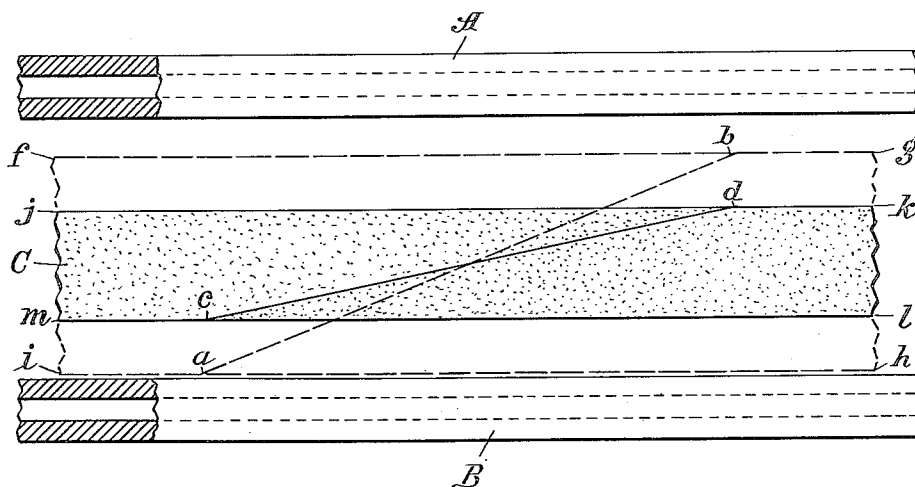


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D. M. SUTHERLAND, JR
METHOD OF JOINING PULPBOARD

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WITNESSES

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METHOD OF JOINING PULPBOARD.

Application filed October 7, 1919. Serial No. 329,123.

To all whom it may concern:

Be it known that I, DANIEL MANSON SUTHERLAND, Jr., a subject of the King of Great Britain, and a resident of Trenton, Mercer County, State of New Jersey, have invented a certain new and useful Improvement in Methods of Joining Pulpboard, of which the following is a specification.

My invention relates to a method of making a joined article of pulp board, and to the product of such method, and such method comprises, broadly speaking, the application of a cementing substance to two pieces to be joined while such pieces are still in a spongy condition, that is to say, have not yet been subjected to the final pressing operation, and then compressing said two pieces. This method is of particular utility when used to join pieces of pulp board containing a large admixture, preferably 50% or more, by weight, of mineral pitch, asphalt, or like substances.

Pulp board is usually made by running paper pulp, wood pulp or the like into a mold, and, by means of pressure, removing the majority of the water (see for instance patent to Daniel M. Sutherland, and myself, No. 971,936, dated October 4, 1910, and patent to myself, No. 1,272,566, dated July 16, 1918) 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 what I term a spongy condition, and is then subjected to heat and pressure to form a compact board.

The pieces or portions of spongy pulp board to be joined may be of any desired size or configuration. They may consist for instance of two sheets of pulp board, or two small pieces of waste, or scrap-board which it is desired to convert into a larger sheet, or they may form portions of one piece of pulp board, for instance two edge portions of a sheet bent to meet at two edges to form a tubular structure.

Preferably, if the joint is to be made edge to edge, the two pieces or portions to be joined are each given a chamfer edge either during the primary formation of such pieces or portions in a suitable mold, or by tooling the sheets after they have been formed in the usual mold, and subjected to the usual pre-

liminary compression, and the chamfered faces are then laid in contact with one another, after one or both such faces have received an application of a suitable cement. In place of a chamfered joint any other suitable scarf joint may be used. If it should not be desired to have the thickness of the joint uniform with that of the remainder of the pieces or portions, any other suitable form of joint may be employed, for instance a lap joint, or a butt joint covered by a third piece, or strip, cemented over the meeting line of the two pieces to be joined.

My invention is, however, not limited to the joining of two pieces edge to edge, as the two pieces may be joined side to side, by being superimposed in whole or in part, so that two pieces of smaller thickness may be united into a structure of greater thickness. It is obvious that a great many forms of joint may be constructed with the aid of my invention, as practically any form of joint which can be constructed with wood and glue can be duplicated with pulp material with the aid of my invention. Of course, it may be necessary to modify the form of one or both of the plates of the hot press to correspond to the form which the joined article is to take.

The cements which I have found most suitable for my method are those made from the phenol resins, with or without the addition of other binders. I may, however, use any other suitable cement, for instance one containing blood-albumen-casein. When I speak in my claims of a cement I refer, of course, to a cement suitable for this purpose.

After the cement has been applied the two pieces or portions are subjected for a suitable length of time to the combined influence of heat and pressure applied preferably by means of a heated press. The degree of heat and of pressure will have to be determined, and can readily be determined, in each instance, with reference to the thickness and nature of the material, and the degree of compactness desired in the finished article. For example, if two pieces of pulp board, each containing 50% by weight of mineral pitch and each one-half inch in thickness, while in their spongy condition, are to be joined by a scarf joint, they may be compressed for from three to five minutes under

a pressure of 160 pounds to the square inch, and they will be found to have been reduced to a thickness of about one-quarter of an inch. The degree of heat employed must be sufficient to soften the pitch in the board. If a more compact, or thinner, product be desired the pressure may be increased to 250 pounds per square inch, and the resulting product will then have a thickness of about three-sixteenths of an inch. If two pieces of pulp board, containing no pitch, or other binder, and each one-half inch in thickness while in their spongy condition, are to be joined by a scarf joint, they may be compressed for from three to five minutes under a pressure of 160 pounds to the square inch, and at a temperature of 300° F., and they will then be found to have been reduced to a thickness of about one-quarter of an inch. Of course, if no binder is added to the pulp before the same is formed into a board, a binder should be added, preferably after the completion of the compression, so as to hold the fibres in their compressed condition. China wood oil may, for instance, be used for that purpose.

It is, of course, preferable in most instances, if not in all, to apply heat and pressure to the joint simultaneously with the application of heat and pressure to the remaining portions of the piece or pieces whose edges are to be joined, so that the heating and compressing of the portions forming the joint may form a part of the usual operation of heating and compressing the article. In any event the formation of the joint does not necessitate the employment of any greater, or appreciably greater, amount of heat and pressure than that otherwise necessary for the compacting of the pulp board, as the pressure necessary for compacting the material serves also to form the joint.

By my method I therefore avoid the necessity of providing a separate operation, and of employing additional heat and pressure, for the formation of the joint, which necessity would be present if I first compacted my material and then formed the joint.

In the drawings forming part of this application I have shown, diagrammatically, the two plates of a hot press, and a joined sheet of pulp board between them, the proportions of the sheet being greatly exaggerated. A and B represent respectively the upper and the lower platen of a press, each provided with a steam chamber. C represents a section of a sheet of pulp board, broken away at each side, the shaded portion *j, k, l, m* representing the sheet after compacting and joining, the uncompacted pieces being indicated by *f, g, h, i*. The line *a, b*, indicates the chamfered edges of the two uncompacted portions, and the line *c, d*, represents the ap-

proximate plane of the finished joint. This illustration of joint and press is, of course, illustrative only, and represents only one of many ways in which my invention can be applied.

I do not claim as new the broad method of joining two articles by cement and pressure, whether the joint is made with scarfed edges, or in any other form, as I am well aware that this idea is old in many arts, for instance in the art of wood working. I believe, however, that I am the first to unite two pieces of unfinished, that is, still spongy, pulp board, by placing a suitable cement upon the spongy mass, and then applying heat and pressure to compact the material to final form and at the same time to bring about the formation of a joint; thus not only forming the joint without any more, or appreciably more, heat and pressure than would be necessary for the compacting of the pulp board, but also producing a joined article in which the cement has entered the material and which is, therefore, much stronger than an article formed of two pieces of paper pulp cemented after final compression.

I claim:

1. In the art of making pulp board that improvement which includes overlapping two edges of portions of substantially uncompacted spongy, and therefore incomplete, pulp board, applying a layer of a suitable cement between said two edges and then subjecting such edges to the action of a hot press so as to provide both heat and pressure sufficient materially to decrease the thickness of, and thus to compact, such portions into completed pulp board while simultaneously joining such portions.

2. In the art of making pulp board that improvement which includes overlapping two edges of portions of substantially uncompacted spongy, and therefore incomplete, pulp board having a suitable binder incorporated therein, applying a layer of a suitable cement between said two edges and then subjecting such edges to the action of a hot press so as to provide both heat and pressure sufficient materially to decrease the thickness of, and thus to compact, such portions into completed pulp board while simultaneously joining such portions.

3. In the art of making pulp board that improvement which includes overlapping two edges of portions of substantially uncompacted spongy, and therefore incomplete, pulp board having approximately 50% of asphaltic material incorporated therein, applying a layer of a suitable cement between said two edges and then subjecting such edges to the action of a hot press so as to provide both heat and pressure sufficient materially to decrease the thickness

of, and thus to compact, such portions into completed pulp board while simultaneously joining such portions.

4. A joined article of pulp board comprising two portions of compressed pulp board containing a binder united at their edges and a layer of cement located between, and attached to each of, the same, said article having been formed by applying a
10 suitable cement to the edges of said portions while in substantially uncompressed spongy

condition and then subjecting such edges to the action of a hot press so as to provide both heat and pressure sufficient materially to decrease the thickness of, and thus to compact, such portions into completed pulp board while simultaneously joining such portions.

In testimony whereof I have hereunto set my hand.

DANIEL MANSON SUTHERLAND, Jr.