Feb. 10, 1931. O. SCHAUB 1,792,040

WOOD REENFORCED CONCRETE STRUCTURAL MEMBER

Filed Jan. 11, 1929

FIG. 1

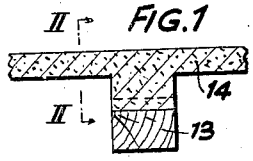



FIG. 2

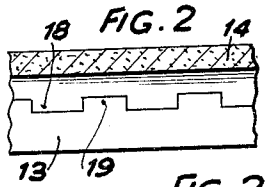



FIG. 2a

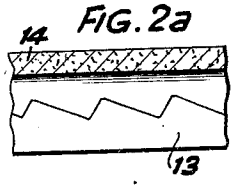



FIG. 2b

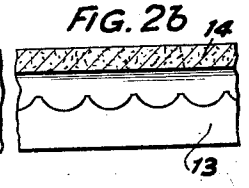



FIG. 3

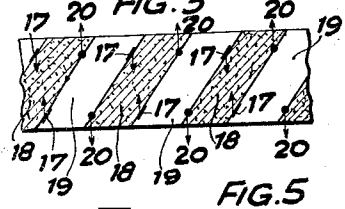



FIG. 2c

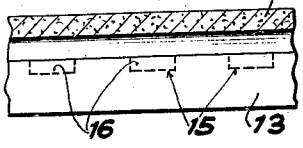



FIG. 4

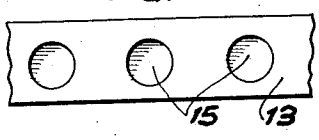



FIG. 5

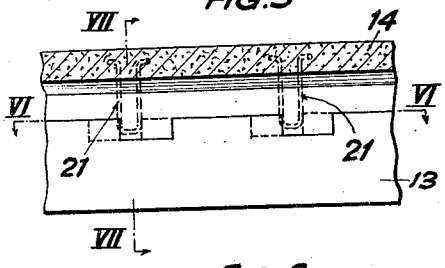



FIG. 7

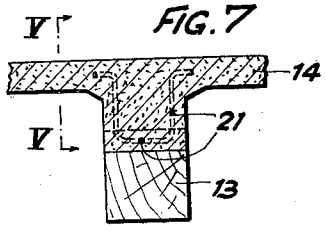



FIG. 6

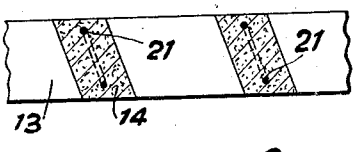



FIG. 8

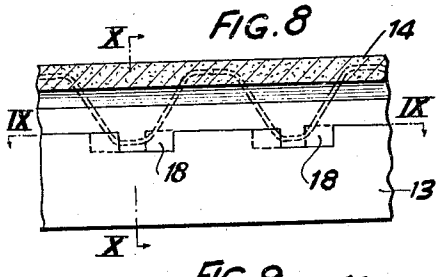



FIG. 10

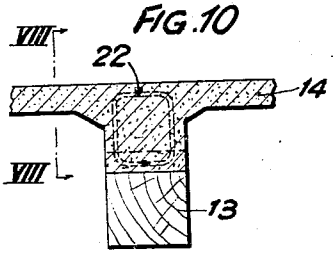



FIG. 9

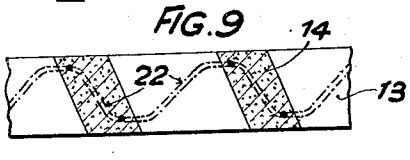



FIG. 11

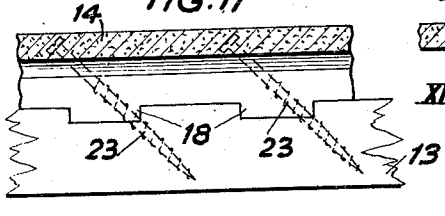
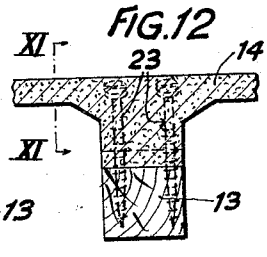



FIG. 12

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# UNITED STATES PATENT OFFICE

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## WOOD REENFORCED CONCRETE STRUCTURAL MEMBER

Application filed January 11, 1929, Serial No. 331,818, and in Germany January 19, 1928.

The invention relates to the construction of a shear-proof connection between the wood reenforcement and the concrete in wood concrete structures. It has been proposed heretofore to replace the steel reenforcement in reenforced concrete constructions by wood reenforcement. For instance attempts have been made to lay wooden bars or boards partly or wholly in the tension zone of concrete constructions, whereby for the purpose of effecting a solid connection between the wood and the concrete, the former was coated with magnesia cement milk or pins were driven in the wood the heads of which were intended to be completely embedded in the concrete.

All the wood-concrete constructions heretofore known present the drawback that the different conditions of humidity of the wood under which it changes its shape considerably have not been sufficiently considered. In drying, pine wood shrinks but slightly in the direction of the fibres (about 0,1%) the same wood however shrinks up to 6% in the transverse direction to the fibres. On the other hand dry wood upon absorbing humidity swells up to a corresponding extent. When contracting or expanding considerable forces are acting in the wood so that separating of the same from the concrete is unavoidable and a lasting safe binding between the two materials is made impossible.

The practical application of all attempts for reenforcing concrete by wood heretofore made were frustrated principally on account of the difficulty to design a connection safe to shear between the two materials (concrete and wood) which are altogether different in character and physical conditions.

According to the present invention this problem is solved in that the contacting surfaces of both parts (concrete and wood), for the purpose of eliminating a longitudinal displacement between them, are recessed so that said surfaces are kerfed, indented or perforated, whereby the concrete projections engaging in the wood are protected against shear by a suitable steel reenforcement.

Several constructional examples of the subject matter of the invention are schematically illustrated on the accompanying drawings, in which:

Fig. 1 is a cross section of a part of a ribbed plate.

Figs. 2, 2*a*, 2*b* and 2*c* are sections each on the line II—II in Fig. 1 for four different modifications of a rib.

The Figs. 3 and 4 are a modified plan view each of a wood reenforcement for a rib.

The Figs. 5, 6 and 7 are sections on the line V—V in Fig. 7, VI—VI in Fig. 5 and VII—VII in Fig. 5 respectively.

The Figs. 8, 9 and 10 are sections on the line VIII—VIII in Fig. 10, IX—IX in Fig. 8 and X—X in Fig. 8 respectively.

Fig. 12 is a section taken through a rib and Fig. 11 a section on the line XI—XI in Fig. 12.

As shown in the Figs. 2–2*c* the contacting surfaces between the wood reenforcement 13 and the concrete 14 for the purpose of effecting an interlocking connection safe to shear are indented, kerfed or perforated, so that a longitudinal displacement between said parts is avoided and all movements for assuming a deformed position under a loading applied to the ribbed plate must be performed in unison by both elements wood and concrete. Examples of such indentations or kerfings respectively are shown in the Figs. 2, 2*a*, 2*b* and 2*c*. The Figs. 2*c* and 4 show how the wood beam 13 is provided with holes 15 in which are fitting corresponding projections 16 of a concrete plate 14.

The teeth and kerfs shown in the Figs. 2–2*b* are either disposed rectangularly to the axis of the beam or as illustrated in Fig. 3 inclined to the same. By giving an inclined position to the indentations and the like a lasting solid contact between the concrete and the wood is effected even when the wood is subsequently contracting or expanding in the transverse direction to the fibres or rectangularly to the axis of the beam. If the wood tends to contract in the transverse direction to the fibres it is held back by the points of contact 17 of the wooden teeth 19 with the concrete projections 18.

If the wood tends to expand it is prevented by the inclined contacting points 20. There-

fore, the wood in its moist as well as in its dry condition remains constantly in contact and in binding with the concrete. The static cooperation of the two heterogeneous materials is thereby assured.

To avoid the shearing off of the concrete projections engaging with the wood, iron stirrups 21 (Figs. 5–7) or the windings of a coiled wire 22 (see Figs. 8–10) extend into the same. Wood screws or iron anchors 23 (Figs. 11 and 12) serve for the same purpose in that they are positioned within the concrete projections 18 and that a part of the screw thread is enveloped in concrete. The iron stirrups 21, wire coils 22 and screws 23 which extend close to the top side of the concrete not only prevent the concrete projections 18 from being shorn off but at the same time take up the shearing forces, between the wooden beam 13 exposed to tension and the compression zone in the upper part of the concrete plate 14.

The stirrups 21 (Figs. 5–7) and the screws 23 (Figs. 11–12) may be disposed rectangularly to the rib or inclined to the same, depending on the direction of the shearing forces, in order to act in the same manner as the bent up diagonal bars in the reenforced concrete constructions.

I claim:

1. A wood concrete beam having a wooden tension member having serrations on its upper surface interlocking with the concrete above it, and metal reenforcing members in the concrete between the serrations.

2. A wood-concrete structure comprising a plate and a beam, said beam having a wooden tension member at its bottom provided with serrations and metal reenforcements in the concrete extending from the plate between the serrations.

3. A wood-concrete structure, comprising a concrete floor plate and a beam, said beam having at its bottom a wooden tension member provided on its top with serrations extending across the member inclined to its longitudinal direction and interlocking with the concrete, and metal reenforcements projecting from the plate between the serrations.

4. A wood-concrete structure having a wooden tension member portion and a concrete portion, said member portion having projections interlocking with projections on the concrete portion to prevent shrinking and swelling of the tension member, the said projections being built up in form of serrations extending across the member inclined to its longitudinal direction.

In testimony whereof I have signed my name to this specification.

OTTO SCHAUB.