, 1929

Fig. 1.

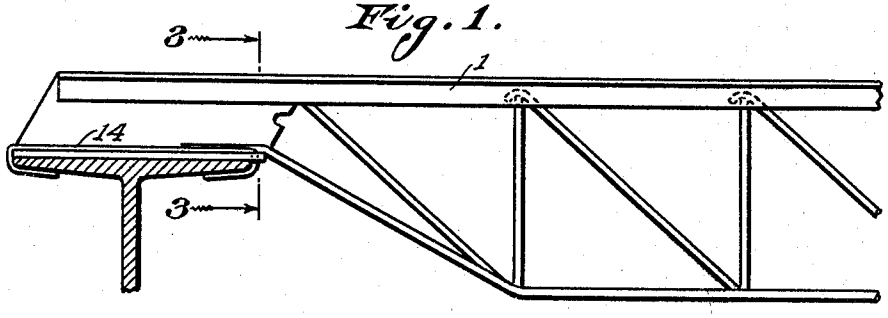


Fig. 2.

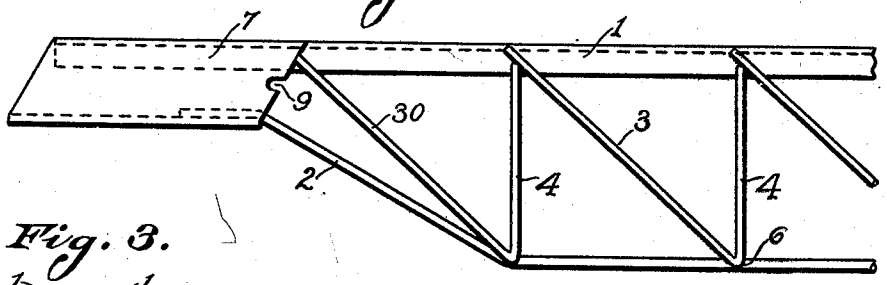


Fig. 3.

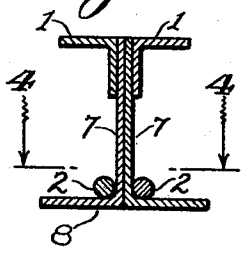


Fig. 4.

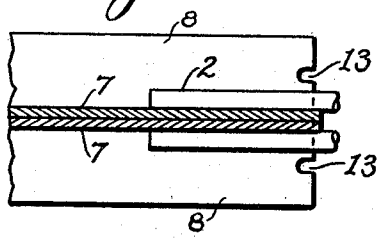


Fig. 5.

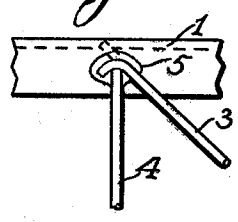


Fig. 6.

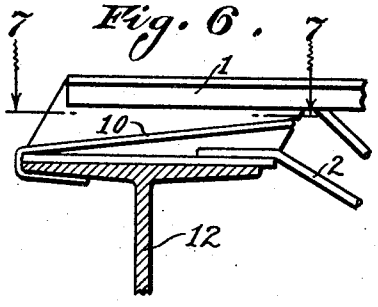


Fig. 7.

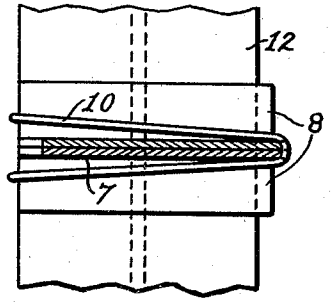
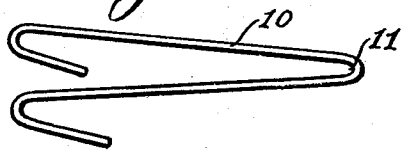


Fig. 8.



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UNITED STATES PATENT OFFICE

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BAR JOIST

Application filed November 15, 1929. Serial No. 407,310.

This invention pertains to building units commonly known as bar joists. Such a unit comprises an assemblage of rods or bars made up in the form of a truss and adapted to serve as a joist for buildings.

One of the objects of this invention is to provide a method of constructing a bar joist by which greater strength and rigidity may be obtained.

Another object is to provide a construction in which members of the joist are interlocked in such a way as to more securely support the forces exerted by such members.

Another object is to provide an improved bearing for the end of the joist.

Another object is to provide improved means for securing the joist to its supports.

Another object is to provide a construction in which the forces active in the joist are balanced with respect to its axial plane.

Another object is to provide a construction in which the end panel of the truss is strengthened.

Further objects will appear from the detail description taken in connection with the accompanying drawing, in which:

Fig. 1 is a side view of part of a bar joist embodying this invention;

Fig. 2 is a view showing the manner of assembling the elements of the joist preparatory to welding the same together; this view showing only one half of the joist along the longitudinal center line thereof

Fig. 3 is a section on line 3—3, Fig. 1;

Fig. 4 is a detail section taken along line 4—4 of Fig. 3;

Fig. 5 is a detail illustrating the manner in which the web members are secured to the top chord;

Fig. 6 is a detail, side view, showing the manner of securing the joist to its supports;

Fig. 7 is a section line 7—7, Fig. 6;

Fig. 8 is a detail of the end anchor.

In accordance with this invention the upper chord of the joist is formed of a pair of angle bars 1, so placed that one flange of each angle is horizontal and forms the upper bearing surface of the joist. The other flange of each angle extends downwardly and these two downwardly extending flanges are positioned on the inside of the chord or facing one another as shown in Fig. 3. The lower chord consists of a pair of rods 2. The web of the joist is made up of a series of units each comprising a bent rod providing a tension member 3 and a compression member or strut 4.

These elements are assembled as shown in Fig. 2, which represents a view taken through the center of the truss with one half of each of the upper and lower chords and half of the end bearing member removed. The web units are placed in position as shown with the bend between the rods of the lower chord and both upper ends between the vertical flanges of the angles 1 of the upper chord. The web members are then secured to the chord members by welding.

In welding the upper ends of the web members to the upper chord, the end of each tension member 3 having been placed so as to extend beyond the end of the strut 4, is heated so as to bend the same over the end of the strut 4 as illustrated in Fig. 5. This serves to lock the members 3 and 4 together so that both the pressure of the strut 4 and the tension of the member 3 are taken up by this interlocking connection. The interlocked ends are then secured to both angle bars of the upper chord by covering the same with welding metal 5 as indicated in Fig. 5. Thus the members 3 and 4 are not only interlocked with one another but are securely welded to the upper chord. The lower ends of the web members are welded at 6 of the lower chord.

In order to provide an end bearing for the joist, a pair of angle bars 7 is placed back to back with adjacent flanges engaging one another and extending between the ends of the vertical flanges of the upper chord members 1, as illustrated in Fig. 3. The other flanges 8 of the member 7 extend horizontally to form a bearing face adapted to rest on the support upon which the joist is placed. The members 7 are welded to the upper chord members 1, and the ends of the lower chord members 2 are bent upwardly and welded to the members 7 at the inner corner thereof, as indicated in Figs. 3 and 4.

In order to strengthen the end section of the joist, the tension member 30 of the last

web unit is bent upwardly and secured to the upper chord at the inner end of the bearing member 7. This provides an extra tension member at this part of the truss where the load is greatest.

In order to more securely anchor the truss to its supports, the members 7 are each provided with a notch 9 on its inner edge near the upper chord. A looped anchor member 10 is formed as shown in Fig. 8, except that its open ends are left straight until after the anchor has been placed in position. The anchor is applied by placing the bight 11 in engagement with the notch 9 as indicated in Fig. 6. The free ends of the anchor extend over the edge of the supporting element 12 which carries the joist. The element 12 may be a girder or wall or any other support on which the joists are placed. The free ends of the anchor 10 are then bent downwardly over the edge of the support so as to secure the latter against slipping on the support.

Another way of anchoring the joist is to provide notches 13 in the rear edges of the horizontal flanges of the members 7, as shown in Fig. 4. A pair of straight anchors may then be hooked into these notches and bent over the edge of the support, as shown in Fig. 1.

It will be seen, therefore, that this invention accomplishes its objects. A joist is provided which is very strong and rigid and in which the forces are balanced about its axial plane. The upper and lower chord members are symmetrical with respect to said plane and the web members are all placed centrally between the upper and lower chord members so as to lie in the axial plane. Accordingly, there will be no tendency for the joist to twist or buckle under load.

The method of securing the web members as illustrated in Fig. 5, forms a secure interlock in which the compression force of the strut 4 is brought directly against the tension of the member 3. This construction relieves the welded joint of a great deal of load on these members. The construction illustrated in Fig. 3 provides an ample bearing for the joist on its support and also provides a very rigid end capable of resisting distorting strain. The arrangement of the extra tension member 30 strengthens the end panel of the truss at a point where most trusses of this type are weak. The anchor construction illustrated in Fig. 6, not only securely anchors the joist to its support but applies a supporting anchorage near the upper extremity of the joist so as to reduce the positive stresses at the center thereof. Since the anchor 10 is secured to the web of the bearing member at a point near the upper extremity thereof, and in fact just below the upper chord, it is in position to exert a tension in the upper part of the joist. When the joist is put under load there is, of course, a tendency to sag and the upper chord has a compressive stress produced therein. The tendency to sag at the same time tends to draw the upper portion of the joist at its ends over the supports 12 inwardly toward the middle of the truss. In other words, there is a tendency to tip that part of the joist shown in Fig. 6 to the right. This tendency is resisted by the anchor 10 which exerts a tension in the opposite direction. This tension is applied near the upper extremity of the joist and along the upper chord. If the above mentioned compressive stress is considered positive, this tension induced by the anchor will be negative and thus tend to reduce the positive compressive stress acting in the upper chord.

While this truss has been described as a unitary structure, it will be understood that individual features, or sub-combinations thereof, are useful without reference to other parts of the structure and that the use of such features or subcombinations is contemplated by this invention, and is within the scope of the appended claims.

It is obvious that various changes may be made in details of construction, within the scope of the appended claims, without departing from the spirit of this invention. It is, therefore, to be understood that this invention is not to be limited to the specific details shown and/or described.

Having thus described the invention, what I claim is:

1. A bar joist comprising, an upper chord, member, a web secured thereto, a pair of lower chord members secured to said web on opposite sides thereof, a bearing member secured to said upper chord member at the end thereof, and a looped anchor member engageable with said bearing member near the upper extremity of said members at the bight of its loop with its ends extending beyond the end of the joist to be bent on a support.

2. A bar joist having a chord member and a web including tension and compression members, characterized by the feature that the end of said tension member is bent over the end of said compression member and welded to said chord member.

3. A bar joist, comprising, a pair of upper chord members, a pair of lower chord members, and a plurality of separate web units each formed to provide a tension member and a compression member, said web units being secured to said chord members between members of a pair so that the end of a compression member of one of said units receives and supports the tension member of an adjacent unit.

4. A bar joist, comprising, a pair of upper chord members, a pair of lower chord members, and a plurality of web units each formed to provide a tension member and a

compression member, said web units being welded to said chord members between members of a pair so that the end of a compression member of one of said units interlocks with the tension member of an adjacent unit at such weld.

5. In the art of making bar joists, the method comprising, assembling a chord member with a plurality of web members, heating the end of one of said web members so as to bend the same over the end of another web member to interlock said members, and welding said web members to said chord member at said bend.

6. In the art of making bar joists, the method comprising, assembling a chord member with a plurality of web members, heating the end of one of said web members so as to bend the same over the end of another web member to interlock said members, welding said web members to said chord member at said bend, and depositing the welding metal to cover said interlocked ends.

7. A bar joist, comprising, upper and lower chords, a web member secured to and connecting said chords, a bearing member secured to said upper chord at the end thereof, and an anchor engaging said bearing member near its upper extremity and inwardly of its bearing portion adapted for connection to a support.

8. A bar joist, comprising, upper and lower chords, a web member secured to and connecting said chords, a bearing member secured to said upper chord at the end thereof and having a recess near its upper extremity at its inner end, and an anchor engaging said recess and adapted for connection to a support.

9. In a bar joist, a web panel unit comprising a bar bent to form a single upright strut member and a single inclined tension member, one of said members being formed to interlock with the other member of an adjacent panel.

10. In a bar joist having upper and lower chords, a web panel unit comprising a single upright strut member and a single inclined tension member, said members being formed to interlock at the junctions of adjacent panels, and means securing said panel elements to said chords.

In testimony whereof I affix my signature this 25th day of October, 1929.

THOMAS A. LUCY.