Oct. 18, 1932. E. H. ANGIER 1,882,715

WATERPROOF SHEET MATERIAL AND ITS PRODUCTION

Filed Nov. 29, 1930

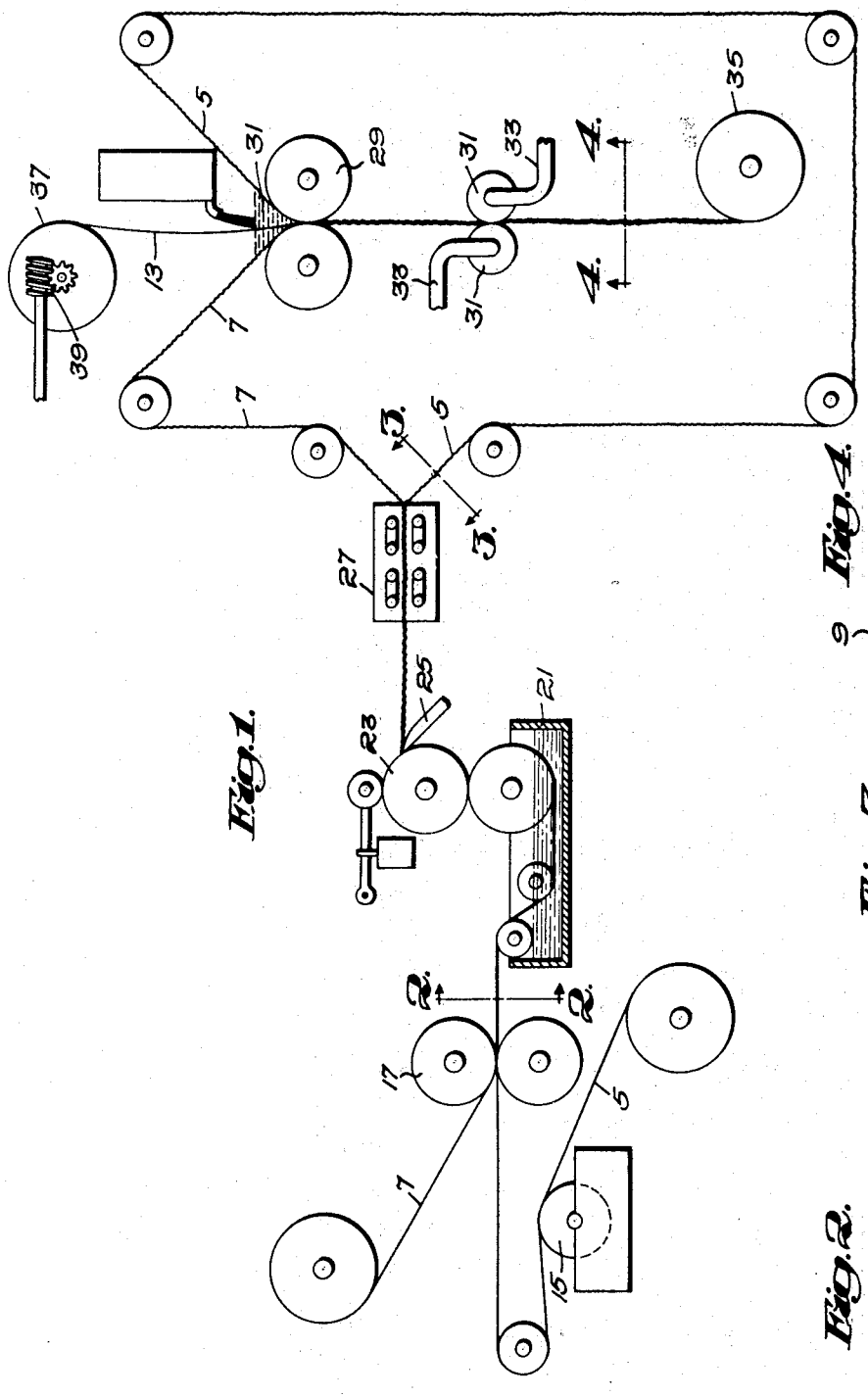


Fig. 1.

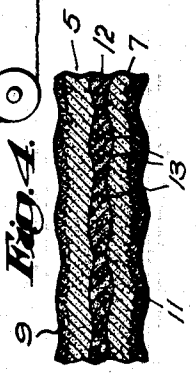


Fig. 4.



Fig. 3.

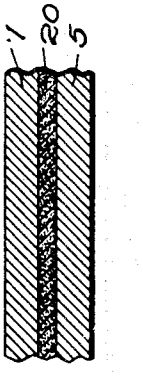


Fig. 2.

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UNITED STATES PATENT OFFICE

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WATERPROOF SHEET MATERIAL AND ITS PRODUCTION

Application filed November 29, 1930. Serial No. 499,065.

This invention relates to the production of waterproof sheet material. A cardinal object of the invention is to provide a strong-bodied paper, adaptable, for example, for use as a building paper, which will retain its efficiency under varied conditions of use. The article herein disclosed is made the subject of my divisional application Serial No. 583,620, filed Dec. 29, 1931.

My invention will be well understood by reference to the following description of an illustrative embodiment thereof taken in connection with the accompanying drawing, wherein:—

Fig. 1 is a diagrammatic view of a process for producing a paper such as referred to; and

Figs. 2, 3 and 4 are broken, fragmentary, diagrammatic sections through the product at various stages of the process, as indicated by the section lines 2—2, 3—3 and 4—4 of Fig. 1 respectively.

In the preferred form of the invention illustrated in the accompanying drawing I provide (see Fig. 4) an expansible paper consisting of two craped sheets 5 and 7, each of which is impregnated with water-resisting material which may be black asphalt or similar bituminous materials or mixtures forming at the outer face of each sheet an adsorbed, substantially continuous film 9 and 11 respectively, the surface of the paper, however, not being tacky or sticky to the touch; the two sheets 5 and 7 receiving between them a layer of water-proofing material 12, which layer may carry embedded in the body thereof strands 13, preferably reticulated into a fabric, which will serve to reinforce the assembly as a whole and also to position the intervening layer 11, as will appear as the description proceeds.

The construction of the paper will be more fully understood from a description of Fig. 1 wherein I have illustrated diagrammatically and as if a continuous process a method of production. It will be understood that the process need not be thus continuous and that various features illustrated may or may not be used in all cases. For instance, I have herein disclosed the sheets 5 and 7 in the completed product as being rendered expansible by craping but for certain purposes the product may be made with plain inexpansible paper.

Referring now to Fig. 1 of the drawing, two webs 5 and 7 of sheet material, which conveniently may be a strong-bodied paper of the kraft type, are led from supply rolls, one, such as 5, over a coating roll 15 which supplies a regulated amount of water-proofing material of an adhesive character such as asphalt or other bituminous material to a face thereof and the two of them are pressed together by squeeze rolls 17 with the asphalt layer 20 between them, as illustrated in Fig. 2. This duplex assembly is in condition to be prepared for craping by being wetted in the water tank 21 and led over and pressed against the craping roll 23 to be crowded back on itself and craped by the doctor blade 25 in well known manner. The duplex craped assembly may be then led through a heating chamber 27 which may fuse the intervening film 20 causing it to be absorbed in the adjacent faces of the webs 5 and 7, and the two craped webs may then be separated, as indicated in Fig. 1 at the right of the chamber 27. In Fig. 3 is shown diagrammatically one of the two resulting sheets. The face of this web 5 which formerly opposed the web 7 has absorbed into it a portion of the material 20, as indicated by the stippling 9, and the other web 7 has similarly absorbed into it a quantity of the coating material, as indicated by the stippling 11. I prefer so to control the amount of material 20 and the heating that the absorbed material only partly penetrates the webs as indicated in Fig. 3, and, while none of it remains to form a tacky surface on what in the finished product will be an exterior face, the material at 9 and 11 only superficially enters the body of the web and forms substantially a continuous film resisting penetration of moisture.

The uncoated faces of the webs 5 and 7 are then united with an intervening layer 12 of asphalt or the like between them, and I have herein shown them as led down through the bite of a pair of rolls 29 between which rolls

is maintained a pool 31 of fluid asphalt. From these rolls the two webs thus united and duplexed may be led through a pair of rolls 31 which are heated as indicated diagrammatically by the showing of the steam pipes 33, and the assembly thus heated sufficiently to draw part of the intervening layer 12 into the body of the paper not previously impregnated with the material supplied from the layer 20 and now appearing in the form of the films 9 and 11. The amount of asphalt supplied is so generous and the heating is so carried on that the intervening layer 12 is not completely absorbed into the two sheets as is the layer 20 but remains as a substantial continuous layer between the two webs, as indicated in Fig. 4.

In Fig. 1 I have also illustrated diagrammatically an improved method of combining strand material 13 with a multi-ply paper. This strand material 13, which may take the form of a loosely woven fabric such as burlap of about $\frac{3}{16}$" or $\frac{1}{4}$" mesh, may be fed from a supply roll 37 through the pool 31 of impregnating material in such manner that the sheet of strands is impregnated and also picks up and carries with it a substantial layer of the molten material before contacting with the webs. The reinforcing material 13 is preferably supplied slackly, as indicated diagrammatically in the figure by the showing of a drive 39 for roll 37.

When a reinforcement of strands is incorporated in a paper structure in the manner described, it is not merely pasted between the two webs or to their faces but, as illustrated in Fig. 4, is embedded in the layer 12 of waterproofing material. An important function of such a material under these circumstances is to position such a layer between the two webs 5 and 7 to resist displacement or flow thereof in such manner as might leave thin or bare spots between the two webs.

The improved product shown is applicable to various uses. Among them may be mentioned, in the case where the webs 5 and 7 are paper material of strong body, use as a building paper to be embodied in a building structure, as described in my application Serial No. 499,064, filed Nov. 29, 1930. In this case the webs 5 and 7 are preferably craped as shown so that the material may expand under the strains which the building undergoes after erection. The substantial layer of material 12 interposed between the webs serves to seal about the nails or similar fastenings by which the paper is secured in position in the structure.

The method of reinforcement herein disclosed is made the subject matter of my divisional application Serial No. 583,621, filed Dec. 29, 1931.

I am aware that the invention may be embodied in other specific forms without departing from the spirit or essential attributes thereof, and I therefore desire the present embodiment to be considered in all respects as illustrative and not restrictive; reference being had to the appended claims rather than to the foregoing description to indicate the scope of the invention.

I claim:

1. A method of preparing water-resisting paper which comprises assembling two sheets with a regulated layer of fusible waterproofing material between, heating the assembly to absorb the waterproofing material into the sheets to leave a substantially non-tacky surface, such absorbing material only partly penetrating the sheets, separating the sheets and reassembling the same with the faces formerly outermost opposed and joining them with water-resisting material penetrating substantially the rest of the sheets and forming an intervening film.

2. A method of preparing water-resisting paper which comprises assembling two sheets with a regulated layer of water-resisting material between the same, heating the assembly to absorb the material superficially into said sheets to provide a substantially continuous film while leaving a non-tacky surface, separating the sheets, reassembling the same with the surfaces formerly outermost opposed and joining them by an intervening film of adhesive water-resisting material.

In testimony whereof, I have signed my name to this specification.

EDWARD H. ANGIER.