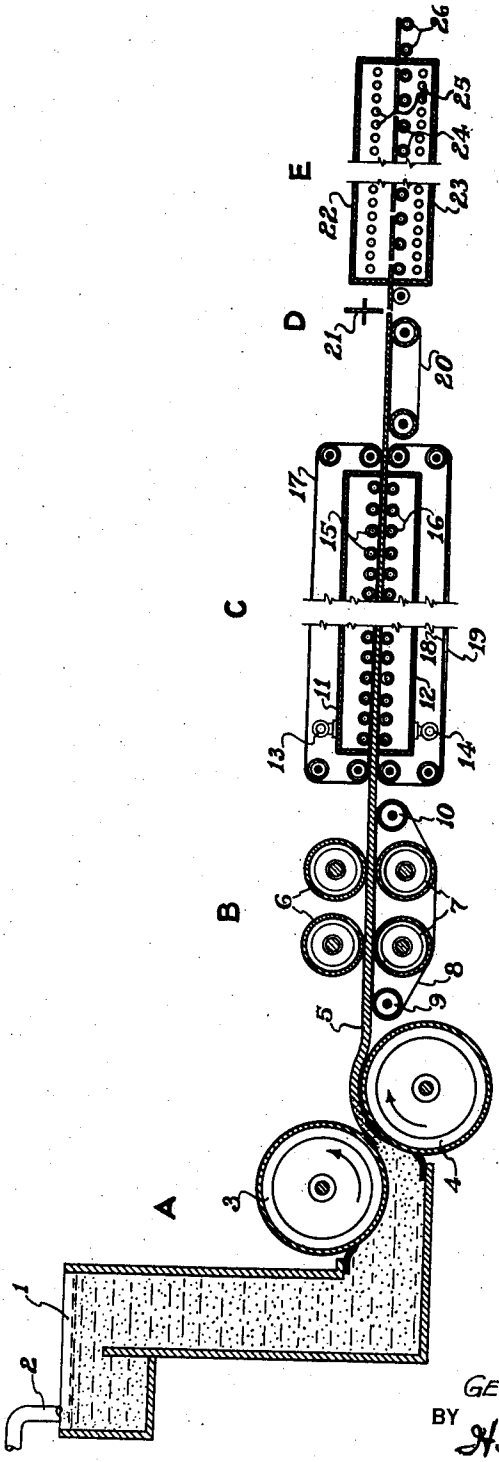
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APPARATUS AND METHOD OF PRODUCING VEGETABLE FIBER PRODUCTS

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APPARATUS AND METHOD OF PRODUCING VEGETABLE FIBER PRODUCTS

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The invention relates to a novel process for producing strong, durable, vegetable fiber products and includes such process and the product resulting therefrom as well as the apparatus used.

Many kinds of vegetable fiber are available for use in this process and in general, it may be stated that all vegetable fiber which can be reduced to a pulpy condition may be used, and the raw material may be converted into pulp in any desired manner.

One of the most desirable raw materials for the production of vegetable fiber for use in this process, is waste material, such as waste wood which may be obtained in large quantities from saw mills and forest operations.

The process is particularly adapted to use saw mill waste and forest waste, including tree tops, bark and needles.

Another object of the invention is the production of a fiber product adapted for use for example, in roofing and flooring of buildings, and the exterior and interior walls thereof. The product is also highly useful for articles such as cabinets, furniture, etc.

In practice the raw material is first comminuted or broken up into small sized particles, preferably from 5/8" to 3/4" with the grain and from 1/8" to 1/4" across the grain.

The preferred manner of treating the fibrous material after it has been broken up is to place it in a suitable container with an alkaline solution. The amount of alkaline solution used generally falls within the range of 2 to 6%, preferably approximately 3%. The treatment may be carried out under a pressure ranging from 100# to 175# per square inch for approximately 2 to 4 hours.

Satisfactory results have been obtained by subjecting the broken up fibrous material to steam treatment without the use of any chemicals.

The material, after the chemical or steam treatment, is further reduced by beating, grinding or by other suitable means.

It is to be understood that the amount of chemical or chemicals used may vary depending upon the material being treated, and the final result desired. As an example of the chemical that may be used, soda ash has given very satisfactory and economical results.

The raw material may be reduced to a pulpy condition according to the process disclosed in my Patent 1,850,832, granted March 22, 1932.

After the material has been reduced to a satisfactory fibrous condition, it is formed into fibrous articles. The formed articles are subjected to heat and pressure, and to a heat curing operation and/or to any other manufacturing necessary to produce the article desired.

The amount of moisture the fibrous products contain at the time heat and pressure is applied is not important, but economically it is preferred that the moisture content fall within the range of 40% to 60%.

With the foregoing and other objects in view, the invention consists of the novel construction, combination and arrangements of parts hereinafter specifically described and illustrated in the accompanying drawing wherein is shown one embodiment of the invention; the novel steps of the process and the fibrous product produced, but it is to be understood that changes, variations and modifications may be resorted to which falls within the scope of the claims hereunto appended.

In the accompanying drawing which illustrates an embodiment of the invention and forms a part of the specification, is shown a diagrammatical view of the apparatus.

Heretofore it has been considered necessary in producing hot, pressed, fibrous products to use relatively high pressures and relatively low temperatures. According to this invention it has been discovered that relatively low pressures may be used and much higher temperatures than have been thought possible.

By using a temperature considerably higher on one side than on the other side during pressing, produces one major surface with a smooth finish, high tensile strength and good water-resisting characteristics. Satisfactory results can be obtained by maintaining any heat differential between the opposite faces.

Under certain conditions where great strength and water resistance is required, a binder and/or water-proofing material is incorporated in the fibrous product. The water-proofing material may be commingled with the fiber while in a water bath or applied during the subsequent steps of manufacture.

If a rot-proof and fungi-resisting product is required, some toxic material or materials should be incorporated therein.

In the embodiment of the invention shown by the drawing is included a sheet forming machine, A; a wet machine, B; a hot pressing apparatus, C; a cut off device, D; and a curing oven, E.

The sheet forming machine comprises a pulp vat, 1, adapted to receive pulp from inlet pipe, 2. The pulp is deposited on the surfaces of the cy-

lindrical members, 3 and 4, and thereby formed into a sheet or board-like body. The board after being formed is passed to a wet machine to remove the surplus moisture. The wet machine includes rollers, 6 and 7; an endless conveyor comprising a belt, 8; and roller members, 9 and 10, for receiving the board and moving it to the pressing device, C.

The pressing device consists of housings or members, 11 and 12, in which are mounted roller members, 15 and 16. The rollers are adapted to be driven by means not shown. To enable heat to be applied to the fibrous product means are provided to heat the rolls, 15 and 16. The heat may be by steam or direct heat, such as oil and gas burners or in fact, any way by which the desired temperature is obtained. The rolls are mounted so that they converge from the wet end to the dry end. It has been found desirable that belts 17 and 18 be so mounted as to rotate into and out of the pressing passage. The belts usually are of steel or the like. For economical operation it is desirable to place a screen or other foraminous member, 19, on at least one of the belts. The member, 19, is adapted to move with the belt or belts. In the drawing a foraminous member is shown mounted on belt, 18. The pressing passage formed by the belts, 17 and 18, and the rolls, 15 and 16, may be considered a converging walled pressing passage.

The pressed product after being discharged from the pressing passage is carried forward by an endless conveyor. The fibrous products are cut into the desired size by cutting member 21.

From the cutting means the fibrous products are passed into a heat curing chamber which consists of upper and lower parts, 22 and 23. Mounted in the curing chamber are heating coils 25, but any other means of heating the curing oven may be used. The fibrous products are carried through the curing oven by a suitable conveyor such as live rolls, 24. The products after being discharged from the curing oven are carried to further treatment or to point of shipment by conveyor, 26.

It is highly desirable that the operation be continuous and this is in part accomplished by arranging the pressing means between a pair of endless or other conveyors.

By way of example, the process may be carried out as follows: The moisture content of the fibrous product reduced to approximately 50% in the wet machine and when delivered to the pressing apparatus contain approximately this amount of moisture. A temperature of approximately 1000° F. is applied on the lower side and approximately 500° F. on the upper side. The temperature at the discharge end on the lower side being approximately 700° F. and on the upper side approximately 350° F. The board is delivered to the curing oven having a temperature above 212° F.

The pressure applied generally falls within the range of 5# to 40# per lineal inch of product being pressed.

It is to be understood that certain steps of the process may be altered as to the sequence in which they are performed and certain steps may be omitted and yet obtain satisfactory results.

What I claim is:

1. An apparatus for pressing and drying fibrous products, the combination of a pair of endless conveyors, rotatable walled converging members for pressing mounted between said conveyors, and means for heating the pressing members said conveyors operating in substantially the same plane as pressing passage formed by converging members.

2. A method of producing fibrous products from fiberized material comprising forming a product, pressing the product in a converging walled passage while being advanced, and applying heat above 212° F. to opposite sides of the product while being pressed, said heat applied whereby a heat differential of at least 100° F. is maintained between heat applied to opposite faces.

3. A method of producing board-like fibrous products from fiberized vegetable material which comprises forming a product, subjecting the product to simultaneous application of heat and pressure while being continuously advanced, the said heat applied to opposite faces being greater than 212° F. and applied whereby a heat differential of less than 65% but greater than approximately 40% is maintained between opposite faces.

4. An apparatus for making hard and stiff vegetable fiber board comprising means for removing surplus moisture from a moving wet board; means for advancing the board to a pressing passage; a rotatable walled pressing passage; said passage consisting of endless metallic belts and rolls for supporting said belts, means for heating the pressing passage; and means for continuously moving the hot pressed board away from the pressing passage, the surplus moisture removing means, the advancing means, and the rotatable walled pressing passage operating in substantially the same horizontal plane.

5. A method of producing hard and stiff board-like products from vegetable fibers in a water suspension comprising forming a board-like body, removing the surplus water, passing the board along a rotatable walled pressing passage and applying approximately 1100° F. to one side and 500° F. to the opposite side near the receiving end of said passage and approximately 700° F. to one side and approximately 350° F. to the opposite side near the discharge end of the passage.

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