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PROCESS FOR THE DRYING OF PIECES OF TIMBER

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Fig. 1.

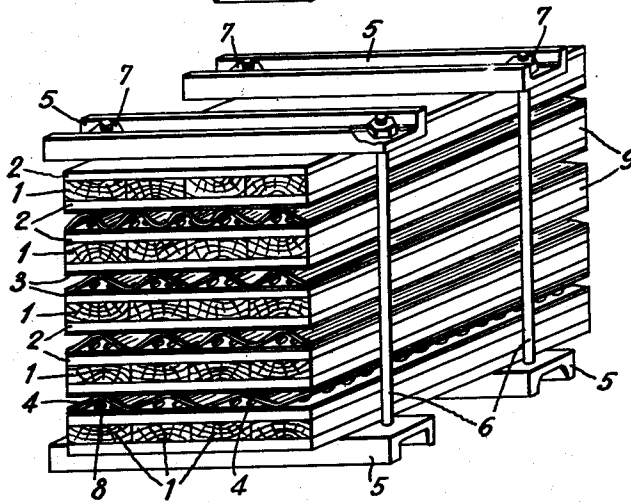


Fig. 2.

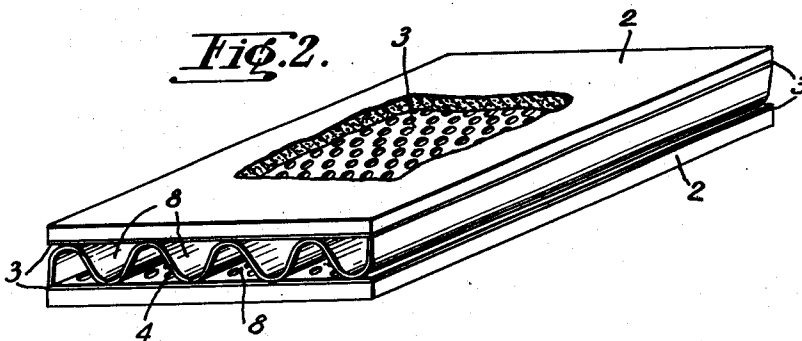
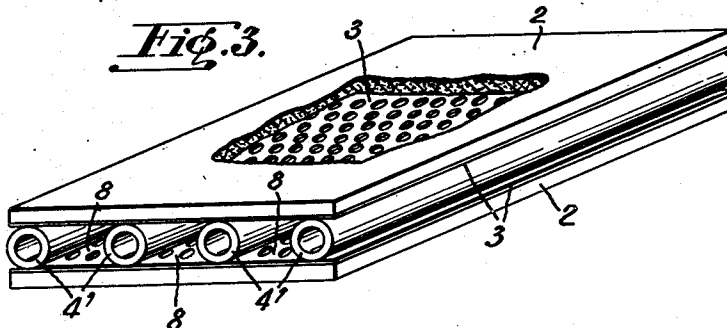


Fig. 3.



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PROCESS FOR THE DRYING OF PIECES OF
TIMBER

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1 Claim. (Cl. 34—6)

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In a general manner, two processes for the drying of timber are known.

On the one hand, the use of a kiln which requires a costly installation and a complicated process and which moreover offers the disadvantage of requiring much time for achieving the drying.

On the other hand, the use of air for effecting the elimination of the water contained in the timber. This air can be simply the ambient atmosphere and in this case it takes a very long time, or air put in circulation by mechanical means, this air being heated if desired. In this case the operation is quicker, but both cases suffer from the disadvantage that the surface of the pieces after drying shows cracks extending sometimes rather deeply perpendicularly to the direction of the wood fibres. The formation of these cracks is the more marked the quicker the drying.

This disadvantage which expresses itself in an important proportion of waste in each dried piece is due to the fact that the surface of the timber, which is in contact with the ambient atmosphere or with a circulation of cooling air, dries very quickly while those parts of the timber which are deeper or underlying dry very slowly. Now, when drying, the pieces of timber shrink mainly in the direction of the fibres. It follows that the surface layer tends to shrink vigorously and rapidly, which is not the case with the underlying layers; hence the cracks in the surface layer of the timber, this is to say the formation of cracks transversely with respect to the fibres which increase in depth at the rate at which the drying itself reaches the interior portions of the timber.

The present invention aims at overcoming this serious defect and has the object of providing a process for the drying of pieces of timber which is characterized in that during the drying operation at least part of the surface of the pieces of timber extending in the direction of the fibres is kept in close contact with a cover consisting of a porous material allowing the moisture escaping from the timber to pass therethrough, but sheltering the timber from the action of the air in order to prevent the formation of cracks in the surface of the timber in contact with said cover.

The invention includes also a device for performing the said process and which is characterized in that it comprises pieces of a porous material allowing the moisture escaping from the timber to pass therethrough, but sheltering the timber from the action of the air in order to prevent the formation of cracks in the surface of the timber in contact with said cover, means for

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keeping assembled during the drying operation an assembly of pieces of timber covered by the said covers, means for providing between the pieces of timber thus assembled free spaces for the circulation of air, and means for preventing the said pieces of timber from warping during the drying.

The accompanying drawing represents by way of example a form of embodiment of the device forming part of the invention, and illustrates, likewise by way of example, the carrying into effect of the process according to the invention.

Fig. 1 is a perspective view of an assembly of said form of embodiment of the device during the drying.

Fig. 2 is a perspective view of a detail of the device according to Fig. 1.

Fig. 3 is a view corresponding to Fig. 2 but relating to a modification of said detail.

In Fig. 1, 1 represents an assembly of pieces of timber such as, for example, railway sleepers or thick planks. These pieces 1 are disposed side by side in groups of four, and the various groups are superimposed on one another. Anyway, on each of the upper and lower faces of the groups thus formed, a cover 2 is applied which consists of a rectangular sheet of porous material of the same area as the rectangle formed by the juxtaposed four pieces 1. These covers of porous material are accordingly in close contact with the larger faces of the pieces 1 which extend in the direction of the wood fibres of these pieces. The small lateral faces are not covered with porous matter; neither are the end faces.

The covering sheets 2 can be, for example, of a fibrous material, such as felt, a textile material, asbestos, a sheet of wood of inferior quality, of agglomerated cork, of papier mâché, or of any suitable agglomerated material. The porous material used should preferably have a lower permeability to water vapour than that of the timber of the pieces to be dried.

The various units formed by the superposition of two porous sheets 2 and a group of juxtaposed pieces of timber 1 are separated from one another by means serving to provide between these units free spaces for the purpose of assuring the circulation of air between them. These means comprise two perforated metal sheets 3 of the same size as the sheets 2 and in contact each with one of these sheets. The two metal sheets 3 are kept spaced by intermediate connecting means serving also to hold the said metal sheets together. These connecting means consist, as will be seen from Fig. 2, of a corrugated metal

sheet 4 which is preferably welded to the perforated metal sheets. In the modification according to Fig. 3 they are formed by metal tubes 4' disposed in parallel at a certain distance from one another, and fixed to the perforated metal sheets 3 for example by welding.

The air can accordingly circulate freely in the spaces 8 enclosed between two adjacent perforated metal sheets 3. The perforations of these metal sheets allow the moisture contained in the porous material of the covers 2—and which comes from the timber—to be carried off in the form of vapour by said air without the latter coming into contact with the surface of the timber. The surface layer of the timber preserves accordingly a content of humidity which is not much different from that existing in the depth of the timber; hence it follows that the formation of cracks is radically obviated.

The device that is shown in Fig. 1 comprises moreover the following means for preventing the pieces of timber 1 from warping during the drying:

The different units described hereinabove and superimposed to one another as shown in the said figure, are clamped together between two pairs of U-profile irons 5, connected by ties 6 provided with clamping nuts 7.

The concentration of water in a piece of timber varies within the timber according to the rate of movement of the moisture to its surface. This rate of movement is a function of surface evaporation and therefore the timber during the drying operation will be drier at its surface than at its interior.

If the timber is exposed to a current of hot air, a rapid drying of the outer fibres will be observed while the quantity of water of the inner fibres decreases slowly. Accordingly a moisture gradient is set up which drops rapidly from the outer fibres to the interior of the wood.

As the timber shrinks when its content of water diminishes, the outer fibres must shrink more than the fibres at the interior, which gives rise to mechanical stresses in the outer fibres, and consequently to cracks in the timber. The more rapidly the timber is dried, the more the formation of cracks in the timber manifests itself.

The process described hereinabove prevents this rapid reduction in the concentration of the water, by the use of a cover consisting of a porous material which must not be too thin, in such a manner that the moisture gradient is varied by maintaining the timber relatively moist at its surface.

If the layer of porous material is in contact with the timber, the water passes from the timber into said layer in the liquid phase, and evaporates from the outer surfaces thereof. If the porous cover is not in contact with the timber, the water evaporates at the surface of the timber and passes through said cover in the vapour phase. Since higher temperatures are permissible, a relatively more elevated vapour pressure between the protective layer and the timber results, the latter being protected by the vapor from its own moisture. It is understood that the vapour atmosphere formed between the timber and the protective layer contains other substances than pure water vapour, for example methyl alcohol or the vapour of resins, of oils or

other organic substances contained in the timber. These substances have undoubtedly a beneficial influence on the structure and the quality of the dried timber. In order that the aforesaid vapour atmosphere be capable of forming properly, the protective layer has to be sufficiently impermeable to the vapour and must not be perforated in any case.

It is advantageous to choose the permeability to vapour of the cover of porous material sufficiently low in order to assure the maintaining of an atmosphere saturated with water vapour between the said cover and the timber.

Forced tests have shown that with the process described a considerable reduction in drying time can be attained as compared with the processes hitherto used. With this process, the drying can be effected at temperatures above 60° C. which marked the limit of the temperatures used in the known processes; it is even possible to work at temperatures in the range between 90° C. and 110° C. which is particularly useful if it is the case of timber intended to be used as electrical insulator, the final water content of which ought to be reduced to less than 1%.

What I claim is:

A process for drying pieces of timber comprising arranging around the pieces of timber at least on that part of the surface of the pieces extending parallel to the fibres of the timber a separate and distinct protection sheet of wood, so as to shelter the timber from the drying action of the ambient atmosphere and from a rapid drop in the moisture gradient in the underlying layer of timber, sweeping the surface of said sheet with air only at the side opposite to that facing the timber while allowing a slow diffusion through said sheet of the water vapour while shielding the timber from the circulating air and simultaneously heating the timber to accelerate the diffusion and exit as vapour of the water contained in the timber, whereby the permeability to water vapor of the wooden sheet is sufficiently low to assure the maintenance of a water vapour atmosphere between said sheet and the adjacent surface of the timber, the rapid drop in the moisture gradient taking place in the protective sheet.

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