May 1, 1962 O. NERATH 3,032,153

TRUSS GIRDERS OF ROUND STEEL

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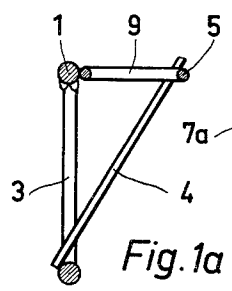


Fig. 1a

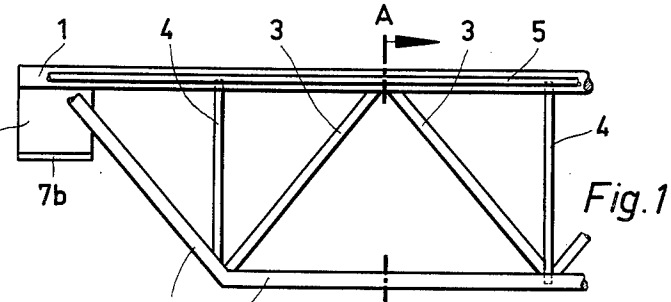


Fig. 1

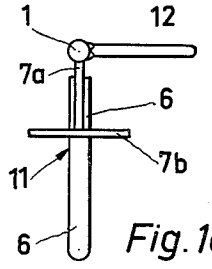


Fig. 1c

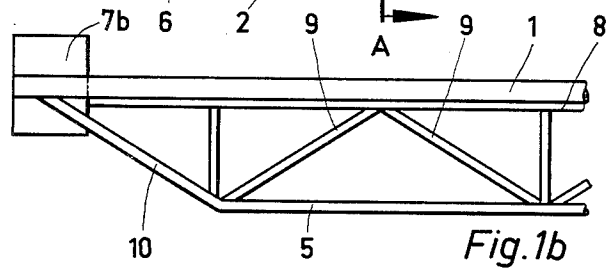


Fig. 1b

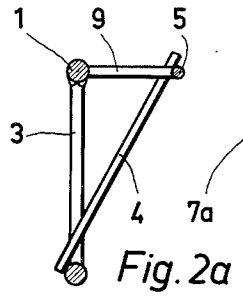


Fig. 2a

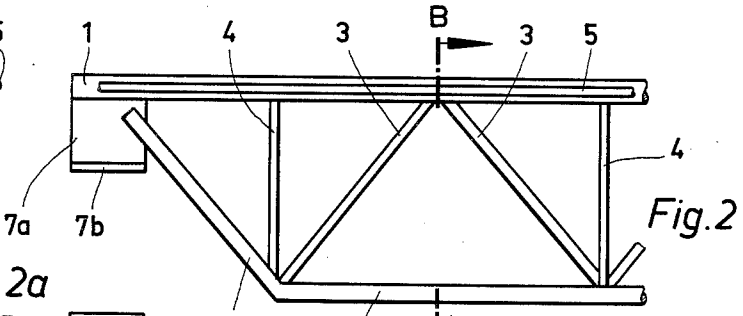


Fig. 2

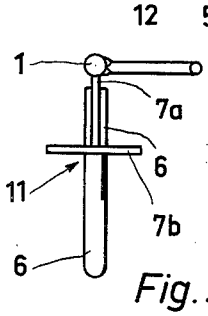


Fig. 2c

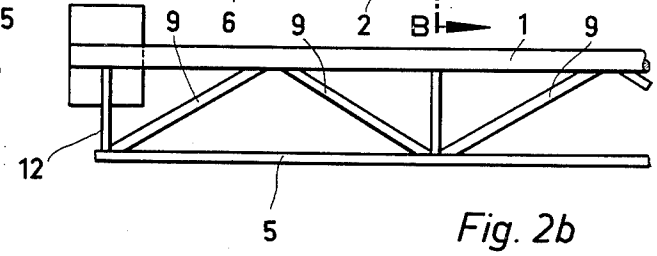


Fig. 2b

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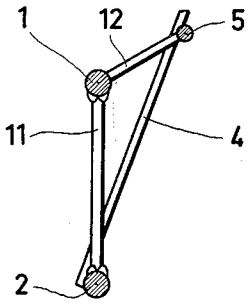


Fig.3

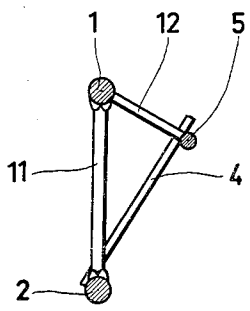


Fig.4

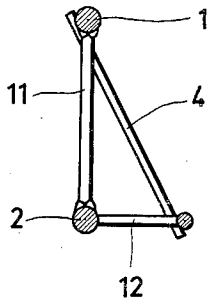


Fig.5

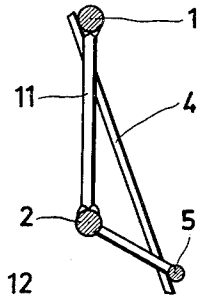


Fig.6

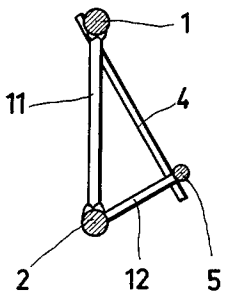


Fig.7

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TRUSS GIRDERS OF ROUND STEEL

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Claims priority, application Germany June 26, 1956
7 Claims. (Cl. 189—37)

The invention concerns a truss girder of round steel comprising a compression chord and a stiffening truss projecting from the compression chord at one side thereof.

Girders of round steel are already known. Their load-bearing capacity and resistance to buckling forces exceeds that of triangular lattice girders or other spacial trusses. The known girder constructions of round steel require a comparatively high quality of material and their manufacture is time-consuming. This is especially due to the fact that numerous welding spots are required for the known girders of round steel. It, therefore, is the object of the present invention to fully utilize the most advantageous properties of round steel, to attain constructions for which essentially fewer welding spots for connection of the building elements will be required without deteriorating the static relations.

According to the invention this goal is achieved by connecting to the compression chords of a simple supporting truss a stiffening truss projecting from the vertical plane defined by the chords at a right, acute or obtuse angle. The stiffening truss serves for the purpose of securing the compression chords against buckling. The trusses and bracings, preferably consisting of round steel, may be welded electrically. Beside round steel other rod steels, for instance square steel, are also suitable. The stiff truss girder of round steel is especially suitable for roof constructions, such as roofs of industrial buildings and dwelling houses of all kinds and with every kind of roofing, for girders on two supports as well as for purlins, pipe bridges, masts, such as line masts for electrically operated railroads and for overhead lines, and also for ceiling and form supports for concrete work.

When using the truss girder according to the invention as roof purlins the arrangement of the stiffening truss has the special advantage that the thrust of the roof covering from the ridge to the eaves can be taken up entirely by the stiffening truss. The stiffening truss then acts as the lower span of the upper chord of the supporting truss of the purlin in the direction of the inclined plane of the roof to the eaves. Therefore, very simple, widely spanned purlins can be made without additional suspension of the ridge of a roof.

In case of purlins it is suitable to connect the stiffening truss acute-angled. This renders it possible to raise wooden purlins on the top truss as required, on which the roofing, such as corrugated sheets, wooden covering or roof laths for tiles, can be put up.

A special advantage when using the truss girder according to the invention is that, for instance, the roof constructions can take up wind pressures and other side loads by means of a suitable stiffening truss, so that the greatest part of the otherwise requisite framings can be saved. For this reason the stiffening truss can be welded on in various widths corresponding to the respective requirements.

In the case of roof cutting and hip constructions the side truss can be adapted in a suitable acute or obtuse angle.

If the stiffening truss is affixed at an acute angle then the top truss of the main girder can be made free for the connection of purlins of the same system. The purlins can then be directly connected to the top truss of the supporting truss without projecting into the stiffening truss. This is especially advantageous in the case of continuous purlins. Rigid connections of the chord members is necessary for these when they are continuous so that the latter can be connected with each other without any difficulty.

If a buckling stress appears in the bottom chord a stiffening truss can be welded on in any desired direction to take up these forces.

A further advantage of the truss girder according to the invention is to be seen in the fact that it can be easily manufactured. Thus the loose top chord of the supporting truss can be connected with the stiffening truss on a simple support. And after this has taken place one can assemble the stiffening truss with the supporting truss after it has been set up. One can also accomplish this inversely.

The diagonal rods or lattice means of the supporting truss can be welded to the chord members as individual members or as a building element bent in zig-zag form. Electric arc welding or electric resistance welding can be used for instance spot welding machines. These simple working operations render it possible to assemble the truss girders on the spot where they are needed for the building. The structural elements can be prepared in the factory so that the materials can be transported to the building site cut to fit. The welding can take place on portable contrivances which are brought to the building site. Thus the expensive transportation of the finished truss girders, which take up a great deal of space, is eliminated. All the advantages mentioned bring about considerable manufacturing economies compared to other truss girders.

It may be necessary to secure the stiffening truss against sagging of the outside chord. For this purpose it is practical that rods be welded at intervals between the outside chord of the stiffening truss and the lower chord of the supporting truss, thus propping the stiffening truss to the lower chord of the supporting truss.

The invention is illustrated schematically in some exemplary embodiments shown in the accompanying drawing wherein

FIG. 1 is a side view of the truss girder, whose individual trusses are welded to each other electrically with the chords at right angles,

FIG. 1*a* is a cross section according to the line A—A of FIG. 1 with propping,

FIG. 1*b* is a top view of the truss girder according to FIG. 1,

FIG. 1*c* is an end view of the truss girder according to FIG. 1 in the direction of its longitudinal axis, without propping,

FIG. 2 is a side view of the truss girder wherein the bracing of the stiffening truss is welded directly to the upper compression chord,

FIG. 2*a* is a cross section according to the line B—B of FIG. 2 with propping,

FIG. 2*b* is a top view of the truss girder according to FIG. 2,

FIG. 2*c* is an end view of the truss girder according to FIG. 2 in the direction of its longitudinal axis, without propping,

FIGS. 3 and 4 show the stiffening truss connected at an acute and an obtuse angle, respectively,

FIGS. 5, 6 and 7 show the trusses connected with each other rectangularly or at an obtuse or acute-angle at the lower chord which serves as compression chord, with suspension of the stiffening truss from the upper chord serving as tension chord.

In the drawings the upper chord of the truss girder **11** is designated with **1**, which represents the compression

chord according to FIGURES 1 to 4. 2 is the lower chord of the supporting truss which, in the case of the FIGURES 5 to 7, is the compression chord. The diagonal rods 3 form a lattice connecting the two chords with each other in the plane of the supporting truss. Propping rods 4 serve for propping the stiffening truss 12 against the lower chord 2 of the supporting truss according to FIGURES 1 to 4, whilst the stiffening truss 12 is connected to the upper chord 1 of the supporting truss by the propping rods 4 according to FIGURES 5 to 7.

The stiffening truss is formed by the outside chord 5 and the inside chord 8 between which a rigid connection is made by the diagonal rods 9 in the plane of the stiffening truss as FIGURE 1*b* shows. According to FIGURE 2*b* the stiffening truss has only the outside chord 5, whilst the bracing is connected directly with the upper chord 1 of the supporting truss at the inside.

End supports for the truss girder are designated with 7*a* and 7*b*. For this purpose the ends of the chords are bent, if, required, as is shown at 6 for the lower chord of the supporting truss in FIGURES 1 and 2, and for the outer chord of the stiffening truss at 10 in FIGURE 1*b*.

I claim:

1. A truss girder made of round steel which comprises, in combination, a compression chord; a second chord parallel with and disposed in a vertical plane common to said compression chord; lattice means rigidly connecting said chords in spaced relation; and a stiffening truss comprising an outside chord of smaller diameter than the first-mentioned chords, said outside chord being spaced from and parallel with said compression chord, and means connecting said outside chord with said compression chord, said stiffening truss being in a plane enclosing an angle with said vertical plane.

2. The structure according to claim 1, wherein the plane of said stiffening truss is disposed at right angles to said vertical plane.

3. The structure according to claim 1, wherein the plane of said stiffening truss is disposed at an acute angle with respect to said vertical plane.

4. The structure according to claim 1, wherein the plane of said stiffening truss is disposed at an obtuse angle with respect to said vertical plane.

5. The structure according to claim 1, wherein said compression chord is disposed above said second chord.

6. The structure according to claim 1, wherein said last mentioned means comprises an inside chord of smaller diameter than the compression chord and welded to said compression chord, and brace means welded to and disposed between said inside chord and said outside chord.

7. Truss girder made of round steel comprising, in combination, three parallel spaced chords, the first of said chords constituting a compression chord and the second of said chords being vertically aligned and in a common plane with said compression chord; lattice means disposed between and connected with said compression chord and said second chord; and bracing means between said compression chord and the third of said chords, said last mentioned chord being of smaller diameter than the first and second chords, said third chord and said compression chord being in a common plane enclosing an angle with the vertical plane passing through said compression chord and said second chord, said third chord and said bracing means constituting a stiffening truss.

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