

J. E. DAVIDSON.
PROCESS OF MAKING MOLDED MATERIAL.
APPLICATION FILED JULY 21, 1913.

1,125,973.

Patented Jan. 26, 1915.

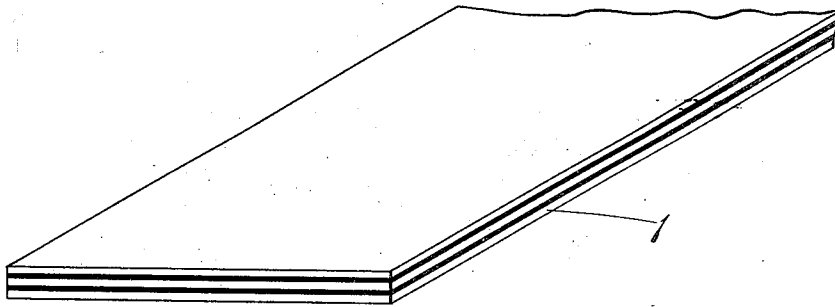


Fig. 1.

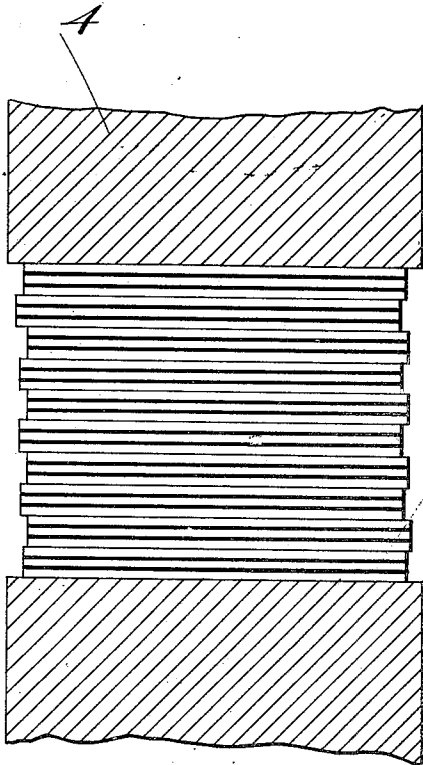


Fig. 2.

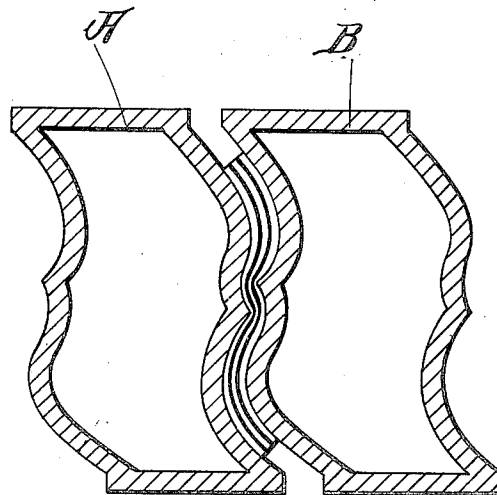


Fig. 3.

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PROCESS OF MAKING MOLDED MATERIAL.

1,125,973.

Specification of Letters Patent.

Patented Jan. 26, 1915.

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To all whom it may concern:

Be it known that I, JOHN E. DAVIDSON, a citizen of the United States, residing at Boston, county of Suffolk, State of Massachusetts, have invented a certain new and useful Improvement in Processes of Making Molded Material, of which the following is a specification, reference being had therein to the accompanying drawings.

I have shown and described in my application for Letters Patent of the United States filed by me January 4, 1913, Serial No. 740,121 a new material which generally speaking consists of layers of green or wet wood, secured together and permeated by a suitable cement, and shaped in molds or the like under pressure to any desired form. Although a cheap wood which is soft, spongy, porous, and of relatively little strength is employed, the resulting material is strong, tough and waterproof, and can be cut or died out without chipping or splintering. These desirable qualities are due largely to the fact that the cement permeates the pores and cells of the layers of wood.

My present invention has for its object an improved process of producing this new material and particularly to insure a more complete permeation of the wood by the cement and incidentally to avoid as far as possible the loss of cement. When the material is made in accordance with my present process, practically all the cement applied to the sheets of wood passes into the pores in the wood, little or none of it being expressed at the sides of the sheets and lost.

In the accompanying drawings I have illustrated the steps which are taken in making a molding, but it will be understood that I do not limit myself to this particular article, since the process can be employed in the manufacture of a great variety of articles.

My invention will be fully understood from the following description taken in connection with the accompanying drawing, and the novel features thereof will be pointed out and clearly defined in the claims at the close of the specification.

In the drawing Figure 1 is a view in perspective of three layers of wood in position preparatory to the application of the so-called cold pressure. Fig. 2 shows a stack

of the cemented layers of wood in a press under and subjected to the cold pressure. Fig. 3 is a view of the material shown in Fig. 1 being subjected to hot pressure in a mold.

Referring now to the drawing, in practicing my improved process, I take relatively thin sheets of wood formed in any well known manner, usually by means of a rotary veneer machine which cuts the sheets from a moist or tempered log of wood. If wood which has been previously dried is used, it is essential that it be rendered thoroughly soft by soaking or steaming so as to open the pores of the wood and render the fibers composing it soft and pliable. It will be understood that the wood may therefore be either green wood or dried wood which has been soaked or steamed as stated.

A sheet of the wood in the condition above described is then laid flat and well covered with a suitable cement adapted to cause layers of wet wood to adhere to each other. Any well known cement, as, for instance, a casein cement may be employed. A second sheet is then thoroughly coated with cement and superposed on the first sheet and a third sheet is placed on top of the other two, the grain of the wood being preferably at right angles. As many sheets as are required for the finished article are thus piled into a group. In practice, I find it convenient to pile up the groups of superposed cement coated sheets to form a pile or stack. The superposed cement coated sheets are then placed under what I term the cold pressure. This may be done conveniently by placing the desired number or the whole stack of cement-coated sheets in a press, of common form and construction, and then subjecting them to a gentle pressure. This will be readily seen from Fig. 2 where the sheets are shown as being subjected to pressure in the press 4. The pressure to be applied is just sufficient to hold the proximate surfaces of the adjacent layers of the wood in contact with each other so that the air cannot reach the cement nor can the layers of wood curl or warp and admit the air. The material is allowed to remain under this pressure, which I term "cold pressure", because no heat is applied, for a considerable time the length depending on the character of the cement, the character of the

wood, its thickness, and its condition of wetness.

I believe that allowing the material to stand for the proper length of time has an important effect on the final result for I find that if the cemented material is not allowed to stand as described but is at once placed under a relatively heavy pressure, as in a mold, the wood will not absorb the cement and become saturated by it, but the cement will be almost entirely squeezed out at the sides. On the other hand if the material is allowed to stand under the cold pressure for the proper length of time it will be found that in the completed material the cement has entered the pores and cells throughout the layers of wood. It will be found that the sheets composing the groups, having remained in the press for a proper length of time, will adhere lightly to each other but sufficiently to permit them to be readily handled as a group, but that the sheets will slide upon one another and accommodate themselves to the shape of the mold during the pressing to which they are then to be subjected. The length of time required for enabling the cement to properly permeate the assembled layers or sheets when the material is subjected to the relatively light "cold pressure," or pressure without artificial heat, hereinbefore referred to, will vary very considerably according to the character or thickness of the layers or sheets, as well as to the size thereof, and also according to atmospheric conditions. The best results have been obtained by employing cold pressure of from twenty-four to thirty hours, under ordinary atmospheric conditions, and with ordinarily thin sheets of wood. With very thin sheets, however, good results have been obtained by as little time as two hours of cold pressure, but with unusually thick and very large sheets it has been found advantageous to continue the cold pressure for some sixty to seventy-two hours, or thereabout, to enable the sheets to become properly permeated or saturated with the cement.

The cement when applied is about the consistency of thick cream, and the cold pressure should be continued until the cement becomes partly set or "tacky." By "tacky" is meant of sufficient thickness and consistency so that it will not squeeze out at the sides of the layers when the material is subjected to heat and relatively heavy pressure. When the atmosphere is dry and warm the cement becomes tacky much more quickly than when it is cold. The cold pressure period therefore depends largely upon the temperature and condition of the atmosphere, as above suggested, as well as upon the thickness and size of the sheets of material. After the material has remained under the cold pressure for a sufficient

length of time and while it is still wet and pliable, it is placed in a press or mold to give it the final shape desired and to complete the forcing of the cement through the wood and to set and densify the entire mass.

In Fig. 3, there is shown a press comprising a pair of male and female dies A and B suitable for forming a molding. These dies A and B are hollow, for the introduction of steam by means of which the dies are heated to the required temperature. The material after having been subjected to the cold pressure for the proper length of time is put in place between the dies and then subjected to a heavy pressure and to heat from the heated dies. The amount of pressure and the length of time the material remains in the press depend largely upon the thickness of the material and to some extent upon its condition. This simultaneous application of heat and relatively heavy pressure should, however, be continued until the cement is well set and the material has become hard and practically dry, so that after it is removed from the dies it will permanently retain the shape into which it has been formed.

When the material is removed from the press, it will be found to have a structure and characteristics quite unlike the wood from which the material was originally made. It will be found to be dense and hornlike, and very strong, tough and rigid. It is also waterproof and unaffected by dampness, and may be polished on a buffing wheel or the like without the application of any surface coating having when so polished a bright lustrous appearance.

From the foregoing, it will be seen that my new and improved process consists essentially of four steps (1) coating the material in a properly tempered condition with the cement, (2) superposing the sheets of cement-coated material, (3) allowing the superposed sheets of cement-coated material to stand for some considerable time under a rather light pressure in a press or the like and (4) subjecting the material to a comparatively heavy pressure and to heat.

I do not wish to be understood in the foregoing specification as stating that the cementitious material composing the cement permeates the pores of the wood during the time the material is standing under the cold pressure, because I do not know whether or not this is true. I only know that, if the material is thus treated, the pores or cells of the final product will be found to be completely permeated by the cement.

The term "properly tempered condition" as hereinbefore used with reference to the wood will be understood to mean a more or less moist condition of the sheets of wood. In other words, the sheets of wood may be

in the moist condition in which they come from the veneer-cutting machine, due either to steaming the logs, or to the natural sap in the wood, or to both; or, if the sheets have become dry, to a proper moistening of the same by steaming or otherwise. Also it will be understood that the different layers in the completed compo-board or sheet will preferably be so disposed that the grain of the wood of each two contiguous layers will be crossed, so that the grain in one veneer or layer will run at right angles to the grain in the contiguous layer or layers. Thus if there are three layers in a completed compo-board or sheet the grain of the middle layer will preferably run crosswise of the grain of the two outer layers, and if there be five layers the grain of two separated layers will preferably run crosswise of the grain of the three alternating layers.

What I claim is:

1. The herein described process of making compo-boards or sheets, consisting in coating certain faces of thin veneers or layers of wood, when in a moist condition, with a suitable cement, then superposing said veneers or layers with the grain of the wood of contiguous layers crosswise, then causing said superposed veneers or layers to stand under a relatively light pressure for a considerable length of time, as hereinbefore

stated, to enable the cement to permeate the layers and to become partly set or "tacky," and finally subjecting the assembled layers to the simultaneous action of heat and a relatively heavy pressure until the cement is well set and the material practically dry.

2. The herein described process of making molded articles from compo-boards or sheets, consisting in coating certain faces of thin veneers or layers of wood, when in a moist condition, with a suitable cement, then superposing said veneers or layers with the grain of the wood of certain layers crosswise of the grain of the other layers, then causing said superposed veneers or layers to stand under a relatively light pressure for a considerable length of time, as hereinbefore stated, to enable the cement to permeate the layers and to become partly set or "tacky," and finally molding the assembled layers into any desired shape by subjecting the same to the simultaneous action of heat and a relatively heavy pressure until the cement is well set and the material practically dry.

In testimony whereof I affix my signature, in presence of two witnesses.

JOHN E. DAVIDSON.

Witnesses:

GEORGE P. DIKE,
ALICE H. MORRISON.