

Fig. 1.

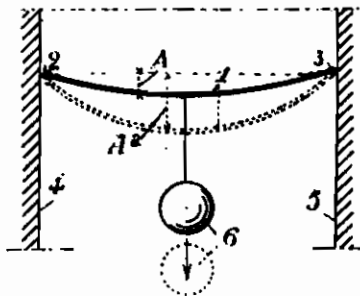


Fig. 2.

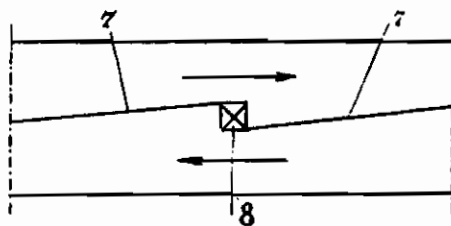
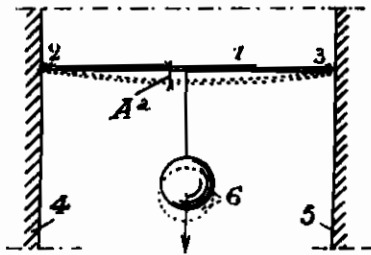


Fig. 3.

Fig. 4.

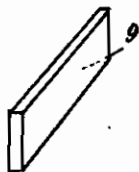


Fig. 5.

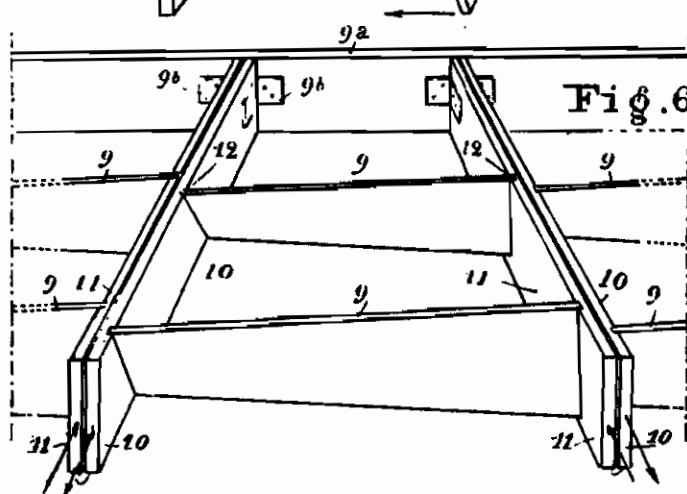
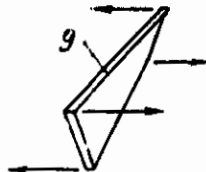


Fig. 6.

JACQUES COUELLE INVENTOR.

BY *Gaseltine, Lake & Co.*

ATTORNEY.

PUBLISHED

JUNE 1, 1943.

BY A. F. C.

J. COUËLLE

PROCEDURE FOR STIFFENING ALL ELEMENTS COUPLED OF
TIMBER-WORK IN LIGHT WOOD BY EMPLOYING OF

THE TORSION OF WOOD ON CERTAIN

OF THESE ELEMENTS
Filed Jan. 31, 1942

Serial No.

428,980

2 Sheets-Sheet 2

Fig. 7.

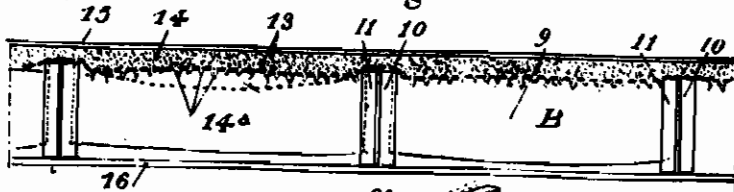


Fig. 8.

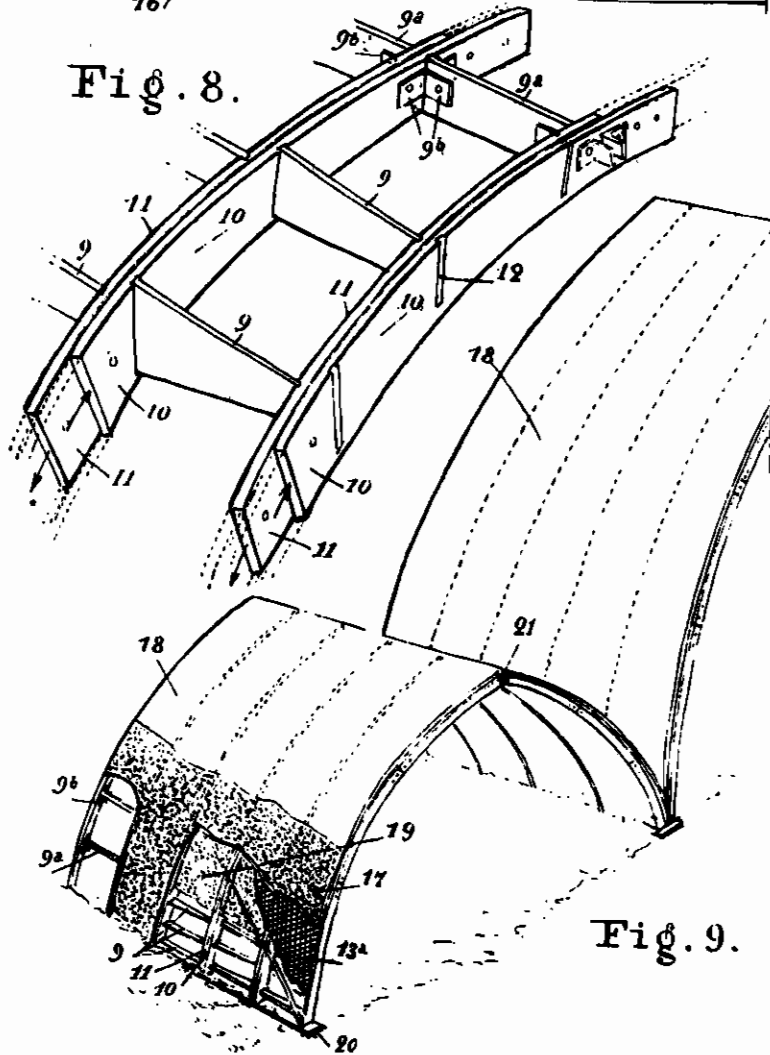


Fig. 9.

JACQUES COUELLE INVENTOR:

BY *Haseltine Lake & Co.*
ATTORNEYS.

ALIEN PROPERTY CUSTODIAN

PROCEDURE FOR STIFFENING ALL ELEMENTS COUPLED OF TIMBER-WORK IN LIGHT WOOD BY EMPLOYING OF THE TORSION OF WOOD ON CERTAIN OF THESE ELEMENTS

Jacques Couëlle, Marseilles, France; vested in the Alien Property Custodian

Application filed January 31, 1942

It is known to construct timber-works out of light wood, formed of planks carved as to the draught, giving a certain resistance to these planks in coupling same on the points and taking care, before doing so, to place the planks thus that their fibres be in opposite direction. The experience has shown that this particularity of mounting allows to use the mechanics phenomena torsion, tension, relaxation of fibres, and chemicals (respiration of wood) which continues to work in its molecules, even long after having been cut, and which could be called life of the wood after its death.

Although experience has shown the qualities and advantages of this way of timber-work, these only can answer to small constructions, means those not surpassing average capacities.

However, the fact to use this work of the fibres of wood in a different manner can now allow to spread and generalize these timber-works light and economical in employing same even for very large capacities without weakening the resistance.

This is towards this realization being the object of this invention; and consisting of a procedure whose very purpose is the stiffening of all elements of the timber-work of light wood in employing the torsion of the fibres on certain of these elements. This torsion of fibres characterizes the invention.

The principle of this procedure and some of its application are shown on the annexed sketches.

Following these sketches:

Figures 1 and 2, essentially schematical, show the principle of the invention.

Figure 3 represents a well-known manner to give tension to the fibres of the piece of wood constituting a beam.

Figures 4 and 5 show respectively the principal element which assures by its torsion the stiffening of the fibres of all the other elements in wood which are coupled to them.

Figure 6 shows—seen in perspective—the application of the procedure on a flooring, following the invention.

Figure 7 seen in front and in elevation, represents the materials trimming and completing the flooring as shown in Fig. 6.

Figure 8 seen in perspective, shows application of the procedure on timber-work of large capacity.

Figure 9 shows, in a smaller scale, the possibility by comparison to extend this procedure of

small constructions of weak capacity to those of sensibly larger.

In order well to understand the principle of tension of fibres in order to raise resistance of the ensemble, flooring or timber-work in wood, there is shown in Figs. 1 and 2 an example comparative the differences in degree of resistance of a fibrous body in neutral estate and in active estate:

Contemplating Fig. 1 there can be remarked that a string *f*, an essentially fibrous body, is hung up by its extremities 2 and 3 on the walls 4 and 5. By its own weight this string will take a flexion as point A. If in this stand, there will be suspended to this string—whose fibres are in neutral estate—a weighty mass 6, the fibres will tend under the influence of the weights and the flexion will accentuate into Aa. If now Fig. 2 will be contemplated there can be remarked that the string *f* is sensibly tended by each of its extremities 2 and 3; the fibres of string *f* are tended, they have changed out of the neutral estate of Fig. 1 into an active estate; if the same weighty mass 6 will now be suspended on this string which is tended it can be constated that the flexion as point Aa is hardly sensible compared to that one showed on Fig. 1 and it can be concluded that the slight deformation of the string *f* is only due to the tension of its fibres.

In applying this principle there have been constructed since long time already beams of wood in two parties as shown on Fig. 3, and reposing one on the other by the surfaces 7 inclined (Jupiter-arrow) slipping with corner 8, whose sinking between the two pieces is tending their fibres following the direction of the points and stiffening the ensemble of the beam thus raising its resistance against the flexion; but this enacting part is particular to beams of flooring and cannot be applied on timber-works, where the same effects of flexion, however, can be constated.

In the modern construction, especially in that one of hutting work, it is essentially employed those timber-work which constitutes the walls and the roofing at one time.

These timber-works, to be economical, are executed in light green (young) wood, but this lightness and economy must not exclude the solidity; and the solidity exactly depends on the putting under tension of the fibres. In order to reach this result the principle, which is considered to be a new one, namely of the torsion of wood as per example shown on Figs. 4 and 5, is employed.

If a plank 9, Fig. 4, of some weak thickness will be considered in estate of rest, this plank, whose fibres are in a neutral estate, does not realize any reaction on itself; but as soon as it suffers a torsion-effort, as indicated in Fig. 5, immediately inverse reactions producing, whose directions are indicated by the points and arising of the changement of the fibres' estate which consequently are active and which will tend themselves in order to regain their neutral position. These reactions are the stronger the degree of the torsion will be more pronounced.

It is exclusively this principle which allows constitute timber-work floorings and any other applications, starting with employment of weak woods, whose fibres have passed to the active estate in order to arrive to ensembles extremely resistant.

This is like that, that it will be easy to construct a flooring, Fig. 6, in coupling planks 10 and 11 by the points or bolts in counterweighing them by the traverses 9, whose fibres' tension will be maintained by simple saw-traces 12, inclined and executed on the faces of the planks 10 and 11. This tension, which is produced by the traverses 9, will be transmitted to each of the planks 10 and 11 but in the inverse sense (as consequence of the opposed inclination of the saw-traces 12); thus is obtained a beam composed out of two parties working under tension by their fibres' active estate, as per the example shown in Fig. 2; and which is improving and raising their resistance towards the flexion in the vertical plan, as that already obtained by the arrow-Jupiter beam, shown in Fig. 3.

It still has to be considered that the fact to give a torsion to the entertoises 9, also is improving their resistance, they cannot more incurve, neither in one nor in the other direction, as could be done by an entertoise whose fibres stay in neutral estate, as shown in Fig. 4.

The timber of the flooring shown in Fig. 6, whose all elements are stiffened by torsion of the entertoises 9, is completed in this example, Fig. 7, by placing a frame-work 13, on which will be spread a slight beton (concrete) 14, which will cling on this frame-work by its penetrations 14a in it.

A coat, 15, will complete the superior party of this flooring ready to receive the parquet, bricks or other flooring, whereas the inferior party of this flooring will receive the elements 16, lathes or trellis of reeds, in order to receive the coat constituting, the vacuum B, created between the planks 15 and the ceiling 16 will allow, what can be called: respiration of the wood, indispensable for its conservation.

This same procedure of stiffening will be applied with all its advantages in the modern timber-works, Figs. 8 and 9, and thus allowing to realize very high capacities, till now limited to rather small ones.

These elements of timber-work can receive, as the flooring shown on Fig. 7, a frame-work 13a, a slight mortar 17, and a tight coat 18. In the interior of the panels or surfaces 19 of cork, counter-plaked wood, agglomerates and of others completing the ensemble of these stiffened timber-works, will now be absolutely convenient for all particular or industrial constructions, such as halls, workrooms, stations, public establishments, churches and so on.

This timber-work out of light wood—the wood can be employed immediately after having been cut (green, young wood) can be applied to all usages, it can suffer some variations slightly different to those which have just been described herein; thus it is possible, that by its utilisation as flooring, Fig. 6 and 7, the vacuum B, can be furnished by application of a coffrage, a concrete of plasters and scria, slag or others, which by its porosity will allow the wood to respire. In this case the frame-work 13 is suppressed, and the flooring 15, as well as the ceiling 18, will be directly fixed on the field of the beams 10 and 11. This ensemble forming flags fortified by stiffened wood.

The same, the beams 10 and 11 are bound by panes 9a, Figs. 6 and 8, entertoising the wood-works and maintained by squares 9b; which allows to produce the principal elements standardized, absolutely interchangeable, and of small length; thus facilitating their transport, mounting or dismounting with the assistance of only one not-specialized workman. Their joining executed by held of bolts, passing in orifices perforated on the extremities of the planks 10 and 11. This ensemble is constituting "panel-work" of small length. Finally, the wall-plates and the ridges, 20 and 21 Fig. 9, are also of small length and could take two or three of the elements of the timber-work.

This disposition of timber-work in light wood can be used for the coffrage of tunnels, collectors, silos and so on.

This timber-work of light wood, stiffened in placing their fibres in an active estate, realizes a very big progress in the art of construction facultatively dismountable, easy and resistant, justified by the new industrial result, which surely is to obtain with light, green (young) wood, economical timber-work at standardized elements or not, and at a resistance which is superior to the actual one, thus allowing to reach very large capacities and to realize also—on the same conditions—flooring and other works such as coffrage out of light wood but very resistant ones, reducing the cubing which is sensibly diminished in relation to the asked efforts.

Recapitulation

Procedure to stiffen all elements coupled of timber-work in light wood by employing of the torsion of these elements only characterized by the torsion of the traverses or (entertoises) slight entertoises, joining two thicker planks to which they transmit their reactions; these planks suffer these reactions in the opposite sense and coupling themselves by fixation, points, screws or bolts, on other planks of the same mounting, in order to obtain an armed beam composed out of two planks leaning the one on the other and which fibres are in an active estate and of opposite reactions, thus raising their resistance against the flexion.

This procedure can constitute the standardized elements, constituted by:

1. Panel-work.
2. Panes, entertoising the panel-work.
3. Stiffening planks.

JACQUES COUËLLE.