Oct. 26, 1937. D. E. HERVEY 2,097,322

TIMBER CONNECTER

Filed May 31, 1935 2 Sheets-Sheet 1

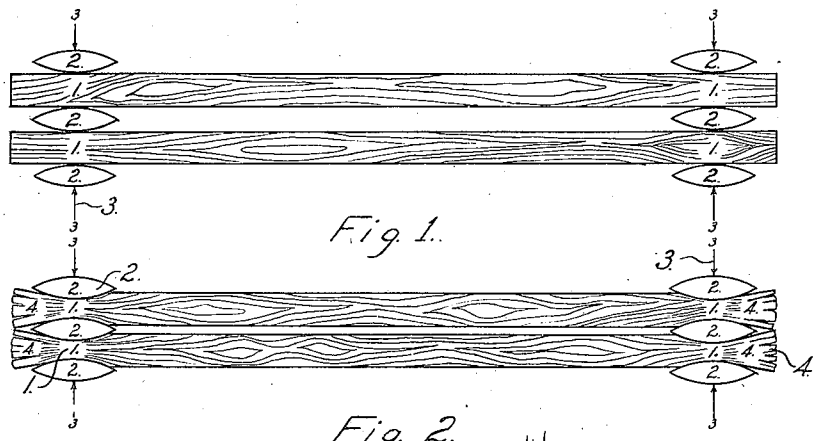


Fig. 1.

Fig. 2.

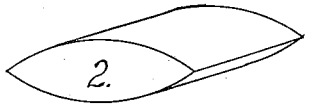


Fig. 3.

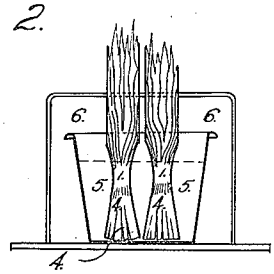


Fig. 4.

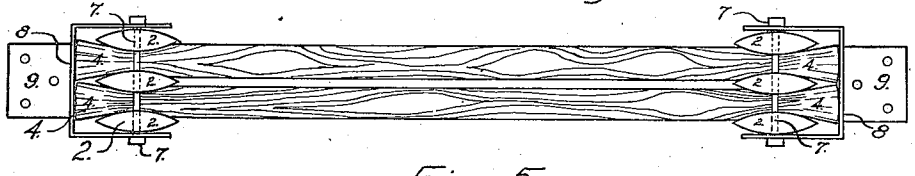


Fig. 5.

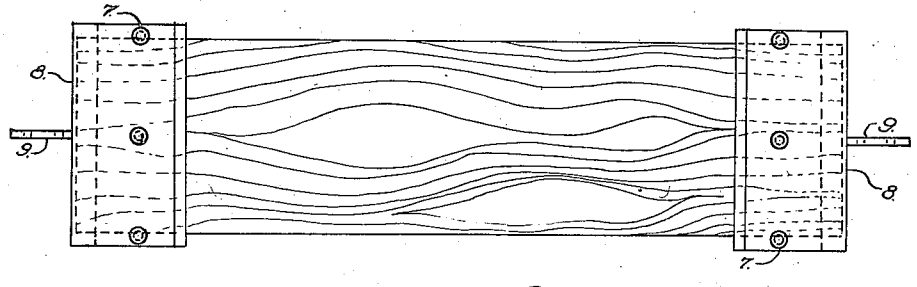


Fig. 6.

Witnesses

Inventor

David E. Hervey

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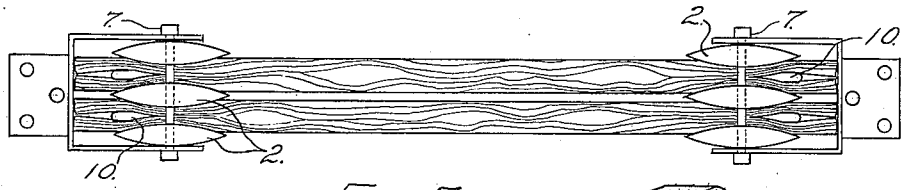


Fig. 7.



Fig. 8.

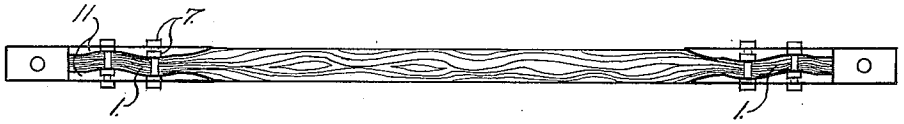


Fig. 9.

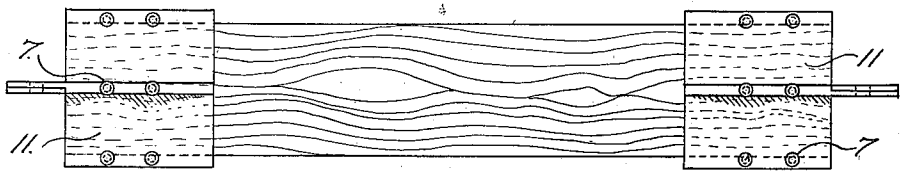


Fig. 10.

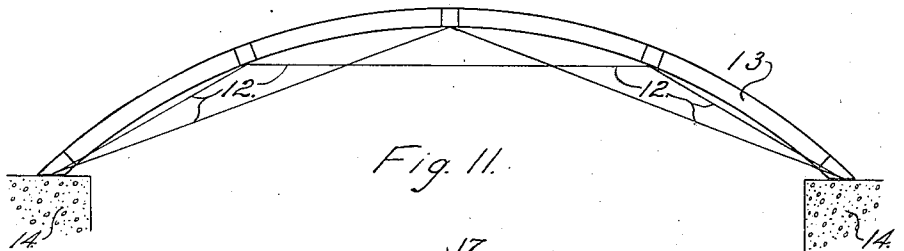


Fig. 11.

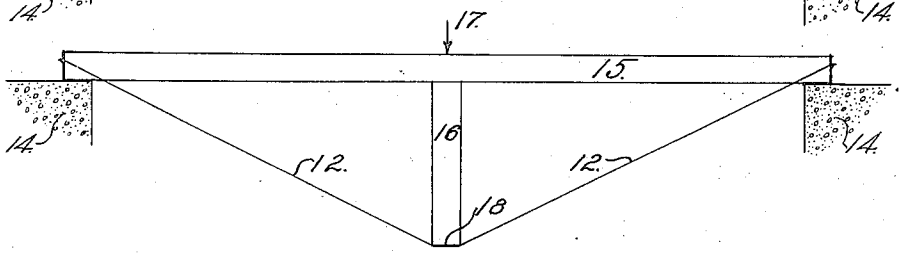


Fig. 12.

Witnesses

Inventor

David E. Hervey

Patented Oct. 26, 1937

2,097,322

UNITED STATES PATENT OFFICE

2,097,322

TIMBER CONNECTER

David E. Hervey, Logansport, Ind.

Application May 31, 1935, Serial No. 24,392

12 Claims. (Cl. 20—92)

My invention relates to a method of joining wood strips as tension-compression members, (forces acting parallel to the grain of the wood), to other portions of a structure.

Heretofore failure in wood units supporting tension loads parallel with the grain has occurred as horizontal shear of the wood and/or a combination of end and side compression; that is, the "stripping out" of the nails, bolts or ring connecters used to make the joint. My connecter takes hold of the fibers of the wood as a compressed, partially fused, mass by side compression and/or surface friction without appreciably weakening the tensile strength of the fibers at or near the connecter.

The primary object of this invention is to provide an improved method of joining wood strips as structural members to other portions of a structure in such a manner that the full tensile strength, parallel with the grain, of the wood strips will be utilized before failure occurs.

A further object is to provide an improved method of joining wood tensile portions of compound structural members, built up of wood and concrete, wood and metal, or wood and other building materials, to the other portions of the member.

I attain these objects by the process illustrated in the accompanying drawings in which:

Fig. 1 shows two wood strips in position to be compressed in regions 1 by plates 2.

Fig. 2 shows the wood compressed and the fibers in regions 4 separated longitudinally.

Fig. 3 shows a perspective view of plate 2.

Fig. 4 is a sectionized view showing the exposed fibers in regions 4 being steeped in glue or molten metal.

Fig. 5 shows the plates 2 replaced, fastened to each other, and fastened to plates 8.

Fig. 6 shows the top plan view of Figure 5.

Fig. 7 is a view similar to Figure 5 showing a modification of the invention.

Fig. 8 is a perspective view of wedge 10.

Figs. 9 and 10 are views similar to Figures 5 and 6 showing a modification of the invention.

Fig. 11 illustrates how the invention may be used in a structure.

Fig. 12 illustrates another way in which the invention may be used.

Referring to the drawing in detail:

Fig. 1 shows the side elevation of two strips of wood in which the fibers in regions 1 have been softened with steam or other methods. Plates 2 are in position to be drawn towards each other by forces 3 acting in the directions indicated by arrows, without rupturing the fibers in region 1 perpendicularly with the length of the wood strip.

Fig. 2 shows the plates 2 drawn towards each other causing the air cavities of the wood in regions 1 to be partially or completely reduced to zero volume, while at the same time the fibers in regions 4 are separated longitudinally by counter action exposing the air voids. This can be facilitated by mechanically splitting the ends of the wood strips. The plates are allowed to remain in place twenty or thirty minutes so the wood will harden and retain the shape imposed upon it.

Fig. 3 is a detailed view in perspective of one of the plates.

Fig. 4 shows the plates removed and the ends of the wood strips being steeped in glue or low fusing metals 5. Greater penetration can be obtained by rarefying the surrounding atmosphere in regions 6, the subsequent atmospheric pressure forcing the liquid into the voids. Of course if the nature of the wood structure after compression permits the introduction of said glue or metal without the removal of the plates, these plates may remain permanently in place.

Fig. 5 shows the plates 2 replaced and held in position by bolts or clamps 7 which are also fastened to plates 8 which are held firmly against the ends of the wood strips. Plates 8 are for the purpose of distributing a compression-parallel-with-the-grain force, a reversal of the tension force which the member will normally carry. After the liquids and fibers have hardened plate 9 is then connected in a conventional manner to other portions of the structure.

Fig. 6 shows the top plan view of Fig. 5.

In the modification Fig. 7 the barbed or roughened metal wedge 10 is used instead of the liquid 5—Fig. 4. The surfaces of the wedges 10 should conform to the contours of the plates 2, being concave as the plates are convex.

Fig. 8 shows an enlarged view of wedge 10 in perspective.

Fig. 9 shows a modification of the invention in which the corrugated plates 11, having barbed or roughened surfaces, are held to the completely compressed wood 1 by clamps or bolts 7. These plates 11 are fastened to other portions of the structure in a conventional manner.

Fig. 10 is a top plan view of Fig. 9.

Fig. 11 shows the wood-strip structural members 12, as illustrated by Figs. 5, 7, and 9, in use. The arch 13, built up of one or more wood strips or steel or concrete or a combination of materials, is reinforced by wood-strip structural members 12, the whole being supported by foundations 14.

Fig. 12 shows another use for the wood-strip structural members 12. When a load or force indicated by the arrow 17 acts on beam 15 and indirectly on end compression member 16 the metal plate 18 distributes a portion of the load or force to wood-strip structural members 12, which are acting as tension members.

I claim:

1. A method of gripping the fibers of a wood strip by first reducing the volume of the air voids within the wood by applying two or more curved metal plates to the wood substantially parallel to the greatest dimension of the fibers of the wood with forces acting perpendicularly to the greatest dimension of the fibers, then securing the metal plates to each other retaining the same relative position between the metal plates and the wood thus providing a frictional bond between the surfaces of the metal and the wood, without appreciably rupturing the fibers of the wood perpendicularly to their greatest dimension.

2. A method of gripping the fibers of a wood strip by first reducing to zero volume the air voids within the wood by applying two or more metal plates to the wood substantially parallel to the greatest dimension of the fibers of the wood with forces acting perpendicularly to the greatest dimension of the fibers, then securing the metal plates to each other retaining the same relative position between the metal plates and the wood thus providing a frictional bond between the surfaces of the metal and the wood, without appreciably rupturing the fibers of the wood perpendicularly to their greatest dimension.

3. A method of gripping the fibers of a wood strip for structural purposes by first softening the wood strip with a gas or liquid, then reducing the air voids of a portion of the wood to zero volume by applying curved or corrugated metal plates to opposite surfaces of the wood (the curvatures or corrugations having a radius sufficient to prevent rupturing the wood fibers), the plates being acted upon by forces perpendicular to and in the direction of the surfaces of the wood which are in contact with the metal plates, then securing the metal plates to each other thereby providing a frictional bond between the metal plates and the wood.

4. A method of joining wood strips as structural units to other portions of a structure by first compressing the wood, perpendicularly to the greatest dimension of the fibers, near the ends of the wood strips with curved plates, removing the plates then inserting a substance into the interstices of the fibers at the end of the strips to increase their bulk and side compressive strength, then replacing the curved plates so that the region of greatest compression is situated between the plates, then fastening the plates to each other substantially so that the treated ends of the strips cannot pass between the plates when forces are applied to the plates in directions parallel to the greatest dimension of the wood fibers and leading away from the centers of the strips.

5. A method of joining wood strips as structural units to other portions of a structure by first compressing the wood, perpendicularly to the greatest dimension of the fibers, near the ends of the wood strips, with curved plates, removing the plates, then inserting solid wedges between the fibers of the ends of the wood strips to increase the bulk of those portions of the wood strips, then replacing the curved plates so that the regions of greatest compression are situated between the plates, then fastening the curved plates to each other, then abutting flat plates to the ends of the wood strips perpendicularly to the greatest dimension of the wood fibers, then securing the flat plates to the curved plates thereby producing a structural unit of wood strips, curved plates, and flat plates in which the fibers of the wood cannot pass between the curved plates when forces are applied to the curved plates in directions parallel to the greatest dimension of the wood fibers and leading away from the centers of the strips and said fibers cannot pass beyond the flat plates when forces are applied to the flat plates in directions parallel to the greatest dimension of the wood fibers and leading toward the centers of the strips.

6. A method of joining wood strips as structural units to other portions of a structure by completely compressing those portions of the wood strips at and near the ends with two curved or corrugated metal plates, the inner surfaces of said plates which come in contact with the wood being roughened or barbed to increase the frictional bond, the said inner surfaces also being complementary with respect to each other, that is, one is concave where the other is convex, then fastening the plates to each other substantially thus preventing the movement of the metal plates with respect to the wood strips when forces are applied to the plates in directions parallel to the greatest dimension of the wood fibers.

7. A structural member, which resists tension and compression strains parallel with its greatest dimension, built of one or more wood strips joined to each other and to curved metal plates by the following means: By first compressing that portion of the wood near the ends of the strips perpendicularly to the greatest dimension of the fibers, with the said curved plates, removing the plates, then inserting a substance into the interstices of the fibers at the ends of the strips to increase their bulk and side compressive strength, then replacing the curved plates so that the regions of greatest compression are situated between the plates, then fastening the plates to each other substantially so that the treated ends of the strips cannot pass between the plates when forces are applied to the plates in directions parallel to the greatest dimension of the wood fibers and leading away from the centers of the wood strips.

8. A method of gripping the fibers of a wood strip by completely compressing a portion of the wood then securing metal plates as connecters to opposite surfaces of the compressed wood substantially, then increasing the bulk of a portion of the wood adjacent to the regions of greatest compression by inserting a liquid which later solidifies between the fibers, thereby preventing the movement of the plates in the direction of the increased bulk.

9. A method of gripping the fibers of wood by partially compressing a portion of the wood then securing metal plates as connecters to opposite surfaces of the partially compressed wood and to each other then increasing the bulk of, and reducing the air voids of, a portion of the partially compressed wood by inserting a solid between the fibers, thereby preventing the movement of the metal plates with respect to the solid.

10. A method of gripping the fibers of wood strips by compressing, perpendicularly to the grain of the wood, those fibers of the wood near the ends of the strips, then inserting solid wedges in those portions of the wood strips between the regions of greatest compression and the ends of the strips in such a manner that the air-voids of the wood between the wedges and the outer sur-

faces of the compressed portion of the wood are reduced to zero volume, then placing metal plates in contact with the surfaces of the compressed wood and fastening the said metal plates to each other substantially thereby preventing the movement of the wedges and wood with respect to the metal plates.

11. A structural member built of wood strips, metal plates, and wedges, joined to each other by first reducing the air voids of the wood strips near their ends, with the metal plates by side compression, then inserting the wedges into the ends of the strips between the fibers, and adjacent to the areas of greatest compression, then fastening the metal plates to each other substantially in such a manner that they cannot move with respect to the wood and wedges.

12. A structural member composed of wood strips, and metal plates which have curved and barbed surfaces, built by first compressing a portion of the wood strips near their ends then removing the compressors then applying the curved and barbed surfaces of the plates to the compressed portion of the wood, then applying pressure to the plates perpendicularly to the fibers of the wood and toward the center of the wood strips thereby reducing the air voids of the entire cross section of a portion of the wood strips to zero volume, and also at the same time spreading a portion of the fibers by the insertion of the barbs, then securing the plates to each other by a conventional method thereby preventing the movement of the plates with respect to the wood.

DAVID E. HERVEY.