Nov. 24, 1925. 1,563,117

J. E. TONNELIER ET AL

FABRICATED STRUCTURAL MEMBER

Filed April 2, 1924

Fig. 1.

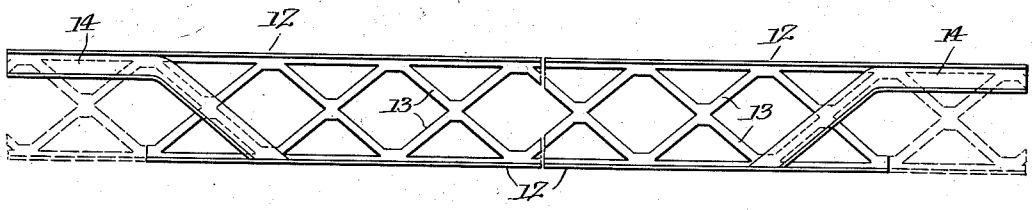


Fig. 2.

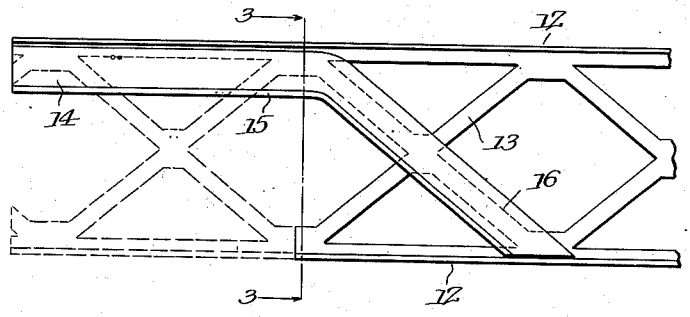


Fig. 3.

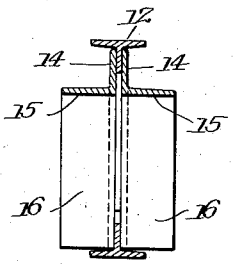
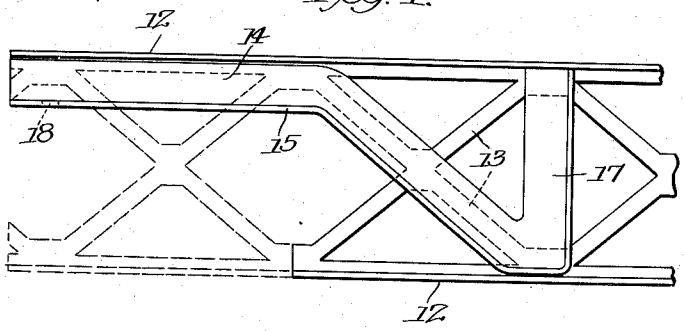


Fig. 4.



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UNITED STATES PATENT OFFICE.

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FABRICATED STRUCTURAL MEMBER.

Application filed April 2, 1924. Serial No. 703,644.

To all whom it may concern:

Be it known that we, J. EDMUND TONNELIER and GEORGE C. FEUCHT, citizens of the United States, residing in Pittsburgh, in the county of Allegheny and State of Pennsylvania, have 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.

Our 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 we have shown one embodiment of our 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; and

Fig. 4 is a view similar to Fig. 2, showing a modified form of the invention.

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 character throughout their lengths. For example, the web tie members may be of similar shape and arrangement, whereby they are of equal strength and are equally spaced lengthwise of the shape. Such structural shapes, if loaded to their maximum carrying capacity, are likely to collapse at their ends where they are supported unless the ends are braced in such a manner as to reenforce the adjacent ties against direct thrust and transverse and longitudinal shear.

The particular embodiment of the invention selected for illustration herein and shown in the drawings comprises a principal member and stiffeners, more especially such as are adapted for reenforcing the ends of lattice-web structural shapes, although they may be applied to intermediate points. 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 on opposite sides of the web members of the beam at its ends and substantially parallel to and between the flanges, preferably with their horizontal flanges or legs 15 lowermost. The angle bars illustrated in Fig. 2 have their outer end portions 11 substantially parallel to the flanges, and their inner end portions 16 are bent preferably to follow the first complete downwardly and inwardly extending diagonal tie member to the lower flange, where they may be secured. Their inner ends may be turned up and secured to the upper flange, forming a vertical strut 17 across the end opening of the lattice work, as shown in Fig. 4. 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.

The horizontal legs 15 of the angles 14 afford wide supports for the ends of the beam and may be punched with holes 18 for securing them to the supporting structure by bolts, rivets or other usual standard forms of construction; and similarly the horizontal legs of the angles may be utilized to support minor portions of the floor system or other parts of the structure.

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

Either angle bars or other shapes, or flat plates, may be utilized for web strengthening members, and by disposing them over 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 drawing, to reduce its length or suit the conditions of use without weakening the beam.

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.

In the claims the term "flange" is used to indicate the upper and lower chord members of a truss-like beam or structural shape, whatever their form and however produced.

What we claim as our invention and desire to secure by Letters Patent is:

1. A rolled shape having a web comprising integral, diagonally disposed tie members, in combination with lengthwise extending braces secured to the shape adjacent to the upper ends of outer tie members, said braces having inwardly and downwardly extending portions secured to the shape adjacent to the lower ends of said tie members.

2. A rolled shape having a web comprising integral, diagonally disposed tie members, in combination with lengthwise extending braces secured to the shape adjacent to the upper ends of outer tie members, said braces having inwardly and downwardly extending portions secured to the shape adjacent to the lower ends of said tie members, and upturned inner extremities secured to the upper flange member of said shape.

3. A rolled shape having a web comprising integral, diagonally disposed tie members, in combination with lengthwise extending braces at its ends secured to the shape adjacent to the upper ends of the end tie members, said braces having inwardly and downwardly extending portions following the end tie members and secured to the shape adjacent to the lower ends of said tie members.

4. A structural member comprising a rolled shape having upper and lower flanges and an open work web, and end braces secured thereto having horizontal portions extending inwardly along the upper flange and bent down to cross the middle axis of the member with their lower ends secured to the shape adjacent to its lower flange.

5. A structural member comprising a rolled shape having upper and lower flanges and an open work web, and end braces secured thereto having horizontal portions extending inwardly along the upper flange and bent down to cross the middle axis of the member with their lower ends secured to the shape adjacent to its lower flange, the inner extremities of said braces being turned up and secured to the shape adjacent to its upper flange.

6. A structural member consisting principally of a rolled shape having marginal flanges and a connecting open work web of uniform character throughout the length of the shape, the ends of the shape being strengthened by stiffeners secured to the web having lengthwise disposed portions extending inwardly adjacent one flange and crossing the web space to the opposite flange to form truss members therewith, thereby providing combined end supporting and web strengthening means for said shape.

7. A structural member consisting principally of a rolled shape having marginal flanges and a connecting open work web of uniform shape and spacing of openings throughout the length of the shape comprising angularly disposed ties, the ends of the shape being strengthened by stiffeners secured to the web having lengthwise disposed portions extending inwardly adjacent one flange and crossing the web space following the angle made by the ties to the opposite flange and secured to said flanges to form truss members therewith, thereby providing combined end supporting and web strengthening means for said shape.

8. A structural member comprising a rolled shape having upper and lower flanges 12 and diagonal ties 13 constituting its web, and end braces 14 having horizontal outer ends 11 and downwardly slanting inner ends 16, said braces being secured to the end ties and to the member at their ends, substantially as described.

In testimony whereof, we have signed our names to this specification.

J. EDMUND TONNELIER.
GEORGE C. FEUCHT.