A. W. LAMB & L. E. VOSÉ.

PAPER MAKING MACHINE.

APPLICATION FILED MAY 11, 1909.

1,052,927.

Patented Feb. 11, 1913.

3 SHEETS—SHEET 1.

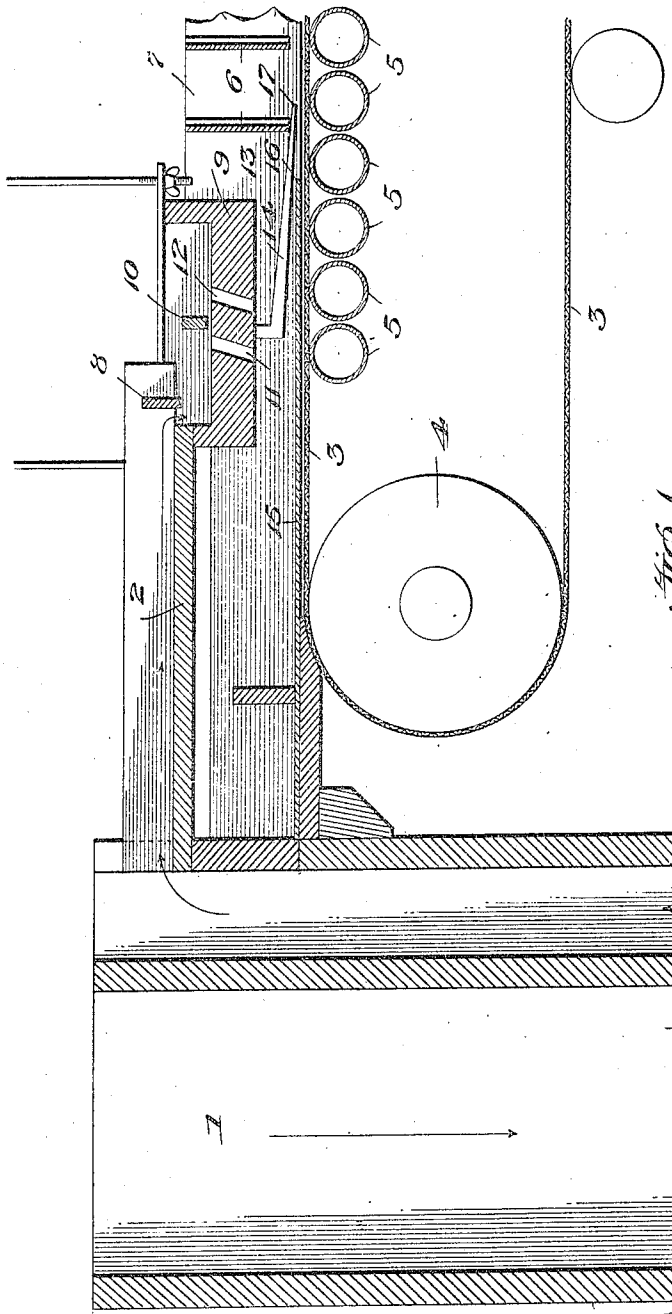

Fig. 1.

Witnesses

Inventors

Arthur W. Lamb

Louis E. Vose

By Louis C. Southard,

their Attorney

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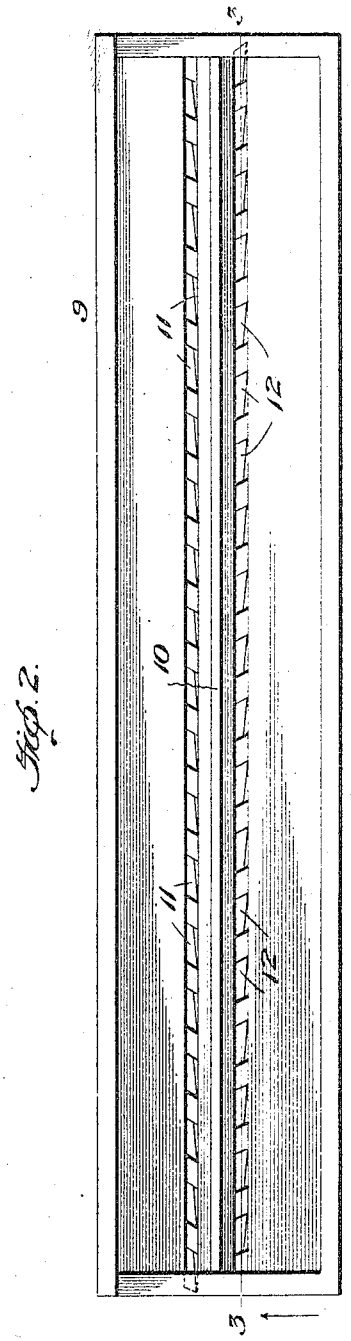

Fig. 2.

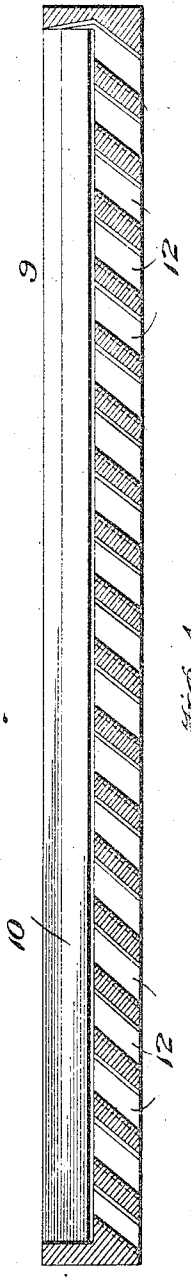

Fig. 3.

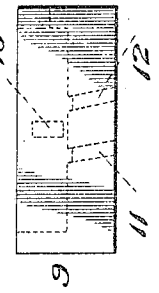

Fig. 4.

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3 SHEETS—SHEET 3.

Fig. 5.

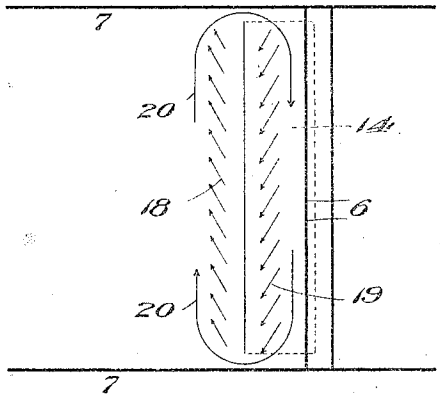
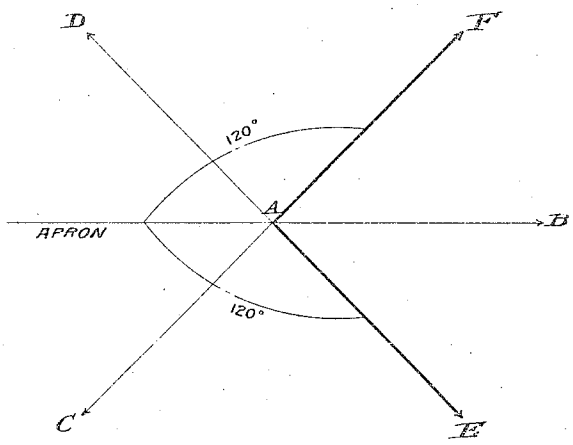


Fig. 6.



Inventors
Arthur W. Lamb
Louis E. Vose

Witnesses

By Louis C. Southard,

their Attorney

UNITED STATES PATENT OFFICE.

ARTHUR W. LAMB AND LOUIS E. VOSE, OF WALPOLE, MASSACHUSETTS, ASSIGNORS TO HOLLINGSWORTH & VOSE COMPANY, OF BOSTON, MASSACHUSETTS, A CORPORATION OF MASSACHUSETTS.

PAPER-MAKING MACHINE.

1,052,927. Specification of Letters Patent. Patented Feb. 11, 1913.

Application filed May 11, 1909. Serial No. 495,317.

To all whom it may concern:

Be it known that we, ARTHUR W. LAMB and LOUIS E. VOSE, citizens of the United States, residing at Walpole, in the county of Norfolk and State of Massachusetts, have invented certain new and useful Improvements in Paper-Making Machines, of which the following is a specification.

This invention relates to fiber crossing devices for paper making machines.

The Fourdrinier paper making machine lays the fibers lengthwise of the paper so that it more readily splits than would be the case if the fibers were crossed.

The present invention is more particularly adapted for use on machines of the Fourdrinier type and has for its object the provision of novel means for crossing the fibers to thereby obtain a paper having equal strength both lengthwise and crosswise and, if desired, with greater strength crosswise than lengthwise and to obtain a paper with a minimum amount of lateral contraction and expansion. A sheet of paper wherein the fibers are laid more nearly at right angles to the running direction of the sheet, not only has greater crosswise strength, but also a minimum amount of expansion and contraction crosswise due to any atmospheric changes.

The invention has for its object the provision of means whereby the crossing of the fibers will result, such means consisting in a novel construction and relative arrangement of devices for directing and distributing the flow and regulating the time and position of placement of the respective fibers on the wire screen apron, whereby the oppositely flowing fibers will be prevented from mixing and will be properly laid without interference.

A convenient construction for carrying out the invention consists of guide openings or conduits arranged in respective series, those of the respective series being slanted in a peculiar and novel manner, whereby the stuff passing to one series is deflected in one direction and made to flow therefrom onto the apron, and that passing to the other series is deflected to flow in a crosswise relation to the flow aforesaid, together with novel means for preventing interference of the streams of fibers so that those flowing from one set of guides or conduits will be first matted on the screen and subsequently those flowing from the other set of conduits will be laid crosswise of the fibers aforesaid, as will appear more fully from the following specification, and will be recited in the appended claims.

In the accompanying drawings:—Figure 1 is a sectional view of a portion of a Fourdrinier machine equipped with our fiber crossing device; Fig. 2, a plan view of the guide-box; Fig. 3, a section on line 3—3 of Fig. 2; Fig. 4, an end view thereof; Fig. 5, a diagrammatic view showing the respective directions of flow of the fibers and their resultants; and Fig. 6, a diagrammatic view showing how the sets of fibers are laid.

The head-box 1 contains the stuff which flows onto the apron 2, but instead of the stuff passing direct to the endless wire screen apron 3 which runs over breast-rolls 4, one of which is shown, the usual tube rolls 5, slicers 6, and deckles 7 being provided, it passes under a dam 8 direct into a guide-box 9 which is provided with a longitudinally extending dam 10 whose lower edge lies slightly above the bottom thereof. This guide-box has two sets or rows of openings 11 and 12 in its bottom, extending from end to end thereof on opposite sides of the dam 10 and constituting fiber guides. Both rows of guide-openings 11 and 12 are pitched or inclined rearwardly. While those of one row, 11, incline laterally in one direction, that is, crosswise to the direction of travel of the apron 3, the guide-openings of the other row, 12, incline laterally in the opposite direction, whereby the fibers flowing through the openings 11 are laid crosswise in one direction and those flowing from the openings 12 are laid crosswise in the other direction. These guide-openings 11 and 12 cause the fibers to be deposited in the pond 13, backed up by the slicers 6 at an angle which is substantially 120° to the running direction of the wire screen apron 3. The fibers which flow through the respective rows of openings 11 and 12 have a tendency to lie in an oblique direction relative to the wire screen apron 3, but the force due to the head in the pond which is causing the stuff to flow out over the apron 3, tends to impart to the fibers an inclination to swing into the line of travel of said screen apron 3.

Referring to Fig. 6, the line A—B represents the direction of travel of the apron 3, the line A—C, the direction of flow from the

openings 11, and the line A—D, the direction of flow from the openings 12. The resultant of the flow from the openings 11 and the travel of the apron 3 is the line A—E which represents the angle of 120°, the angle at which the fibers flowing from the guide-openings 11 lie crosswise of the apron, and, similarly, the resultant A—F represents a corresponding angle of 120° at which the fibers flowing from the opening 12 will lie crosswise of the apron 3, and this crossing of the fibers exists in the perfected paper.

In order that the oppositely flowing fibers coming from the openings 11 and 12 may not actually flux or mix until they are laid on the screen 3, an inclined metal apron 14 is provided, being secured to the under side of the guide-box 9 and extending almost the entire length thereof, but its ends are separated slightly from the deckle straps 7 leaving spaces for a rotary flow as is diagrammatically illustrated in Fig. 5. The fibers flowing from the openings 11 drop onto a stationary apron 15 and actually deposit and are partially matted on the apron 3 at the point 16 before the fibers which flow from the openings 12 and run down the apron 14 reach the apron 3 at the point 17, being there laid upon the previously matted fibers in crossed relation thereto.

In the diagram shown in Fig. 5, the small arrows 18 represent the direction in which the fibers are deposited in the pond as they issue from the openings 11, and the small arrows 19 show the direction in which the fibers issuing from the openings 12 are deposited in the pond, the resultant rotary flow being shown by the large arrows 20.

Actual tests of paper made with the use of our fiber crossing device show greatly increased crosswise strength over that of the same grade of paper made without it, and, also, paper made with a machine having our invention show greatly decreased crosswise expansion and contraction over paper made on a machine not having our improvements, as follows:

	Without the present invention.	*With the present invention.*
Test 1.	$\frac{\text{Strength crosswise}}{\text{Strength lengthwise}} = 0.462$	$\frac{\text{Strength crosswise}}{\text{Strength lengthwise}} = 0.853$
Test 2.	$\frac{\text{Strength crosswise}}{\text{Strength lengthwise}} = 0.478$	$\frac{\text{Strength crosswise}}{\text{Strength lengthwise}} = 0.873$
Test 3.	$\frac{\text{Strength crosswise}}{\text{Strength lengthwise}} = 0.54$	$\frac{\text{Strength crosswise}}{\text{Strength lengthwise}} = 0.935$

Having thus described our invention, what we claim as new and desire to secure by Letters Patent, is:—

1. In a paper making machine, the combination with a conveyer on which the paper is to be formed, of a source of supply, conducting means for receiving fibers from the source of supply and directing the same onto said conveyer at an angle thereto, conducting means for receiving other fibers from the source of supply and directing the same onto the first set at an angle to said first set and the conveyer, and means separating the two conducting means.

2. The combination in a paper making machine, of a conveyer on which the paper is to be formed, a stuff receiver, guide conduits disposed obliquely to the line of movement of the conveyer, and complementary guide conduits disposed obliquely to the line of movement of the conveyer and reversely to the first-named guide conduits.

3. In a paper making machine, the combination with a conveyer on which the paper is to be formed, of a receiver for the stuff, a plurality of guide-conduits leading from said receiver and disposed in general crosswise direction to the running direction of the conveyer which discharge the fibers angularly or crosswise of the running direction of said conveyer, a similarly arranged set of conduits adapted to discharge the fibers in a similar manner but in an opposite direction crosswise of the running direction of the conveyer, and an apron for preventing the laying of the fibers from the last-named set of conduits until the fibers from the first-named set of conduits have been laid on the conveyer.

4. In a paper making machine, the combination with a conveyer on which the paper is to be formed, of a receiver for the stuff, a plurality of guide-conduits leading from said receiver and disposed in general crosswise direction to the running direction of the conveyer which discharge the fibers angularly or crosswise of the running direction of said conveyer, a similarly arranged set of conduits adapted to discharge the fibers in a similar manner but in an opposite direction crosswise of the running direction of the conveyer, and an apron for preventing the laying of the fibers from the last-named set of conduits until the fibers from the first-named set of conduits have been laid on the conveyer, said apron having its ends arranged and constructed to permit circulation in the pond from one side to the other thereof.

5. In a paper making machine, the combi-

nation of a conveyer on which the paper is to be formed, a guide-box for the stuff, disposed above the conveyer, a dam in said guide-box and extending longitudinally thereof, a plurality of guide-conduits leading downward from said guide-box, at one side of said dam, and disposed in general cross-wise direction to the running direction of the conveyer, a similarly arranged set of conduits, at the opposite side of said dam, adapted to discharge the fibers in a similar manner but in an opposite direction of the conveyer cross-wise of the running direction of the conveyer, an apron extending downward from the guide-box, at a point between the two sets of guide-conduits, and then forward, and an apron arranged above the conveyer and below the first-named apron and extending rearward of the latter.

6. In a paper making machine, the combination of a conveyer on which the paper is to be formed, a guide-box for the stuff, disposed above the conveyer, a plurality of guide-conduits leading downward from said guide-box and disposed in general cross-wise direction to the running direction of the conveyer, a similarly arranged set of conduits adapted to discharge the fibers in a similar manner but in an opposite direction of the conveyer cross-wise of the running direction of the conveyer, and an apron extending downward from the guide-box, at a point between the two sets of guide-conduits, and then forward.

7. In a paper making machine, the combination with a conveyer on which the paper is to be formed, of means for depositing crossed sets of fibers on said conveyer, the said means being reversely arranged and obliquely to the direction of movement of the conveyer.

8. In a paper making machine, the combination with a conveyer on which the paper is to be formed, of a receiver for the stuff, and a plurality of guide-conduits extending in rows which overlap each other and leading from said receiver and disposed in general cross-wise direction to the running direction and reversely to each other and obliquely of the conveyer which discharge the fibers angularly or crosswise of the running direction of the said conveyer.

9. The herein described process of paper making consisting in first depositing fibers upon a conveyer obliquely to the line of travel thereof and subsequently depositing fibers in overlapping rows upon the said conveyer at a different angle to the travel thereof and reversely to first-deposited fibers.

10. The herein described process of paper making consisting in first depositing fibers upon a conveyer at an angle to the line of travel thereof and subsequently depositing fibers upon the said conveyer at a different angle to the travel thereof, the first deposit overlapping the second; the two deposits being reversely arranged and oblique to the line of movement of the conveyer.

In testimony whereof we affix our signatures, in presence of two witnesses.

ARTHUR W. LAMB.
LOUIS E. VOSE.

Witnesses:
LOUIS C. SOUTHARD,
MARY E. BOWDEN.