

June 19, 1934.

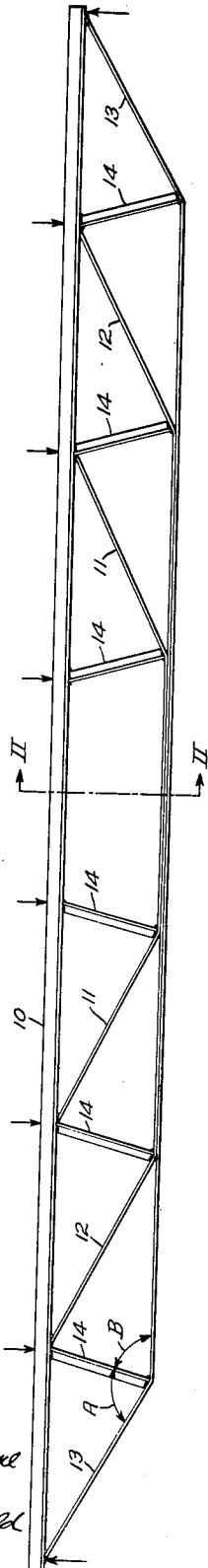
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1,963,184

WELDED TRUSS

Filed June 30, 1932

Fig. 1.



WITNESSES

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Fig. 3.

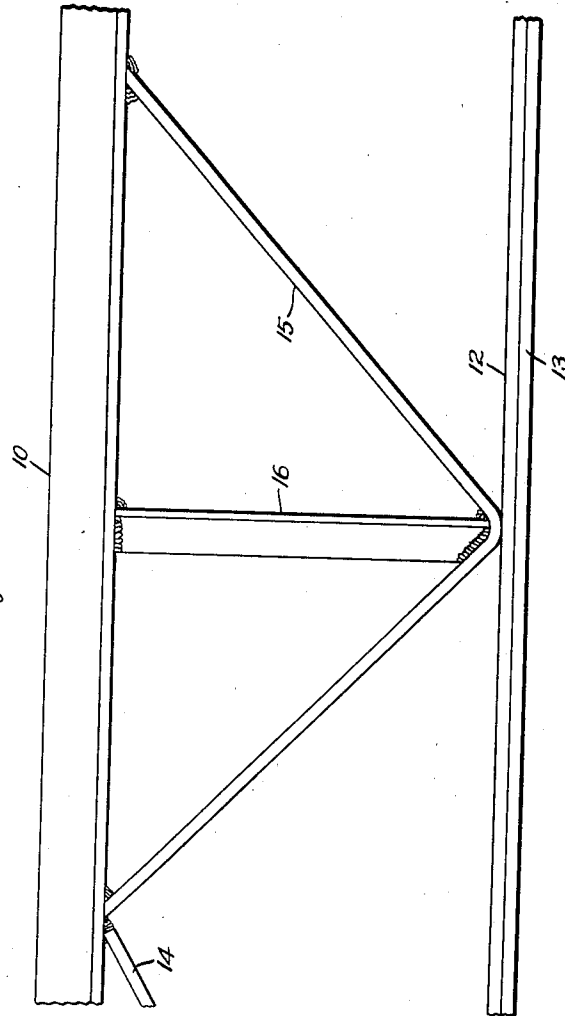
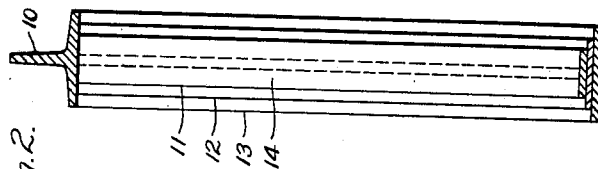


Fig. 2.



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WELDED TRUSS

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11 Claims. (Cl. 189—37)

My invention relates, generally, to building construction and it has particular relation to the fabrication of trusses to be used in building construction.

5 In the past, it has been customary in the construction of flat roofs and the like to use I beams for supporting the roof or to use a fabricated beam, the upper and lower chords of which are of uniform cross-sectional area. With this
10 type of construction, it is necessary to proportion the supporting member or truss to withstand the maximum stress, which occurs in the supporting member at the center when it is symmetrically loaded, and to use the same size of members not
15 only at the location of maximum stress but also to use the same size of members at other points where the stress is considerably less. Thus, it is necessary to use a greater amount of material than would be necessary if all of the sections
20 forming the support for the desired load were designed to be uniformly stressed.

It is, therefore, an object of my invention to provide a fabricated truss which shall be of minimum weight to withstand a given load and which
25 may be readily and economically manufactured and installed in position.

The principal object of my invention is to provide for uniformly distributing the stresses in the members of a fabricated truss.

30 Another object of my invention is to provide for uniformly stressing an under chord member of a truss throughout its entire length.

Still another object of my invention is to provide for a minimum number of tension members
35 in a truss.

Other objects of my invention will, in part, be obvious and, in part, appear hereinafter.

My invention, accordingly, is disclosed in the embodiment hereof shown in the accompanying
40 drawing, and comprises the features of construction, combination of elements and arrangement of parts which will be exemplified in the construction hereinafter set forth, and the scope
45 of the application of which will be indicated in the appended claims.

For a more complete understanding of the nature and scope of my invention, reference may had to the following detailed description taken in connection with the accompanying drawing,
50 in which:

Figure 1 is a view, in side elevation, of a truss constructed in accordance with this invention; Fig. 2 is an enlarged sectional view taken along the line II—II of Fig. 1, and

55 Fig. 3 is a fragmentary view of a modification

of the truss shown in Fig. 1 showing the center panel only.

Referring now to Figs. 1 and 2 of the drawing, the truss there shown comprises an upper chord 10 of webbed beam construction in the form of
60 an inverted T. As will be readily understood the upper chord 10 is stressed in compression when the truss is loaded. The upper chord 10 may be of the customary rolled construction which is easily obtainable from the manufac-
65 turers of structural steel. While the upper chord 10 is illustrated as having a T section, it will be readily apparent that it may be of any other suitable section such as an I section or the like. However, it is preferable to use the T section
70 in the embodiment of the invention illustrated in the drawing.

In order to provide the desired rigidity in the truss, lower chords 11, 12 and 13 are provided and are secured at spaced intervals to the under
75 side of the chord 10, as illustrated. The lower chords 11, 12 and 13 are of continuous strap construction having a rectangular cross-section. Each of the lower chords is provided with a centrally located straight portion having the ends
80 bent upwardly at uniform angles to meet the under side of the upper chord 10.

The lower chord 11 is centrally located along the upper chord 10. Each succeeding chord, 12 and 13, is disposed in overlapping relation around
85 the centrally located chord 11 so that the distance between each successive joint of the lower chords 11, 12 and 13 with the upper chord 10 is the same.

The load which may be applied to the upper chord 10, as indicated by the arrows, is trans-
90 mitted to the lower chords 11, 12 and 13 by means of struts 14. The struts 14 are preferably of T section since this shape lends itself readily to fabrication. However, a channel section may
95 also be used to advantage for the strut 14.

The lower chords 11, 12 and 13 and the struts 14 are preferably secured together and to the upper chord 10 by means of arc welded joints. While a riveted joint may be used in practicing the invention, the particular form of construction
100 of the truss does not lend itself readily to this type of joint and, therefore, its use is not feasible. The arc welded joint provides a very cheap and strong connection between the elements of the truss and fashions it into an integral structure of
105 minimum weight for a given loading.

It will be observed that the lower chords 11, 12 and 13 will be stressed in tension when the truss is loaded as indicated by the arrows. It is desirable to apply the tension stress to these low-
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er chords 11, 12 and 13 uniformly throughout their length. The desired uniform stressing of the lower chords 11, 12 and 13 is obtained by positioning the struts 14 to bisect the angle formed between the straight central portion and the upwardly turned ends of the lower chords 11, 12 and 13.

As is particularly shown in the drawing at the left hand end of the truss, the angles A and B are equal. With this form of construction, any stress which occurs in the bent portion of the lower chord 13 is transmitted undiminished to the remaining portion thereof. The struts 14 are then subject only to a compressive force and no torsional stress is applied thereto.

While a single strut 14 is illustrated in the drawing, it will be readily apparent that two or more angularly disposed struts may be used in place of a single strut 14, as is desired, when the load applied to the upper chord 10 is distributed at a greater number of points than are indicated in the embodiments illustrated.

The joints formed at the junction of the lower chords 11 and 12 and the struts 14 are so arranged that the lines through the centers of gravity of the bent portions of the lower chords 11 and 12 and of the struts 14 intersect along the center of gravity of the upper chord 10. With this form of construction, it is possible to transmit the stresses from the upper chord 10 to the lower chords 11 and 12 and the struts 14 with the application of a minimum of torsional stress.

In the event that it is desired to provide a truss having an equal number of panels in place of the truss having an unequal number, as is illustrated in Fig. 1 of the drawing, the construction illustrated in Fig. 3 may be used.

In the construction illustrated in Fig. 3, a lower chord 15 is bent at its center thereby providing no straight portion as shown in Fig. 1 in the lower chord 11. A single strut 16 may then be used to transmit the load from the upper chord 10 to the lower chord 15 in place of the two struts 14 used for transmitting the load to the lower chord 11. When the single strut 16 is used, it is located at right angles to the upper chord 10 since, in this position, a minimum of torsional stress will be applied thereto.

It will be readily apparent to those skilled in the art that the total stress applied to the lower chord 12 is greater than that applied to the lower chord 11. Likewise the total stress that is applied to the lower chord 13 is greater than that applied to the lower chord 12. It will also be apparent that none of the stress which is applied to any one of the lower chords 11, 12 or 13 is applied to any of the other chords. Therefore, each lower chord member may be proportioned to withstand the stress applied thereto without reference to the stress in any of the other lower chord members.

As illustrated more clearly in Fig. 2 of the drawing, the cross-sectional area of each succeeding lower chord member after lower chord 11 may be increased to withstand the stress applied. Thus, each lower chord member may be proportioned to withstand the stress applied thereto and, further, no more material than is necessary need be used for each lower chord member. At the center of the lower chord members, where the maximum stress is applied, the maximum amount of material is also present with this type of construction and, as the applied stress decreases towards the ends of the truss, the

amount of material present decreases somewhat in proportion thereto.

While a truss has been illustrated and described comprising three lower chords, namely 11, 12 and 13 and a modification thereof as shown in Fig. 3, it will be evident that various other modifications of the invention may be fabricated without departing from the scope of the invention. It will also be apparent that this invention may be practiced in connection with the use of a greater or lesser number of panels by increasing the number of lower chord members that are used. Therefore, it is intended that all matter contained in the above description or illustrated in the accompanying drawing shall be interpreted as illustrative and not in a limiting sense.

I claim as my invention:

1. A truss for use in building construction comprising an upper chord, and a plurality of under-running continuous lower chords secured at the ends of the under side of the upper chord and spaced therefrom by separate strut means having column sections, each succeeding lower chord having a different cross-sectional area than the preceding lower chord to permit a uniform stress distribution in the lower chords.

2. A truss for use in building construction comprising an upper chord, a plurality of lower chords secured to the upper chord, the cross-sectional area of each lower chord being substantially proportional to the stress applied thereto, and a plurality of pairs of separate struts having column sections, each pair of struts being individual to one of the lower chords and interposed between the upper and lower chords.

3. A truss for use in building construction comprising an upper chord, a plurality of individual lower chords secured to the upper chord at spaced intervals along its under surface, the cross-sectional area of each lower chord being substantially proportional to the stress applied thereto, and a plurality of pairs of separate compression members having column sections, each pair being individual to one of the lower chords and interposed between the upper chord and each of the lower chords.

4. In building construction, a truss comprising an upper chord, a plurality of continuous tension members secured at the ends to the upper chord at spaced intervals, the cross-sectional area of each tension member being substantially proportional to the stress applied thereto, and a plurality of separate compression members having column sections interposed between the upper chord and the tension members for spacing them apart and transmitting the load applied on the upper chord to the tension members.

5. A truss for use in building construction comprising a continuous upper chord of webbed beam construction serving as a compression member, a plurality of continuous lower chords of flat plate construction serving as tension members, the cross-sectional area of each lower chord being substantially proportional to the stress applied thereto, each of the lower chords being of different length and secured at the ends at spaced intervals to the underside of the upper chord and overlapping each successive lower chord, and a plurality of struts of webbed beam construction serving as compression members to space the upper and lower chords apart.

6. A truss for use in building construction comprising an upper chord of webbed beam construction, a lower chord comprising a plurality of overlapping continuous members welded to the

underside of the upper chord, and a plurality of struts having column sections interposed between the underside of the upper chord and the members of the lower chord and welded thereto, the cross-sectional area of each succeeding member of the lower chord being different than the cross-sectional area of the preceding member to permit a uniform distribution of the stress in each member.

7. A truss for use in building construction comprising an upper chord of inverted T section, a plurality of lower chords of rectangular cross-section and of different length secured in overlapping relation with each succeeding chord at the ends at spaced intervals to the underside of the upper chord, each of the under chords having a straight central portion and a bent portion at each end and each successive chord being smaller in cross-sectional area than the preceding chord, and a plurality of struts of webbed beam construction interposed between the underside of the upper chord and the lower chords, each of the struts being positioned to bisect the angle formed between the straight portion and the bent portion of each lower chord to permit a uniform stress distribution throughout the entire length thereof.

8. A truss for use in building construction comprising an upper chord, a plurality of overlapping lower chords of different lengths, each of the lower chords having a centrally located straight portion and a bent portion at each end, the ends of each of the lower chords being welded to the underside of the upper chord at spaced intervals, and a plurality of struts interposed between the underside of the upper chord and the lower chords and welded thereto, each of the struts being positioned to bisect the angle formed between the straight portion and the bent portion of each lower chord to permit a uniform stress distribution throughout the entire length.

9. A truss for use in building construction comprising an upper chord of webbed beam construction, a lower chord comprising a continuous strap of rectangular cross-section secured at the

ends in a central position on the under side of the upper chord and spaced from the underside of said upper chord midway the ends thereof by separate strut means having a column section, and a plurality of additional lower chords symmetrically disposed in overlapping relation around the centrally located lower chord and spaced from the upper chord by additional strut means, each succeeding lower chord being of larger cross-sectional area than the preceding chord to permit a relatively uniform stress distribution in each of the lower chords.

10. A truss for use in building construction comprising an upper chord of webbed beam construction, a lower chord comprising a continuous strap of rectangular cross-section secured at the ends in a central position on the under side of the upper chord and spaced therefrom at its center by a single strut having a column section, and a plurality of additional lower chords symmetrically disposed in overlapping relation around the first mentioned lower chord and spaced from the upper chord by a pair of struts individual to each additional lower chord, each succeeding lower chord being of larger cross-sectional area than the preceding chord to permit a relatively uniform stress distribution in each of the lower chords.

11. A fabricated member for use in building construction or the like comprising, in combination, an upper chord member of webbed beam construction, a plurality of rectangularly shaped overlapping lower chord members secured to the underside of said upper chord member, the cross sectional areas of said lower chord members being proportioned to permit the application of substantially uniform unit stress thereto, and a plurality of pairs of separate strut members having column sections, said pairs of strut members being individual to each of said lower chord members and disposed between the upper and lower chord members for transmitting stress therebetween.

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