A. WENDLER.

MANUFACTURE OF REINFORCED PAPER, PASTEBOARD, AND THE LIKE.

APPLICATION FILED JULY 20, 1909.

1,169,895.

Patented Feb. 1, 1916.

2 SHEETS—SHEET 1.

Fig. 1.

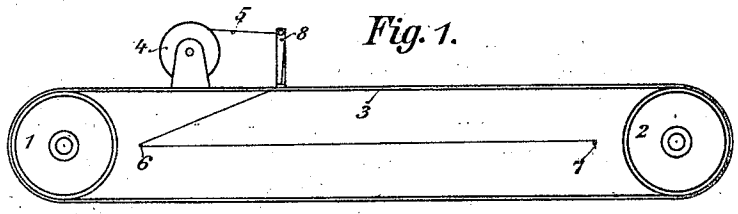


Fig. 2.

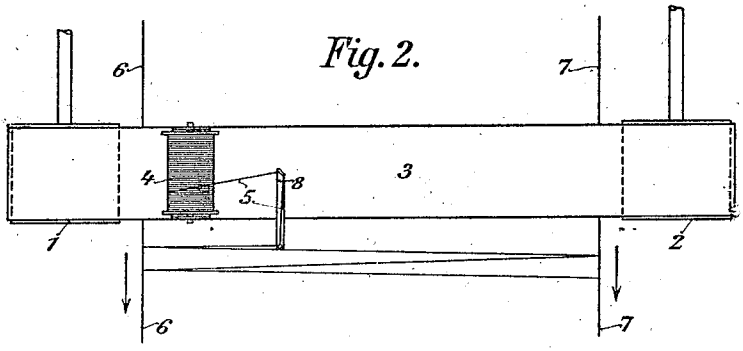


Fig. 5.

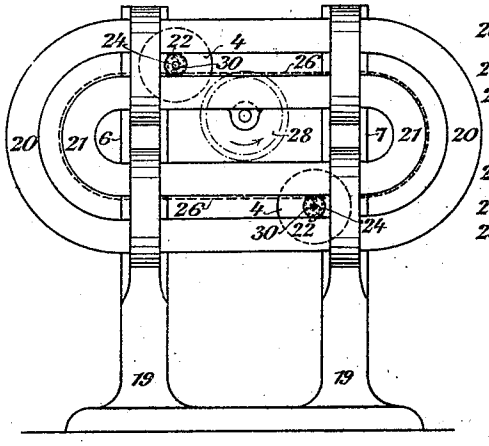
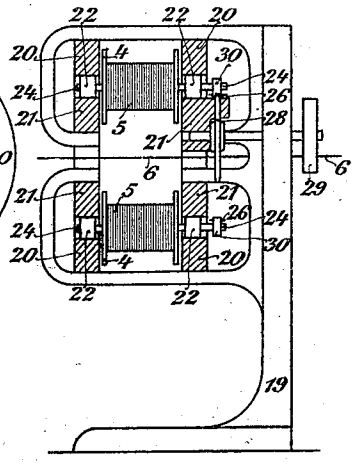


Fig. 6.



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2 SHEETS—SHEET 2.

Fig. 3.

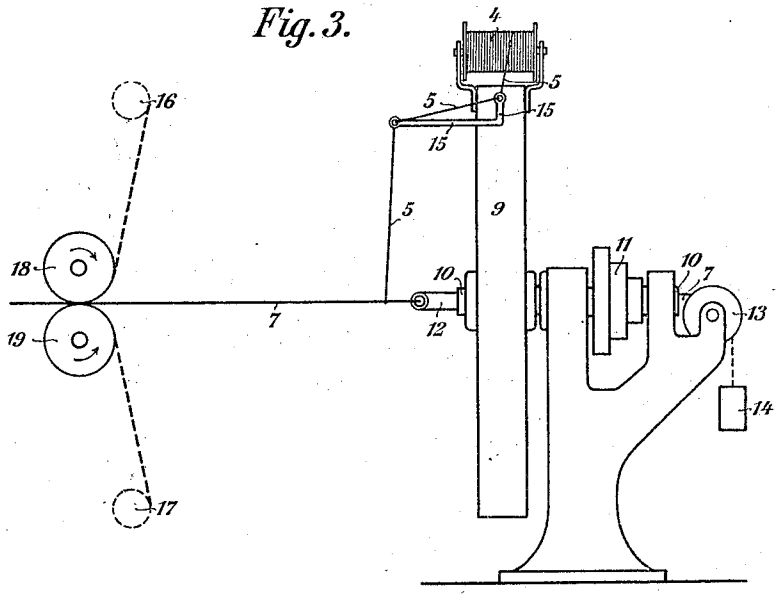
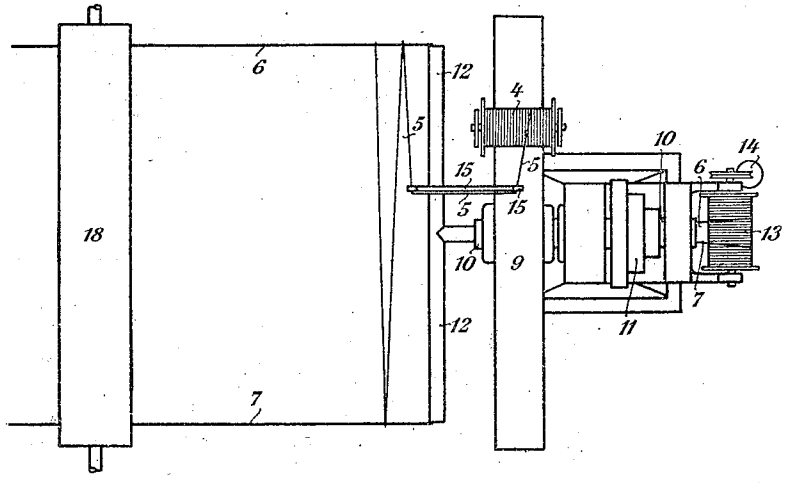


Fig. 4.



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UNITED STATES PATENT OFFICE.

ALEXANDER WENDLER, OF CHARLOTTENBURG, GERMANY.

MANUFACTURE OF REINFORCED PAPER, PASTEBOARD, AND THE LIKE.

1,169,895. Specification of Letters Patent. Patented Feb. 1, 1916.

Application filed July 20, 1909. Serial No. 508,615.

To all whom it may concern:

Be it known that I, ALEXANDER WENDLER, a subject of the German Emperor, and residing at Charlottenburg, near Berlin, German Empire, have invented certain new and useful Improvements in the Manufacture of Reinforced Paper, Pasteboard, and the like, of which the following is a specification.

My invention relates to the manufacture of paper, millboards and other forms of pasteboard and the like, of that class in which longitudinal wires and cross wires are incorporated in the material by a continuous operation, the wire for forming the transverse members being wound around the longitudinal members, without being interwoven therewith. In prior machinery for this purpose a large number of separate continuous cross members, each delivered from its own reel, are employed, a net work being manufactured therefrom and immediately embedded in the advancing paper pulp. Such machinery, however, is essentially complicated by the presence of so many reels, together with the requisite supporting-cylinders and the like for sustaining and guiding the network. Moreover, for certain articles, such for instance as reinforced paper sacks for cements and other heavy goods, reticulate strengthening is wholly unsuitable. For these sacks, as is well known, are so made that the strain is in the direction of the paper web and in a direction at right angles thereto, while in the network the cross members necessarily run at a pronounced inclination to the longitudinal members, so that they do not coincide with the direction of strain. The load is first taken up by the unstrengthened paper between the meshes, while the latter themselves are distorted, without the wires bearing the strain.

The purpose of my invention is the production of a material in which the transverse wires cross the longitudinal ones at substantially right angles. When such material is used in the manufacture of cement sacks and the like, it is manifest that the directions of the strain due to the load, are coincident with the directions of the longitudinal and cross wires, so that the load is borne directly by the wires, and the defects attaching to the use of netted reinforcing material are thus entirely obviated.

In carrying out my invention the reel of wire for the cross members is conducted around the two outer longitudinal wires; or around two longitudinal extensions of such wires. At the places of bend of the crossing wire around the outer longitudinal ones, the crossing wire is drawn tightly against the outer longitudinal wires; or instead of this, the crossing wire may be seized by two rollers located at a slight distance in front of the reel, which press down the places of bend.

It is obvious that the cross wires will lie the closer together, that is, the angle at which they cut the longitudinal wires will the more nearly approximate to a right angle, the more rapidly the reel travels. Where such rapid motion is impracticable, two or more reels may be employed.

I would have it understood that throughout this specification I employ the word "wire" in the broadest sense, as designating any long thin wirelike or filamentous member, and I do not therefore intend to restrict myself solely to threads of metal, but may use filaments of any suitable material whatever.

My new method of manufacture is illustrated in the accompanying drawings, in which certain forms of apparatus are shown suitable for carrying out the process.

Figure 1 is an elevation and Fig. 2 a plan of one form of apparatus in which the reel of cross wire is carried by an endless apron. Fig. 3 is an elevation and Fig. 4 a plan of a modification in which the reel of cross wire is secured to a wheel. Fig. 5 is an elevation and Fig. 6 a vertical cross section of a second modification in which two reels of cross wire are employed, traveling between tracks.

Referring more particularly to Figs. 1 and 2, 3 is an endless apron running over two pulleys or rollers 1, 2, the one of which is driven in suitable manner. Instead of an apron any other suitable member, such as a sprocket chain might be employed. To the apron 3 there is secured a reel 4 to hold the wire 5 for the crossing members. The two outside members 6, 7 of the longitudinal wires run between the two stretches of the apron 3, which thus travels around them, the wire 5 being thus delivered from the reel 4 and wound around the longitudinal wires with the aid of the guide or tension device 8. The intermediate longitudinal wires (not shown in the drawing) may pass between the stretches of the apron in the same man-

ner as the outside wires 6, 7; or they may be introduced subsequently, after the cross wires have already been laid.

The manner in which the wiring is introduced between the paper webs is well known and forms no part of the present invention.

In the modification shown in Figs. 3 and 4, the reel 4 for the coil of cross wire 5 is secured to the rim of a wheel 9, mounted on a hollow shaft 10, driven by a belt pulley 11. 12 is a tubular T-piece telescoping in the hollow shaft 10 and adapted to receive and hold apart the two outermost longitudinal wires 6, 7, which pass along the interior of the shaft 10. 13 is a reel on which the wires 6, 7 are wound and which is under the influence of the weight 14 which exerts a braking action. On rotation of the wheel 9 the wire 5 is delivered by the reel 4 with the aid of the tension device or guide 15 around the longitudinal wires 6, 7, thus forming cross wires. If desired the longitudinal wires 6, 7 might be fed like the intermediate longitudinal wires from the rollers 16, 17, the rollers 18, 19 being in this case brought sufficiently near to the wheel 9, so that they may press the cross wire down at the places where it bends around the longitudinal wires 6, 7. In such event it is naturally unnecessary for the shaft 10 to be hollow. This method might also be applied to the apparatus shown in Figs. 1 and 2.

Referring now to the modification shown in Figs. 5 and 6, the standard 19 supports the two pairs of concentric endless rails 20, 21, between which run the rollers 22 mounted at the ends of the spindles 24 of the reels 4 for the coil of cross wire 5. 26 is an endless chain which receives its motion from a sprocket wheel 28 driven by a belt pulley 29. The chain 26 is furnished with catches 30, which engage the extensions of the spindles 24, whereby the reels 4 are carried around the tracks between the two rails 20, 21, and cross wire 5 thus wound around the outer longitudinal wires 6, 7.

In place of a single sprocket wheel and chain, two such might be provided, one at each side of the spindles 24. Naturally an apron and pulleys might be employed instead of a chain and wheel.

Having thus described my invention, I declare that what I claim as new and desire to secure by Letters Patent is—

1. The herein described method of providing paper or the like with an incorporated, non-reticular, non-interwoven reinforcement of longitudinal and cross strands, consisting in stretching continuously running, parallel, longitudinal edge strands, winding a continuous strand around said edge strands to form strengthening strands which extend at nearly a right angle to the longitudinal strands, running continuous intermediate strands between said edge strands, and incorporating the reinforcement so formed in the paper.

2. The herein described method of providing paper or the like with an incorporated, non-reticular, non-interwoven reinforcement of longitudinal and cross strands, consisting in stretching parallel edge and intermediate longitudinal strands spaced at short intervals from each other, winding a continuous strand around said longitudinal strands to form strengthening strands which extend at nearly a right angle to the longitudinal strands, and incorporating the reinforcement so formed in the paper.

In testimony whereof I affix my signature in presence of two witnesses.

ALEXANDER WENDLER.

Witnesses:

HENRY HASPER,

WOLDEMAR HAUPT.