United States Patent

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[54] **TRUSS CONNECTOR PLATE**
10 Claims, 6 Drawing Figs.

[52] **U.S. Cl.** ..... **85/13,** 52/712, 287/20.92 L
[51] **Int. Cl.** **E04c 3/292,** F16b 5/00
[50] **Field of Search** ..... 287/20.92 LP, 20.94, 20.95; 85/11, 13; 52/712, 715, 690, 691, 692, 693, 694, 695, 696

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ABSTRACT: A truss plate is provided comprising a metal sheet having at least one pair of prongs integrally projecting from the undersurface thereof and forming a single elongated slot in said sheet having a central portion wider than the adjacent portions thereof, the prongs of said pair being disposed at the opposite ends of said slot, each prong comprising an elongated narrow shank and a barbed tip, said barbed tip being wider than said shank at its juncture thereto.

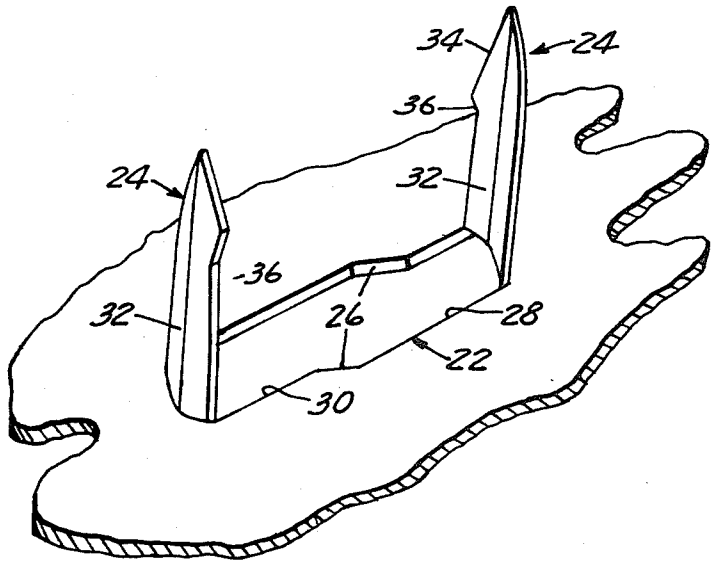


FIG. 1

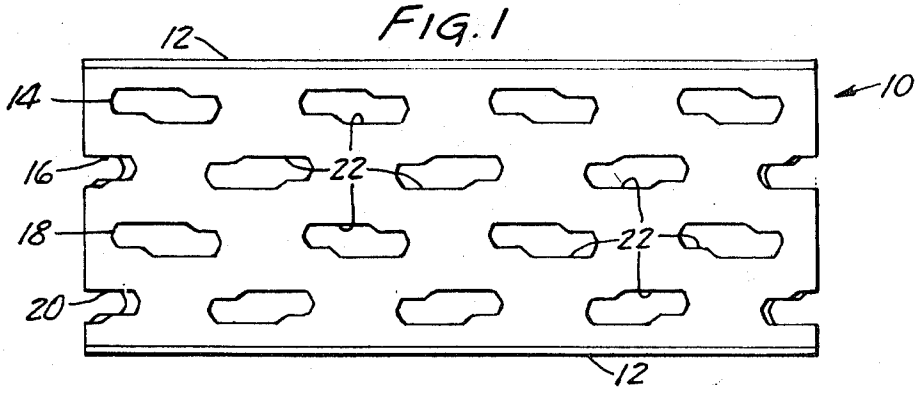


FIG. 2

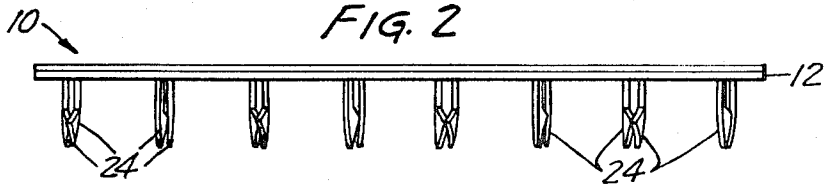


FIG. 3

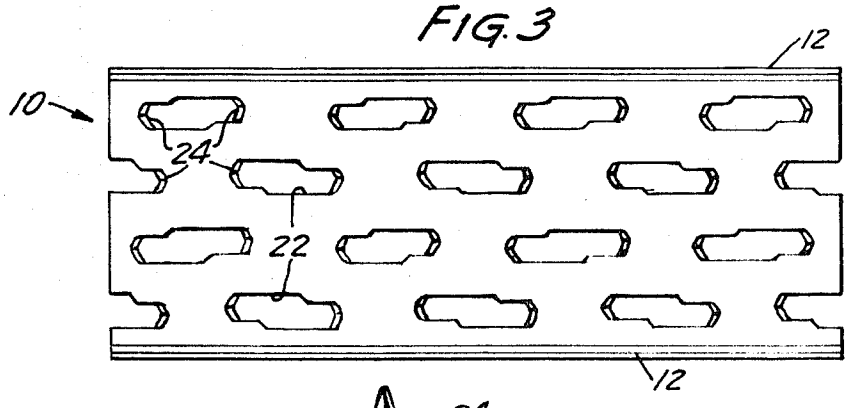


FIG. 4

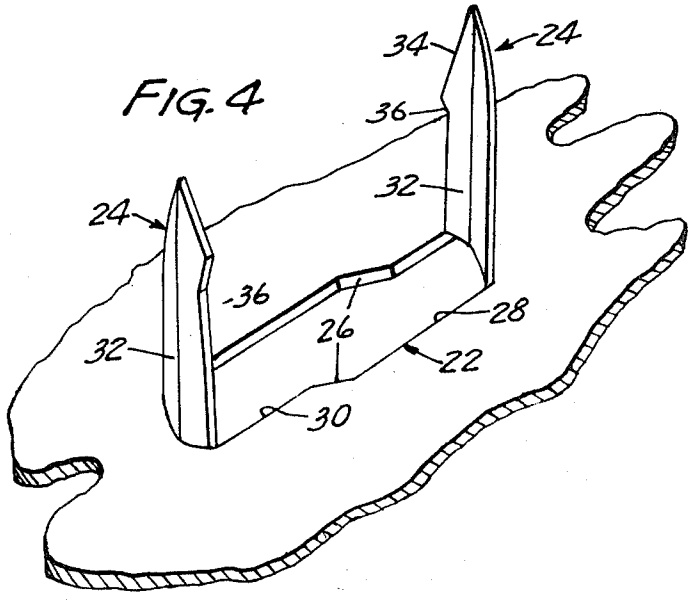
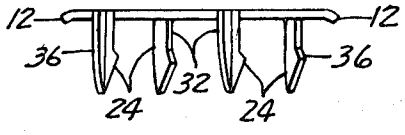
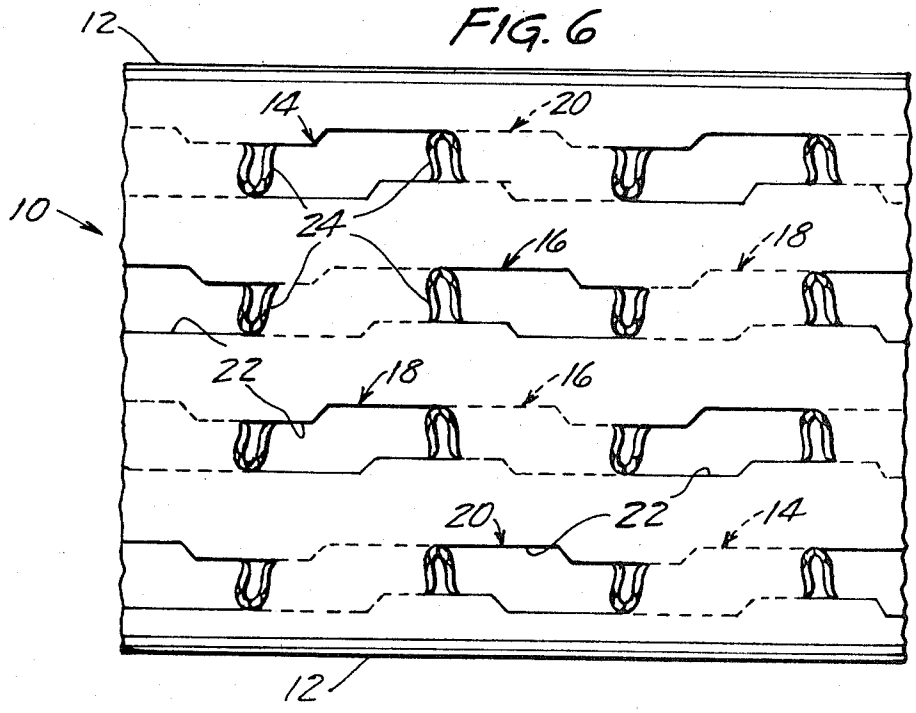


FIG. 5



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FIG. 6



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TRUSS CONNECTOR PLATE

This invention relates to connector plates to join abutting wooden truss members to one another in the formation of wooden trusses. More particularly, this invention relates to a new and useful truss-connector plate having a combination of plate openings and integral prongs or teeth which provides a unique combination of desirable features, and to trusses constructed with such plates.

The formation of wooden trusses having the abutting members thereof joined with metal truss-connector plates is quite well known to the art. Wooden trusses having such plate-connected joints are strong and lightweight and support greater loads than similar trusses having the joints connected by other means, e.g. nails and the like. Thus, using truss-connector plates, in lieu of or in conjunction with nails, wooden trusses having longer spans and lower pitches than were theretofore possible can be constructed. Also, truss fabrication is simplified and the speed of production greatly increased.

Nonetheless, the prior known truss-connector plates have certain deficiencies. High strength in the truss joint formed using a connector plate is usually gained only by increasing the thickness of the connector plate as none of the commercially used plates can be applied one on top of the other; good holding strength of the plate to the truss members is usually achieved only by providing a large number of teeth per square inch, usually eight or more; many plates require the use of stitching nails in addition to the teeth of the plates; when trusses are stacked together, both stacking and separation are sometimes difficult as the plates of adjacent trusses tend to catch against one another.

The truss-connector plate of the present invention provides a unique combination of properties, combining high strength and tenacious holding power with lightweight and a minimal number of prongs. The plates of this invention, although having elongated slotlike openings from which the prongs are punched, are nevertheless provided with barbed prongs which are arranged in rows and in such a way that the plates can be readily overlaid one upon the other, the barbed prongs of the overlying plate extending through the openings of the underlying plate, to provide increased strength at areas of high stress in wooden trusses, thereby eliminating the need of special underlay plates or plates of heavier gauges as have been heretofore required in such areas.

In general, the truss-connector plate of this invention comprises a rectangular plate of sheet metal or the like having at least one pair of prongs integrally projecting from the undersurface thereof and forming a single elongated generally rectangular slot in said sheet, the prongs of each pair being disposed at opposite ends of the slot with each prong comprising an elongated narrow shank having a barbed tip, the barbed tip being wider than the shank at its juncture thereto.

A preferred form of connector plate in accordance with the invention is a flat rectangular plate having embossed side edges which dig into the wood of the truss to make the edges of the plate flush with the truss wood. Each plate or plate section is provided with four rows of slots, each slot being in the form of a pair of lineally offset partially overlapping elongated rectangles so that the slot comprises lineally offset narrow end portions and an enlarged central portion. The slots in each row are equidistant from another and each row of slots is staggered and these slots thereof are reversed relative to the slots of each adjacent row. Also, the distance between the slots of each row is lightly less than the length of each slot and each prong is twisted so that the barbed tip thereof fits through the narrow end portion of the slot of an underlying plate of identical construction. Each four rows of slots are separated by the indented embossment. Thus, each plate has four rows of slots equidistant from one another. Larger plates are multiples of the four-row slotted arrangement wherein the distance between each four-row grouping of slots is greater than the distance between rows of each grouping. This arrangement

provides the staggered-row slot construction with even higher tear resistance. Also, with this construction, when the plates are overlaid one upon the other with each row of slots of the overlying plate spanning the distance between the slots of each staggered row of reversed slots of the underlying plate overlaid thereby, the prongs of the overlying plate go through the slots of the underlying plate; this versatility is unique in a truss-connector plate.

This new plate, and other and further features thereof, are described in more detail in conjunction with the accompanying drawings wherein a preferred form of this plate is illustrated and wherein:

FIG. **1** is a top plan view of a connector plate made in accordance with this invention;

FIG. **2** is a side view of the plate;

FIG. **3** is a bottom view of the plate;

FIG. **4** is an enlarged perspective of a portion of the underside of the plate;

FIG. **5** is an end view of the plate; and

FIG. **6** is a bottom plan view of a pair of plates, one overlying the other.

Referring to the accompanying drawings in more detail, there is illustrated in FIGS. **1–4** a preferred form of connector plate designated in its entirety by the numeral **10**. The plate illustrated is an elongated flat rectangular plate of sheet metal or the like having a planar top surface with indented side edges **12** (which appear as embossed when viewing the undersurface of the plate) and four longitudinally extending rows, **14**, **16**, **18** and **20**, respectively, of elongated generally rectangular-shaped slots **22** therein. From the undersurface of the plate **10** integrally project prongs **24**, there being one pair of prongs **24** for each slot **22**, the prongs of each pair being disposed at the opposite ends of the slot from which they have been forced by a punch press or the like.

Each of the slots **22** is in the shape of a pair of partially overlapping elongated rectangles lineally offset from one another forming a wide central portion **26** and narrower lineally offset end portions **28** and **30**.

Turning particularly to FIG. **4**, the construction of the prongs **24** is most clearly observed. Each prong **24** is generally V-shaped in cross section for strength and comprises an elongated shank **32** having generally parallel edges and a barbed tip **34** equipped with barb **36**, the barbed base of the tip **34** being wider than the shank **32** of the prong.

By observing the bottom of the plate **10** as illustrated in FIG. **5** it will be seen that the prongs **24** are twisted from the base of the tip, although remaining perpendicular to the plane of the plate, so that the barbed tip **34** of each prong **24** is no wider at its widest point than the width of the narrow end portions **28**, **30** of each of the slots **24**.

The distance between slots in each row is less than the overall length of each of the slots. In each four-row plate, or section of plate in the event the four-row sections are not separated from one another along the embossed areas (FIG. **6**), rows **14** and **18** are identical and rows **16** and **20** are identical, rows **16** and **20** being staggered relative to rows **14** and **18** and having their slot pattern reversed from that of rows **14** and **18**. By construction of the plates in this manner as described, the plates **10** of this invention may be readily overlaid one upon the other to increase the strength of a joint wherever such strength increase is necessary. To do this, as illustrated in FIG. **6**, it is only required that the overlying plate be reversed with respect to the underlying plate. In other words, the overlying plate in FIG. **6** is shown with its slot rows **14—20** reversed with respect to the corresponding rows of the underlying plate **10**.

The plate thus constructed is a remarkably good connector plate. The slot shape and arrangement of the rows of slots provide a universal plate construction whereby the plates can be overlaid congruently or otherwise, one upon the other to provide the plate with a unique versatility. The lineally offset barbed prongs of each row of prongs projecting from the underside of the plate provide tremendous holding power in

wood without undue disruption of the wood fiber while the shape and arrangement of the resultant slots provide a plate which, while of thin gauge metal, is very resistant to tearing.

In tests conducted by the Pittsburgh Testing Laboratory on tension assemblies having the joints secured by truss-connector plates of the kind illustrated in the drawings, a design value of 220 pounds per square inch was approved by the Federal Housing Administration for trusses made of any of southern yellow pine, west coast Douglas fir or west coast hemlock. So far as I am aware this is the only connector plate having this high a design value assigned for all three wood species.

These plates as presently constructed average seven teeth or prongs per square inch. The slots of each plate are each ½-inch long and longitudinally spaced on ⅞-inch centers and in staggered rows 5/16-inch apart in each four-row grouping and ⅜-inch apart where the four-row groupings are interrupted with an embossment **12**. With this arrangement, the plates possess great tear strength, forcing a diagonal tear pattern under tearing stress. Further in the multisectioned plate, where the distance between rows flanking the embossed area (or areas where the plate is made up of more than two four-row sections) is greater than the distance between the rows in each section, the resistance to tear is further increased. Adjacent prongs in each row alternate as to the direction of twist and barbed edge.

While the plates of this invention are generally described as truss-connector plates, this term is in no way meant to limit the environment of their use. Thus the plate lends itself to such connection, or it may be used as a retainer plate or cleat to fix crates and the like in place relative to one another or to the confining areas of railroad cars, trucks, ships, etc. It may also be used to join wall sections to one another, or as a general fastening plate wherever required.

That which is claimed is:

1. A connector plate comprising a metal sheet having at least one pair of prongs integrally projecting from the undersurface thereof and forming a single elongated slot in said sheet having generally parallel end portions lineally offset from one another and an enlarged central portion, the prongs of said pair being lineally offset from one another and being disposed at the opposite ends of said slot, each prong comprising an elongated narrow shank and a barbed tip, said barbed tip being wider than said shank at its juncture thereto.

2. A connector plate in accordance with claim **1** wherein said plate has a plurality of parallel, equidistantly spaced rows of said slots therein, adjacent rows of said slots being staggered relative to one another and the distance between slots in each row being less than the length of each slot.

3. A plate in accordance with claim **2** wherein said prongs are twisted so that the apparent width thereof is less than the width of said slot adjacent the ends of the slot whereby said plate is capable of being laid over another identical plate with the prongs of the overlying plate projecting through the slots of the underlying plate.

4. A connector plate comprising a metal sheet having parallel rows of elongated slots therethrough, each slot having been formed by a pair of prongs integrally projecting from the undersurface of said sheet, the prongs of each pair being disposed at the opposite ends of their associated slot in lineally offset relation to one another, each prong comprising an elongated shank having a barbed pointed tip, the barbed base of said tip being wider than said shank, each of said slots being in the shape of a pair of partially overlapping elongated rectangles lineally offset from one another forming a wide central portion and narrower lineally offset end portions, the slots of adjacent rows being staggered relative to one another.

5. A connector plate in accordance with claim **4** wherein said prongs are twisted so that the apparent maximum width thereof approximates the width of the end portions of said slots.

6. A connector plate adapted to connect abutting components of a wooden truss to one another, said plate comprising a flat metal sheet having a plurality of equidistantly spaced rows of generally rectangular identical slots therein, the slots of each row being equidistant from one another, each slot being in the shape of a pair of lineally offset, partially overlapping rectangles and having narrow lineally offset end portions and an enlarged central portion, said plate having prongs integrally projecting from the undersurface thereof, said prongs depending from the end of each slot, there being one pair of prongs punched from the material forming each slot, each prong having a straight shank terminating in a barbed tip, the barbed portion of the tip being wider than said shank.

7. The connector plate of claim **6** wherein adjacent rows of slots are staggered relative to one another and the slots of adjacent rows are reversed relative to one another, the distance between the slots of each row being slightly less than the length of each slot, each prong being twisted so that the barbed tip thereof fits through the slot of an underlying plate of the same construction whereby the plate can be applied over a plate having an identical slot and prong arrangement by overlaying the plates so that each slot of each row of slots of the top plate spans the distances between adjacent slots of each reversed row of slots of the underlying plate.

8. The connector plate of claim **7** wherein said plate is rectangular, the side edges of each plate being embossed to stiffen the plate and cause the plate edges to press into the wood upon application to a truss.

9. The connector plate of claim **8** wherein the side edges of each plate are embossed to stiffen the plate and cause the plate edges to press into the wood upon application to connect the joint of a truss.

10. The connector plate of claim **6** wherein the shortest distance between the slots of adjacent rows is shorter than the distance between the slots of each row whereby the plate will tear diagonally under stress.