United States Patent

[11] 3,591,995

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[45] Patented **July 13, 1971**

[54] **TRUSS JOIST WITH CLAMP-CONNECTED WEB MEMBERS**
12 Claims, 9 Drawing Figs.

[52] U.S. Cl. 52/693, 287/189.36
[51] Int. Cl. E04c 3/292, E04c 3/12
[50] Field of Search ..... 52/693; 287/20, 20.95, 20.92.5, 20.92 D, 20.92 B, 189.36 C; 16/149, 158, 169

[56] **References Cited**
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ABSTRACT: A truss joist comprises upper and lower chords having in their opposed faces a staggered pattern of slots with inwardly projecting, reversely tapered end walls. A plurality of clamp connectors are disposed one in each slot. Each clamp connector comprises an outer and an inner hollow case arranged back to back. The end walls of each case have a taper substantially matching the taper of the slot end walls. A plurality of web members are arranged diagonally between the chords with the ends of adjacent web members extending into the inner case of each connector. Web member securing means secure the web members in the cases. Case securing means secure the cases of each pair to each other, while contemporaneously exerting clamping pressure against the inwardly tapered end walls of each slot.

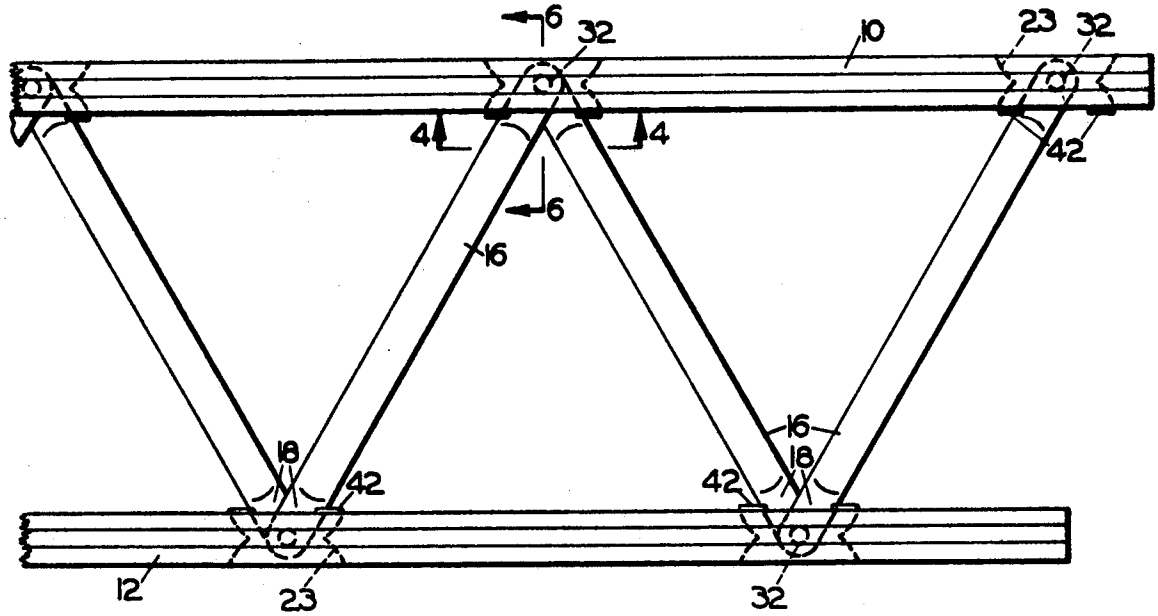


FIG. 1

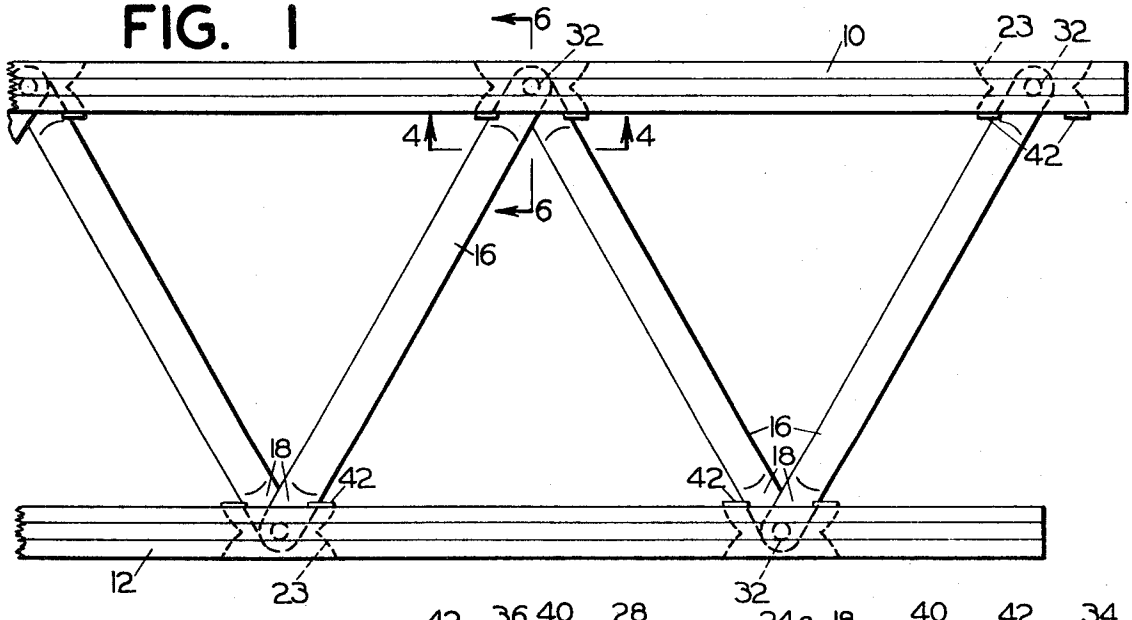
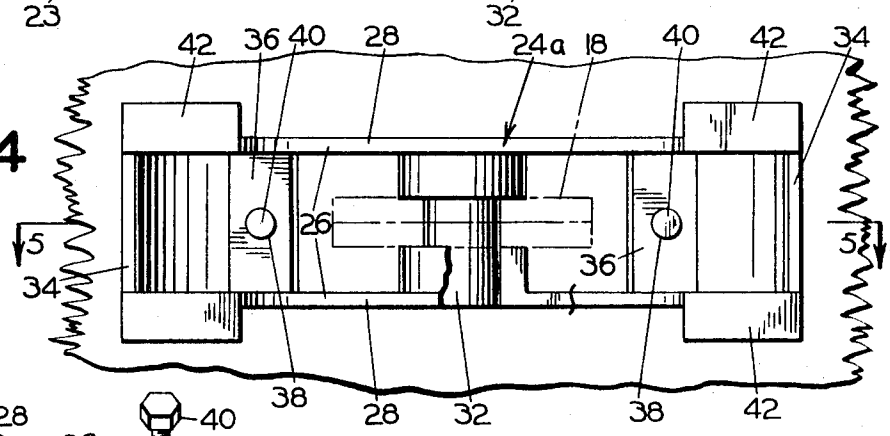


FIG. 4



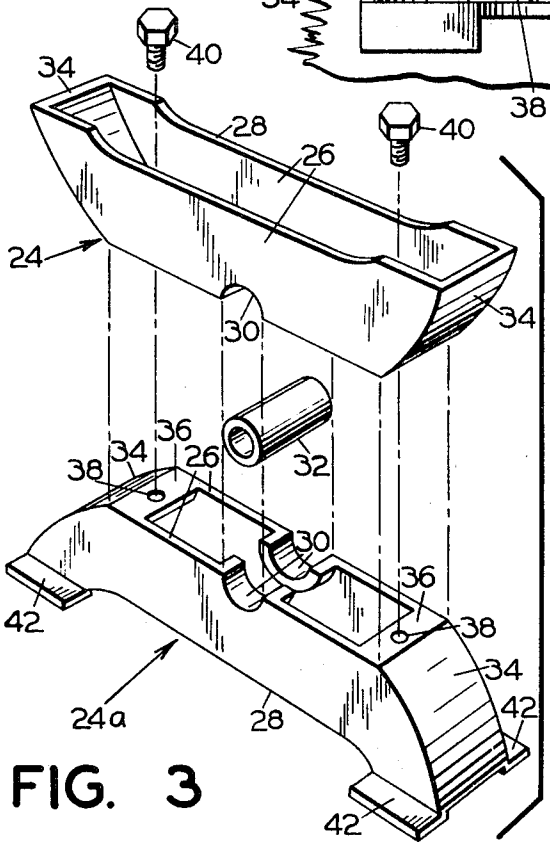


FIG. 3

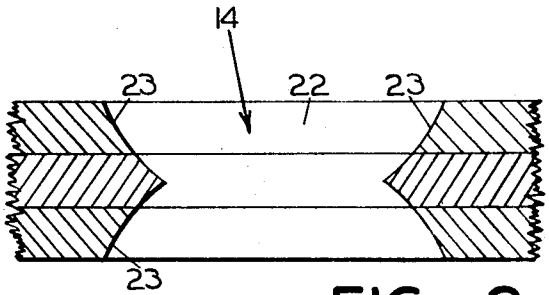


FIG. 2

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FIG. 5

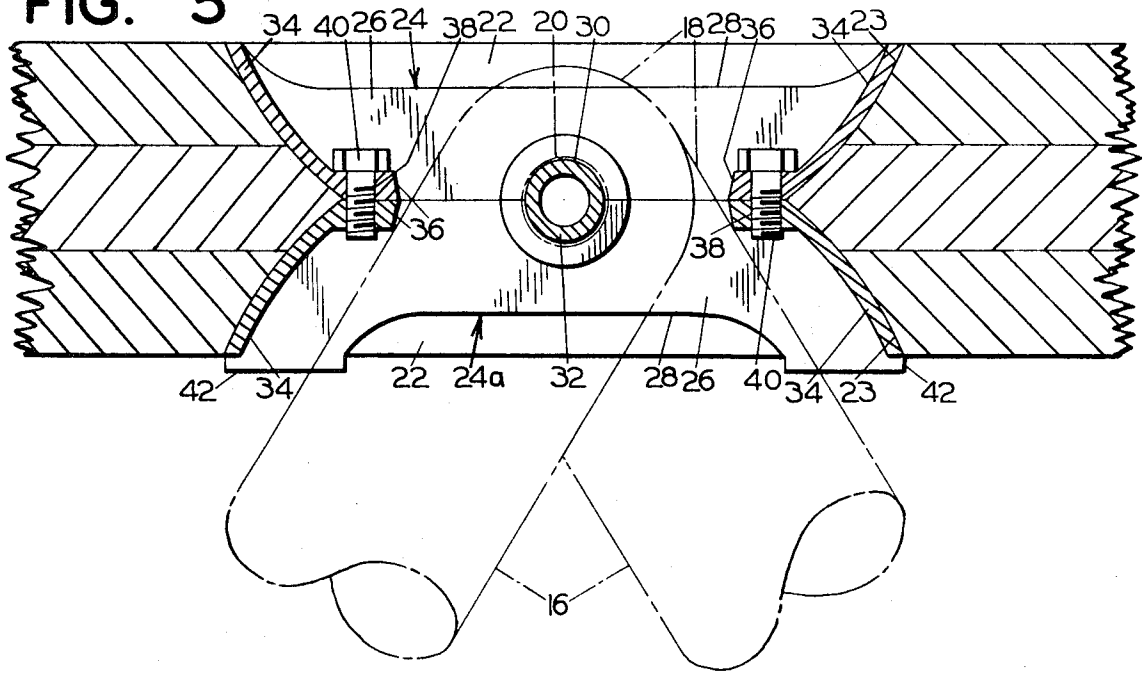


FIG. 6

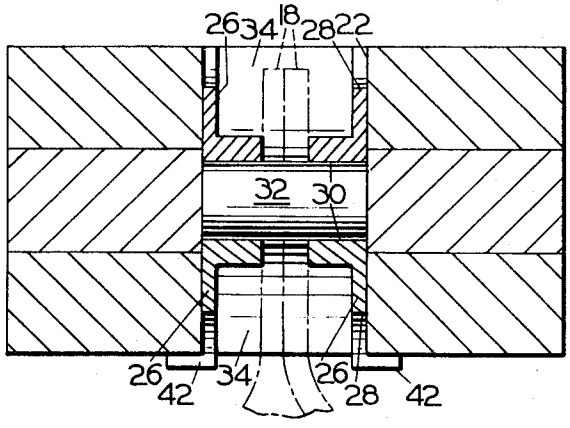


FIG. 8

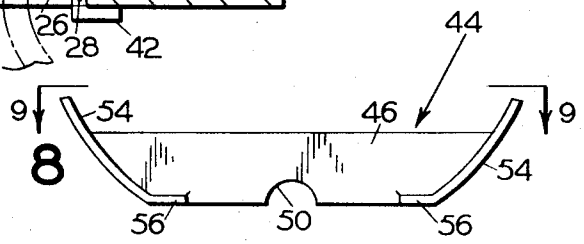


FIG. 9

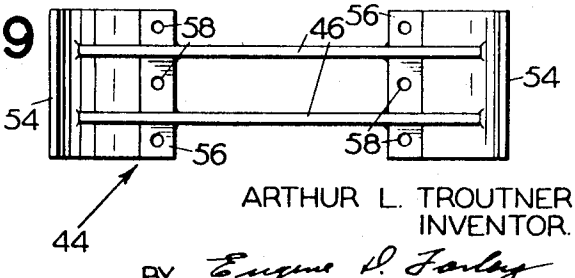
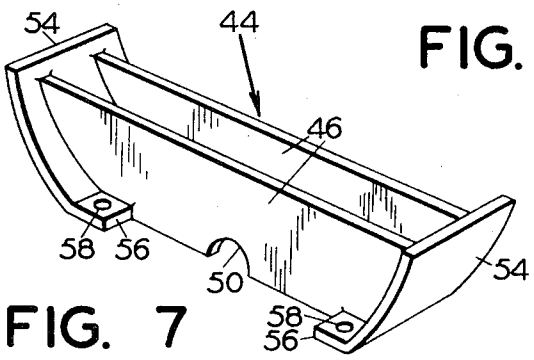


FIG. 7



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TRUSS JOIST WITH CLAMP-CONNECTED WEB MEMBERS

This invention relates to truss joists of the class employed for supporting floors, roofs and other structural components. It pertains particularly to truss joists of substantial size utilizing as chord components laminated beams or like structural members of substantial cross section.

One widely known and highly efficient type of truss joist comprises wooden upper and lower chords having staggered slots in their opposed faces and cross bores intercepting the slots. Web members or links are arranged diagonally between the chords.

The web members have perforated ends which at each panel point are are overlapped and inserted, one pair of overlapped ends in each slot, with the perforations in the web member ends being aligned with each other and with the cross bores of the slots. Pins are pressed through the aligned openings to interlock the truss joist elements.

A truss joist of the foregoing class is subject to a certain disadvantage in that the provision of the cross bores which intercept the slots recesses and contain the pins removes some of the net cross section of the wood. This detracts from the efficiency of the truss. Also, the cross bores present points of weakness which make the truss joist subject to splitting during manufacture, transportation, installation and use.

It accordingly is the general purpose of the present invention to provide a truss joist, preferably a truss joist of large dimensions, having chords which are not cross bored, which accordingly works with increased efficiency, and which has chords with planar side faces unmarked by the presence of visible pin ends.

A further important object of the invention is the provision of a truss joist in which the tendency to split at the panel points is diminished, not only by the absence of cross bores, but also by positive clamping pressure exerted upon the wood defining the slots which receive the web member ends.

Still other important objects of the invention are the provision of a truss joist which is of balanced construction, which lends itself to assembly line production, which may be disassembled for repair and other purposes, and which is especially well suited for use in the manufacture of truss joists including laminated beams as chords.

The manner in which the foregoing and other objects of this invention are accomplished will be apparent from the accompanying specification and claims considered together with the drawings wherein:

FIG. 1 is a fragmentary view in side elevation of the truss joist of the invention;

FIG. 2 is a fragmentary view of one of the chords of the truss joist shown in longitudinal section;

FIG. 3 is an exploded view of one of the clamp connectors used in the manufacture of the truss joist, illustrating the construction and manner of assembly of the connector;

FIGS. 4, 5 and 6 are a bottom plan view, a longitudinal sectional view and a transverse sectional view, respectively, of the clamp connector in its assembled condition, taken along lines 4–4 of FIG. 1, 5–5 of FIG. 4 and 6–6 of FIG. 1, respectively; and

FIGS. 7, 8 and 9 are views in perspective, side elevation, and top plan of an alternate form of the clamp connector.

As shown in FIG. 1, the herein described truss joist includes an upper chord 10 and a lower chord 12. For best use of the principle of the invention the chords are of substantial construction and comprise timbers, glue lam beams, etc. The opposite faces of the chords are provided with staggered recesses or slots 14 which extend completely through the chord from top to bottom.

The slots in the chords are in staggered relation to each other, top and bottom. The chords are interconnected by a plurality of web members or links 16. These may be comprised of tubular steel and have flattened ends 18. Suitably dimensioned and located transverse perforations 20 penetrate each of the web member ends.

The character and configuration of slots 14 are one of the keys to the performance and application of the herein described truss joist. As illustrated in FIG. 2, each slot has sidewalls 22 extending longitudinally of the chord and end walls 23 extending transversely thereof.

The end walls have the characteristic contour illustrated in FIG. 2. Each end wall comprises two segments tapered inwardly one from the top, and one from the bottom of the chord. The net result is to provide a central projection or tongue in the central area of the slot. These provide bearing surfaces of use in the application of the clamp connectors by means of which the webs are secured to the chords.

A slot of the foregoing configuration may readily be made by two passes of a router, one from the top face of the chord, and the other from the bottom face on the same plane with one of the router cuts intercepting or overlapping the other. Normally, and in the absence of special measures taken to prevent it, a slot thus formed in the wood would be a focal point for the formation of splits, fissures, as well as for delaminations of a laminated chord. However, the clamp connectors of the present invention provide means for overcoming this problem.

The construction of the clamp connectors is shown particularly in FIG. 3.

Each clamp connector comprises an outer case indicated generally at 24, and an inner case, represented generally at 24*a*.

The two cases are constructed from a rigid metal having appreciable strength so that the cases have structural properties. They may be of identical construction and may be fabricated easily by stamping them out heavy sheet metal.

Each case comprises a pair of sidewalls 26, having cutaway outer margins 28 and formed with extended, arcuate recesses 30 in their lower inner margins. The recesses in effect are segments of a sleeve dimensioned to receive in snugly fitting relation a connecting pin 32 by means of which web members 18 are connected to the cases.

Cases 24, 24*a* also are provided with integral end walls 34. These are tapered on a taper which matches the taper of end walls 23 of slots 14 in the chord.

The tops of the cases are open. Their bottoms are partially closed by means of segmental sleeve segments 30, above described, and by short plates 36 having openings 38 transversely therethrough. The openings in one of the cases, for example case 24, may be plain while those in the other, for example case 24*a*,are threaded for the reception of a pair of screws 40.

Cases 24, 24*a* are adapted to be arranged back to back, one such pair in each of slots 14. When they are thus arranged, sleeve segments 30 and openings 38 in one case register with the corresponding elements of the other case, forming on the one hand a sleeve dimensioned to receive pin 32 and on the other, a continuous passageway for screws 40.

If desired, for special applications, as where it is desired to add greater strength for vertical load support, the innermost of the cases 24*a*,may be provided with laterally extending pads 42 which bear against the inner faces of the chords as shown particularly in FIGS. 5 and 6.

An alternate form of case is shown in FIGS. 7, 8 and 9. This is designed to provide a greater end bearing area, where this is desired. It also is designed to lend itself to alternate manufacturing methods, as by means of welding the components together.

The basic construction of the case is the same as that previously described. Thus it comprises a pair of sidewalls 46 having formed in their surfaces sleeve segments 50. The sidewalls are interconnected by a pair of end walls 54 which are arcuate or tapered to conform to the ends of the slots in the chords. As noted, the ends are substantially wider than the spacing between the sidewalls to afford a greater bearing area.

The tops of cases 44 are open. The bottoms are partly closed off by plates 56 provided with bolts or screw holes 58. When the two cases are placed back to back, the openings 58 in one register with the openings 58 in the other so that they may be clamped together.

In their assembled condition, the cases of both categories form a connector having a three-fold function. First, it couples the webs to the chords. Second it absorbs and distributes the stresses occurring upon loading the truss. Third, it clamps together the inwardly tapered end walls 23 of chord slots 14, thus preventing splitting and delamination of the chords in the panel point areas.

The manner of assembly of the truss joist of my invention is apparent from the foregoing.

Chords 10, 12 are arranged with slots 14 in proper staggered relation. Adjacent pairs of webs 16 are arranged with their flattened ends 18 overlapped and openings 20 registering.

One such pair is inserted in the inner case 24*a*,pin 32 inserted through the registering web end openings, the outer case 24 super imposed, and clamped to the inner case by means of screws 40. This not only anchors the web members to the chord, but also clamps the wood of chord slot ends 23 to prevent it from splitting.

Having thus described my invention in preferred embodiments, I claim as new and desire to protect by letters patent:

1. A truss joist comprising
   a. upper and lower wooden chords having a staggered pattern of vertical, longitudinally arranged slots,
   b. each slot having end walls tapering inwardly toward the center of the chord from the chord top and bottom surfaces, thereby providing inwardly projecting end walls of predetermined reverse taper,
   c. a plurality of clamp connectors disposed one in each slot,
   d. each clamp connector comprising outer and inner hollow cases arranged back to back and having end walls engaging the opposite sides of the inwardly projecting end walls of the slots,
   e. a plurality of web members arranged horizontally between the chords with the ends of adjacent web members extending into inner case of each connector,
   f. web member securing means securing the web members in the cases, and
   g. case-securing means securing the cases of each pair to each other, thereby contemporaneously exerting clamping pressure against the reversely tapered end walls of each ach slot.

2. A truss joist comprising
   a. upper and lower wooden chords having a staggered pattern of vertical, longitudinally arranged slots,
   b. each slot having inwardly projecting, tapered end walls,
   c. a plurality of clamp connectors disposed one in each slot,
   d. each clamp connector comprising outer and inner hollow cases arranged back to back,
   e. each case comprising a pair of sidewalls, a pair of inwardly tapered end walls, and an open bottom,
   f. the inwardly tapered end walls of the cases bearing against the end walls of the slot and having a predetermined reverse taper substantially matching the taper of the slot end walls,
   g. a plurality of web members arranged diagonally between the chords with the ends of adjacent web members extending into the inner case of each connector,
   h. web member securing means securing the web members in the cases and
   i. case-securing means securing the cases of each pair to each other, thereby contemporaneously exerting clamping pressure on the end walls of the slot.

3. The truss joist of claim 2 wherein the web member ends are overlapped and the web member securing means comprise pin means extending through the clamp connector means and the web member ends.

4. The truss joist of claim 2 wherein the web member ends are overlapped and the web member securing means comprise pin means seated in registering recesses in the meeting surfaces of each clamp connector pair and extending through the overlapped web member ends.

5. The truss joist of claim 2 wherein the inner case is provided with outwardly extending feet engaging inner surface of the chord.

6. The truss joist of claim 2 wherein the web member securing means comprises screw means interconnecting the case components of each connector.

7. The truss joist of claim 2 wherein the end walls of the cases project outwardly beyond the planes of the sidewalls thereof fore providing increased end wall bearing areas.

8. For use in a truss joist comprising upper and lower wooden chords interconnected by a lacing of web members the ends of which register with longitudinal slots in the chords and each of which slots has inwardly projecting reversely tapered end walls, a clamp connector for connecting the web members to the chords and comprising
   a. an outer and an inner hollow case adapted to be arranged back to back within one of the chord slots,
   b. each case comprising a pair of sidewalls and a pair of inwardly tapered end walls adapted to abut the tapered end walls of the chord slot,
   c. web member securing means engaging and extending transversely of at least one of the outer and inner cases and adapted to engage the end of a web member, and
   d. case-securing means releasably interconnecting the outer and inner cases.

9. The clamp connector of claim 8 wherein the web member securing means comprises pin means seated in registering recesses in the meeting surfaces of the outer and inner cases.

10. The clamp connector of claim 8 wherein the inner case is provided with outwardly extending feet for engaging the inner surface of a chord.

11. The clamp connector of claim 8 wherein the end walls of the cases project outwardly beyond the planes of the sidewalls thereof for providing increased end wall bearing areas.

12. The clamp connector of claim 8 wherein the case securing means comprises screw means interconnnecting the outer and inner cases.

UNITED STATES PATENT OFFICE

CERTIFICATE OF CORRECTION

Patent No. 3,591,995 Dated July 13, 1971

Inventor(s) ARTHUR L. TROUTNER

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

Claim 1, line 35 change "horizontally" to --diagonally--.

Signed and sealed this 8th day of April 1975.

(SEAL)
Attest:

RUTH C. MASON
Attesting Officer

C. MARSHALL DANN
Commissioner of Patents
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