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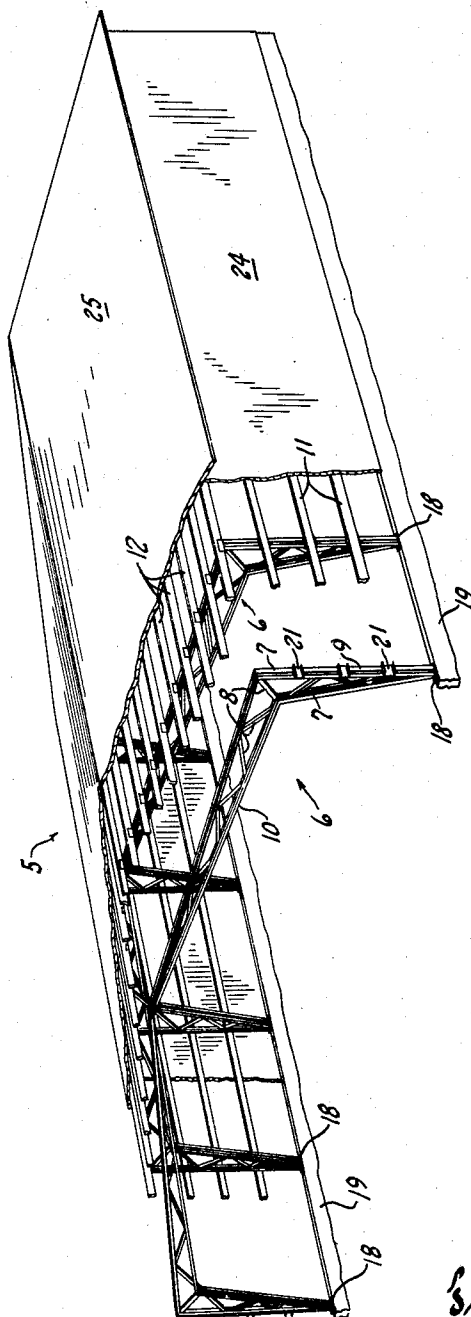
2,904,139

METAL BUILDING FRAME TRUSS UNIT

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3 Sheets-Sheet 1

Fig. 1.



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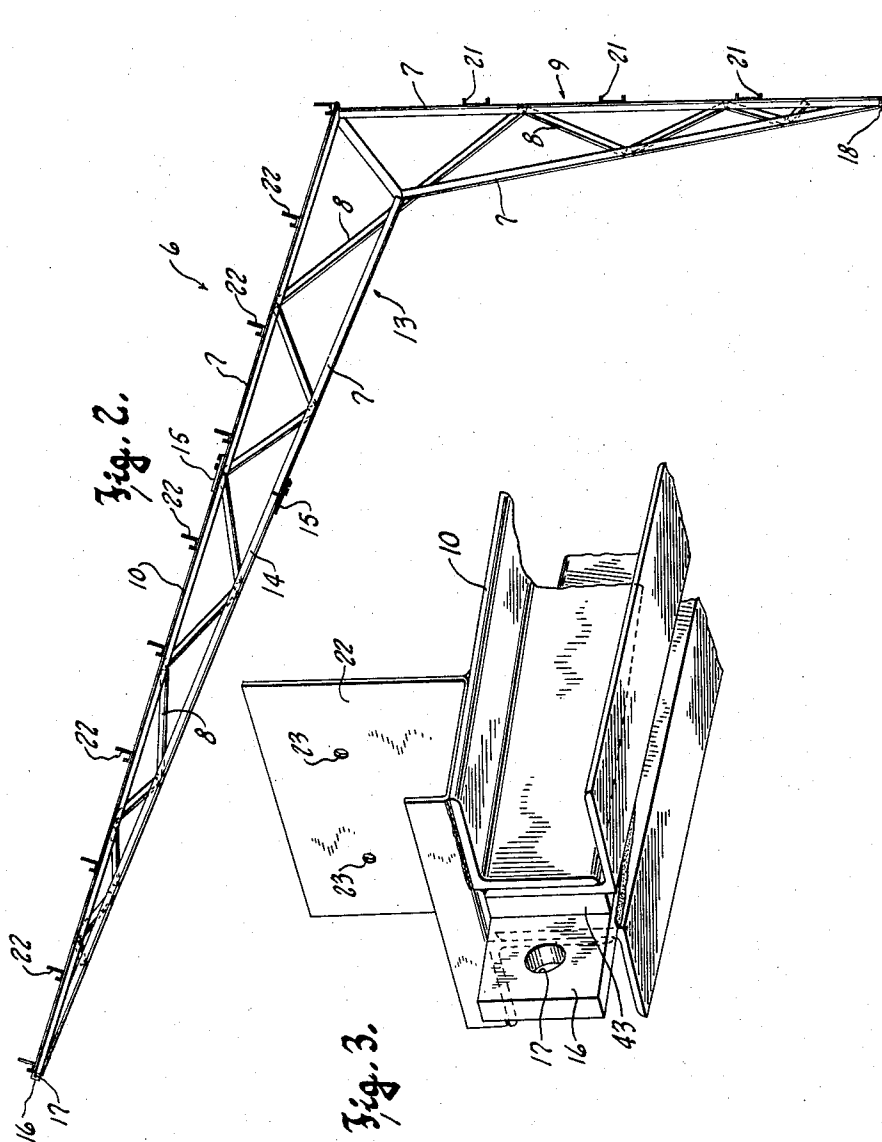
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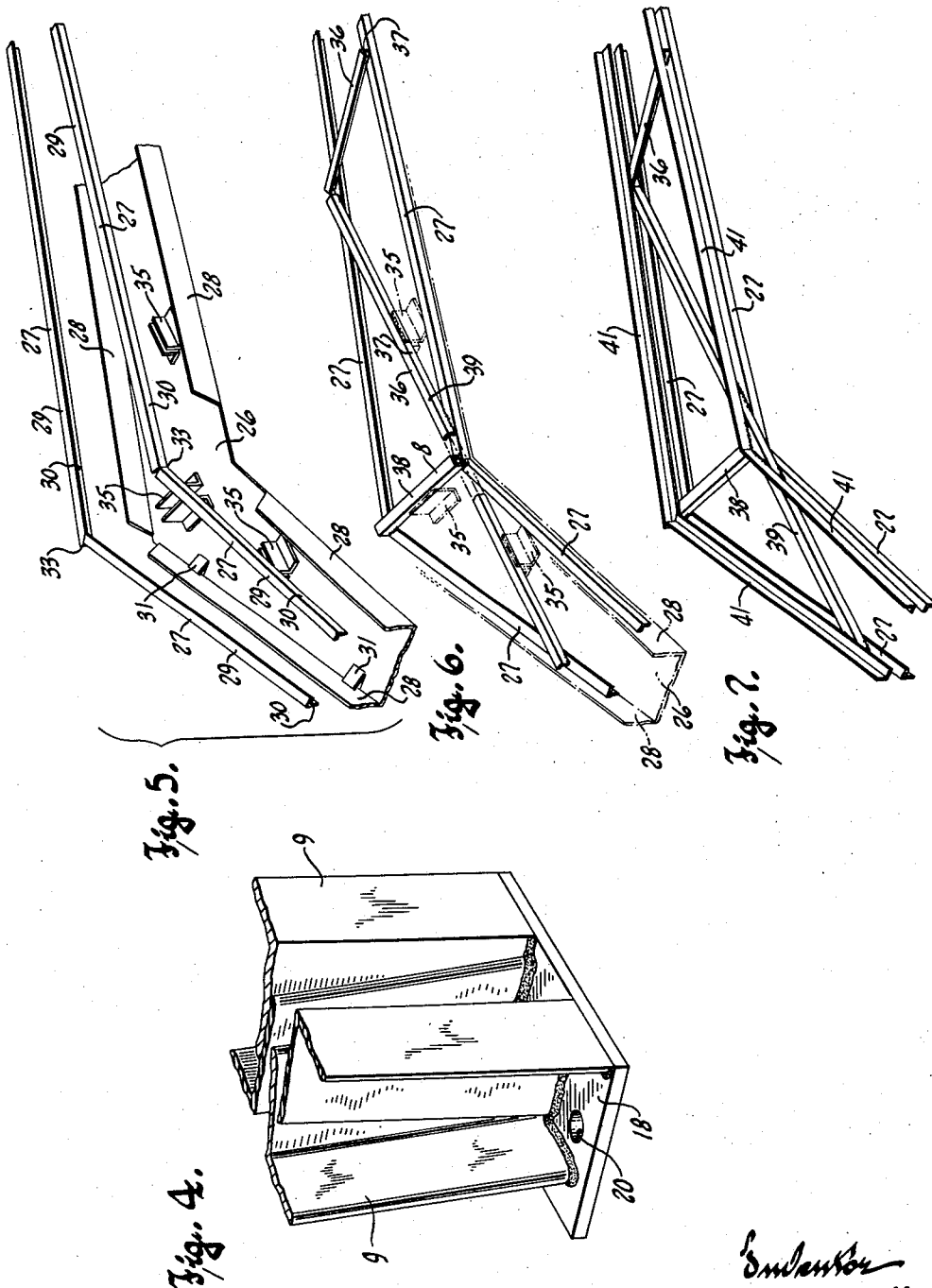
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METAL BUILDING FRAME TRUSS UNIT

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METAL BUILDING FRAME TRUSS UNIT

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2 Claims. (Cl. 189—1)

This invention relates to metal frames for buildings such as warehouses and sheds, and refers more particularly to a building frame truss unit comprising spaced apart chords connected by transverse ties and providing a wall supporting column portion and a roof supporting rafter portion.

It is an object of this invention to provide a truss type building frame unit having elongated chords connected by transverse ties, wherein both the chords and ties are formed of L-section members and wherein the ties are disposed substantially on the median plane of the unit so that loads imposed upon the unit exert substantially uniform strains thereon at both sides of its median plane, and so that the thickness of the structural member is relatively great, thus minimizing the possibility of lateral bending or twisting of the unit.

Another object of this invention resides in the provision of a building frame truss unit of the character described which may be fabricated with a minimum of labor from L-section members welded together to provide elongated chords and connecting ties, and which unit may be inexpensively manufactured without the necessity for removing it from the fixture in which it is held for welding until it is completely finished.

Still another object of this invention resides in the provision of a method of fabricating a building frame truss unit of the character described whereby the unit may be welded together from L-section members held in a fixture, without the necessity for removing the partially finished unit from the fixture at any stage during its fabrication, prior to its completion, and without the need for making "overhead" welds or welds in locations which are difficult to get at.

With the above and other objects in view, which will appear as the description proceeds, this invention resides in the novel structure and method by which it is made, substantially as hereinafter described and more particularly defined by the appended claims, it being understood that such changes in the precise embodiment of the hereindisclosed invention may be made as come within the scope of the claims.

The accompanying drawings illustrate one complete example of the method and the physical embodiment of the invention constructed according to the best mode so far devised for the practical application of the principles thereof, and in which:

Figure 1 is a perspective view of a building with portions of its walls and roof cut away to illustrate the manner in which they are supported by truss unit frames of this invention;

Figure 2 is a side elevational view of one of the building frame truss units per se of this invention;

Figure 3 is a fragmentary perspective view of the upper end portion of the truss unit;

Figure 4 is a fragmentary perspective view of the lower end portion of the truss unit;

Figure 5 is a fragmentary perspective view showing a fixture in which the unit of this invention may be assembled, with chord members in position to be placed in the fixture for the first step in fabricating the truss unit;

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Figure 6 is a fragmentary perspective view corresponding to Figure 5 but showing a portion of the truss unit at an intermediate stage of its fabrication; and

Figure 7 is a view similar to Figure 6 but showing a portion of the truss unit in substantially finished form and removed from the fixture.

Referring now more particularly to the accompanying drawings in which like numerals designate like parts throughout the several views, the numeral 5 designates generally a building, such as a garage, shed or warehouse, incorporating building frame truss units of this invention, designated generally by 6. Each truss unit comprises an upright column portion 9 and a straight roof supporting rafter portion 10 connected to the upper end of the column portion and defining an obtuse angle therewith. Both the column and rafter portions 9 and 10 are of truss-like construction, and comprise elongated chords 7 connected and braced by ties 8.

The building frame comprises a number of such truss units extending across the building and spaced along its length, together with lengthwise extending girth strips 11 and purlins 12. To facilitate transportation of the frame members, each has its rafter portion 10 constructed in two sections, namely an inner section 13 adjacent to and permanently joined to the top of the column portion 9, and an outer section 14 detachably connected to the inner section 13. Preferably the length of the outer section 14 is about twice that of the inner section 13 which is integral with the column portion 9, so that the outer rafter section 14 will be of about the same size as the remainder of the truss unit. The rafter sections 13 and 14 may be fastened together in endwise abutting relationship by means of tie plates 15 on their chords welded to one of the rafter sections and bolted to their adjoining rafter sections.

It will be observed that the frame units extend across the building in pairs, the units at opposite sides of the roof centerline being identical with one another, and the outer ends of the rafter sections 10 being joined to one another at the roof centerline. For this purpose an upper tie plate 16 at the top of each unit provides for its connection with a similar tie plate on a mating unit at the opposite side of the building, as by means of a bolt or similar fastener engaged in aligning holes 17 in said tie plates.

The lower end of the column portion of each unit is provided with a base plate 18 by which the unit may be secured to a suitable footing 19, as by means of studs projecting upward from the footing through holes 20 in the base plate. It will be seen that two truss units of this invention (each consisting of a column portion and connected inner and outer rafter sections) may be readily fastened together while lying flat on the ground, by means of a bolt through their flatwise overlying tie plates 16, and may be readily erected and secured to a footing.

Girth clips 21 on the outer chords of the column portions and purlin clips 22 on the upper chords of the rafter portions provide for attachment of girth strips and purlins, respectively, which may be ordinary 2 x 6 lumber or the like. Both the girth clips and the purlin clips comprise short channel shaped elements having their webs welded or otherwise secured to the chords with their flanges outermost. Nail holes 23 in the flanges facilitate attachment of the framing lumber. In the purlin clips 22 one flange of the channel is relatively short to clear a nail driven through the purlin from the other flange.

With the purlins and girth strips in place, any suitable sheet siding 24 and roofing 25 may be fastened thereto to finish the building.

Considering more specifically the novel truss unit of this invention, it is fabricated entirely from L-section

members, except for attachment fittings (clips, tie plates, etc.) and it has its tie members disposed substantially on its median plane, so that imposition of a load on the unit will not set up unevenly distributed strains therein which might twist or warp it, as would be the case if the ties were all disposed to one side or the other of the median plane.

The construction of the unit is readily understandable from the method of its fabrication disclosed in Figures 5 through 7, which, by way of example, show a column and inner rafter section in various stages of manufacture. A relatively simple channel-like fixture 26 may be used in fabricating this lower half of the unit. The fixture has upstanding legs or flanges 28 for supporting a first set of elongated chord forming members 27 inside the fixture in relative positions corresponding to those of the chords on the lower half of the finished unit, with one leg 29 of each chord member disposed in a common (preferably substantially horizontal) plane and with the other legs 30 of all of the other chord members projecting in the same direction (e.g. downwardly) therefrom, to lie flatwise against the inner surfaces of the flanges 28, and resting edgewise upon the bottom of the fixture. These chord members may be held in said positions by means of tabs 31 struck up from the base or bottom of the fixture and which co-operate with the flanges 28 thereof to confine the legs 30 of the chord members in the desired angular relationship.

It will be observed that the column and inner rafter sections of the lower half of the unit are defined by separate chord members edwise abutting one another at an obtuse angle, welded together at their junctions as at 33, with the chords of the column and inner rafter sections converging away from said junctions.

Shorter tie members 8 are next welded to the first set of chord members 27. The tie members are held in the fixture by means of clip like fingers 35 on the bottom thereof, with each tie member disposed with one of its legs 36 in a plane spaced above but parallel to the plane containing the legs 29 of the chord forming members and the other legs 37 of each tie member extending toward the latter plane. The downwardly projecting legs 37 of the several tie members are edgewise welded to the horizontal legs of the chord members therebeneath, at each end of each tie member, so that every tie extends between and is bonded to each set of converging chord members.

Since the tie member 38 which connects across the junctions 33 of the chord members is subjected to very large compressive loads, it is preferably fashioned from a pair of L-section members disposed adjacent to one another with their legs projecting in opposite directions and welded to form a hollow square section. To provide further rigidity and reinforcement at the corner defining the junction of the wall column and rafter portions, one tie member 39 extends straight and unbroken across the inner corner, being fastened at its ends to the outer chord members and at its middle to the apex of the inner chord members.

Fabrication of the lower half of the unit is completed in the fixture by welding a second set of chord members 41 to the ties, with the chord members of the second set disposed alongside those of the first set. The chord members comprising the second set thereof are arranged back to back with those of the first set or in other words each chord of the finished unit comprises two L-section members, each having one of its legs parallel to and spaced from a leg of the other, with the other legs of the two chord members extending in opposite directions from their parallel legs, and with the ties interposed between and welded to the parallel legs of both chord members.

It will be observed that because of the disposition of the ties, the second set of chord members may be welded directly to them without necessity for removing the unit

from the fixture and without the necessity for overhead or other difficult welding operations.

The tie plates, foot plate, and purlin and girth clips may of course be welded to the structure while it is in the fixture. The upper tie plate 16 should be disposed off-center, with one face thereof lying on the median plane of the structure, so that when the tie plate of another unit is secured to it the two units will have coinciding median planes and will not have to be warped or twisted during erection to provide a properly squared up structure. The correct position of the upper tie plate 16 can of course be obtained with a suitable spacer block 43.

The outer rafter sections are fabricated in similar fashion, in a fixture having locating and supporting flanges for the chord members, which flanges are entirely straight but converge toward one end of the fixture.

From the foregoing description taken together with the accompanying drawings it will be apparent that this invention provides a building frame truss unit having elongated chords and connecting ties, all formed from L-section material, wherein the ties are disposed substantially on the median plane of the unit, to preclude any tendency of the unit to twist or warp when a load is imposed thereon and to provide a relatively thick structural member which resists transverse bending forces; and wherein the units may be fabricated in fixtures to assure uniformity, without the necessity for removing them from the fixtures at any time during fabrication and without entailing "overhead" or other difficult welding operations.

What I claim as my invention is:

1. A building frame truss unit having chords and L-section ties forming a wall supporting column portion and a roof supporting rafter portion disposed at an obtuse angle to the column portion, the median planes of said portions coinciding, said truss unit being characterized by: the fact that each of the chords comprises a pair of spaced apart inner and outer L-section chord members, the inner chord members of the column and rafter portions being connected and the outer chord members of the column and rafter portions being connected, and each chord member having one of its legs disposed parallel to and spaced from said median plane and its other leg projecting away from said plane; and by the fact that the ties are interposed between and have portions of both legs thereof welded to both L-section members of each chord, with one leg of each tie flatwise engaging the first designated leg of one of the L-section members of each chord and edgewise engaging the first designated leg of the other L-section member of each chord and extending through said median plane, normal thereto, all of said first designated legs of the ties being disposed in a common plane; and further characterized by the fact that the junctions of the inner and outer chord members are connected by a hollow square section tie member rigidly welded thereto.

2. The truss unit of claim 1 further characterized by the fact that one tie extends straight and unbroken across the corner formed by the junction of the inner chord members and has its ends welded to the outer chord members of the two portions of the truss unit and its middle welded to the adjacent connected ends of the inner chord members, so that said tie is common to both the column and rafter portions of the truss unit.

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