Aug. 14, 1928. 1,680,976

H. F. FREASE

TRUSSED STRUCTURE

Filed Nov. 4, 1925 5 Sheets-Sheet 1

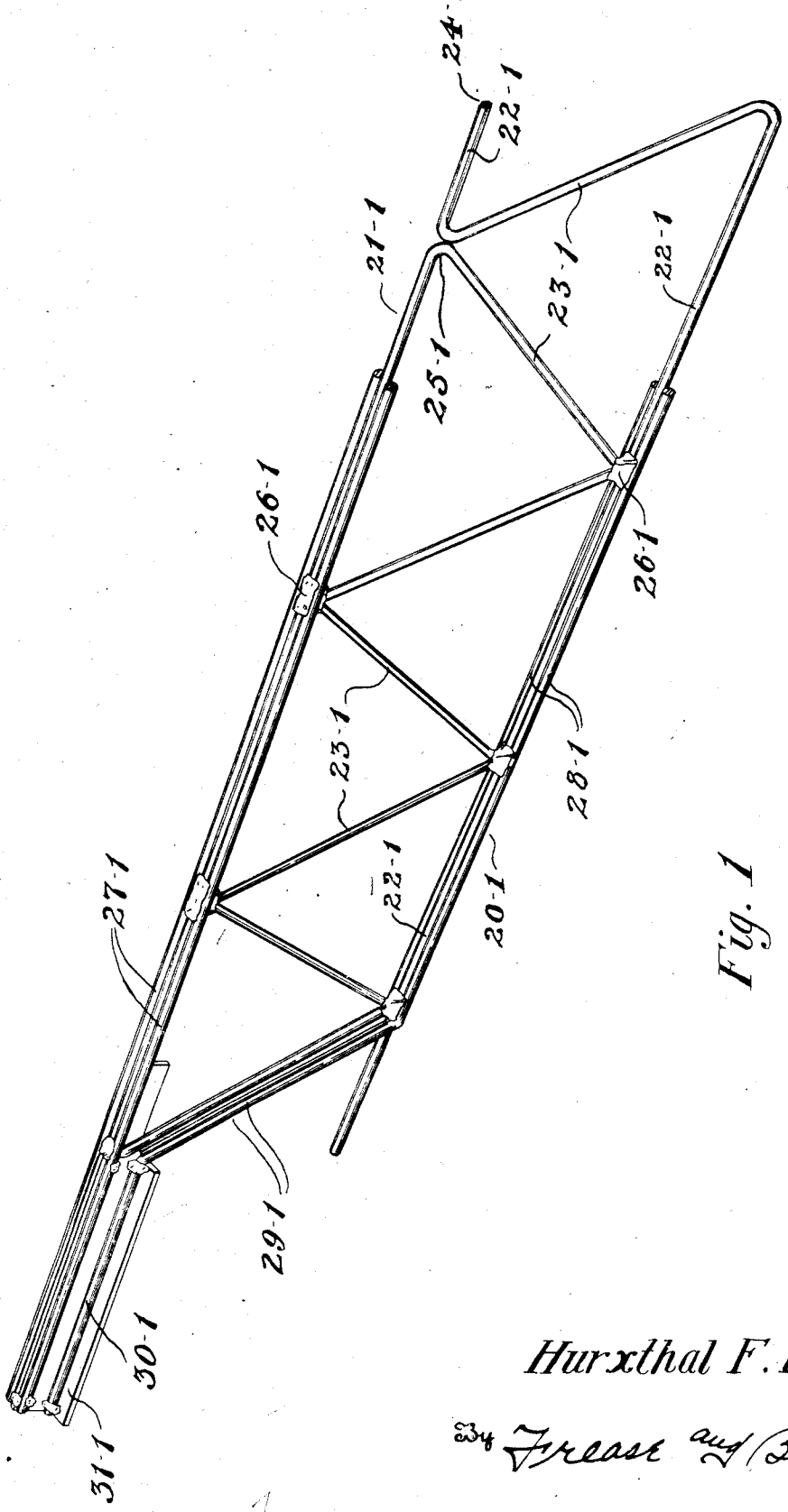

Fig. 1

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TRUSSED STRUCTURE

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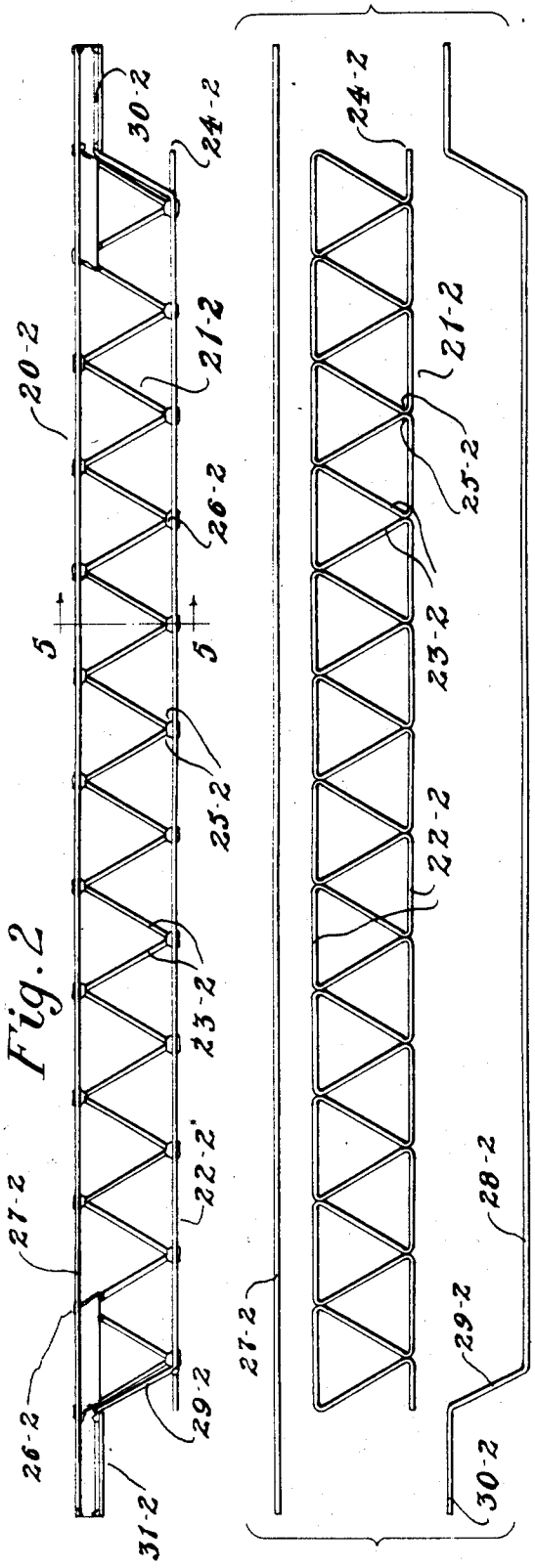

Fig. 2

Figs. 3

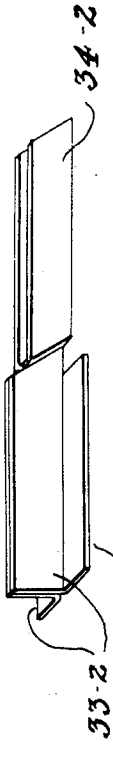

Fig. 4

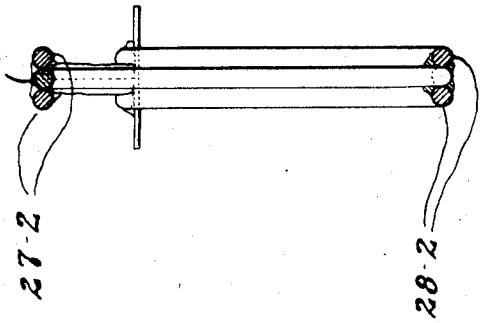

Fig. 5

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TRUSSED STRUCTURE

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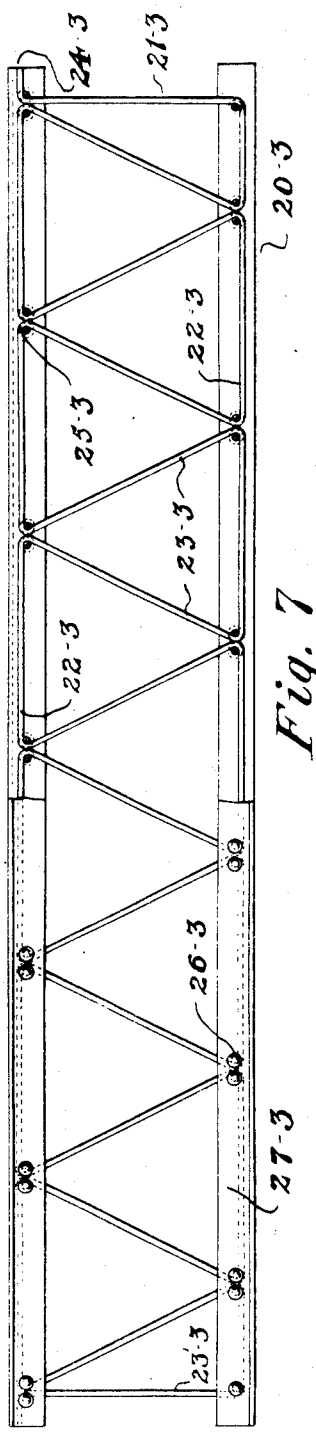

Fig. 7

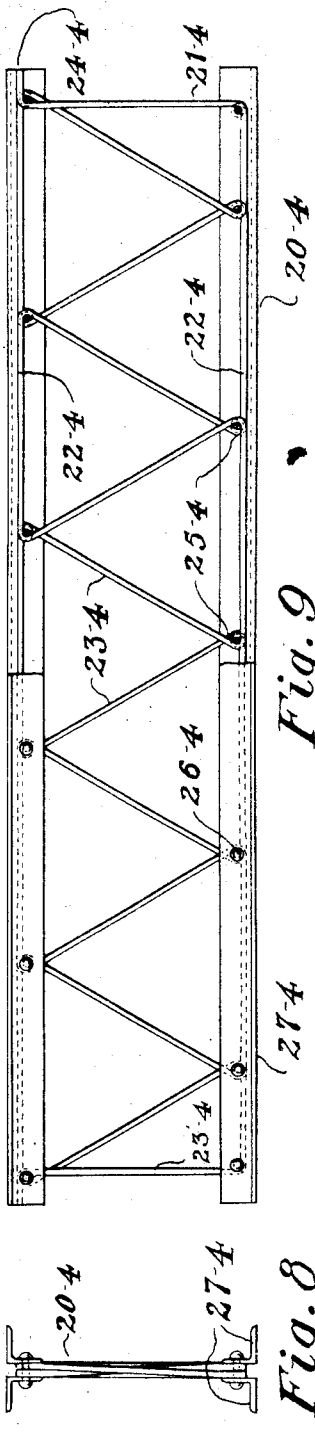

Fig. 9

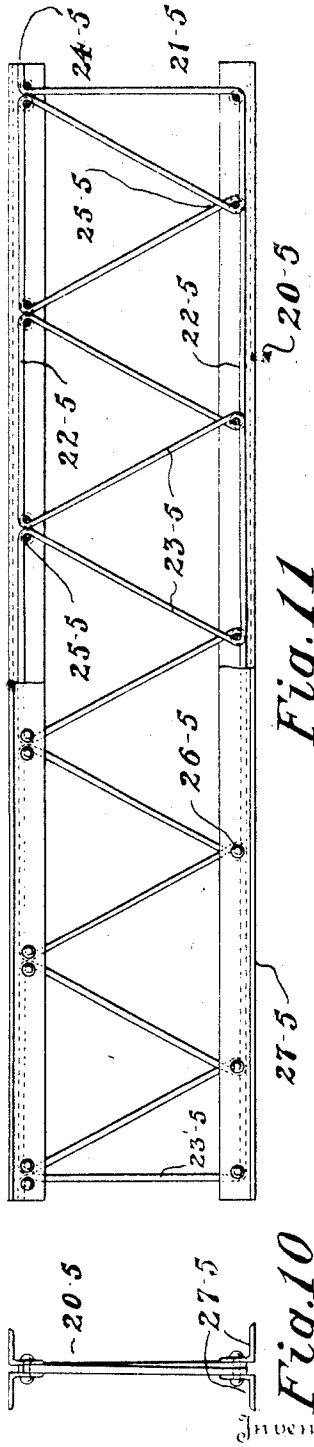

Fig. 11

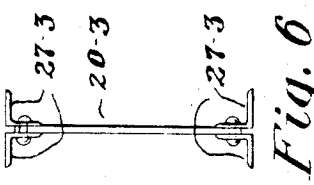

Fig. 6

Fig. 8

Fig. 10

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TRUSSED STRUCTURE

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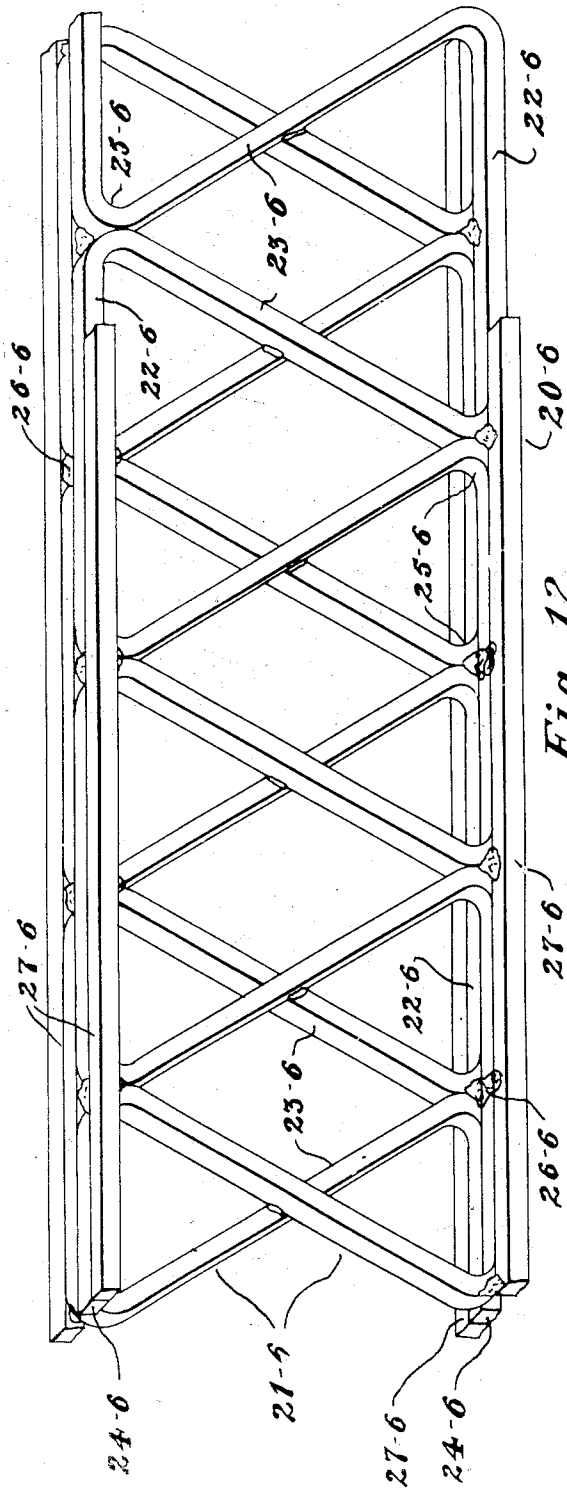

Fig. 12

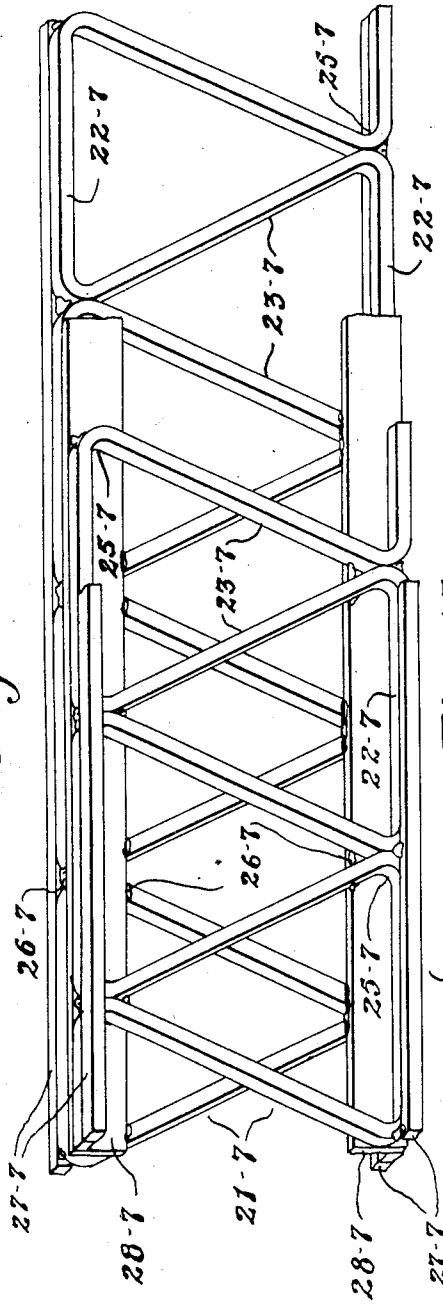

Fig. 13

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TRUSSED STRUCTURE

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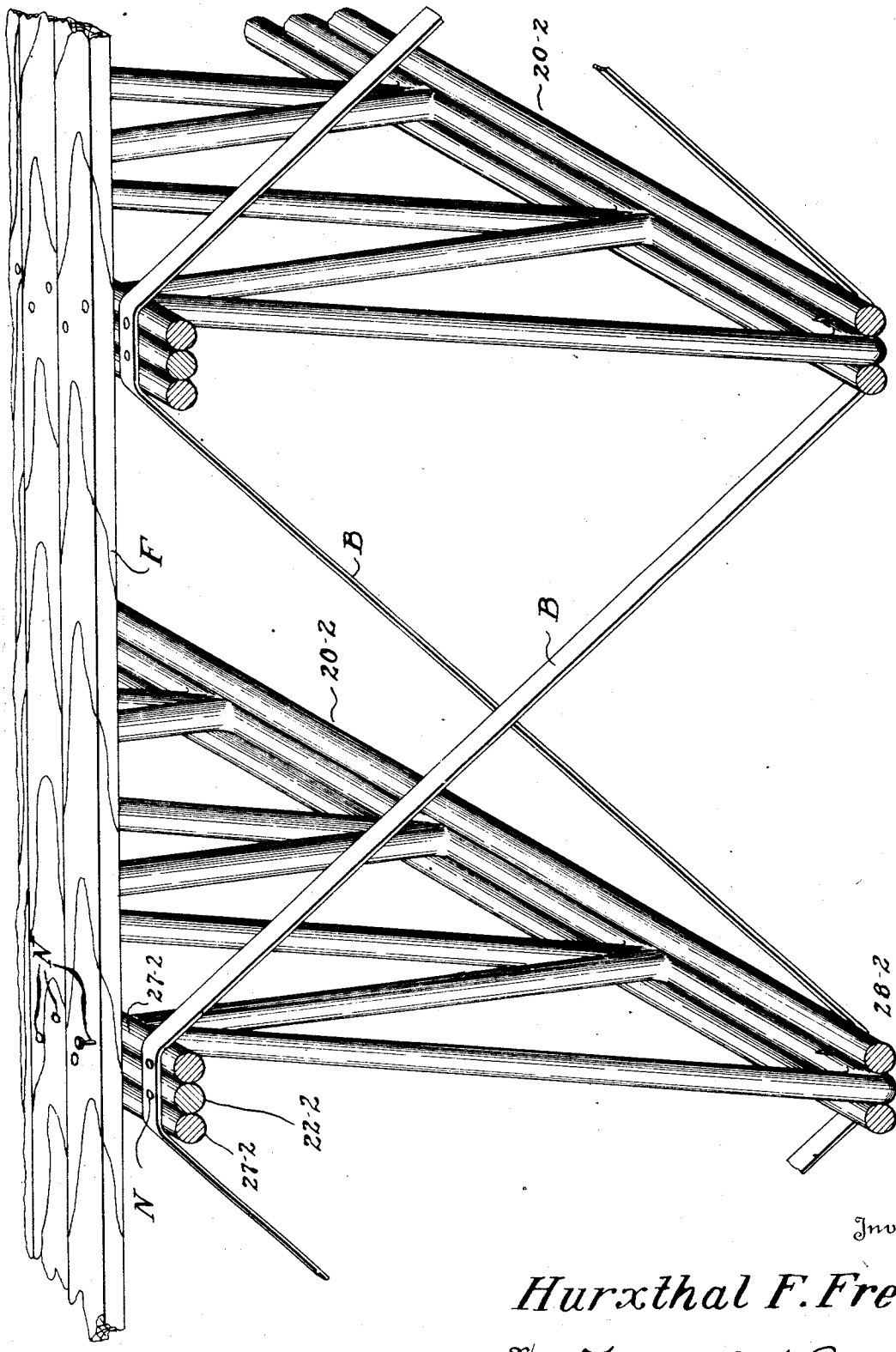

Fig. 14

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Patented Aug. 14, 1928. 1,680,976

UNITED STATES PATENT OFFICE.

HURXTHAL FIELD FREASE, OF CANTON, OHIO.

TRUSSED STRUCTURE.

Application filed November 4, 1925. Serial No. 66,847.

The invention relates to trussed structures having spaced chord members and connecting web members joined together, and more particularly to trussed structures having crossed-sectional outlines substantially similar to the outline of an I.

The structures of the present invention embody the improvements set forth in United States Letters Patent No. 1,526,463, issued on February 17, 1925, to George Hives Dawson and Hurxthal Field Frease, for trussed structures, and divisions thereof, together with other improvements set forth herein; and the objects of the invention are to provide trussed structures whose cross-sectional outlines are preferably substantially similar to the outline of an I, and having comparatively great transverse strength, and comparatively great lateral rigidity, and which may be nailed into directly.

Because of the relative magnitude and compact disposition of their chord portions, the trussed structures of the present invention may have greater transverse strength, and greater lateral rigidity and stability than have trussed structures of the same weight and similar outlines as ordinarily constructed, such as ordinary lattice girders made by riveting a plurality of separate lattice web bars between laterally and transversely spaced angle chord bars, or ordinary bar joists made by welding in old and well known manner a continuous zig-zag web formation between laterally and transversely spaced chord bars.

In the case of each of the above types of old construction, the laterally spaced arrangement of chord bars, with no intervening material to prevent lateral deflection of the separate chord bars, renders such structures laterally unstable and exceedingly liable to failure by lateral buckling.

Moreover, when it is desired, as is commonly the case, to nail flooring, sheathing, metal lath, and the like to such old types of metallic trussed structures, when used as beams or joists, or as columns or studding, it is first necessary to bolt or otherwise secure to the chord portions of such lattice girders and bar joists, wooden strips for receiving the nails, thereby increasing the cost of installation.

In metallic trussed structures made according to the present invention, however, nails may be driven directly into and secured in the chord portions without requiring the addition of wooden strips or other devices for receiving the nails.

The above and other objects and advantages are attained in the present invention by the use of one or more truss elements including spaced rows of chord members and connecting web members all formed from a single continuous strip, there being junction angles between the chord and web members, and one or more of the rows of chord members being fastened preferably at the junction angles to a plurality of laterally spaced chord bars extending alongside of and abutting a plurality of the chord members of the truss element.

In general the fastening of any assembled product is achieved in one of three ways: namely (1) the use of positive fasteners, such as bolts, screws, rivets, or eyelets; (2) the use of some type of welding, such as electric arc, butt, spot, or flash, the acetylene flame, or direct pressure welding of heated parts; and (3) physical or mechanical manipulation of the assembled members.

Examples of each of the first two broad types of fastening means for the trussed structures of the present invention are illustrated and described herein, and examples of the third type are to be the subject matter of companion applications for United States Letters Patent for specific forms of the present invention.

It is to be understood, however, that in broad combinations including fastening means securing other parts together, it is immaterial which of the above three types of fastening means are selected to fasten parts together, the particular choice being determined by the plant equipment available.

Several practical embodiments of the present invention are illustrated in the accompanying drawings forming part hereof, in which—

Figure 1, is a fragmentary perspective view of one form of the invention adapted to be used as a beam or joist, the chord bars being broken away to show the truss ele-

ment, and the fastening means illustrated being arc welds;

Fig. 2, a side elevation of another form of the invention adapted to be used as a beam or joist, differing from the construction shown in Fig. 1, only in the specific form of shear reinforcement for the joist ends;

Fig. 3, side elevations of an upper chord bar, a truss element, and a lower chord bar, therefor, ready to be assembled;

Fig. 4, an oblique view of a shear reinforcement therefor, before assembly;

Fig. 5, a vertical cross section thereof, taken as on line 5—5, Fig. 2;

Fig. 6, an end elevation of another embodiment of the invention, which may be used either as a beam or a column, and in which both rows of the junction angles of the truss element are in substantially endwise abutment with each other, the fastening means as illustrated being rivets;

Fig. 7, a side elevation of the same, portions of the outside chord bars being broken away to show the arrangement of the truss element;

Fig. 8, an end elevation of a modification of the embodiment illustrated in Figs. 6 and 7, in which both rows of junction angles of the truss element are in substantially sidewise or overlapping abutment with each other;

Fig. 9, a side elevation of the same, portions of the outside chord bars being broken away to show the arrangement of the truss element;

Fig. 10, an end elevation of another modification of the embodiment illustrated in Figs. 6 and 7, in which one row of junction angles are in substantially endwise abutment, and the other row of junction angles are in substantially sidewise or overlapping abutment with each other;

Fig. 11, a side elevation of the same; portions of the outside chord bars being broken away to show the arrangement of the truss element;

Fig. 12, an oblique view of another form of the invention in which a plurality of truss elements are combined with a plurality of chord bars, as by arc welding, portions of the outside chord bars being broken away to show the arrangement of the truss elements;

Fig. 13, an oblique view of a further modification of the form of the invention illustrated in Fig. 12, in which portions of the chord bars and truss elements have been broken away to show the arrangement of all the parts; and

Fig. 14, a fregmentary oblique view illustrating the adaptability of the structures of the present invention for use in a type of floor construction in which strip metallic bridging and ordinary wood flooring may be nailed directly to the welded trussed structures hereof, used as joists, the nails being driven and wedged between the side by side and abutting chord bars and chord members of the truss element.

While the material used to form the various types of trussed structures comprehended hereunder may be of any desired workable substance; for most practical purposes metallic material adapts itself most easily to the requirements of fabrication and use.

The preferred cross-sectional outlines of the structures as illustrated and described are all similar to the outline of an I.

Similar numerals refer to similar parts throughout the several views.

Figure 1, as aforesaid, illustrates one form of the invention indicated at 20—1, adapted to be used as a beam or joist, and includes a truss element indicated at 21—1, having spaced rows of chord members 22—1 and connecting web members 23—1, all formed from a single continuous strip or bar 24—1, which may be "a round" as indicated, there being junction angles 25—1 between the chord and web members, and one row of chord members are fastened preferably at the junction angles as by arc welds indicated at 26—1 to a plurality of laterally spaced upper chord bars 27—1, which may be "rounds" as shown, and the other row of chord members being likewise fastened to a plurality of laterally spaced lower chord bars 28—1, both sets of chord bars extending alongside of and abutting a plurality of the chord members of the truss element.

In order to provide a suitable end construction for pendulously supporting the joist and having adequate shear reinforcement, the lower chord bars 28—1 may be bent at their ends to form upwardly extending portions 29—1 and end portions 30—1, the end portions being preferably parallel with the upper chord bars 27—1, and there being a shear reinforcement 31—1 in the form of a suitably cut-away T-section, as shown, secured as by arc welds to the ends of the upper and lower chord bars and the truss element, as illustrated.

The arc welds 26—1 are preferably built up around the junction angles in a pyramidical form, as indicated at 32—1 and thus preferably join the junction angles 25—1 of the truss element to each other and to the side by side chord bars, the junction angles being preferably in endwise abutment with each other, as shown.

The form of the invention 20—2 illustrated in Fig. 2, and adapted to be used as a beam or joist, differs from the construction shown in Fig. 1, only in the specific form of shear reinforcement for the joist ends. The structure 20—2 includes a truss element indicated at 21—2, having spaced rows of chord members 22—2, and connecting web members 23—2, all formed from a single continuous strip or bar 24—2, there being

junction angles 25—2 between the chord and web members, and one row of chord members being fastened preferably at the junction angles as by arc welds, indicated at 62—2 to a plurality of laterally spaced upper chord bars 27—2, and the other row of chord members being likewise fastened to a plurality of laterally spaced lower chord bars 28—2, both sets of chord bars extending alongside of and abutting a plurality of chord members of the truss element.

In order to provide a suitable end construction for pendulously supporting the joist and having adequate shear reinforcement, the lower chord bars 28—2 may be bent at their ends to form upwardly extending portions 29—2 and end portions 30—2, the end portions being preferably parallel with the upper chord bars 27—2, and there being a shear reinforcement indicated at 31—2, consisting of a pair of suitably formed angle sections 33—2, secured as by arc welds to the ends of the upper and lower chord bars and the truss element.

The Figs. 3 illustrate an upper chord bar, a truss element, and a lower chord bar for the structure 20—2 before assembly.

Fig. 4 illustrates the shear reinforcement for the structure 20—2 before assembly, and more clearly shows the exact details of construction, including the pair of formed angle sections 33—2 having the inner portions of their bottom angle legs cut away, as illustrated, enabling the outward forming of the end portions of the vertical angle legs 34—2, as shown, for extending alongside the outside of the truss element 21—2, as illustrated in Fig. 2.

Figs. 6 to 11, inclusive, illustrate embodiments of the invention, which may be used either as beams or columns, and including various modifications of the truss element, and upper and lower chord shape bars here shown as being angles, the fastening means illustrated being rivets.

Figs. 6 and 7 illustrate one modified form of the invention, as aforesaid, indicated at 20—3, and includes a truss element indicated at 21—3 having spaced rows of chord members 22—3, and connecting web members 23—3 and 23′—3, all formed from a single continuous strip or bar 24—3, there being junction angles 25—3 between the chord and web members, and both rows of the junction angles being in substantially endwise abutment with each other, and both rows of chord members being secured at the junction angles as by rivets 26—3 to a plurality of laterally spaced chord shape bars 27—3.

The truss structure 20—4, illustrated in Figs. 8 and 9, includes a truss element indicated at 21—4, having spaced rows of chord members 22—4, and connecting web members 23—4 and 23′—4, all formed from a single continuous strip or bar 24—4, there being junction angles 25—4 between the chord and web members, and both rows of the junction angles being in substantially sidewise overlapping abutment with each other, and both rows of chord members being fastened at the junction angles as by rivets 26—4 to a plurality of laterally spaced chord shape bars 27—4.

The truss structure indicated at 20—5, illustrated in Figs. 10 and 11, includes a truss element indicated at 21—5, having spaced rows of chord members 22—5, and connecting web members 23—5 and 23′—5, all formed from a single continuous strip or bar 24—5, there being junction angles 25—5 between the chord and web members, and one row of junction angles being in substantially endwise abutment with each other, and the other row of junction angles being in substantially sidewise or overlapping abutment with each other, and the rows of chord members being fastened at the junction angles as by rivets 26—5 to a plurality of laterally spaced chord shape bars 27—5.

In Fig. 12 is illustrated a truss structure indicated at 20—6, which includes a plurality of truss elements indicated at 21—6, each truss element having spaced rows of chord members 22—6 and connecting web members 23—6, all formed from a single continuous strip or bar 24—6, there being junction angles 25—6 between the chord and web members, and the rows of chord members being fastened preferably at the junction angles, as by arc welds indicated at 26—6, to a plurality of laterally spaced chord bars 27—6.

In Fig. 13 is illustrated a truss structure indicated at 20—7, which includes a plurality of truss elements indicated at 21—7, each truss element having spaced rows of chord members 22—7 and connecting web members 23—7, all formed from a single continuous strip or bar 24—7, there being junction angles 25—7 between the chord and web members, and the rows of chord members being fastened preferably at the junction angles, as by arc welds indicated at 26—7, to a plurality of laterally spaced chord bars 27—7 and 28—7, the bars 28—7 being interposed between the truss elements 21—7, as illustrated.

In Fig. 14 a plurality of the welded truss joist structures 20—2, illustrated in detail in Figs. 2 to 5 inclusive, are illustrated as in use in a type of floor construction in which strip metallic bridging B and ordinary wood flooring F may be nailed directly to the truss joist as shown, the nails N for this purpose being driven and wedged directly between the side by side and abutting chord bars 27—2 and 28—2, and the chord members 22—2 of the truss element, thus illustrating the practical adaptability of the structures of the present invention for re-

ceiving nails and eliminating the otherwise necessary operation or bolting or securing nail receiving wooden strips to the chord members, as is required in other types of joists as aforesaid.

In all of the herein illustrated and described improvements of the invention, the laterally spaced chord bars having the intervening chord members of the truss elements secured between them are rendered much more laterally rigid than in the older types of structures in which there is no intervening and abutting material to prevent lateral deflection of the laterally spaced chord bars.

Moreover, the addition of the section area of the chord members of the truss elements into the total chord section area of the truss structures of the present invention provides members having greater transverse strength than has been available under the old methods of construction.

All of these features enable economies in erection and in the dead weight of truss structures required for any particular purpose as for floor joists for a particular floor.

I claim:

1. A trussed structure including a truss element and a plurality of spaced chord bars, the truss element including spaced rows of chord members and connecting web members, all the element members being formed from a single continuous strip, and there being spaced junction angles between the chord and web members, one of the rows of chord members abutting and being fastened at each junction angle to a plurality of the spaced chord bars.

2. A trussed structure including a truss element and a plurality of spaced chord bars, the truss element including spaced rows of chord members and connecting web members, all the element members being formed from a single continuous strip, and there being spaced junction angles between the chord and web members, and means abutting and fastening at each junction angle one of the rows of chord members to a plurality of the spaced chord bars.

3. A trussed structure including a truss element, and a set of laterally spaced chord bars, the truss element including spaced rows of chord members and connecting web members, all the element members being formed from a single continuous strip, and there being spaced junction angles between the chord and web members, and spaced means fastening each chord member of one row of the chord members to and in abutment with the laterally spaced chord bars.

4. A trussed structure including a truss element, and a plurality of sets of laterally spaced chord bars, the truss element including spaced rows of chord members and connecting web members, all the element members being formed from a single continuous strip, and there being spaced junction angles between the chord and web members, and spaced means fastening each chord member of the rows of chord members to and in abutment with a set of the laterally spaced chord bars.

5. A trussed structure including a truss element, and a plurality of sets of laterally spaced chord bars, the truss element including spaced rows of chord members and connecting web members, all the element members being formed from a single continuous strip, and there being spaced junction angles between the chord and web members, and spaced means substantially at the junction angles fastening each chord member of a row of chord members to and in abutment with a set of the laterally spaced chord bars.

6. A trussed structure including a truss element, and a plurality of sets of laterally spaced chord bars, the truss element including spaced rows of chord members and connecting web members, all the element members being formed from a single continuous strip, and there being spaced junction angles between the chord and web members, and spaced means substantially at the junction angles fastening each chord member of the rows of chord members to and in abutment with a set of the laterally spaced chord bars.

7. A trussed structure including a truss element, and a plurality of spaced chord bars, and means fastening the truss element to the chord bars, the truss element including spaced rows of chord members and connecting web members, all the element members being formed from a single continuous strip, and there being spaced junction angles at each row of chord members between the chord and web members, junction angles being in substantial abutment with each other and the chord members abutting the chord bars.

8. A trussed structure including a truss element, and a plurality of sets of laterally spaced chord bars, the truss element including spaced rows of chord members and connecting web members, all the element members being formed from a single continuous strip, and there being spaced junction angles between the chord and web members, and means substantially at the junction angles fastening each of the rows of chord members to a set of the laterally spaced chord bars, and junction angles at each row of chord members being in substantial abutment with each other and the chord members abutting the chord bars.

9. A trussed structure including a truss element, and a plurality of spaced chord bars, the truss element including spaced rows of chord members and connecting web members, all of the element members being formed from a single continuous strip, and there being spaced junction angles between

the chord and web members, and spaced means fastening some of the junction angles to each other and to a plurality of the spaced chord bars and the chord members abutting the chord bars.

10. A trussed structure including a truss element, and a plurality of spaced chord bars, the truss element including spaced rows of chord members and connecting web members, all of the element members being formed from a single continuous strip, and there being spaced junction angles between the chord and web members, some of the junction angles being fastened to a plurality of the chord bars and the chord members abutting the chord bars.

11. A trussed structure including a plurality of truss elements and a plurality of spaced chord bars, each of the truss elements including spaced rows of chord members and connecting web members, all the element members being formed from a single continuous strip, and there being spaced junction angles between the chord and web members, some of the chord members in each truss element being fastened at intervals to a plurality of the spaced chord bars.

12. A trussed structure including a plurality of truss elements and a plurality of spaced chord bars, each of the truss elements including spaced rows or chord members and connecting web members, all the element members being formed from a single continuous strip, and there being spaced junction angles between the chord and web members, and spaced means fastening some of the chord members of each element to and in abutment with a plurality of the spaced chord bars.

13. A trussed structure including a plurality of truss elements and a plurality of spaced chord bars, each of the truss elements including spaced rows of chord members and connecting web members, all the element members being formed from a single continuous strip, and there being spaced junction angles between the chord and web members, and spaced means fastening some of the chord members of each truss element to some of the chord members of another truss element and to an in abutment with one of the chord bars.

14. A trussed structure including a plurality of truss elements and a plurality of spaced chord bars, each of the truss elements including spaced rows of chord members and connecting web members, all the element members being formed from a single continuous strip, and there being spaced junction angles between the chord and web members, some of the chord members of one element being fastened at intervals to some of the chord members of another element and to and in abutment with a plurality of the chord bars.

15. A truss structure including a set of laterally spaced chord bars and a truss element, the truss element including spaced rows of chord members and connecting web members, all the element members being formed from a single continuous strip and there being spaced junction angles between the chord and web members, some of the chord members being interposed between and abutting the set of the laterally spaced chord bars, and spaced means abutting and fastening each of the interposed chord members to the chord bars.

16. A truss structure including a plurality of sets of laterally spaced chord bars, and a truss element, the truss element including spaced rows of chord members and connecting web members, all the element members being formed from a single continuous strip, and there being spaced junction angles between the chord and web members, some of the chord members being interposed between and abutting the sets of the laterally spaced chord bars, and spaced means fastening each of the interposed chord members to the chord bars.

In testimony that I claim the above I have hereunto subscribed my name.

HURXTHAL FIELD FREASE.