

A. WENDLER.
REINFORCED PAPER.
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1,197,315.

Patented Sept. 5, 1916.

Fig. 1.

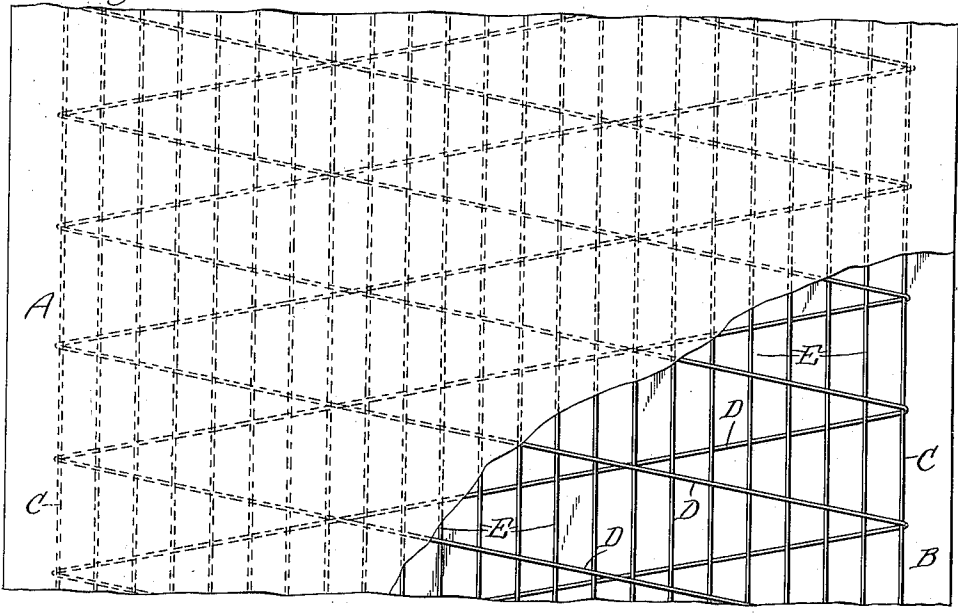
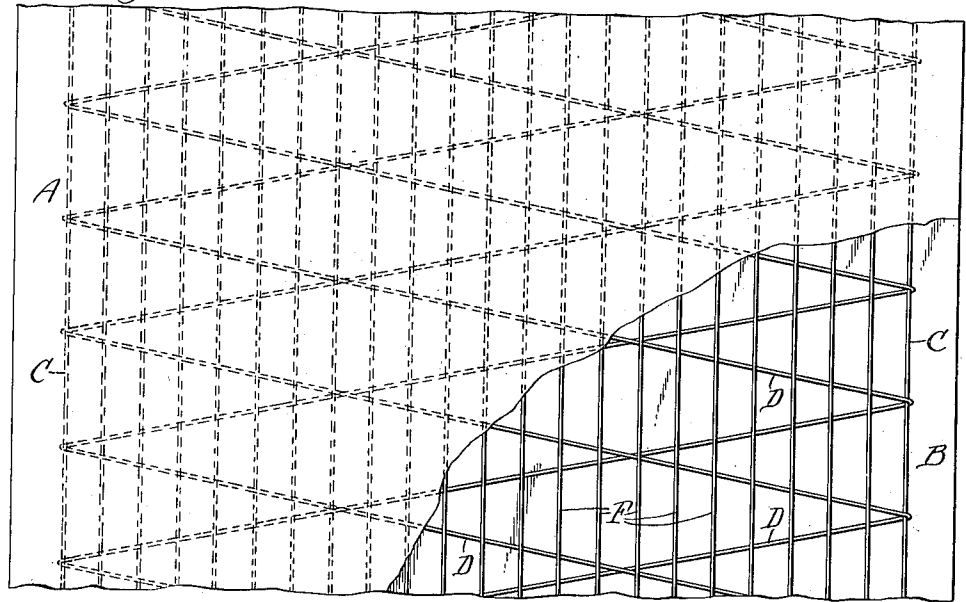


Fig. 2.



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REINFORCED PAPER.

1,197,315.

Specification of Letters Patent.

Patented Sept. 5, 1916.

Original application filed July 20, 1909, Serial No. 508,615. Divided and this application filed November 30, 1915. Serial No. 64,237.

To all whom it may concern:

Be it known that I, ALEXANDER WENDLER, a subject of the Emperor of Germany, residing at Berlin-Charlottenburg, Germany, have invented a new and useful Improvement in Reinforced Paper, of which the following is a specification.

This invention relates to reinforced paper of the kind consisting of two sheets or plies secured together by suitable means and having a reinforcement secured between the sheets or plies, and is a division of my pending application No. 508,615, filed July 20, 1909.

The objects of the invention are to provide a paper of this kind which is reinforced by means of threads or strands extending longitudinally and transversely of the paper to reinforce the same against strains acting either substantially lengthwise of the paper or substantially at right angles to the length thereof, and in which the strands are so arranged that the longitudinal strands will support the transverse strands.

In the accompanying drawings: Figure 1 is a face view of the paper embodying the invention, having a portion of the upper ply or layer of paper broken away to show the reinforcement. Fig. 2 is a similar view of paper having a slightly modified form of reinforcement.

A and B represent two sheets or plies of paper, paper-board, or the like, between which the reinforcement is held. These two sheets or plies may be secured together in any suitable manner, for example, by means of an adhesive or glue which also serves to hold the reinforcement in place between the two plies of paper.

The reinforcement includes two continuous longitudinal edge strands C C which are arranged adjacent to the side edges of the paper, and one or more continuous transverse strands D, three being shown in the embodiment of the invention shown in the drawings, which are wound around the edge strands C C from side to side of the paper. These strands are arranged as nearly cross-wise of the paper or at right angles to the longitudinal strands as is practical, so that the lateral strains to which the paper is subjected will be resisted thereby. The longitudinal and lateral reinforcing strands may be made of any suitable flexible material, such as cord, twine, or the like.

The paper is strengthened longitudinally thereof by means of a plurality of intermediate, continuous longitudinal strands E E arranged at intervals between the longitudinal edge strands. These intermediate strands may be so arranged that the transverse strands pass under and over the same in the same manner as they pass around the edge strands, see Fig. 1, or they may be placed beneath or above the transverse strands, as in the case of the longitudinal strands F F, shown in Fig. 2. The longitudinal strands are stretched during the operation of placing the same in the paper and the transverse strands are wound around the edge strands as tightly as possible, so that the transverse strands are supported and held in place by the longitudinal edge strands and so that the transverse strands extend as nearly as possible in straight lines.

In the manufacture of the paper, two plies of paper are passed continuously over rolls and glue or other adhesive is applied to one or both sheets. The two sheets then pass on to pressure rolls or analogous devices which press the two sheets together. The reinforcement is passed between the sheets and is held in place between the two sheets by the adhesive. The reinforcement is made by passing the longitudinal edge strands into the pressure rolls or analogous devices and winding the transverse strands around the edge strands by means of bobbins or spools passing from one edge strand to the other and around the same, the transverse strands being supported by the edge strands. The intermediate longitudinal strands may be passed between the pressure rolls either between the transverse strands, as shown in Fig. 1, or beneath or above the same to produce the paper shown in Fig. 2.

Paper of the kind described has the advantage that it is reinforced in the direction in which it is usually subjected to strains, namely in the longitudinal and transverse directions. The reinforcement is not expensive to make and has the advantage that the strands support each other without making it necessary to knot or interweave the same. This paper has the further advantage that it can be economically used in cases where the strains are in cross-wise and lengthwise directions, for example in paper bags, where the strains are lengthwise and circumferentially of the bag, and

where large sheets of the paper are required, as in awnings, since the reinforcing strands extend lengthwise and nearly crosswise of the paper, and the paper can be cut without
 5 waste into large sheets having reinforcing strands extending lengthwise and substantially crosswise of the sheets. On the other hand, in the case of paper reinforced by means of diagonal strands instead of nearly
 10 crosswise and longitudinal strands, the paper must be cut diagonally in order to have the reinforcing strands extending in longitudinal and crosswise directions, thus involving much waste in cutting and making
 15 it impracticable to obtain large sheets for such purposes.

I claim as my invention:

1. Reinforced paper provided with an incorporated non-reticular, non-interwoven
 20 reinforcement comprising longitudinal strands near the side edges of the paper, a continuous strand which passes around and connects said longitudinal strands and forms a plurality of transverse strengthening
 25 elements in the paper, and intermediate longitudinal strands arranged at intervals between said edge strands and strengthening the paper lengthwise thereof, the transverse strands extending in directions nearly
 30 crosswise of the paper, and said longitudinal and transverse strands being retained in fixed position by the paper.

2. Reinforced paper comprising two sheets of paper secured together by an adhesive and having a non-reticular, non-interwoven reinforcement secured between the
 35 two sheets, said reinforcement comprising

longitudinal edge strands stretched adjacent to the side edges of the paper, a continuous strand passing around said edge
 40 strands and forming a plurality of transverse strengthening elements extending from side to side of the paper nearly crosswise thereof, and intermediate longitudinal
 45 strands arranged at intervals between said edge strands and strengthening the paper lengthwise thereof, the transverse and longitudinal strands being retained in fixed position relatively to each other and the
 50 paper by the connected sheets of paper.

3. Reinforced paper provided with an incorporated non-reticular, non-interwoven reinforcement comprising longitudinal edge
 55 strands near the side edges of the paper, a strand which passes continuously from side to side of said reinforcement and forming transverse strengthening elements in the
 60 paper, and intermediate longitudinal strands arranged at intervals between said longitudinal edge strands and strengthening the paper lengthwise thereof, said transverse strand passing around both the longitudinal
 65 edge and intermediate strands and extending nearly crosswise of the paper, and the longitudinal and transverse strands crossing each other nearly at right angles and being retained in fixed position by the paper.

Witness my hand, this 25th day of October, 1915.

ALEXANDER WENDLER.

Witnesses:

HENRY HASPER,
 ARTHUR SCHROEDER.