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L. F. LONG ET AL
PROCESS OF CORRUGATING SHEETS
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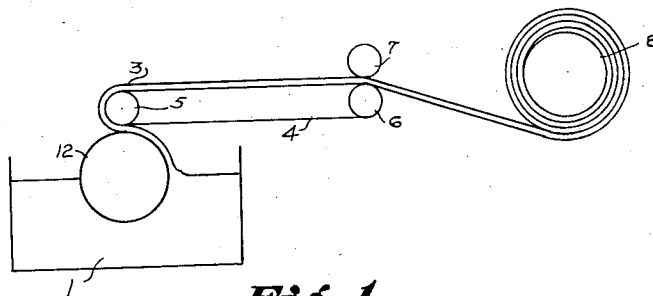


Fig. 1.

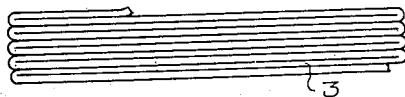


Fig. 2.

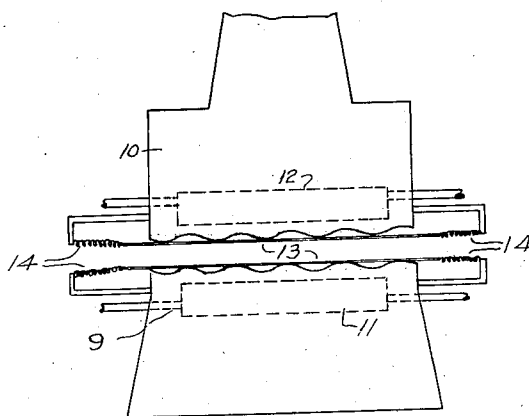


Fig. 3.

INVENTORS
Leonard F. Long
Walter A. Gorman
BY
Chas. W. Mortimer
ATTORNEY

UNITED STATES PATENT OFFICE.

LEONARD F. LONG, OF HOBOKEN, NEW JERSEY, AND WALTER A. FORMAN, OF BROOKLYN, NEW YORK, ASSIGNORS TO THE BARRETT COMPANY, A CORPORATION OF NEW JERSEY.

PROCESS OF CORRUGATING SHEETS.

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This invention relates to a method for corrugating sheets of materials which would ordinarily be cracked or injured by bending or distorting the same.

Heretofore processes have been known by which sheets of fibrous material can be made on a paper-making machine and during the process of formation of such sheets comminuted particles of waterproofing material can be embodied in said sheets by merely introducing the same into the paper-making machine along with the watery pulp of fibrous material. These sheets may be dried and may afterwards be saturated in any convenient way.

By the present invention we are able to form thicker sheets than is possible with the paper-making machine, which sheets shall be substantially homogeneous, and at the same time we are able to corrugate these thick sheets without injuring the same. During the process of corrugation the sheets are also rendered very homogeneous and unitary; or they may be first pressed flat for this purpose and subsequently hot pressed to corrugate the same.

In carrying out this invention a thick sheet is first formed from a plurality of convolutions or laminations of a single sheet that is formed on a paper-making machine, preferably in such a manner that the fibers along contacting surfaces of the convolutions or laminations are felted or matted to an appreciable extent so as to produce an initial integration or joining of the sheets. After the thick sheet has been made it is heated sufficiently to melt the contained waterproofing material and is corrugated while the waterproofing material is in this molten condition, the sheet being maintained in its corrugated shape until the same has been cooled, thereby causing it to "set" and assume a permanent corrugated form.

The invention will be understood from the description taken in connection with the accompanying drawings in which

Fig. 1 is somewhat diagrammatic view showing how the sheet is formed on a paper-making machine and rolled up.

Fig. 2 shows the sheet folded up.

Fig. 3 is an elevation of a press in which the sheets may be corrugated.

In the drawings, reference character 1 refers to the vat of a paper-making machine

in which is a foraminous cylinder 2, upon which a sheet 3 of fibrous material is made in the usual way and picked up by the wet blanket 4 passing over rolls 5 and 6. The sheet 3 passes between the rolls 6 and 7 where some of the water is squeezed out and is then rolled up on a mandrel 8. The comminuted bituminous material is introduced into the vat 1 along with the paper pulp and becomes incorporated in the sheet 3 as the same is formed. When a sufficient number of turns have been made on the mandrel 8 the sheet is severed and the roll is slit along a line parallel to its axis and then spread out as a flat sheet.

Instead of rolling the sheet up, as indicated in Fig. 1, the sheet may be folded back and forth, as indicated in Fig. 2, thus forming a sheet of the desired number of layers to produce the proper thickness. It is preferable to have the sheet 3, as it is being rolled or folded up as above indicated, quite wet so that the fibers on the surfaces of the same will become matted or felted to an appreciable extent during the rolling or folding operation.

The press shown in Fig. 3 consists of a base 9 and a member 10, both of which are provided with hollow portions 11 and 12 into which may be introduced heating and cooling fluids. The faces of the base 9 and member 10 are corrugated as indicated, and along the face of corrugations are disposed thin flexible plates 13 preferably of metal that are held by springs 14 as indicated.

Heretofore it has been found that when thick sheets, say about one-quarter of an inch thick, are made of fibrous material and a high percentage, say about 50% to 90%, of comminuted bituminous material and are bent, they will crack or be injured on the surface or even break through the sheet. It has been found that sheets made as indicated in Figs. 1 or 2 can be successfully corrugated by properly handling the same in such a press as is indicated in Fig. 3. For this purpose the sheet is placed between the thin metal plates 13 and after bringing the plates 13 into contact with the surfaces of the sheet the same is thoroughly heated by admitting heating fluid to the hollow portions 11 and 12 until the waterproofing material is melted. This melting of the waterproofing material decreases the stiffness or

rigidity of the sheet, and at the same time permits the felted or matted fibers to slide or move upon each other to a sufficient extent without tearing or mutilating any portion of the sheet. The plates 13, being in contact with the hot corrugations and also in contact with the surfaces of the sheet to be pressed, help to conduct the heat to said sheet and uniformly heat the same. These plates 13 also remain in close contact with the surfaces of the sheet to be pressed and slide over the corrugated surfaces so that the sheet of fibrous and comminuted material is thereby bodily carried into the corrugations of the plates without being torn or stretched.

Preferably the water is dried from the sheet before it is inserted in the press, and the sheet may be heated to melt the bituminous material before it is introduced into the press, or the sheet may be partially heated and the heating operation completed after being introduced in the press, or the heating operation may take place entirely in the press. When the sheet has been pressed so as to form the corrugations, the pressure is maintained while the heating fluid is turned off and cooling fluid is introduced to cool the press and sheet, thus permitting the waterproofing material to solidify and insuring the maintenance of the corrugated form when the pressure is removed. The amount of pressure may vary from 100 pounds to 300 pounds per square inch more or less and the densification of the pressed sheet may be approximately 50%, and the specific gravity of the pressed corrugated sheet may be made to be about the same as that of the bituminous material itself.

The process may also be carried out by forming the thick sheet from a plurality of convolutions or laminations, as above described, and then hot pressing to melt the waterproofing material and form a flat sheet which may be subsequently subjected to a hot pressing operation in a press having corrugated faces so as to corrugate the same as above described.

For certain purposes we have found that the bituminous material to be used may, for example, be pitch of a melting point of about 250° F., and the amount of pitch may be by weight about 50% to 90% of the water-free content of the final product.

I claim:

1. The herein described process, which comprises forming on a paper-making machine a sheet containing fibrous material and pitch, pre-heating said sheet sufficiently to melt said pitch, and pressing said sheet between corrugated plates without materially tearing the fibers of the sheet.

2. The herein described process, which comprises forming on a paper-making machine a sheet containing fibrous material

and solid waterproofing material, pre-heating said sheet sufficiently to melt said waterproofing material, pressing said sheet in opposite directions from its normal plane between corrugated plates without materially tearing the fibers of the sheet, and cooling said sheet while maintaining said pressure.

3. The herein described process, which comprises forming on a paper-making machine a sheet containing fibrous material and pitch, pre-heating said sheet sufficiently to melt said pitch, pressing said sheet in opposite directions from its normal plane between corrugated plates without materially tearing the fibers of the sheet, and cooling said sheet while maintaining said pressure.

4. The herein described process, which comprises forming on a paper-making machine a sheet containing fibrous material and solid waterproofing material, pre-heating said sheet sufficiently to melt said waterproofing material, and corrugating said sheet by application of pressure substantially perpendicular to its surface along lines upon its opposite sides staggered with respect to each other without materially tearing the fibers of the sheet.

5. The herein described process, which comprises forming on a paper-making machine a sheet containing fibrous material and solid waterproofing material, pre-heating said sheet sufficiently to melt said waterproofing material, corrugating said sheet by application of pressure substantially perpendicular to its surface along lines upon its opposite sides staggered with respect to each other without materially tearing the fibers of the sheet and cooling said sheet while maintaining said corrugating pressure.

6. The herein described process, which comprises forming a sheet containing fibrous material and solid waterproofing material, pre-heating said sheet sufficiently to melt said waterproofing material, and pressing said sheet between corrugated plates that have thin flexible plates disposed along the faces of said corrugations conformable to said corrugations when under pressure.

7. The herein described process, which comprises forming on a paper-making machine a sheet containing fibrous material and solid waterproofing material, pre-heating said sheet sufficiently to melt said waterproofing material, flat pressing said sheet and subsequently hot pressing said sheet between corrugated plates without materially tearing the fibers of the sheet.

In testimony whereof we affix our signatures.

LEONARD F. LONG.
WALTER A. FORMAN.