

W. M. WHEILDON.
 REINFORCED PAPER AND METHOD OF MAKING THE SAME.
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1,269,140.

Patented June 11, 1918.

Fig. 1.

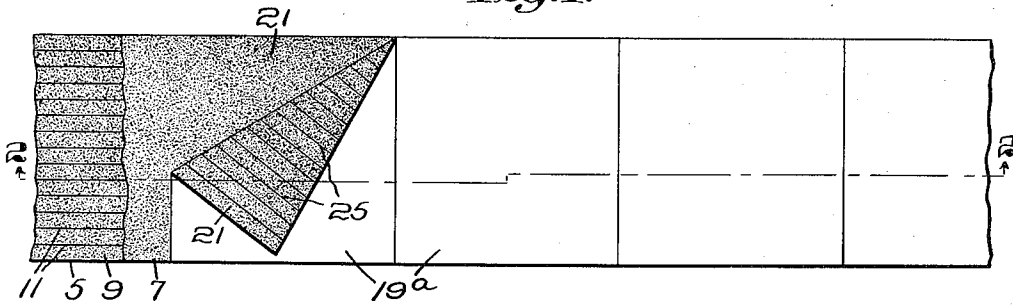


Fig. 2.



Fig. 3.

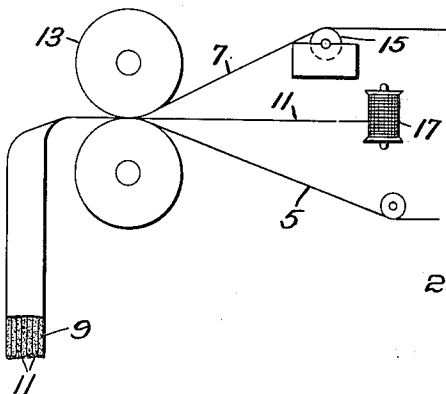
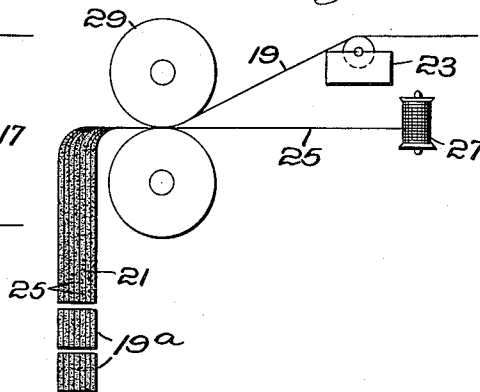


Fig. 4.



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REINFORCED PAPER AND METHOD OF MAKING THE SAME.

1,269,140.

Specification of Letters Patent. Patented June 11, 1918.

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To all whom it may concern:

Be it known that I, WILLIAM M. WHEILDON, a citizen of the United States, and a resident of Ashland, in the county of Middlesex and Commonwealth of Massachusetts, have invented an Improvement in Reinforced Paper and Methods of Making the Same, of which the following description, in connection with the accompanying drawings, is a specification, like characters on the drawings representing like parts.

This invention relates to reinforced paper and to a method of manufacturing the same, and the object is to provide a laminated structure comprising sheets of paper reinforced in two directions by threads or similar strands, the threads preferably extending at right angles to each other.

My invention will best be understood by reference to the following description taken in connection with the accompanying drawing wherein:

Figure 1 is a plan view of a paper web constructed in accordance with my invention with various of the laminations broken away or separated to reveal the construction;

Fig. 2 is a section on the line 2—2 of Fig. 1; and

Figs. 3 and 4 are diagrammatic views explaining steps in the manufacture of the material shown in Fig. 1.

For the sake of brevity I shall first describe a preferred method of manufacturing my improved laminated material, as the construction of the material itself will be reading understood from the description of the process of manufacture.

In Fig. 3 I have diagrammatically illustrated the production of a reinforced web of paper comprising two webs or strips 5 and 7 which are secured together in face-to-face contact by means of an adhesive 9, preferably of a waterproof character, and which have interposed between them and secured in position by the adhesive longitudinal reinforcing threads 11. Such material is conveniently made as illustrated by passing the two webs 5 and 7 between rolls 13, one of the webs being coated with suitable adhesive, for example bitumen, by means of a coating device illustrated diagrammatically at 15. The threads 11 are drawn from reels or spools 17, inserted between the webs 5 and 7 and are drawn out

and secured in position as the webs pass through the rolls 13. In Fig. 4 I have shown a similar web of paper 19 which is coated on one face with adhesive 21 which may be applied by device 23. Longitudinal threads 25 led from suitable spools 27 are applied in spaced relation to that face of the web which has the adhesive applied thereto and are pressed into engagement therewith by means of the rolls 29.

By the means illustrated diagrammatically in Figs. 3 and 4 longitudinal reinforcements may be added to a web of paper with ease and rapidity. In order to produce a sheet which is reinforced both longitudinally and transversely, I may divide one of these longitudinally reinforced webs, such as the web 19, into sections 19^a (Fig. 4) each of the same length as the breadth of the web. As seen in Figs. 1 and 2, the sections 19^a may then be placed with the face which is coated with the adhesive 21 downward in contact with the web 7 and with the threads 25 extending transversely of the length of the web 7 and at right angles to the threads 11. Sections 19^a are placed edge to edge and form a sectional web combined with the true or continuous webs 5 and 7.

By this means a laminated structure is provided comprising in the present instance three thicknesses of paper united by waterproof adhesive layers 19 and 21, in which layers are incorporated reinforcing threads 11 and 25 the directions of which cross in successive layers. Furthermore, since paper which is ordinarily produced in long webs has a marked grain, the grain of the sectional web formed of the sections 19^a is transverse to the grain of the webs 5 and 7 and the entire structure is thus reinforced apart from the threads.

A structure comprising, as described, three or more layers with the sets of threads which cross incorporated in independent layers of adhesive possesses particular advantages over reinforced paper which has hitherto been described and which embodied two sheets of paper having crossed threads interposed. The crossing of the thread is undesirable since it interferes to a degree with the stability of the completed structure. More important is the fact that the laminated structure comprising three layers possesses considerably more strength for a given weight or thickness and can be pro-

duced at a considerably less cost. Three comparatively thin layers of paper are cheaper than two webs of the same combined thickness and the laminated structure built up by combining them is more flexible and of greater strength. Furthermore, in the present structure the tensile strength of two undivided webs 5 and 7 is combined with the transverse reinforcement provided by the crossed grain of the web formed by the sections 19^a.

It has hitherto been proposed to provide paper reinforced with both longitudinal and transverse threads and many machines have been devised for introducing these threads. As far as I am aware, however, none of these machines have come into practical use as they are of complicated structure, usually involve a large waste of reinforcing material, and, when the attempt was made to utilize independent threads, it was found impracticable to apply them in a proper state of tension across the web so that they would afford any true reinforcement thereto. It is very easy, however, to insert longitudinal threads as illustrated in the diagrams in Figs. 3 and 4 of the present application and by the method described as seen in Fig. 1, independent transverse reinforcing threads 25 are provided for the completed laminated structure which involve no waste due to selvage and which are stretched tightly across the sections 19^a and provide a true reinforcement to the laminated web against transverse disrupting strains.

While in the accompanying drawings I have illustrated in Figs. 1 and 2 the completed product as a continuous web, it of course may be divided into smaller sheets, as may be required.

Having thus described a preferred embodiment of my invention, what I claim as new and desire to secure by Letters Patent is:

1. A method of constructing laminated sheet material comprising the following steps:—providing webs having on a face thereof a layer of adhesive having incorporated therewith reinforcing strands extending longitudinally of the web and assembling sections of one web transversely with the other web and with a lamination of material similar to the web interposed between said layers.

2. The method of constructing laminated

sheet material comprising the following steps:—superposing a pair of webs with an interposed adhesive layer having longitudinal reinforcing strands incorporated therewith and applying transversely thereto sections of a web having an adhesive facing in which reinforcing strands are longitudinally stretched whereby to provide a structure of alternating thicknesses of fabric material and adhesive reinforced with independent sets of strands in the several layers of adhesive, the direction of the strands in successive sets crossing.

3. The method of constructing laminated sheet material comprising the following steps:—coating a web with adhesive and incorporating in said adhesive reinforcing strands stretched longitudinally of the web, dividing said web transversely into sections and securing them in traversing relation on another web by means of said adhesive.

4. As a new article of manufacture, a laminated structure comprising in serial order as named:—a paper web, a thickness of adhesive, a thickness of paper, a thickness of water repellent adhesive and a paper layer comprising sections joined end to end, reinforcing strands in said layers of adhesive and extending longitudinally of the web in one layer and stretched transversely across the same in the other layer, the grain of the paper forming the first and last laminations mentioned being crossed.

5. As a new article of manufacture, a laminated structure comprising in alternation three or more paper thicknesses, interposed layers of adhesive and reinforcing strands in said adhesive layers extended in one layer transversely to those in an adjacent layer, certain of the thicknesses of paper having the grain thereof relatively crossed.

6. As a new article of manufacture, a laminated structure comprising a true or continuous web of paper and a web composed of sections set end to end secured thereto by an interposed layer of adhesive, independent reinforcing threads embedded in said adhesive and stretched transversely across said webs from edge to edge, the grain of the paper in the continuous and sectional webs being crossed.

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

WILLIAM M. WHEILDON.