

Aug. 24, 1926.

1,597,384

F. H. MOYER

STEEL JOIST

Filed Oct. 21, 1925

2 Sheets-Sheet 1

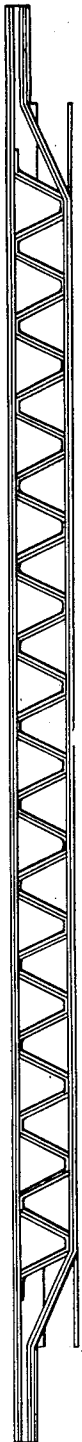


Fig. 1

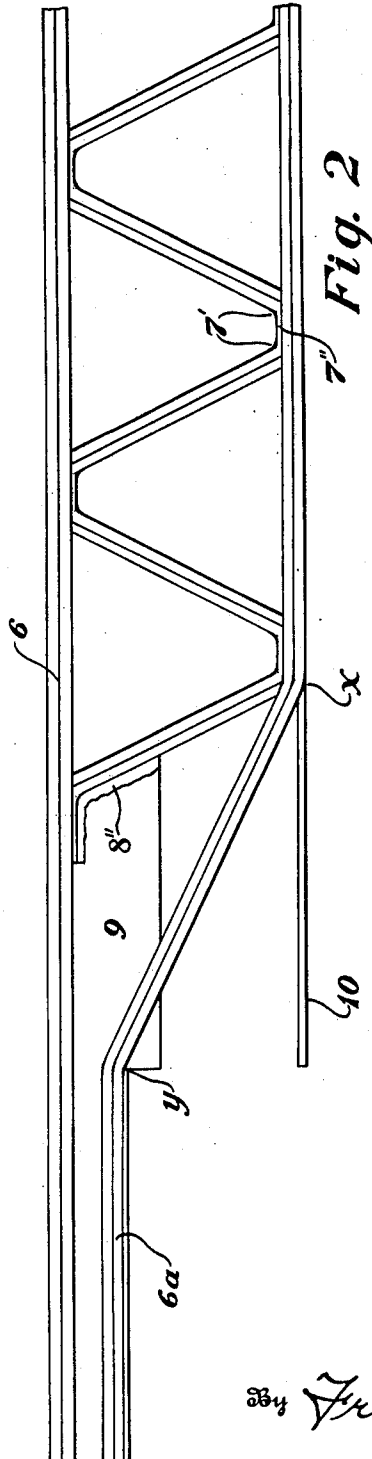


Fig. 2

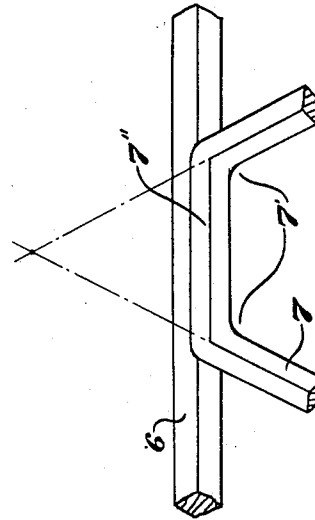


Fig. 7

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Fig. 3

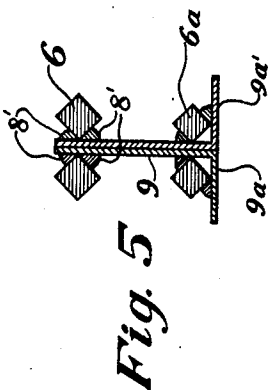
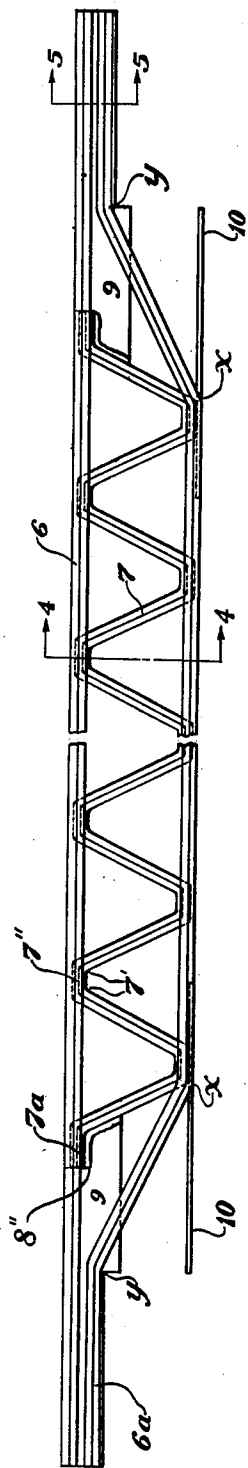


Fig. 5

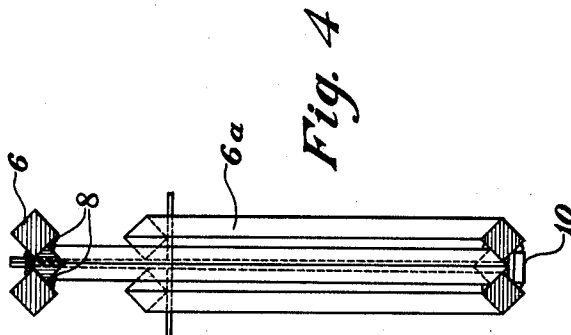


Fig. 4

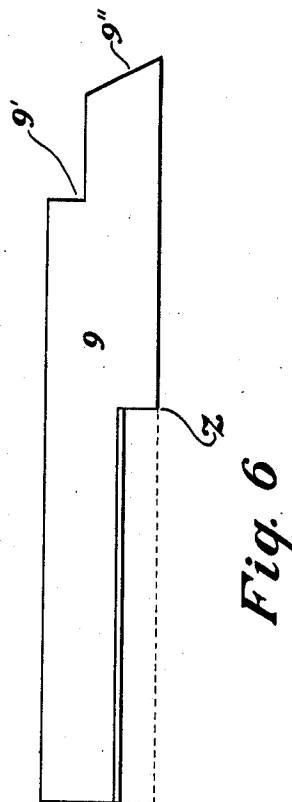


Fig. 6

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UNITED STATES PATENT OFFICE.

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STEEL JOIST.

Application filed October 21, 1925. Serial No. 63,903.

The invention relates to a structural member made of steel or other metal for use in buildings in lieu of timber cut to shapes commonly known as lumber, the smaller sizes of the metal member being adapted for use as rafters and joists, and the larger sizes being adapted for use as beams and girders in building construction, either in connection with wooden flooring, roofing and lathing, or with expanded metal and reinforced concrete floor and ceiling construction in common use.

One object of the improvement is to provide a trussed member made out of ordinary standard steel bars in common use and more particularly to assemble and secure together bars of such shape as will give the greatest strength between the joints of the different elements of the structure, and also to dispose the bars in such a manner as to give each element the greatest strength in the plane requiring the same.

A further object of the improvement is to so construct each end of the metal member as to give a pendulous support located above the axial locus of the center of gravity, so that when placed upon end supports, the member will remain in proper position for supporting a load thereon.

The accompanying drawings forming part hereof, illustrate the improvement in a form adapted for use as a steel joist, and in the drawings—

Figure 1 is a side elevation of the improved joist;

Fig. 2, an enlarged side elevation of one end thereof;

Fig. 3, an enlarged side elevation, broken away in the middle, of the improved joist;

Fig. 4, an enlarged section of same on line 4—4, Fig. 3;

Fig. 5, an enlarged section of same on line 5—5, Fig. 3;

Fig. 6, a side elevation of one terminal L-plate; and

Fig. 7, a fragmentary view showing detail arrangement of a joint.

Similar numerals refer to similar parts throughout the drawings.

The structural member may be made of upper and lower chord bars 6 and 6^a, laterally spaced apart in pairs, between which is

secured a connecting bar 7 bent to form a web element for the member.

For the purpose of the present improvement, square section bars are used for all of these elements, and they are also preferably arranged with their diagonal diameters in upright and transverse planes, so as to avail of the greatest strengths of the various bars in these directions.

For use in making a steel joist fifteen feet in over-all length, the upper chord bars 6 may be made of a $\frac{3}{4}$ " square section, and the lower chord bars 6^a may be made of a $\frac{1}{2}$ " square section, and the web bar may be made of a $\frac{3}{8}$ " square section.

The upper chord bars 6 preferably extend straight from end to end of the joists and the lower chord bars 6^a may extend parallel with the upper bar a suitable distance, say 8" below the upper bars to points *x*, preferably some two feet from the ends of the upper bars; whence the lower bars may be bent diagonally upwards to points *y* which may be 12" from the ends of the upper bars; whence the lower bars extend parallel with the upper bars some 2" below the same, so as to form a bearing for the ends of the joists well above the longitudinal axis of the joists.

The web bar 7 is bent in well known zig-zag fashion to form a truss between the chord bars and each diagonal portion of the bar may be located at an angle of say 30° from the vertical. For the purpose of the present invention, each upper and lower angle of the web bar may be made in two bends 7', located something more than an inch apart; between which bends a straight portion 7'' of substantial length is formed in the angle of the web bar, the flat sides of which are contiguous with the abutting flat sides of the chord bars through a substantial area in length and breadth, as compared with a single point or line contact between round bars.

Furthermore, the double bend at each angle not only provides a surface contact at each weld to insure the greatest strength, but the metal in the web bar in contact with the two chord bars, reinforces the joint to overcome the bending moment due to the lines of force in both tension and compression.

sion members of the web bar meeting at a panel point outside of the center of gravity of the chord bars, as indicated in Fig. 7.

The chord bars are spaced a slight distance apart, which may be equal to the thickness of two plies of 11 gauge sheets or plates; so that the upper and lower angles of the web bar will protrude upward and downward respectively above and below the inner angles of the chord bars, as shown in the drawings. This arrangement of the bars permits them to be secured together by arc welds 8 located both on the upper and lower inner sides of the chord members, thus giving at each joint a substantial length of said welds for each angle of the truss rod.

It will be understood, however, that instead of using arc welds as illustrated, the joints of the bars can be secured together by an actual welding of the contiguous surface by the use of heat and pressure in well known manner; in which event the square section bars, the arrangement of the diagonal diameters in upright and transverse planes, and the longitudinal elongation of each angle of the web bar, gives a welding area of substantial length and width for the abutting surfaces at each joint of the bars.

An inverted-T terminal member, which may be composed of two abutting plates 9 suitably secured together as by spot welding, may be used in each end of the steel joists for securing the ends of the chord members together and also forming a bearing support for the ends of the joists.

These plates may be made of 11 gauge steel and may be slit upward at z from the lower edge, so that one end of each plate may be bent outward to form an L-flange 9^a and 9^{a'}, upon which the terminal end portions 7^a of the truss bars may rest, and these flanges also form a bearing surface of substantial length and width for the end of the joists upon a supporting wall.

The stem of the T-member formed by the plates extends upward between the lower and upper chord bars, which may be secured thereto by arc welds 8' as well shown in Fig. 5 of the drawings, and the inner ends of the plates are notched at 9' and beveled at 9'' to conform to the lower edge of the terminal portion 7^a of the web bar, and these edges of the plates and bar may be secured together by arc welds 8''; thus rigidly securing all of the terminal and bearing parts of the joist together by means of the T-member.

An extension strip or bar 10 may be secured to the under side of the chord bars at the angle x thereof, whence the strips 10 may extend horizontally outward to a point below the angle y of the lower chord bars, so as to form a continuation of the lower chord bars and furnishing a support for

expanded metal or other kinds of lathing which may be secured thereto.

I claim:—

1. A structural member including laterally spaced pairs of upper and lower bars and an intervening zig-zag web bar secured at its angles as by welding between the chord bars, all the bars being of rectangular section having flat sides arranged with their diagonal diameters in upright and transverse planes and with portions of their flat sides in abutment with each other.

2. A structural member including laterally spaced pairs of upper and lower bars and an intervening zig-zag web bar secured at its angles as by welding between the chord bars, all the bars being of rectangular section arranged with their diagonal diameters in upright and transverse planes, and each angle of the web bar being made with two bends forming an elongated portion contacting with the chord bars.

3. A structural member including laterally spaced pairs of upper and lower bars and an intervening zig-zag web bar secured at its angles as by welding between the chord bars, all the bars being of rectangular section arranged with their diagonal diameters in upright and transverse planes, the lower chord bars being inclined upward toward the upper chord bars and thence extended parallel therewith above the longitudinal axis of the member, and an upright plate secured as by welding between the end portions of the chord bars.

4. A structural member including laterally spaced pairs of upper and lower bars and an intervening zig-zag web bar secured at its angles as by welding between the chord bars, all the bars being of rectangular section arranged with their diagonal diameters in upright and transverse planes, the lower chord bars being inclined upward toward the upper chord bars and thence extended parallel therewith above the longitudinal axis of the member, and an upright plate secured as by welding between the end portions of the chord bars and having L-flanges extending under the end portions of the lower chord bars.

5. A structural member including laterally spaced upper and lower bars and an intervening zig-zag web bar secured at its angles as by welding between the chord bars, all the bars being of rectangular section arranged with their diagonal diameters in upright and transverse planes, the lower chord bars being inclined upward toward the upper chord bars and thence extending parallel therewith above the longitudinal axis of the member, and an inverted T-plate secured as by welding between the end portions of the chord bars with its flanges under the end portions of the lower chord bars.

6. A structural member including later-

ally spaced pairs of upper and lower bars and an intervening zig-zag web bar secured at its angles as by welding between the chord bars, the lower chord bars being inclined upward toward the upper chord bars and thence extended parallel therewith above the longitudinal axis of the member, and an upright plate secured as by welding between the end portions of the chord bars, and having its inner end edge abutted and secured as by welding to the end portion of the web bar.

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

FREDELLIA H. MOYER.