

UNITED STATES PATENT OFFICE.

JAMES E. LAPPEN, OF WINONA, MINNESOTA, ASSIGNOR TO UNION FIBRE COMPANY,
OF WINONA, MINNESOTA, A CORPORATION OF MINNESOTA.

PROCESS FOR PRODUCING HEAT-INSULATING BOARDS FROM FIBROUS MATERIAL.

1,155,330.

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No Drawing.

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To all whom it may concern:

Be it known that I, JAMES E. LAPPEN, a citizen of the United States, residing at Winona, in the county of Winona and State of Minnesota, have invented new and useful Improvements in Processes for Producing Heat-Insulating Boards from Fibrous Material, of which the following is a specification.

My invention relates to an improved process for producing heat insulating boards from fibrous material.

Its object is to increase the efficiency with which such boards are felted with a minimum amount of manipulation.

My process may be applied to any of the vegetable fibers used in the manufacture of insulating boards, such for example as flax, hemp, jute, cereal straws or to a mixture of such materials.

It has heretofore been deemed essential in producing a self-sustaining, long fiber felt for heat insulating purposes, to inter-tangle or felt the fibers by hand while submerged in water. My primary purpose is to obviate the necessity for such submersion and hand-puddling. I also succeed by the use of my improved process in producing a satisfactory insulating board with a smaller percentage of the long and expensive fibers, such as those of flax, jute or hemp, than was formerly considered necessary.

Whether a single species of raw fiber or a mixture of fibers be used, I prefer to first cook the stock in a digester with an alkaline or similar chemical solution. The digester commonly used in paper making is satisfactory for this purpose, but the alkaline solution may be much weaker and the stock should not be reduced to a pulp. The cooked stock, having been dumped from the digester, is drained and is preferably washed to remove the alkali, gums and other readily soluble residuum. While this cooking is desirable, I have found that a satisfactory board may be produced from uncooked stock, if the materials are thoroughly mixed before applying the jets of water hereinafter described. The stock, whether cooked or uncooked, is then, in a moist condition, spread upon an apron or conveyer having a foraminous or slatted bottom adapted to permit the quick drainage of water therefrom. One or more series

of jets of water, under pressure, are applied vertically to the stock while the apron or the jets are moved horizontally. In practice I prefer to move the apron while the jets remain stationary. The effect of these jets is to level and make uniform the thickness of the layer of fibrous material passing beneath them, reducing the irregular tangles or lumps which are usually found in the stock, and also to intermesh and felt the fibers into a mat of substantially uniform consistency. The water applied in jets, as above specified, quickly drains off through the apertures in the apron, so that the stock is not immersed as has heretofore been the common practice. I have found that these vertical jets of water, acting upon the horizontally moving layer of stock, have upon the longer fibers very much the effect of needles, which drive and interlace such long fibers quite uniformly through the mass in a manner which produces a coherent and homogeneous felt. After the stock has been thus treated, it is thoroughly compressed into sheets by any suitable means, such as tampers, rolls or the like, and when so compressed is dried, the result being a board of substantially uniform texture, which, while self-sustaining and tough, is filled with an enormous number of minute air cells and is of high insulating value.

Practical tests have demonstrated that if a given fibrous material, or mixture of such materials, be treated in all respects as above indicated, except that the jets of water are omitted, the resulting sheets will be uneven in thickness and deficient in uniformity of felting and in tensile strength as compared with the product produced by my process; nor is it practicable to efficiently felt the stock under water, as for example in a vat, without a considerable amount of hand manipulation. It will thus be seen that my process eliminates this hand-labor and also, it is believed, produces from a given mixture of fibers a stronger, more uniform and efficient insulating board than has heretofore been produced from the same ingredients.

Having described my invention, what I claim as new and desire to protect by Letters Patent is:

1. The process of felting fibrous materials, which consists in applying jets of water under pressure to a layer of stock,

while the stock is moved beneath the jets, and then draining the water from the stock.

2. The process of manufacturing self-sustaining boards from fibrous material, which consists in first spreading the stock while wet upon a traveling conveyer provided with drainage facilities, second, in applying to said fibrous material upon said conveyer a plurality of vertical jets of water under pressure and allowing said water to escape, whereby said material is felted into a homogeneous sheet, third, in compressing said sheet and finally in drying the same.

3. The process of manufacturing self-sustaining boards from fibrous material,

which consists in first spreading the stock upon a platform provided with drainage facilities, second, in applying to said fibrous material a plurality of jets of water under pressure and allowing said water to escape, while the platform or jets are moved in a substantially horizontal plane, third, in compressing said stock and finally in drying the same.

In testimony whereof, I have signed my name to this specification in the presence of two subscribing witnesses.

JAMES E. LAPPEN.

Witnesses:

A. S. MORE,
J. J. BROWN.