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COMPOSITE TRUSS JOIST WITH OFFSET BEARING

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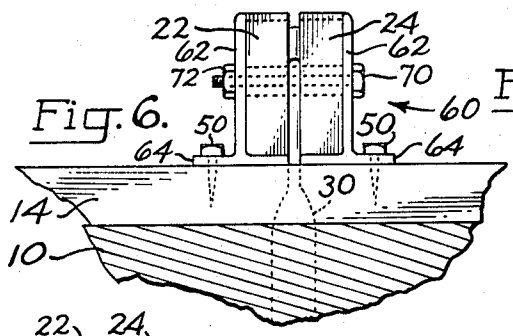


Fig. 6.

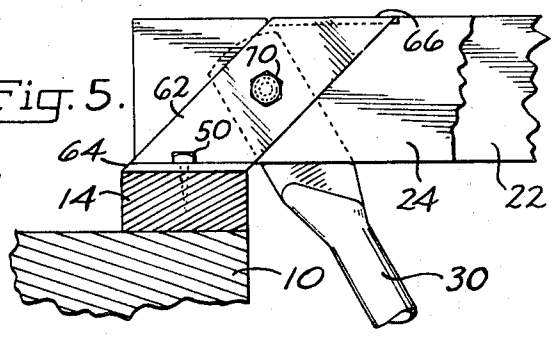


Fig. 5.

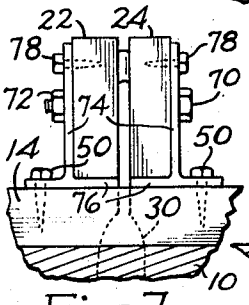


Fig. 7.

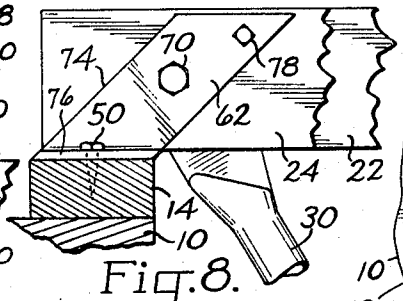


Fig. 8.

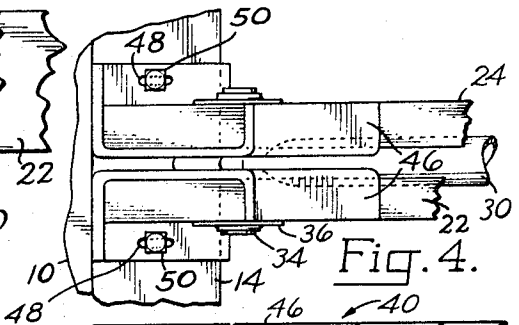


Fig. 4.

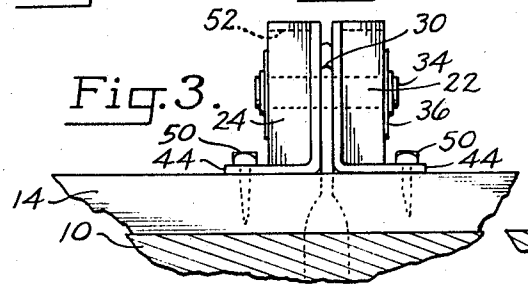


Fig. 3.

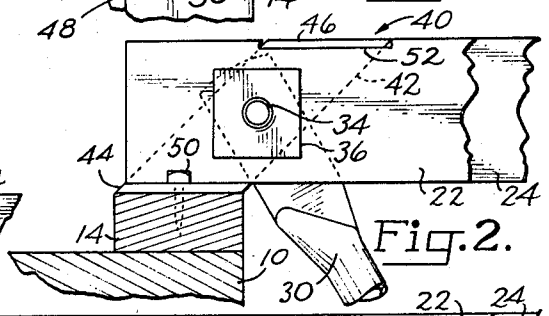


Fig. 2.

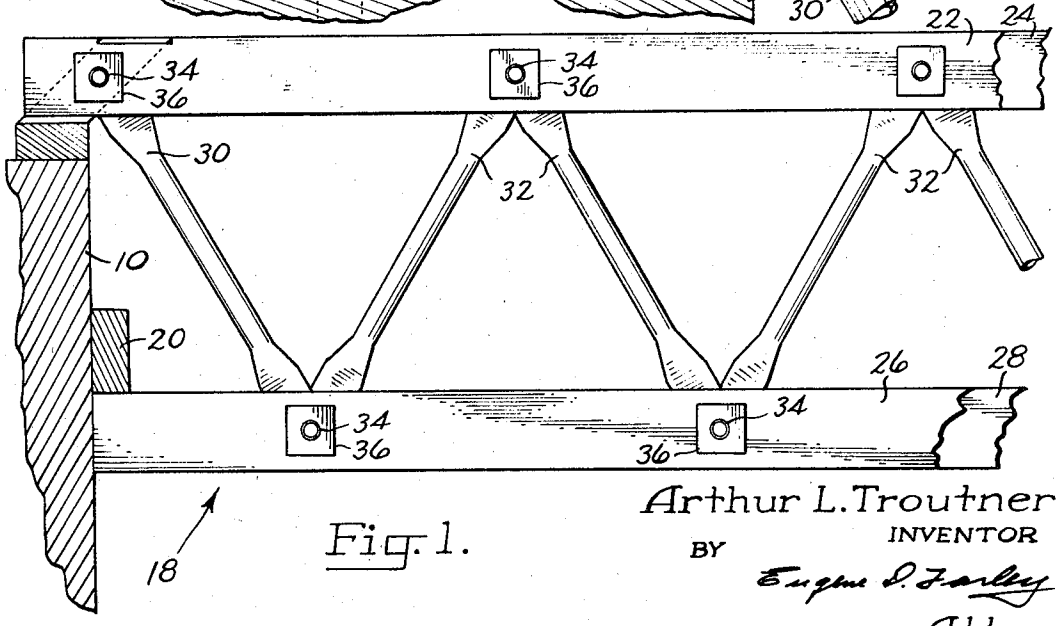


Fig. 1.

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COMPOSITE TRUSS JOIST WITH OFFSET BEARING

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Int. Cl. E04c 3/292; E04b 1/30; F16b 21/10

ABSTRACT OF THE DISCLOSURE

A composite truss joist comprises upper and lower chords interconnected by zig-zag links. The terminal ends of the terminal links are pinned to the upper chord and to diagonally arranged mounting plates carried thereby, the points of attachment being offset substantially inwardly of the chord end.

This invention is a continuation-in-part of my copending application Ser. No. 334,705 filed Dec. 31, 1963 now patent No. 3,330,087 for Long Span, High Load, Composite Truss Joist.

This invention relates to truss joists of the class comprising vertically spaced chords interconnected by a plurality of link members arranged in zig-zag disposition between the chords.

It is the general object of the present invention to provide a composite truss joist of the class described which has an unusually low profile, which may be used to advantage between walls of narrow cross section, which may be abutted end to end on a single supporting wall of narrow cross section, and which prevents or compensates for splitting of the ends of its component chords when the chords are made of wood.

It is another object of this invention to provide a truss joist which is of great strength and capable of supporting heavy loads over long spans.

Another object of this invention is the provision of a composite truss joist which may be assembled from ordinary lumber and metal tubing; which is light in weight; which may be prefabricated in assembly line production at the plant; which may be transported with facility; and which may be erected rapidly on a building site without the necessity of using power equipment.

Still a further object of the present invention is the provision of a composite truss joist which may be mounted on various types of bearing support members, such as bearing walls of concrete wood or masonry, and cross beams of wood and steel.

In the drawings:

FIG. 1 is a fragmentary view in side elevation of the herein described composite truss joist, illustrating its offset bearing construction;

FIGS. 2, 3 and 4 are fragmentary views in side elevation, end elevation and plan, respectively, of the end of the truss joist which bears on a wall or other supporting member;

FIGS. 5 and 6 are views in side and end elevation, respectively, of the truss joist in a second embodiment; and

FIGS. 7 and 8 are views in side and end elevation, respectively, of the truss joist in a third embodiment.

As shown in FIG. 1, the truss joists of my invention are supported in parallel spaced arrangement between a pair of support members such as bearing walls **10**. These may be made of wood, concrete or masonry. A bearing plate **14** is fixed to the upper surface of each bearing wall. This may comprise a piece of lumber of suitable dimensions, as a 2 x 4, or 2 x 6.

Each truss joist is composed of an upper chord, indicated generally at **16**, and a lower chord, indicated generally at **18**.

In the illustrated form of the invention, upper chord

16 is somewhat longer than is lower chord **18**. It overlies and is supported by bearing plate **14**. Lower chord **18** is substantially codimensional with the distance between supporting bearing walls **10** against which it abuts. It is nailed or otherwise secured to a longitudinally extending stringer **20** which stabilizes and strengthens the installation.

If desired, however, the arrangement may be such that lower chord **18** is substantially longer than the distance between bearing walls **10** and hence becomes the bearing chord when the entire truss joist is superimposed on the walls. This arrangement is of interest when it is desired to make cantilevered construction used in producing roof or wall overhangs, as well as skylighting and other effects of design and functional interest.

To lend strength to the truss joist, each of chords **16, 18** is a composite of two structural pieces placed side by side parallel to each other and spaced horizontally to provide an intermediate space of sufficient width, to accommodate the structural links by which they are interconnected. Thus chord **16** may be a composite of 2 x 4 or 2 x 6 pieces **22, 24** placed on edge. Similarly, lower chord **18** may be a composite of 2 x 4 or 2 x 6 pieces **26, 28** placed on edge.

Upper chord **16** and lower chord **18** are interconnected by a lacing of terminal link members **30** and central link members **32**, arranged in zig-zag fashion. Each link member may comprises a metal tube having transversely perforated flattened ends. The latter are of such thickness that when overlapped they may be inserted in the space between the structural pieces comprising each chord.

At spaced, offset intervals the upper and lower chords are cross bored to form openings which register with the perforations through the flattened ends of the link members. Hollow pins **34** are inserted through the registering openings to interconnect the link members and chords, as well as to secure together the component pieces of each chord. They are locked in place by press-on, spring steel, friction grip washers **36**.

When upper chord **16** is the bearing chord, the terminal ends of terminal link members **30** are inserted between structural pieces **22, 24** which comprise the chord. They are secured to the pieces and to the supporting structure in a manner which makes it possible to achieve the purposes of the invention.

The means employed for this purpose comprise cooperating pairs of mounting brackets, or bearing clips, the constituents of each pair being mounted back to back between the structural pieces comprising the bearing chord, at each of its ends. The structure and manner of mounting the brackets is shown particularly in FIGS. 2, 3 and 4.

Each bracket is indicated generally at **40**. It comprises a diagonally arranged, central segment **42**; a lower, or "support-bearing" segment **44**; and an upper, or "chord-engaging" segment **46**.

The lower, or support-bearing segment rests flush against the upper surface of plate **14**. It has a length somewhat greater than the width of the structural chord component which it underlies. It is provided with an adjustment slot **48** which receives a screw **50** by means of which the bracket adjustably is secured to the plate.

The upper, or chord-engaging segment **46**, has a length substantially equal to the width of the structural chord component which it overlies. It is received in a notch **52** in the latter and bears against its upper surface.

Both the lower support-bearing segment and the upper, chord-engaging segment lie substantially parallel to each other. However, because of the bias or diagonal arrangement of the central segment, the upper chord-engaging segment is offset inwardly by a substantial dis-

tance with reference to the lower, support-bearing segment of the bracket.

The central segment **42** of the bracket is of sufficient length to span the width of the structural pieces with which it is associated. It is provided with an opening which registers with the corresponding opening of the companion bracket as well as with the openings through the chord components hereinabove described. Like the latter they receive pin **34** by means of which the elements of the assembly are locked together.

The angle present between support-bearing segment **44** and central segment **42** of the bracket is somewhat variable, and determines the diagonal arrangement of the central segment. To achieve the purposes of the present invention the angle should be sufficient, with relation to the thickness of the chord, to locate pin **34** inwardly of plate **14**. This is accomplished, for example, when the angle between the bracket parts lies within the broad range of from 30 to 60°, preferably about 45°. This accomplishes several important functions.

First, it locates link **30** inside plate **14** so that the latter does not have to be notched to receive the flat end of the link, thus simplifying and strengthening the construction.

Second, it lowers the profile of the truss joist so that the valuable vertical construction space is saved.

Third, the eccentricity in the bearing is converted to a moment in the chord, which moment is resisted by the chord. This places a clamping pressure on the end of the chord and prevents the chord from splitting. It also enables the efficient use of chords having split ends.

Fourth, it makes possible locating pin **34** closer to the end of the chord than otherwise would be possible. This in turn makes it possible to mount the truss joist on supports of exceptionally narrow width. This feature further makes possible abutment of the ends of aligned truss joists on beams or supports of restricted cross section.

An alternate form of the invention achieving the same purpose is shown in FIGS. 5 and 6. In this embodiment, the mounting plate or bearing clip **60** comprises a diagonally arranged, central segment **62**; a lower or support-bearing segment **64**, and an upper or chord-engaging segment **66**.

Like segment **44** of FIGS. 1–4, lower or support bearing segment **64** rests flush against the upper surface of plate **14**. It underlies one of the chord components and is secured to plate **14** by means of a lag screw **50**.

The upper or chord engaging segment **66** lies parallel to lower segment **64**. It has a length substantially equal to the length of the chord member which it overlies and preferably is received in a notch in the latter.

Diagonal central segment **62** interconnects segments **64** and **66**. Like central segment **42** previously described, it performs an offsetting function. Unlike the latter segment, however, it is attached centrally of lower segment **64** and mounts along the outer face of the chord member, thereby achieving increased ease of assembly and stability of installation.

The elements of the assembly may be secured together by means of the hollow pin and friction grip washers previously described. In the alternative, however, they may be fastened together by means of a bolt **70** and nut **72**.

In the form of the invention illustrated in FIGS. 7 and 8, the upper or chord-engaging segment of the mounting plate is separate from the rest of the plate and secures the plate to the adjacent chord member.

Thus the mounting plate assembly includes a diagonal central segment **74**, which mounts along the outer side face of the chord member, and a lower or support bearing segment **76**, which underlies the chord member and is fastened to plate **14** by lag screw **50**.

The upper or chord engaging member comprises a lag screw or bolt **78** which penetrates an opening through the upper part of the central segment and engages the

underlying substance of the chord member. This arrangement further increases the strength and stability of the joist assembly.

It accordingly will be seen that there is provided an apparatus in which the several objects of this invention are achieved and which is well adapted for the conditions of practical use.

It is to be understood that the forms of my invention herein shown and described are to be taken as illustrative examples of the same and that various changes in the shape, size and arrangement of parts may be resorted to without departing from the spirit of my invention or the scope of the subjoined claims.

Having thus described my invention, I claim:

1. A composite truss joist comprising:

(a) two vertically spaced chords dimensioned to span two horizontally spaced bearing supports, with one of the chords in bearing contact therewith,

(b) each chord comprising two juxtaposed structural pieces placed side by side, parallel to each other,

(c) a plurality of links arranged in zig-zag relation between the chords with the ends of adjacent links overlapping and extending between the structural pieces comprising the chords, the terminal ends of the terminal links being inserted between the structural pieces comprising the said chord which is in bearing contact with the bearing supports,

(d) two pairs of mounting brackets, the constituents of each pair being adapted to be mounted along the side faces of the structural pieces comprising the said one chord at the respective ends thereof,

(e) each mounting bracket comprising a central segment, a lower, support-bearing segment and an upper, chord-engaging segment,

(f) the support-bearing segment and the chord-engaging segment extending substantially parallel to each other and substantially normal to the central segment, with the chord-engaging segment offset inwardly of the chord with respect to the support-bearing segment,

(g) there being registering openings through the structural pieces, the central segment of the mounting brackets, and the link end,

(h) pin means penetrating all of the registering openings and interengaging the structural pieces, brackets and links, and

(i) fastening means for fastening the brackets to the bearing supports.

2. The combination of claim **1** wherein the chord-engaging segment is offset from the support-bearing segment sufficiently to locate the vertical plane of the pin means inwardly of the support-bearing segment.

3. The combination of claim **1** wherein the off-setting angle of the plane of the support-bearing segment and the central segment of the bracket lies in the range of from 30 to 60°.

4. The combination of claim **1** wherein the pin means comprises a pin inserted through all of the registering openings and extending outwardly from each side of the chord, and a spring clip, friction grip washer pressed on each end of the pin.

5. The combination of claim **1** wherein the mounting brackets are mounted back to back between the structural pieces.

6. The combination of claim **1** wherein the mounting brackets are mounted along the outside side faces of the structural pieces.

7. The combination of claim **1** wherein the upper chord-engaging segment comprises a spur-type fastener penetrating the central segment and engaging the chord.

8. The combination of claim **1** wherein the upper chord-engaging segment comprises a threaded fastener penetrating the central segment and engaging the chord.

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U.S. Cl. X.R.

52—262; 287—20.95