Nov. 4, 1930. P. W. CODWISE 1,780,743

LAMINATED WALL BOARD

Original Filed Feb. 23, 1928

Fig. 1.

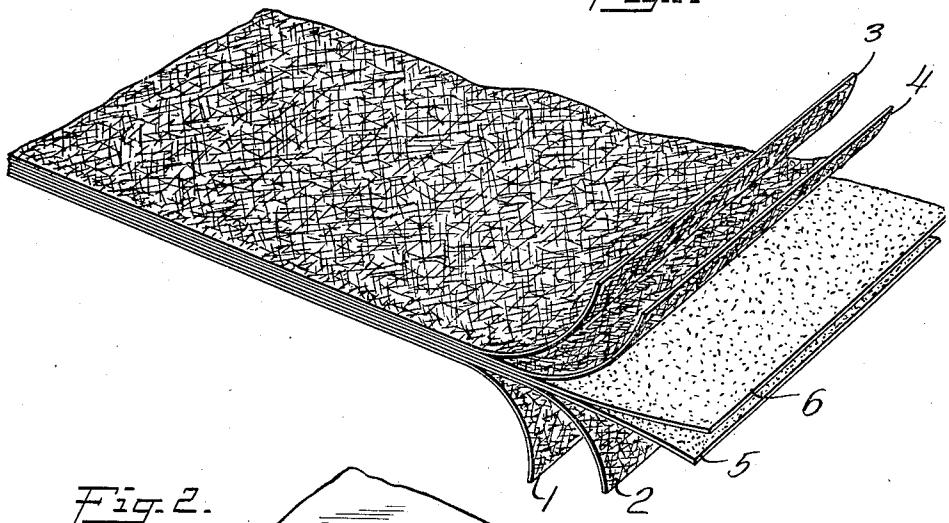
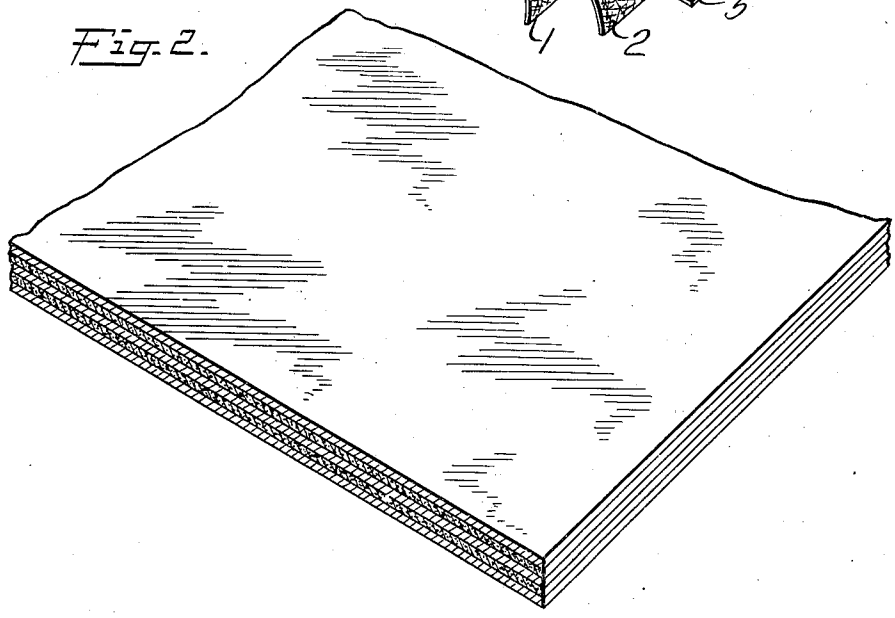


Fig. 2.



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Patented Nov. 4, 1930 1,780,743

UNITED STATES PATENT OFFICE

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LAMINATED WALL BOARD

Original application filed February 23, 1928, Serial No. 256,091. Divided and this application filed June 13, 1928. Serial No. 284,962.

This invention relates to wall boards and is a division of my copending application filed February 23, 1928, Serial No. 256,091.

An object of the present invention is the production of a thick laminated board, the outer plies of which are formed, for the most part, of wood screenings and saw-dust and the inner plies of which are formed, at least in part, from paper waste. A further object is to provide a wall board of this character having such strength, toughness and freedom from warpage and having such good insulating qualities, that it can be used with advantage as a plaster base on which to apply stucco and a hard finish.

This new product is obtained by a novel process. Other objects and advantages of the present invention will become apparent from the following description taken in conjunction with the accompanying drawings.

In the drawings, Fig. 1 is a diagrammatic representation of one of the layers of which the board is built, the plies of the layer being separated in the drawing to show their relation to each other, and

Fig. 2 is a perspective view of a fragment of the complete board.

As described and claimed in my parent application, the complete board, as illustrated in Fig. 2 of the drawings, comprises several separate layers, preferably five, cemented together with a suitable adhesive. When the board is made according to the embodiment of the invention forming the subject matter of the present invention, each layer is about .08 inches in thickness and possesses the characteristics of an extreme rough surface. The five or more layers are identical in construction and each of them preferably consists of six plies felted together during the process of manufacture. The four outermost plies, reference numerals 1, 2, 3 and 4, see Fig. 1, are composed essentially of ground wood screenings, wood flour and saw-dust. The screenings are preferably spruce screenings obtained from ground wood pulp in usual paper making operations. Such screenings consist largely of slivers, shives or bundles of fibers, not torn apart when the spruce log is ground to pulp on the grind stone. While the proportions of materials employed in the manufacture of the outer plies may be varied, I preferably employ approximately equal parts of ground wood screenings and saw-dust.

By using screenings as a major constituent of the two outer-most plies of each layer, the layer is given a nap or roughened surface of substantial advantage when the layers are being cemented together and also a great importance in securing a firm bond between the board and a layer of plaster spread thereon when the board is used as the inner wall of a building. The addition of saw-dust to the outer layer increases the bulk of the board without detracting from the advantages obtained by the use of the screenings. One of the advantages of having the four outermost layers composed in part of such screenings is the toughness and strength inherent in a layer of stock built up of slivers, shives and bundles of fibers. When saw-dust is admixed with such screenings in proper proportions, an increased bulk is obtained without sacrificing these advantages.

The two innermost plies 5 and 6 can well contain a relatively high percentage of short fibered stock.

The short fibered stock for the inner plies 5 and 6 is made by charging the ingredients into a hollander beater and there beating on a continuous plan until a smooth, uniform pulp is produced. The ingredients of the inner plies may vary but I have found that a mixture of substantially 35% wood flour, 30% ground wood and 35% mixed paper gives excellent results. Newspaper waste, container board waste and the like can be used. Roughly estimated, it takes about three-quarters of an hour to pass such a charge through the hollander. A suitable sizing of the short fibered stock is important and I prefer to effect this sizing with an alum rosin size, introducing the alum to the extent of 4% by dry weight into the batch while in the hollander and introducing the solution of rosin at the head box just before the stock passes to the Jordan, using rosin to the ex-

tent of 3% by dry weight. From the hollander beater the short fibered stock passes to a beater chest, then to the Jordan, then to the machine chest and then to two of the cylinders of a six cylinder machine as hereinafter described. Each of these plies has a thickness of about .011". This short fibered stock thus sized is pressed as it leaves these two cylinders for felting between the four outer plies of stock.

In the embodiment of the invention forming the subject matter of this application, the stock for the outer plies, consisting of wood pulp screenings, preferably ground spruce, wood flour and fine saw-dust, is run into a hollander with water and alum and there beaten to a uniform pulp. The wood screenings and saw-dust may be employed in substantially equal parts and the shives or bundles of fibers of the screenings should average one-quarter to one-half an inch in length. From the hollander the beaten charge is run into the beater chest where a rosin solution is added to thoroughly size the fibers. The percentages of alum and rosin may be the same with this stock as with the stock of the inner plies. The stock is then lightly jordanned and then passed to four cylinders of the six cylinder machine. The amount of sawdust employed in the outer plies may be varied within wide limits, greater quantities being used where greater bulk is desired.

When saw-dust is used in the mixture, certain precautions are necessary during the pressing operation to prevent splitting the bond between the plies of the layer or increasing the density of the product beyond the desired limits. The press employed consists of two primary rolls and one large roll. The weight on the primary rolls is merely sufficient to keep the machine operating and in the large press, I employ a light weight upper roll without any leverage or additional weights on it. The sheet is thus compressed very little and retains practically all the bulky characteristics which the saw-dust naturally imparts to it. During the pressing operation excess water is removed from the plies and the constituents are bonded to each other. The plies are also felted together in an inherent sheet or layer as indicated in Fig. 1 of the drawings. The layer is then dried on drums in the usual manner but without calendering or other surface treatment which would destroy the roughened or napped surface of the outermost plies.

After the layers have been formed, they are passed through a laminating machine and a suitable adhesive applied to cement them together into a rigid board. An adhesive composed of silicate and clay has advantages for cementing the layers together. A clay silicate mixture as described in the Carter Patent, No. 1,188,040 granted June 20, 1916, is suitable, but a water compound such as lime-casein may be employed. Proper sizing of the fibers of the plies is important at this stage of the process as the sizing regulates to some extent the penetration of the adhesiveness and its effectiveness in producing a good bond between adjacent layers. The water content of the board is increased by the application of the adhesive and the board may then be dried by kiln drying and/or by seasoning until the moisture content drops to about 12 percent.

The process of the present invention has the advantage that it can be carried out with standard equipment. The beaters, Jordans, cylinder machine, drum dryers and laminating machines are well understood by workers in this art. Recourse need not be had to special or expensive processes, continuous dryers and the like. The layers of stock each composed of a plurality of plies can be readily stored or can be transported to a remote board mill without detrimental change in moisture content and when cemented together into the complete board yield a product in which the moisture content is substantially uniform throughout.

The product of the present invention has good insulating qualities and when a large proportion of saw-dust is used, it has great bulk in addition to tensile strength. The laminated form of the product contributes toward greater strength and the clay silicate adhesive between the layers, not only stiffens the structure but is to some extent a protection against fire. In addition, the provision of long fibered or slivered stock in the outermost plies produce a sheet with a nap or surface roughness of substantial benefit in cementing the plies together and of controlling importance on the adhesion which can be had when the board is used as a plaster base for the inner wall of a building. Such a plaster base must be strong and tough, must not warp, must take up enough water to make proper bond with the plaster and must not take up that water too rapidly. The board above described fulfills all these conditions. It serves satisfactorily as the base for a plaster layer three-eighths to one-half inches in thickness over which may be applied a hard finish in the usual manner.

The board may be built of any number of layers and any number of plies may be used in the board thereby increasing the thickness of the board for various uses without essentially changing its characteristic features. Additional plies in each layer or additional layers in the finished board, of course, give greater strength and increase insulating power.

I claim:

1. A laminated wall board composed of a plurality of layers, each layer having outer plies composed in part of pulp screenings and

saw-dust and inner plies composed in part of paper waste.

2. A laminated wall board composed of a plurality of layers, each layer having outer plies composed of spruce in the form of ground wood screenings and saw-dust properly sized and inner plies composed in part at least of paper waste.

3. A laminated wall board composed of a plurality of layers, each layer having outer plies composed of ground wood screenings and saw-dust properly sized and having inner plies composed of about 35 percent paper waste, 35 percent wood flour and 30 percent ground wood all by dry weight and suitably sized.

4. A laminated wall board composed of a plurality of plies grouped in separate layers and with adhesive applied between the adjacent layers, the outer plies of each layer being composed essentially of spruce in the form of ground wood screenings and saw-dust suitably sized and the inner plies being composed essentially of paper waste, wood flour and ground wood suitably sized.

5. A laminated wall board comprising a plurality of plies grouped in separate layers and with a stiffening adhesive applied between adjacent layers, each of said layers having its outermost plies composed of ground wood screenings and saw-dust suitably sized and its inner plies composed in part at least of paper waste.

6. A laminated plaster base board comprising a plurality of plies grouped in separate layers and with adhesive applied between the adjacent layers, each of said layers having its four outermost plies composed of spruce in the form of ground wood screenings and saw-dust suitably sized and having its innermost plies composed essentially of paper waste, ground wood and wood flour.

7. A laminated plaster base board comprising a plurality of plies grouped in separate layers and with clay silicate adhesive between adjacent layers, each of said layers having its outermost plies composed of spruce in the form of ground wood screenings and saw-dust suitably sized and having its innermost plies composed of about 35 percent paper waste, 30 percent ground wood and 35 percent wood flour all by dry weight and suitably sized.

8. The method which comprises beating a mixture of paper waste, wood flour and ground wood to a pulp, shaping said pulp into plies, uniting said plies by pressure between plies of ground wood screenings and saw-dust to form a coherent layer having a rough surface substantially as described and cementing a plurality of such layers together to form a rigid plaster base board.

9. The process which comprises beating into a pulp with water a mixture of substantially 35 percent paper waste, 35 percent wood flour and 30% ground wood, shaping said pulp into plies, compressing a plurality of such plies between plies of sized wood pulp screenings and saw-dust to form a coherent layer with rough surfaces and a thickness of about .080 inches and ultimately cementing a plurality of said layers together to form a rigid board serviceable as a plaster base board substantially as described.

In testimony whereof I affix my signature.

PHILIP W. CODWISE.