

UNITED STATES PATENT OFFICE

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PULP BOARD AND METHOD OF MAKING
SAME

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Pulp board is usually made by running paper pulp, wood pulp, or the like, with or without the admixture of a suitable binder such as mineral pitch, asphalt, gilsonite, or like substances, into a mold and, by means of pressure, removing the majority of the water (see, for instance, United States Patents 971,936, 1,272,566, and 1,506,509) and subsequently drying out the remainder of the water by the application of heat, preferably in a suitably constructed drier. The board, after substantially all the water has been removed is in a spongy condition and is then subjected, preferably by pressing the same between the two plates of a hot press, to combined heat and pressure to form a compacted board.

According to my present invention, the raw fibrous material is pulped in a beater, run into a mold and shaped therein, subjected to a preliminary pressing operation to remove the bulk of the water, placed between the steam filled platens of the hot press, and subjected to heat and also pressure, retained between the platens until it is substantially completely dry, and then released without cooling of the platens.

The fibrous material from which my board is made may be of any suitable kind, for instance, raw wood fibre, chemically digested wood fibre, newspaper stock, which is a mixture of these two kinds of fibre, straw, or bagasse. The pulp is beaten with or without the admixture of a suitable binder except that when straw or bagasse is used as the pulp material the use of a binder is preferable, though not necessary, and run into a mold and preferably subjected to pressure to remove the majority of the water therefrom, all in the manner hereinabove set forth. The partially dried board is then placed between the two platens of a hot press and steam is supplied to the platens sufficient in amount and degree of temperature to drive off the interstitial water contained in the board. If a fluxing binder is used the temperature of the steam should be sufficient to cause the binder to soften. A wire screen may be placed on one or both sides of the board in order to facilitate the escape of the water vapor. However, during this drying operation no, or substantially no, pressure is applied to the board.

After substantially all, or all of the interstitial water has been driven off, pressure is applied gradually to compact the board while steam of a sufficiently high temperature is introduced to drive off the colloidal water, and if a fluxing binder be used to maintain such binder in a fluxed condition or to flux it if it has not already been fluxed during the first drying operation. The board is retained be-

tween the platens until it is completely dry and the pressure is applied so as to compact the material as the colloidal moisture is leaving it until the board when dried has the particular compactness desired.

All vegetable structures or cellulosic materials contain water in combination with their fibre in two forms, as colloidal moisture and as intercellular or interstitial moisture. Through wood elements moisture is so distributed that some of it occupies the cavities in the wood elements and some saturates the walls of such wood elements. Colloidal moisture is such moisture as is absorbed by the fibre proper and is present therein even when it is in air-dry condition, whereas interstitial moisture is such moisture as is present between the fibres and may be readily driven out. See in this connection, patent to Harold C. Harvey, No. 1,668,314, May 1, 1928.

While interstitial moisture is being driven from the board, the board will not warp but as soon as colloidal moisture is being driven off the board will warp. By observing the behavior of the board it can therefore readily be determined, for all practical purposes, when the colloidal moisture begins to go off as a warping of the board begins to take place at such time. I therefore do not subject the board to pressure while the interstitial moisture is being driven off as I thereby give a better opportunity to the water vapors to escape and do not imprison water or vapor within the interior of the board by compressing the board. On the other hand when the interstitial moisture has been removed and I apply pressure to the board, I prevent a warping of the board and facilitate the felting of the fibres while there is still moisture in the board and while the fibres are being kept soft by the water vapors.

I thus obtain a strong board even without the use of a binder. The use of a suitable binder such as Montan wax, sulphur, shellac, mineral pitch, asphaltum, gilsonite, China wood oil and resinous matters generally or of the well-known sizes will therefore strengthen my board but my invention does not depend upon the use any binder whether natural to the material used, for instance resin in undigested wood pulp, or added binders. I may therefore make a strong board of digested wood pulp, for instance, sulfite wood pulp and may use newspaper stock which contains as high as 20% of digested fibre and 80% of raw fiber, containing only a very small amount of what has sometimes been designated as a binding material, for instance, resin or lignin.

It is obvious that a process in which the ma-

jority of the water is first removed and the remaining interstitial water is driven off by drying in a suitable drier, for instance, that described in patent to Harold C. Harvey, No. 1,688,314, hereinabove referred to, and the board then placed in the hot press, where combined heat and pressure are applied to remove the colloidal moisture, would be within the spirit of my invention.

10 I claim:

1. The method of making pulp board which comprises shaping a suitably digested pulp into the form of a board, subjecting said board to a preliminary operation to remove the bulk of the water and then subjecting it to heat until at least a substantial proportion of the interstitial moisture has been removed but not to the extent of removing any substantial proportion of the colloidal moisture and then to heat and pressure between the steam filled platens of a hot press until completely dry, and releasing the same without cooling the platens.

2. The method of making pulp board which comprises shaping a suitably digested pulp and a binder into the form of a board, subjecting said board to a preliminary operation to remove the bulk of the water and then subjecting it to heat until at least a substantial proportion of the interstitial moisture has been removed but not to the extent of removing any substantial proportion of the colloidal moisture and then to heat and pressure between the steam filled platens of a hot press until completely dry, and releasing the same without cooling the platens.

3. The method of making pulp board which comprises shaping a chemically treated pulp retaining practically none of its original lignins into the form of a board, subjecting said board to a preliminary operation to remove the bulk of the water and then subjecting it to heat until at least a substantial proportion of the interstitial moisture has been removed but not to the extent of removing any substantial proportion of the colloidal moisture and then to heat and pressure between the steam filled platens of a hot press until completely dry, and releasing the same without cooling the platens.

tween the steam filled platens of a hot press until completely dry, and releasing the same without cooling the platens.

4. The method of making pulp board which comprises shaping a mixture of a chemically treated pulp and a suitable binder into the form of a board, subjecting said board to a preliminary operation to remove the bulk of the water and then subjecting it to heat until at least a substantial proportion of the interstitial moisture has been removed but not to the extent of removing any substantial proportion of the colloidal moisture and then to heat and pressure between the steam filled platens of a hot press until completely dry, and releasing the same without cooling the platens.

5. The method of making pulp board which comprises shaping a suitably digested fibrous material into the form of a board, removing the interstitial moisture from said material, and drying the board by heat and pressure when only colloidal moisture is present in the fibres.

6. The method of making pulp board which comprises shaping a mixture of a suitably digested fibrous material and a binder into the form of a board, removing the interstitial moisture from said material, and drying the board by heat and pressure when only colloidal moisture is present in the fibres.

7. The method of making pulp board which comprises shaping a mixture of a chemically treated fibrous material and a suitable binder into the form of a board, removing the bulk of the water, subjecting the board to heat to remove the remaining interstitial moisture from the fibres of said material, and completing the drying of the board when only the colloidal moisture is present in the fibres by subjecting the board to combined heat and pressure between the steam filled platens of a hot press, releasing the pressure when the board is completely dry without cooling the platens.

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