United States Patent [19]

Satchell

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[54] **ROOF TRUSSES**

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[52] **U.S. Cl.** **52/645,** 52/634, 52/640, 52/641, 52/655

[51] **Int. Cl.** **E04c 3/11**

[58] **Field of Search** 52/70, 655, 645, 52/640, 641, 639, 634, 636

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Assistant Examiner—Leslie A. Braun
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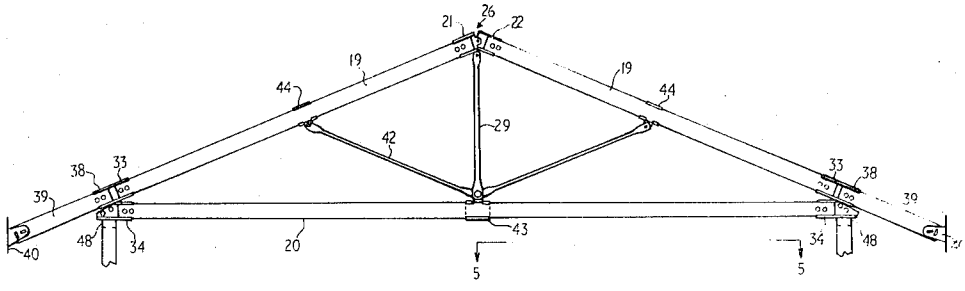
[57] **ABSTRACT**

A roof truss has two top chords and a bottom chord extending therebetween. The upper ends of the top chords are received in separate ridge sockets which are pivotally attached so as to form a ridge fitment. The lower ends of the top chords are each received in the upper socket of spaced bottom fitments, each bottom fitment also having a lower socket which respectively receive the ends of the bottom chord. The respective upper and lower sockets are arranged for pivotal movement relative to each other over a selected range of pitch angles. The respective upper and lower sockets may be maintained at any selected pitch angle within this range by inserting a bolt through any selected set of aligned holes provided therein.

6 Claims, 14 Drawing Figures



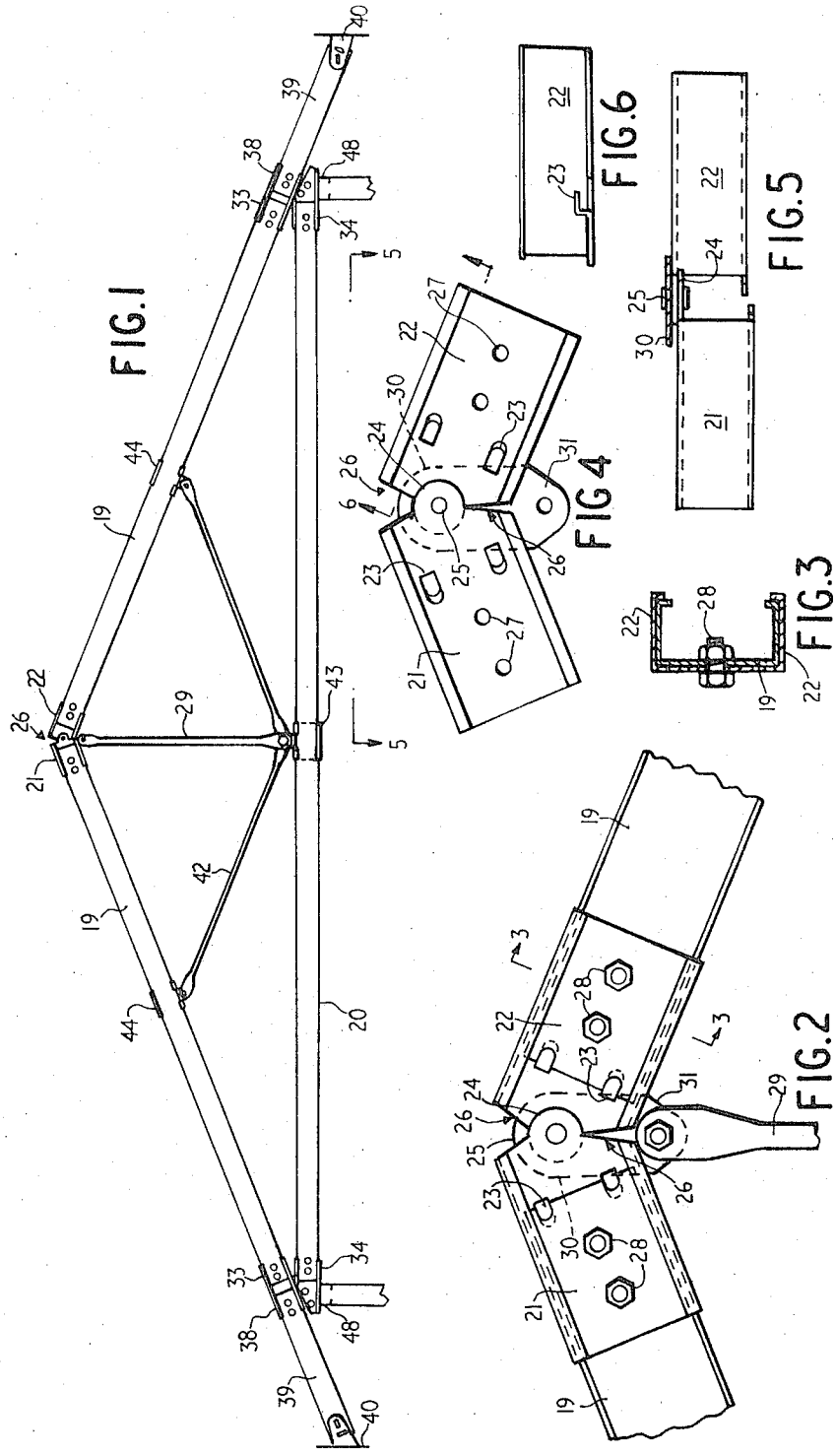


FIG.1
FIG.2
FIG.3
FIG.4
FIG.5
FIG.6

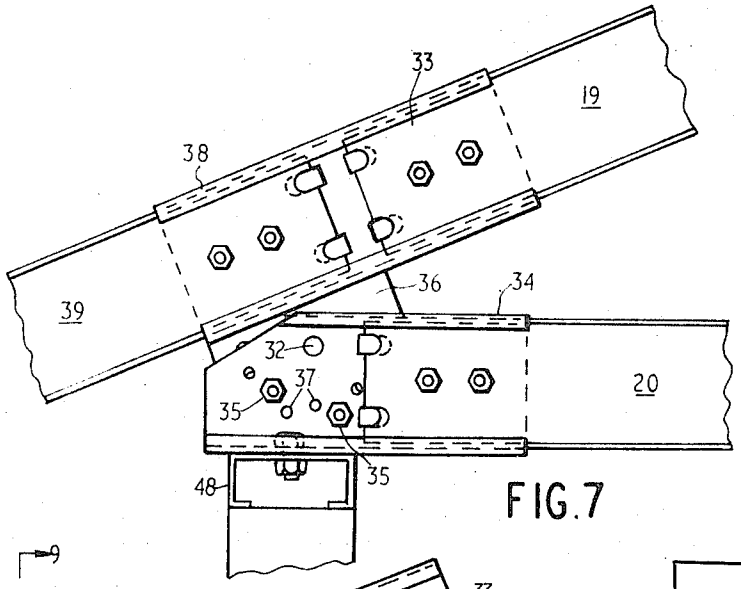


FIG.7

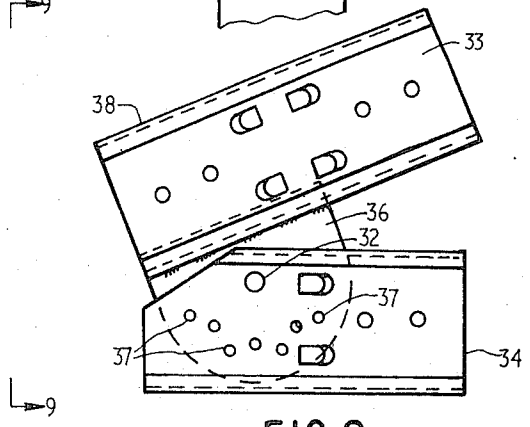


FIG.8

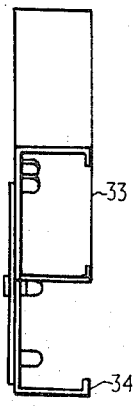


FIG.9

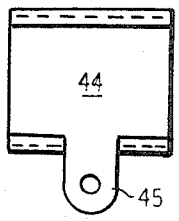


FIG. 12

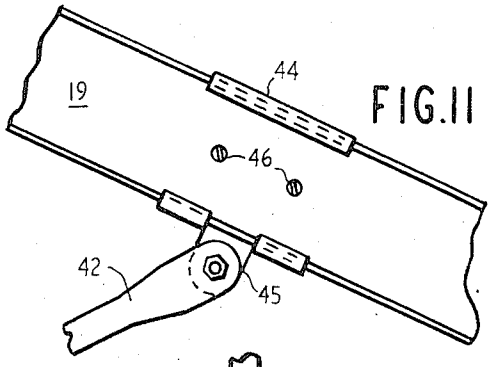


FIG. 11

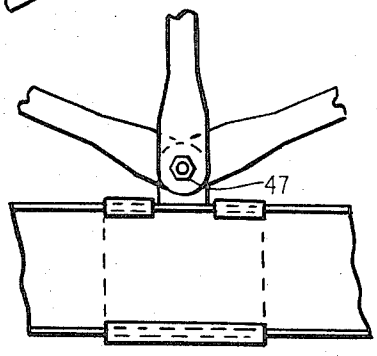


FIG. 10

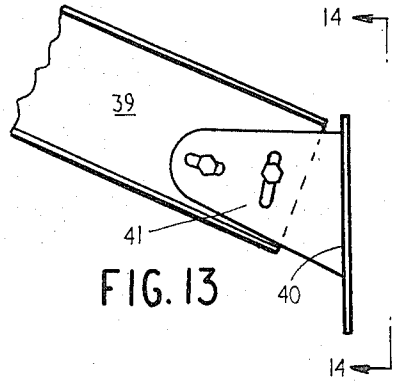


FIG. 13

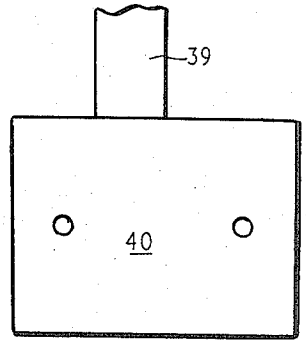


FIG. 14

ROOF TRUSSES

The object of this invention is to provide a roof truss which, irrespective of the span or pitch angle required of it when in use, may have its constituent parts selected from a relatively small range of standard, mass-produced or stock components, which may be packed into small compass for ready transportability, and subsequently assembled at a required site without special skill and without need for tools, machinery, welding gear, or assembling equipment other than such simple tools as spanners, screw-drivers and the like.

The invention is applicable to triangulated trusses generally, but is primarily intended for use in relation to those of isosceles triangular shape which consist, at least, of two top-chords which meet in a ridge, and a horizontal tension member or bottom chord by which the lower ends of the top-chords are restrained against spreading apart.

Although the invention is applicable to roof trusses of any span or any pitch angle, it is expected that in its preferred embodiments it will be applied only to spans usually employed in practical and common roof design, and will be designed in terms of its applicability to a practical range of pitch angles extending, for example, from a minimum of about 7° to a maximum of about 30°. Although the trusses may be designed on the basis of the indicated pitch angle range being stepless, it is preferable that the range consist of a number of specific pitch angles being those in common use. For example, a preferred range of pitch angles may run at 7.1°, 9.5°, 11.9°, 14.0°, 16.0°, 22.6° and 30.0°.

The terms "top," "bottom," "upper" and "lower" are used herein merely for descriptive convenience; they are not intended to imply locational or orientational restriction; they apply literally to a truss, in its normal disposition when in use.

The invention provides a roof truss comprising: two top chords, a bottom chord; a ridge fitment composed of two ridge sockets pivotally connected together and respectively having the upper ends of said top chords secured thereto; two bottom fitments each composed of a lower socket and an upper socket pivotally connected together, said lower sockets having the lower ends of said bottom chord respectively secured therein and said upper sockets having the lower ends of said top chords respectively secured therein; and means for holding the lower and upper sockets of each of said bottom fitments in selected pitch angle adjustment.

As already indicated, a truss according hereto may consist of no more than two top chords, a bottom chord, and the fitments for joining their ends together as a triangle. More usually however, trusses according hereto will include diagonal brace members, vertical tie-rods and the like.

This description will now proceed in terms of the drawings herewith. These drawings illustrate a preferred, and what is presently expected will be the commonest, practical embodiment of the invention.

FIG. 1 is a side elevation of a truss.

FIGS. 2 to 18 are on an enlarged scale by comparison with FIG. 1.

FIG. 2 repeats a ridge portion of FIG. 1.

FIG. 3 is a section taken on line 3 — 3 in FIG. 2.

FIG. 4 repeats a portion of FIG. 2.

FIG. 5 is a plan of the matter shown in FIG. 4.

FIG. 6 is a section taken on line 6 — 6 in FIG. 4.

FIG. 7 repeats a left-hand end portion of FIG. 1.

FIG. 8 repeats a portion of FIG. 7.

FIG. 9 is an end elevation looking in the direction of line 9 — 9 in FIG. 8.

FIG. 10 repeats a tie-rod bottom-chord sleeve-piece already shown in FIG. 1.

FIG. 11 repeats a tie-rod top-chord sleeve-piece already shown in FIG. 1.

FIG. 12 repeats a sleeve-piece as shown in FIG. 11.

FIG. 13 repeats a facia bracket portion shown in FIG. 1.

FIG. 14 is an end elevation looking in the direction of line 14 — 14 in FIG. 13.

Referring to all of the figures of the drawings, the top chords 19 and the bottom chord 20 are preferably of the same material and of the same uniform cross-sectional shape. They may be of timber of rectangular section, or they may be steel tubes, but for preference these members are of channel form as shown; that is, a rectangular channel form which readily lends itself to production of the chord members by roll forming of sheet steel.

The ridge fitment comprises two sockets 21 and 22 and these are preferably of 'C' Cross-sectional shape as shown whereof the dimensions are such that the upper ends of the top chords may be neatly inserted therein. Stops are preferably provided in the socket webs in the form of offset tongues or lugs 23 which prevent over-insertion of the top chord upper ends.

The webs of the ridge sockets, at their upper ends, have lapping projecting portions 24 which are pivotally held together by a rivet 25 bolt or the like. The socket webs and flanges are cut back obliquely from their pivot connection (as indicated at 26) so that the two sockets may be variously angled each relative to the other so to be adjustable over the range of ridge angles to be accommodated thereby.

The upper ends of the top chords are furnished with bolt holes which register with similar holes 27 in the socket webs so to enable firm connection together of the top chords and the ridge sockets by bolts 28.

If the truss is one required to include a vertical tie-rod or king post 29, the ridge pivot joint may include an extra plate 30 providing a bottom lug 31 to which the upper end of the tie-rod 29 may be bolted.

The two bottom fitments include sockets of the same kind as those of the ridge fitment; these bottom fitments are each virtually the same as the ridge fitment except for them having their sockets pivoted together (at 32) in such manner as will accommodate an angle between the two sockets equal to the acute pitch angle (22.6° for example) as distinct from the obtuse ridge angle (which, in such case, would be 134.8°).

The two bottom fitments are furnished with means for holding their lower and upper sockets 33 and 34 in selected pitch angle adjustment. These means may be in the form of through bolts 35 extending through a pivoting flange extension 36 on one of the sockets which laps against the flange of the other socket, bolt holes being provided between the two for insertion and tightening of bolts 35.

It will be appreciated that it would be theoretically possible to omit holding means (such as bolts 35) but in practice this would involve excessive shearing and bearing stresses in the pivot pin and socket portions which it hingedly connects together. Therefore such holding means are included in all practical embodiments of the invention.

The bolt holes **37** for the holding bolts **35** could be of elongated arcuate form if the truss were required to be steplessly able to accommodate all pitch angles within a selected range thereof. Such elongated bolt holes are not preferred however, because where a truss is required to accommodate specific pitch angles within a range, the holding bolts may be advantageously so placed that (assuming two holding bolts are used in each bottom fitment) only two pairs of holes in the webs to be bolted together will be in register when the sockets are placed at the selected pitch angle. Thus when the required pitch angle is known the holding bolts may be entered into and tightened relative to those bolt holes which are in register which then act to fix the pitch angle without need for protractor or other determination thereof.

When the roof is required to have eave extensions of the top chords, the upper socket of each of the bottom fitments may have a second socket **38** formed as a downward extension thereof, and an eave member **39** preferably of the same cross-sectional shape and dimensions as the top chord may be inserted in the extension socket and bolted therein. The chord eave extension would, of course, be of the required eave length and the outer or free end of the extension, if desired, may be furnished with brackets to which facia plates, gutters or the like may be attached.

These facia brackets consist of a face plate **40** having a bolting web **41** fixed thereto. The bolting web has elongated bolt holes therein so that irrespective of the pitch angle of the chord extension, the facia bracket may be fixed thereto so that the bracket face plate **40** will be vertical.

Where the truss is required to include diagonal brace members such as **29** and **42,** extra fitments **43** and **44** are provided which are preferably of the same C cross-sectional shape as the sockets and are thus slidable along the top and bottom chord members. The braces may be simple strip-like members having end bolt holes which may be bolted to lugs **45** on the appropriately applied sliding fitments. When the sliding fitments have been applied to the several chords and the diagonal braces bolted thereto, the sliding fitments may be secured in position on the chord which carries them by use of self-tapping screws (**46** - FIG. **11**) or the like as well understood.

All of the slidable fitments **43, 44** will be of the same cross-sectional shape and each will be furnished with an offset bolting lug **45** to which a brace or braces may be secured by a single bolt such as **47.** Where three brace connections are required (for example, two diagonal braces and a king post as in FIG. **1**) the sliding fitment will then require its bolting flange to provide for three separate bolting connections thereto as shown in FIG. **10.**

The bottom flanges of the bottom chord fitments may be furnished with bolt holes or the like to enable them to be secured upon the top of a wall stud or a wall top plate **48** as well understood.

It will be appreciated that where diagonal braces are employed their upper ends may be positioned by suitable placing of their sliding fitments, as will impose varying degrees of camber on the bottom chord as may be required having regard to the loading effect of the kind of roof coverage (e.g., tiles, corrugated steel sheets, corrugated abestos cement sheets or the like) which may be used.

It will be seen that as the various fitments, or rather the form thereof, is independent of the pitch angle for the truss or the span of the truss, these fitments may be mass produced and kept in stock in readiness for fulfilment of any order for a truss. Similarly, because any diagonal brace members employed may be connected to their chords by way of fitments which are slidable relative to their final position of fixing to the chord the braces may also be made in a plurality of standard lengths, supplies of which may be kept in stock. This applies equally to the chord members, but for preference these are made out of stock of indefinite length as it is a simple matter simply to cut them to such length as may be required upon receipt of a truss order. Their lengths can then be readily determined in terms of whether they are to be top chords, bottom chords or eave extensions; and also in terms of truss span and pitch angle.

It will be apparent that the above described preferred embodiment may be modified in several ways. For example, those parts which have been described above as "sockets" could, where they receive the end of a chord, be fitted inside the chord end instead of outside as shown. Again these "sockets" could be simple flat (unflanged) plates bolted directly to the chord webs on one or the other side thereof.

If desired, an extra plate as **30** (FIG. **2** or FIG. **4**) could have its bottom lug **31** elongated and furnished with a vertical row of bolt holes, or a single elongated bolt hole so that a tie rod such as **29** could be of standard length, for any given truss span, notwithstanding variation of the truss pitch angle. It will also be apparent that eave chord extensions such as **39** could be omitted and, with only slight design modification of the fitment shown in FIG. **8,** the top chords could be downwardly extended to provide an eave portion sufficient for many practical expressions of the invention.

I claim:

1. A roof truss, comprising two top chords each having an upper and a lower end portion; a bottom chord extending in a direction from one to the other of said top chords and having two end portions each of which faces a respective one of said top chords; a ridge fitment including two ridge sockets arranged for pivotal movement relative to each other, each of said ridge sockets receiving one of said upper end portions; two bottom fitments each including an upper and a lower socket arranged for pivotal movement relative to each other to a plurality of positions within a range of pitch angles, each of said upper sockets receiving one of said lower end portions, and each of said lower sockets receiving one of said end portions of said bottom chord; means for arresting the respective upper and lower sockets of each of said bottom fitments in any one of said positions within said range of pitch angles; a fitment slidably mounted on said bottom chord; a tie-rod extending in a direction from said slidable fitment towards said ridge fitment, said tie-rod having two end portions one of which is received by said ridge fitment and the other of which is received by said slidable fitment; two additional fitments each of which is slidably mounted on a respective one of said top chords; and two diagonal tie-rods one of which extends in a direction from said slidable fitment on said bottom chord to one of said additional fitments and the other of which extends in a direction from said slidable fitment on said bottom chord to the other of said additional fitments,

said one diagonal tie-rod having two end portions one of which is received by said slidable fitment on said bottom chord and the other of which is received by said one additional fitment, and said other diagonal tie-rod having two end portions one of which is received by said slidable fitment on said bottom chord and the other of which is received by said other additional fitment.

2. A roof truss as defined in claim **1**, wherein all of said end portions are of channel-shaped cross-sectional configuration, and all of said sockets are of C-shaped cross-sectional configuration, said sockets being adapted to embrace respective one of said end portions.

3. A roof truss as defined in claim **2**, wherein each of said sockets comprises at least one stop lug whereby to prevent over-insertion of the respective end portions into said sockets.

4. A roof truss as defined in claim **1**, wherein portions of the respective upper and lower socket of each of said bottom fitments overlap, one of said overlapping portions being provided with at least one hole and the respective other overlapping portion being provided with a plurality of holes, said one hole being adapted to become aligned with a different one of said plurality of holes at each of said plurality of positions within said range of pitch angles, and said arresting means comprising at least one through-bolt adapted to be inserted into said one hole and one of said plurality of holes upon alignment therewith.

5. A roof truss as defined in claim **1**; and further comprising an eave extension mounted on each of said bottom fitments.

6. A roof truss as defined in claim **5**; further comprising facia brackets adapted to be mounted on each of said eave extensions; and mounting means adjustably mounting said facia brackets on said eave extensions.

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