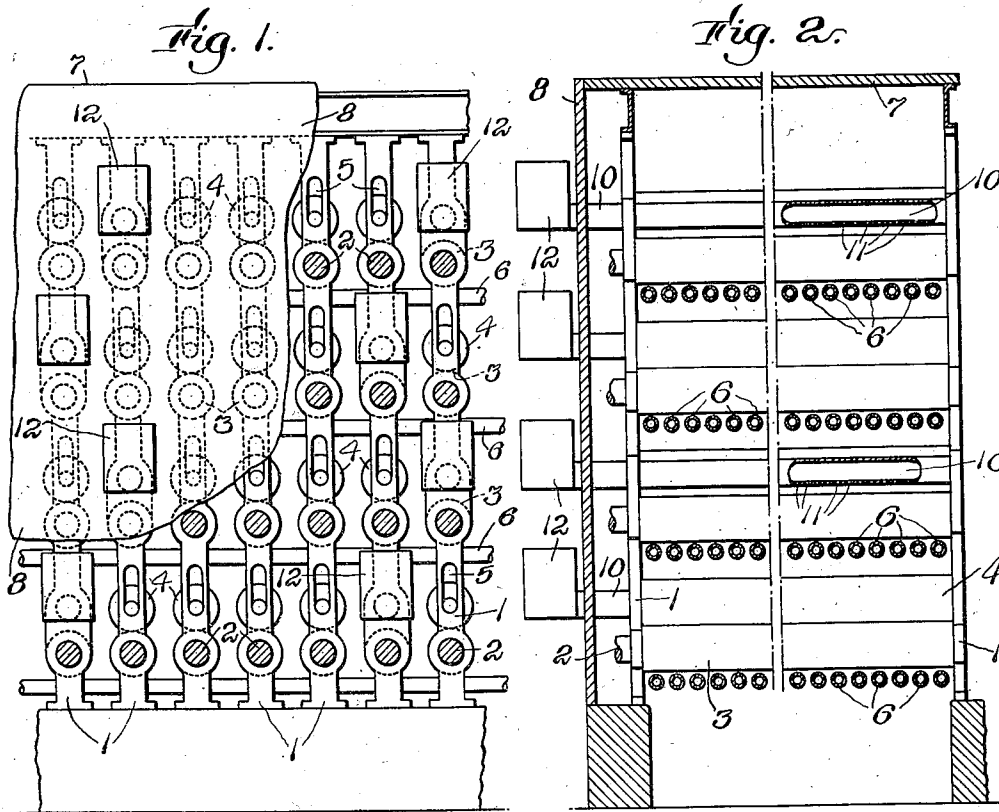
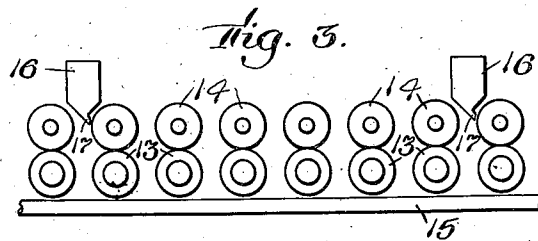


A. L. CLAPP.
 PROCESS OF WATERPROOFING SHEET MATERIAL.
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1,312,682.

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UNITED STATES PATENT OFFICE.

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Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, ALBERT L. CLAPP, a citizen of the United States, and resident of Marblehead, in the county of Essex and State of Massachusetts, have invented an Improvement in Processes of Waterproofing Sheet Material, of which the following description, in connection with the accompanying drawings, is a specification, like letters on the drawings representing like parts.

My present invention is an improved process of treating sheet material, particularly so treating the same as to waterproof such material. Broadly considered, my process consists in simultaneously drying and gradually waterproofing any article by successive applications of the waterproofing compound or ingredients during the application of heat to effect the drying. This process is specially applicable to all kinds of sheet material which are fibrous in their texture and which include the drying operation as a final stage in their manufacture. Of this class of materials are all kinds of sheet material, such as wood, lumber and pump and fiber articles, such as fiber board, leather board, wall board, card board, and ground wood pulp products, and the like. In the manufacture of such articles it is customary to form the same into sheets or slabs of pulp material and then to dry these sheets so formed, either in a drying tunnel, oven, kiln, or in a machine which may simultaneously apply heat and also pressure to the pulp material during the drying. My process is preferably utilized during this drying operation in the manufacture of the sheet material and therefore I am enabled to produce a completed, dried and waterproofed article during the actual manufacture of such article without separate machines requiring additional space, handling, attendants, or the like.

Heretofore, in the waterproofing of many kinds of paper, paper pulp, leather board and the like, it has been customary after the sheet material has been completely formed and dried, to immerse the material in a bath of waterproofing solution. Oftentimes repeated immersion was necessary and repetition of handling was required, and there was a lack of uniformity in the waterproofed material. My process, on the contrary, supplies the waterproofing material

during the drying operation as above explained, preferably by successive applications of the waterproofing solution in thin films or layers and in timed relation with the drying operation so as to permit just the right amount of waterproofing to be applied to the article as the water in said article is dried out. Preferably also, I utilize, during drying, pressure applying devices, which will further serve to work, press, and force into the sheet material, the waterproofing substance with which it is being treated. I may apply successive quantities of the same or different waterproofing material during this drying operation, or I may apply, successively, different ingredients, which combined will constitute the desired waterproofing material.

In waterproofing leather board, for example, which leather board must be dried, compressed and waterproofed, when intended for use in building heels in the manufacture of boots and shoes, it is most desirable to have a waterproofing treatment which will permeate entirely through the leather board and also be as uniform throughout the fibrous texture of the leather board as is possible. The old operation of immersing leather board in waterproofing solutions gave a coating on the surface only, did not penetrate and soak into the leather board satisfactorily nor uniformly. By my process of supplying the waterproofing material to such leather board during the drying operation in the manufacture of the board, the waterproofing solution permeates throughout the entire thickness of the material as thoroughly in thin board as well as in relatively thick board. Furthermore, an important feature of my process is that by the successive applications of waterproofing substance the waterproofing is worked into the sheet material with a great saving in solution. In the prior immersing method of waterproofing leather board, for example, from twenty-five to thirty per cent. in weight of waterproofing substance was necessary to suitably treat leather board for use in heels, whereas by my process only ten per cent. in weight of waterproofing material is necessary and rarely more than fifteen per cent. need ever be applied.

Any suitable waterproofing solution or mixture may be employed in my process, the important point being that it is applied

to the material during the final step of drying the material and preferably that it is applied in small quantities and at a plurality of successive intervals. Thus, for example, where leather board of a desired thickness is passed through a drier of one hundred feet in length, I would provide a plurality of waterproof applying stations, approximately ten, with means for spreading a thin layer or film of the waterproofing solution over the material at each of the applying stations. Such solution may be paraffin, linseed oil, or the like, or I may apply different kinds of waterproofing material at each different station, at one applying rosin, at one paraffin, at the next linseed oil, and so on, as well as repeating the order of the applications as may be necessary to give the best results.

A very important advantage of this process of gradually saturating the sheet material with successive applications of waterproofing, is that the sheet material does not change its color to any appreciable extent, whereas in the old processes of immersion, a very great change in color usually resulted and it was impossible to foretell what color would result therefrom. This difficulty was specially present in the prior manufacture of heavy leather board.

It will be understood that my process may be carried on by hand applications at successive points during the drying, but I prefer to utilize automatic means, and also to employ heat and pressure during the simultaneous operation of drying and waterproofing, which heat and pressure still further serves to force the waterproofing substances into the material to be treated, thoroughly impregnating the same uniformly. In the accompanying drawings I have illustrated one form of apparatus for carrying out my process, wherein—

Figure 1 is a fragmentary side view of a portion of a well-known type of drying apparatus wherein my invention is embodied;

Fig. 2 is a cross sectional end view of a portion of the apparatus, and

Fig. 3 is a fragmentary view of a modification.

In the manufacture of such sheet material as leather board and the like, a drying machine has lately been developed with a large number of conveying and pressure applying rolls which pass the sheet material from one end of the drier to the other during the application of heat. Such a machine may be from one hundred to three hundred feet long and means are provided to rotate adjacent pairs of rolls so as to feed a strip, slab or board of material through the entire length of the drier, such driers usually having a plurality of pairs of rolls so that a considerable number of leather board sheets are being constantly fed through the drier.

A fragmentary portion of such a drier is illustrated in Figs. 1 and 2 wherein the drier proper consists of a number of racks 1 adapted to carry and support a plurality of sets of rolls, each rack having journal bearings 2 for a fixed roll 3 and means for its cooperating adjacent roll 4 to be yieldingly supported as by a sliding bearing in a slot 5 directly thereover. These rolls are arranged in pairs on each stack and under each pair of rolls are supported a plurality of steam pipes 6. A sheet of leather board being fed into the machine at one end is engaged by any of the pairs of rolls 3 and 4 which are rotating in unison by a sprocket or gear connection with a suitable source of power, and is fed through said rolls to the next adjacent pair, supported in the adjoining racks 1, the yielding rolls 4 automatically compensating for the different thicknesses of material fed through and also applying the desired degree of pressure on the material fed therethrough. The series of racks and rolls thus constitute an entire machine which is completely enveloped in top and side coverings 7 and 8 so that the heat supplied by the steam pipes 6 will be conserved and a suitable temperature maintained throughout the drier. Such driers may be three hundred feet long and have three hundred pairs of rolls to operate on each leather board sheet going through the same. The particular machine illustrated in the drawings also having provision for treating four sheets simultaneously. In a machine of this type I would supply a plurality of waterproofing stations, preferably from twenty to thirty, arranged equidistant throughout the machine beginning at an appropriate distance from the feeding-in end of the machine so as to permit of a partial evaporation and drying of the board to be treated. Such waterproofing stations may consist in a perforated pipe 10 fitted in fixed position in place of one of the upper rolls 4 and supported by the racks 1, such pipe having a plurality of perforations 11 in its under-surface so as to permit the paraffin wax, oil or waterproofing substance contained therein to drip down upon the sheet being fed through or upon the lower roll 3. This pipe may be spaced from the lower roll to permit the greatest thickness of sheet material which will be fed through the machine to pass thereunder, the rotating gears or sprocket chains to actuate the adjacent pairs of rolls not being connected to the pipe 10, so that the perforations 11 are at all times in the lowermost portion. I prefer to extend the pipe 10 outwardly beyond and through the partition 8 and connect the outer end with a receiving tank 12 into which the waterproofing may be, from time to time, poured, so as to keep a constant supply within the pipe. If de-

sired, such tank 12 may be elevated to afford pressure or force on the waterproofing material which will press the same through the holes 11, but ordinarily this would not be necessary. For quicker waterproofing of some materials a pneumatic pressure device could be applied to the pipe 10, if desired. This arrangement permits the attendants to fill up the various receptacles 12 with the waterproofing material desired for each station and from time to time change the kind of waterproofing at any particular station if found to give better results for any particular kind of work.

The operation of the drying machine thus automatically dries and simultaneously waterproofs the sheet material being fed therethrough, such waterproofing being supplied at successive stations in suitable quantities and at appropriate points. The drying operation which is necessary in the manufacture of the sheet material, also simultaneously acts to dry and furnish the waterproofing operation, which waterproofing is furthermore accelerated by the application of heat and pressure during the successive treatments of the waterproofing thoroughly impregnating and working the waterproofing into the fibers. With the completion of the drying of the leather board it is also completely waterproofed and no extra machine, operation, or time is required. The heat of the drier will also keep the waterproofing solution, where wax, paraffin, etc., is employed, in proper condition for spreading and working into the sheet material and the constant rolling of a drier such as that shown in the drawings, greatly aids in this particular embodiment of my process. Furthermore, a great saving of waterproofing material is effected and uniformity of product is insured.

Different methods of supplying the waterproofing material during such drying will readily occur to those skilled in this art, and I have illustrated in Fig. 3 a modification. In this form the sheet material would be passed through pairs of rollers 13 and 14, a rack of steam pipes 15 running adjacent said pairs of rollers and throughout their entire width. At suitable intervals receptacles 16 to hold the waterproofing material are arranged with narrow slots or holes in a depending portion 17 adjacent the upper roll 14 to supply a thin film of the waterproofing solution on the surface of such roll, which is then, by it, transferred to the sheet material fed through and worked thereinto, as above explained.

In the illustrative embodiment of the invention above described, I have referred specifically to the process of waterproofing leather board for subsequent manufacture into boot and shoe heels, but it will be readily understood that my invention is not

so limited. In fact, I find that the combination of drying and waterproofing by successive applications of thin films or coatings of the waterproofing solution can be utilized on fabrics, on thin sheets of wood, such as veneering board, as well as upon fibrous building board, and the like. In the latter instances the drying and waterproofing operations may be performed separately from the manufacturing process.

In the accompanying claims, therefore, I use the term "drying operation" to apply both to the original drying necessary in the production of manufactured articles such as leatherboard, and also for the operation of drying in the manufacture of a waterproofed article, such as wood.

While I have described my apparatus as preferably being carried out in a machine of the type described, it will be understood that the process may be utilized without such a machine, or by other apparatus, or by hand, the important point consisting in the waterproofing of sheet material during the drying as a simultaneous operation with the drying and preferably through successive applications of relatively small quantities of the waterproofing material at each application.

My invention is further described and defined in the form of claims as follows:—

1. That process of waterproofing leather- or fiber-board which is characterized by passing the wet or moist sheet leather- or fiber-board between successive sets of pressure members; applying the waterproofing material to said sheet intermediate the successive sets of pressure members; and simultaneously drying said sheet.

2. That process of waterproofing leather- or fiber-board which is characterized by passing the wet or moist sheet leather- or fiber-board between successive sets of pressure members; applying the waterproofing material to said sheet in regulated quantities intermediate the successive sets of pressure members; and simultaneously drying said sheet.

3. That process of waterproofing leather- or fiber-board which is characterized by passing the wet or moist sheet leather- or fiber-board through a heated atmosphere to dry said sheet; and simultaneously applying waterproofing material to said sheet.

4. That process of waterproofing fiber- or leather-board, which is characterized by applying the waterproofing material to the sheets or fiber-board after they have been formed from the pulp and while they are still wet or moist; and simultaneously heating said sheets to drive out the moisture and dry the same while maintaining said sheets in a substantially flat condition.

5. That process of waterproofing leather- or fiber-board, which is characterized by

applying the waterproofing material at a plurality of points to said leather- or fiber-board while the latter is in a wet or moist condition; heating said leather- or fiber-board to dry the same while the waterproofing material is being applied thereto; and compressing and maintaining said fiber- or leather-board in a substantially flat condition until dried.

6. That process of waterproofing leather- or fiber-board which is characterized by passing the sheet leather- or fiber-board through a heated atmosphere to dry said material; and simultaneously applying the waterproofing material to said leather- or fiber-board at different successive points in the line of feed.

7. That process of waterproofing leather- or fiber-board, which is characterized by applying the waterproofing material to the moist or wet leather- or fiber-board as the latter is being fed in a substantially flat condition between successive feeding means and in the presence of heat, simultaneously to waterproof and dry said leather- or fiber-board while thus maintaining it in a substantially flat condition.

8. That process of waterproofing leather- or fiber-board, which is characterized by applying the waterproofing material to the moist or wet leather- or fiber-board as the latter is being fed in a substantially flat condition in the presence of heat, simultaneously to waterproof and dry said

leather- or fiber-board while thus maintaining it in a substantially flat condition.

9. That process of waterproofing leather- or fiber-board which is characterized by applying the waterproofing material to the wet or moist leather- or fiber-board while applying pressure and heat to the latter simultaneously from both sides, thus simultaneously to drive out the moisture from said leather- or fiber-board and impregnate the latter with the waterproofing material.

10. That process of waterproofing leather- or fiber-board, which is characterized by applying the waterproofing material to the wet or moist leather- or fiber-board, after it has been formed from the pulp into sheet-form; and drying said leather- or fiber-board while the waterproofing material is being applied thereto.

11. That process of waterproofing leather- or fiber-board, which is characterized by passing the wet or moist leather- or fiber-board in substantially flat condition through rollers, applying waterproofing material to said leather- or fiber-board and drying the same, these three steps being effected simultaneously.

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

ALBERT L. CLAPP.

Witnesses:

JAMES R. HODDER,
HAROLD J. CLARK.