

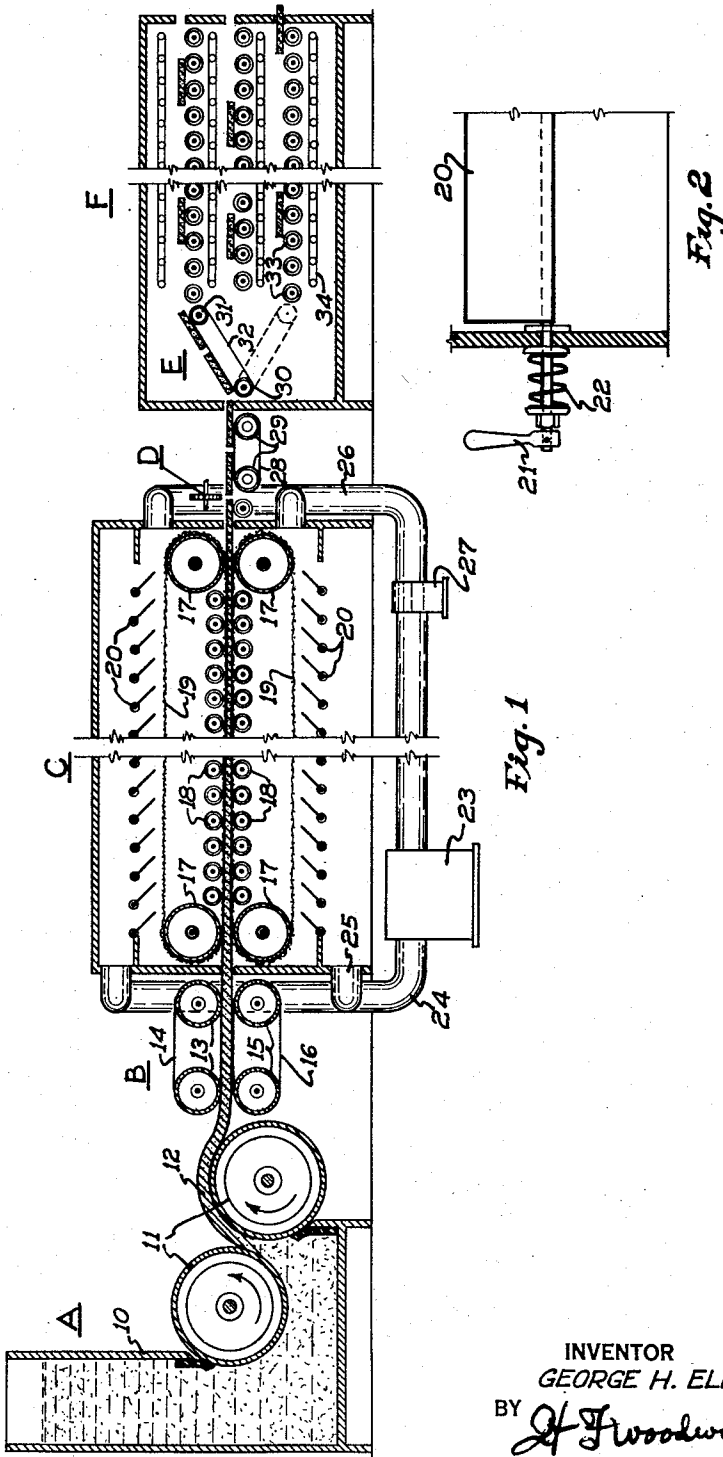
June 6, 1939.

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2,161,655

METHOD OF MAKING HARD, DENSE, FIBROUS, BOARDLIKE PRODUCTS

Filed Oct. 30, 1936



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UNITED STATES PATENT OFFICE

2,161,655

METHOD OF MAKING HARD, DENSE, FIBROUS, BOARDLIKE PRODUCTS

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Application October 30, 1936, Serial No. 108,372

7 Claims. (Cl. 92—21)

This invention relates generally to an apparatus for and the process of making dense, hard, board-like products from wood or woody materials.

5 Another object of the invention is the making of board or sheets from vegetable fibers adapted for use in construction of buildings and various other purposes.

10 A further object of the invention is to provide an improved process of forming composition boards or sheets from fibrous pulp stock, which comprises forming a sheet, applying heat and pressure to compact and unite the sheet into a homogeneous body.

15 In practice the vegetable material is first comminuted or reduced to pulp by any suitable means. Of course any vegetable material which can be reduced to pulp may be used but economically it is preferred that waste material be used.

20 With the foregoing and other objects in view the invention consists of the novel construction, combination and arrangement of parts hereinafter more specifically described and illustrated in the accompanying drawing wherein is shown
25 embodiments of the invention and also in the novel steps of the process hereinafter to be more fully described but it is to be understood that changes, variations and modifications may be resorted to which fall within the scope of claims
30 hereunto appended.

In the accompanying drawing which illustrates an embodiment of the invention and forms a part of the specification:

35 Figure 1 is a view diagrammatically illustrating an apparatus for carrying out the process.

Figure 2 is a sectional view of a heat controlling damper.

40 In the embodiment of the invention here shown there is illustrated an apparatus for carrying out the process of making board-like bodies. The apparatus shown comprises a suitable sheet forming machine A, a wet press, B, a hot pressing apparatus, C, a cut-off means, D, a tippie conveyor E, and heat chamber F.

45 The felting or sheet forming apparatus consists of a suitable stock tank 10. The pulp is deposited upon the cylinders 11 and 12, and fed upwardly thereby forming a web or sheet. The sheet so formed passes to wet press to remove
50 the surplus water. This press consists of rolls 13 and 15 and rotatable belts 14 and 16, mounted upon rolls 13 and rolls 15, respectively.

55 The sheet after having the surplus water removed, is passed to the hot pressing apparatus. The hot pressing is enclosed in a suitable hous-

ing and consists of large rolls, 17, which carry belts 19. The rolls 17 and the belts are caused to rotate by any suitable means (not shown); and a series of upper and lower rolls 18.

Heat is supplied to the press by any desired 5 means but it is preferred that a furnace 23, discharges hot gas through conduit 24, and branch 25, into the receiving end of the press housing. The gas is withdrawn from the housing at or near the discharge end by conduit, 26, and its 10 branches, and returned by the aid of a fan, 27, to the furnace.

In the press housing are located dampers 20, which may be opened or closed by a suitable means located outside of the housing. For ex- 15 ample, this may be accomplished by means of handle 21, secured upon a damper rod. A spring 22, may be used for holding the dampers 20, in the adjusted position. The dampers 20, control the amount of gases discharged to any given 20 part of the press and also create a turbulence of the air adjacent to the rolls 18, so that stratification of the gas is prevented.

The sheet after being pressed to the desired thickness is discharged from the housing and is 25 divided into the desired dimensions by cut-off saw, D. The sections may then be discharged or subjected to further treatment. The sections may be carried by endless conveyor belts, 28, mounted upon rolls 29, to a heat treating cham- 30 ber F. In this chamber is located spaced apart and superimposed conveyor, 33. Heat is supplied to the chamber by means of coils 34.

The sections of the board are delivered to the 35 conveyors 33, by means of a tippie conveyor E, which consists of fixed roll, 30, movable roll, 31, and endless belt 32, rotatably mounted upon rolls 30 and 31.

To produce a relatively inexpensive, hard, dense, board-like product, having a specific grav- 40 ity of approximately 1, there is used 80% to 95% of rather coarse, pulped vegetable material, such as ground wood, having a freeness measured by the Canadian standard tester of from 500 to 700, preferably approximately 600. There is com- 45 mingled with this pulp, 5% to 20% of vegetable material, derived from the same source as the pulp but having a freeness of from 40 to 80 measured by the same tester, preferably a freeness of approximately 60. The vegetable material 50 ranging from 5% to 20% is usually in the form of pulp (for example ground wood pulp in its natural state) and if the freeness is to be around 40 the material is treated in a pebble mill or the like to obtain this freeness. 55

The low freeness stock is preferably commingled with the high freeness stock while in a water bath. Of course the stocks may be commingled at any time prior to formation of the board-like body. The low freeness stock acts as a binder for the product made.

The board or sheet is formed and the surplus water removed, the extent to which the sheet is dried is not important but from an economical standpoint it is preferred the board contain 40% to 60% of water at the time it is subjected to simultaneous heat and pressure.

The temperature in the press must be above 212°. In a continuous process the temperature is preferably approximately 700° F. at the receiving end and approximately 430° F. on the discharge end.

The pressure to which the product is subjected may vary from 25# to 75# per lineal inch of roll in contact with the product being pressed. Pressures above this may be used if found desirable.

The product may be completely free from moisture in the press or in a continuous process, the product may be discharged having a predetermined moisture content.

If it is desired that the body have one smooth surface, a belt having a highly polished surface is placed against the surface it is desired to have smooth.

The board-like body after being discharged from the pressing apparatus is divided into sections of the desired size. The sections may be submitted to a heat curing operation at a temperature of approximately 250° F.

If it is desired to give the board additional resistance to water absorption and higher stiffness and tensile strength, a material or materials are commingled with the stock prior to forming the product.

If casein within the range of 1% to 3% based upon the dry weight of the pulp is added, this results in a high gloss finish and a high tensile strength.

A synthetic petroleum resin or a synthetic wood resin which hardens under heat and pressure within the range of from 2% to 15% may be used to obtain higher water-proofing and greater tensile strength.

It is to be understood that the board-like body may be made continuously or intermittently in a suitable hydraulic press.

A product for instance a board-like body made from stock having the major portion of relatively high freeness and the remainder of relatively low freeness, results in a complete bonding of the fibers under heat and pressure into a homogeneous and water-resisting product.

I claim:

1. The process of making a grainless and high strength board-like body from raw, unbeaten ground wood fibers which comprises commingling fibers having a freeness of 40 to 80 with

fibers in a water suspension having a freeness of 500 to 700, the fibers having a freeness of 40 to 80 percent within the range of 5% to 20%, forming a board-like body and simultaneously applying heat and pressure to produce a dense and hard board.

2. The process of making a hard and highly water-resisting board-like body which comprises forming a board-like body from a mixture of 5% to 20% of raw and unbeaten ground wood fibrous material having a freeness of from 40 to 80 and 80% to 95% of raw and unbeaten wood fibrous stock having a freeness within the range of 500 to 700, commingling with the fibers while in a water suspension 1% to 3% of casein, and simultaneously applying heat and pressure to consolidate and dry the board.

3. The process of making high strength, board-like body comprising mixing 5% to 20% unbeaten ground wood pulp having a freeness of 40 to 80 with 80% to 95% of unbeaten ground wood pulp having a freeness of 500 to 700, forming a board-like body, simultaneously applying heat and pressure to compress the body into a dense and stiff product.

4. The process of making high strength, board-like body comprising grinding wood to product pulp having a freeness of 500 to 700, grinding wood to produce pulp having a freeness of 40 to 80, commingling 5% to 20% of the 40 to 80 freeness stock with 80% to 95% of stock having a freeness of 500 to 700, forming a board from the mixture of fibers in a water suspension, and simultaneously applying heat and pressure to the board.

5. The process of making a hard, dense, grainless, board-like body which comprises grinding wood without substantial hydration into a freeness within the range of about 500 to 700, commingling 5% to 20% of raw ground wood having a freeness within the range of 40 to 80 with the disintegrated wood having a freeness of from 500 to 700 while in a water suspension, forming a board-like body, and simultaneously applying heat and pressure.

6. The process of making a hard and dense, board-like body which includes commingling 5 to 20% of unbeaten ground raw wood pulp having a freeness of approximately 60 with 80% to 95% of raw unbeaten wood pulp in a water bath having a freeness of approximately 600, forming a board-like body, and simultaneously applying heat and pressure to the board-like body.

7. The process of making a hard and highly water-resisting, board-like body which includes grinding wood into raw, unbeaten pulp, 80% to 95% of the pulp having a freeness of about 500 to 700, 5% to 20% of the pulp having a freeness of about 40 to 80, forming a board-like body, and simultaneously applying heat and pressure to the board-like body to consolidate, densify and reduce the thickness of the board-like body.

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