

Nov. 24, 1925.

G. H. DANFORTH

1,563,077

FABRICATED STRUCTURAL MEMBER

Filed April 2, 1924

Fig. 1.

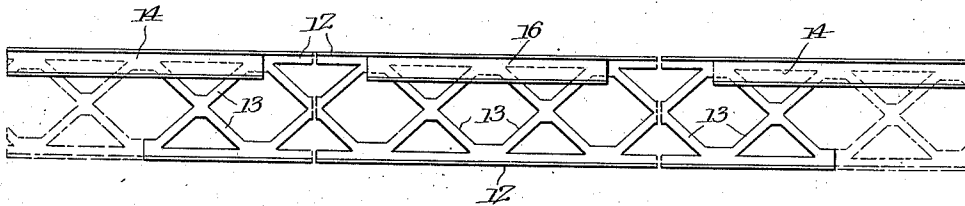


Fig. 2.

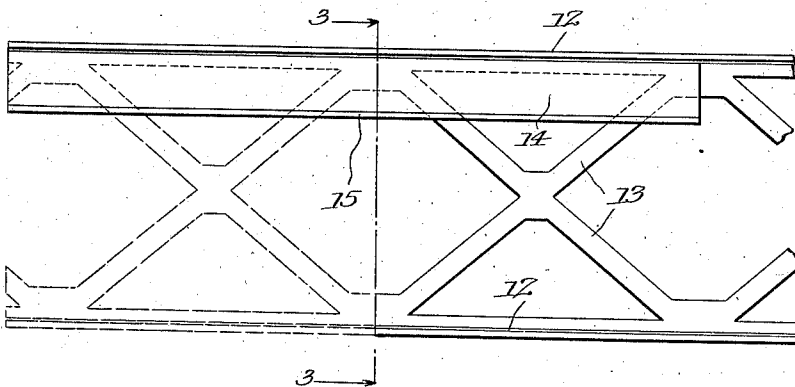


Fig. 3.

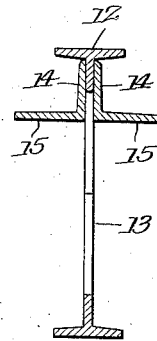


Fig. 4.

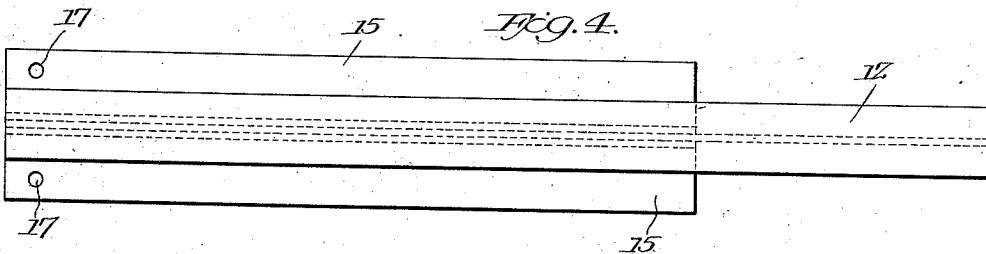
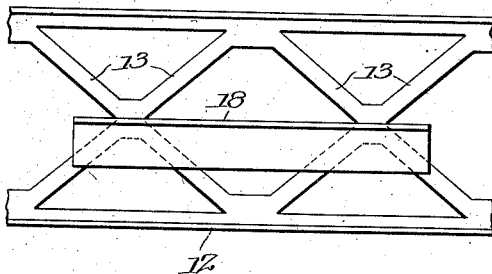


Fig. 5.



Inventor

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1,563,077

UNITED STATES PATENT OFFICE.

GEORGE H. DANFORTH, OF PITTSBURGH, PENNSYLVANIA, ASSIGNOR TO JONES & LAUGHLIN STEEL CORPORATION, OF PITTSBURGH, PENNSYLVANIA, A CORPORATION OF PENNSYLVANIA.

FABRICATED STRUCTURAL MEMBER.

Application filed April 2, 1924. Serial No. 703,652.

To all whom it may concern:

Be it known that GEORGE H. DANFORTH, a citizen of the United States, residing in Pittsburgh, in the county of Allegheny and State of Pennsylvania, has invented an Improvement in Fabricated Structural Members, of which the following description, in connection with the accompanying drawings, is a specification, like characters on the drawings representing like parts.

My invention aims to strengthen and improve rolled structural members or "shapes" of open web or trussed form, and to enable such members to be readily and economically fabricated and utilized for building and other purposes.

In the accompanying drawings, wherein I have shown one embodiment of my invention for purposes of illustration,

Fig. 1 is a side view of a trussed web I-beam such as is suitable for floor beams, roof trusses and purlins, bridge girders and other structural purposes;

Fig. 2 is an enlarged side view of one end of the beam shown in Fig. 1;

Fig. 3 is a cross-section of the same on the line 3—3 in Fig. 2;

Fig. 4 is a top view of the end portion of the beam, Figs. 2, 3, and 4 being drawn to the same scale; and

Fig. 5 is a side view of a portion of a trussed web I-beam having web bracing serving also as a means of connection and support for other parts of the structure.

The invention may be applied to I-beams, channels, Z-sections, T-sections, H-sections, and other shapes with and without flanges, having trussed or open web portions formed integrally with the flanges or margins. In rolling such structural shapes the web portions (which may be in the form of tie members) are most readily made of uniform strength and are equally spaced lengthwise of the shape. This distribution of web members is not suitable for developing the maximum strength of the section under all conditions of load. Also, in using such shapes, they may require to be cut at points between the panel points, i. e., the ends of the tie members, and they may be called upon to support concentrated loads, as, for example, at the points of support of a beam. In

such and many other cases, provision may advantageously be made to prevent collapse of the shape at unsupported or highly stressed points by additional bracing for the web portions capable of resisting bending and shearing stresses.

The particular embodiment of the invention selected for illustration herein and shown in the drawings comprises angle plate stiffeners for reenforcing the ends and selected intermediate points of lattice-web structural shapes, but other shapes and forms of stiffeners are contemplated. Referring particularly to Fig. 1, the invention is embodied in a trussed I-beam having flanges 12 connected by angularly disposed lattice or web members 13 formed integrally with the flanges by any suitable process of manufacture. Each end of the beam is strengthened by securing thereto suitable stiffeners or reenforcement, such as the angle plates 14, which are preferably disposed opposite sides of the web members of the beam at its ends and substantially parallel to and near the upper flange and which in the form shown in the drawings are angle bars, spanning one or more panels at their upper sides, with their horizontal legs out-turned, whereby their vertical legs may be secured on both sides of the web members and stem portions of the flanges. Intermediate points may be likewise strengthened by stiffening members 16, spanning the space between two or more panel points.

The preferred manner of securing shear plates to the web portions of the beam is by welding, although any suitable means for attaching the members rigidly together may be used.

In the embodiment of the invention shown in Figs. 1 to 4 of the drawings, the horizontal legs of the angles 14 are lowermost and afford wide supports for the ends of the beam. At their outer ends these legs may be punched with holes 17 for securing them to the supporting structure by bolts, rivets or other usual standard forms of construction. In the form of the invention shown in Fig. 5 the angle bars 18 are spaced between the top and bottom flanges 12 with their out turned horizontal legs uppermost to receive and support any intermediate members of the structure that re-

quire it. Similarly the horizontal legs of the angles 15 may be utilized to support minor portions of the floor system or other parts of the structure.

5 Any free end portions of incomplete tie members at the ends of the beams may advantageously be removed to avoid interference with portions of the supporting structure.

10 Either angle bars or other shapes, or flat plates, may be utilized for web strengthening members, and by disposing them horizontally upon the web of the beam so as to span one or more complete panels the distribution of stresses in the web portions of the beam is made less severe upon the tie members.

The stiffener members not only strengthen the ends and critical points of the beam or other element to enable it to carry its maximum load with safety, but enable standard forms of connections with other portions of the structure to be utilized. The end supports afforded by the angle bars are wide and if located above the central axis of the beam, enable such members to be placed in position for use without temporary bracing to secure them against overturning during erection of the structure. A further advantage is that the ends of the beam may be cut off, or the web members and lower flange may be cut out as indicated in broken lines in the drawings, to reduce its length or suit the conditions of use without weakening the beam.

35 The invention is not restricted to the forms, shapes and dimensions of the members shown in the drawings, as it is obvious that it may be applied in various forms and shapes suitable to the uses for which it is adapted.

What I claim as my invention and desire to secure by Letters Patent is:

45 1. A rolled shape having straight continuous margins and an open work web strengthened by longitudinally extending stiffening bars rigidly secured to the web members on opposite sides above its middle axis.

50 2. A rolled shape of the character described having a web comprising tie members strengthened by angle bars secured to a plurality of tie members on opposite sides of its web.

55 3. A rolled shape having flanges connected by tie members integral therewith forming panels and stiffening members

parallel to said flanges spanning one or more panels and secured to said tie members.

4. A rolled shape having flanges connected 60 by tie members integral therewith forming panels, and end braces disposed parallel to said flanges on opposite sides thereof and secured thereto, said braces being secured to the adjacent tie members. 65

5. A rolled shape having straight continuous margins and a web comprising integral, diagonally disposed tie members, and lengthwise extending braces secured to the upper margins and adjacent ends of 70 meeting tie members.

6. A flanged rolled shape having a web comprising integral, diagonally disposed tie members connecting said flanges at spaced points forming panels, and lengthwise extending braces secured to the upper ends of adjacent tie members and having a length greater than the space between adjacent tie members of said beams so as to span more than one panel. 80

7. A rolled shape having straight continuous upper and lower margins and a web comprising integral, diagonally disposed tie members, and lengthwise extending braces extending inwardly from its ends and secured to the upper ends of adjacent tie members. 85

8. A rolled shape having straight continuous upper and lower margins and a web comprising integral, diagonally disposed tie 90 members, and lengthwise extending braces extending inwardly from its ends and secured to the upper ends of adjacent tie members, said braces comprising horizontally disposed portions constituting supports. 95

9. A rolled shape having straight continuous margins and a web comprising integral, diagonally disposed tie members, and lengthwise extending braces arranged on opposite sides thereof providing supporting 100 means for attachment of connections intermediate the ends of said shape.

10. A rolled shape having straight continuous margins and a web comprising integral, diagonally disposed tie members, and 105 lengthwise extending braces having outwardly projecting flanges arranged on opposite sides thereof, said flanges providing supporting means for attachment of connections intermediate the ends of said shape. 110

In testimony whereof I have signed my name to this specification.

GEORGE H. DANFORTH.