

G. S. WITHAM, SR.
 PAPER MAKING MACHINE.
 APPLICATION FILED AUG. 31, 1921.

1,434,033.

Patented Oct. 31, 1922.

3 SHEETS--SHEET 1.

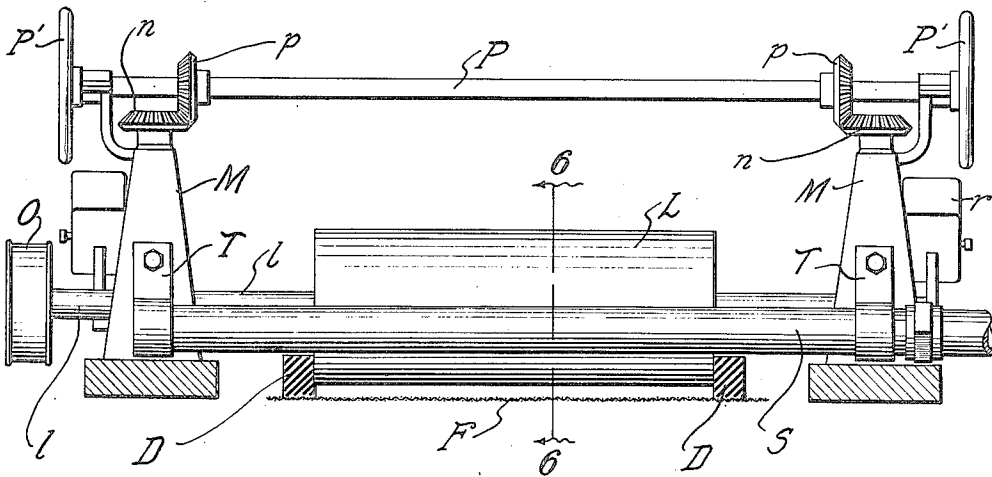
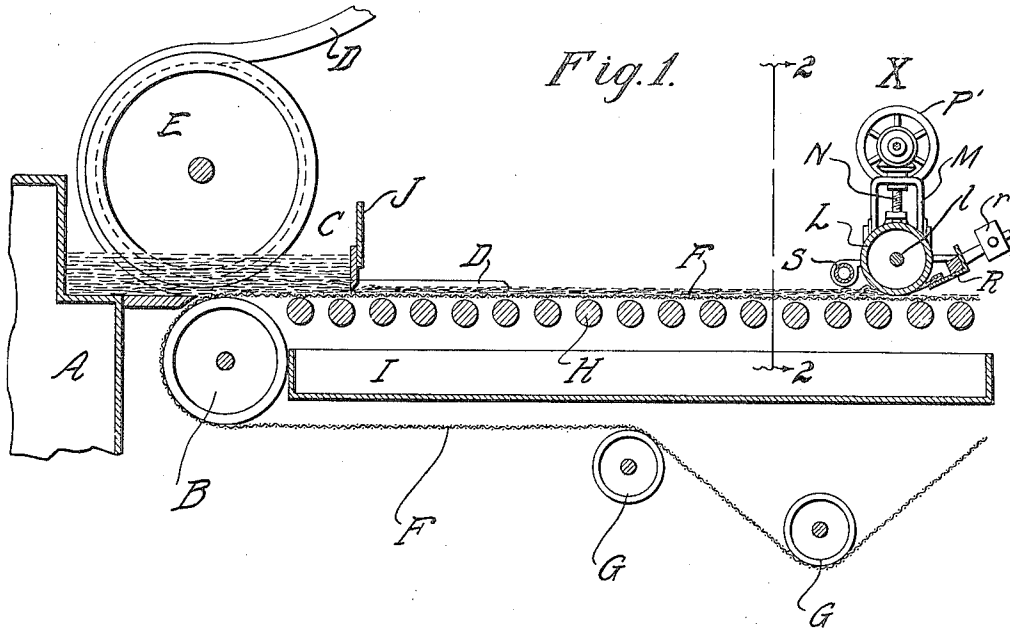


Fig. 2.

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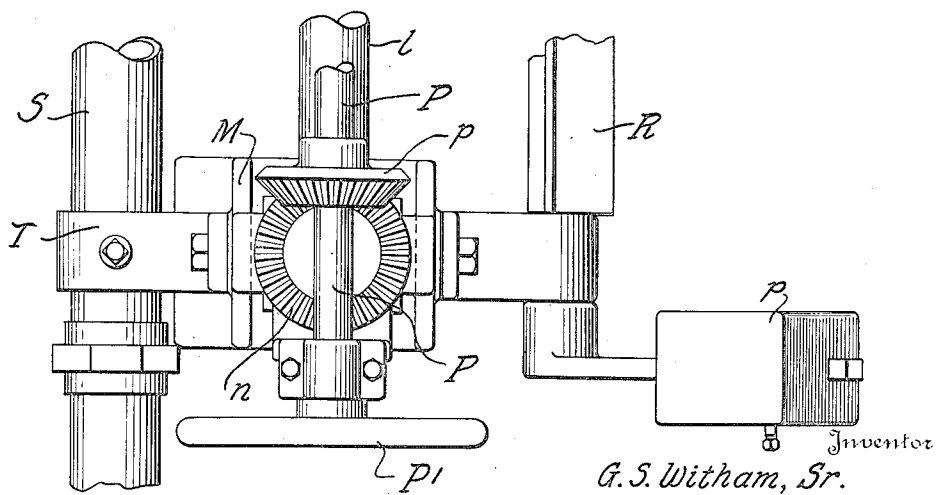
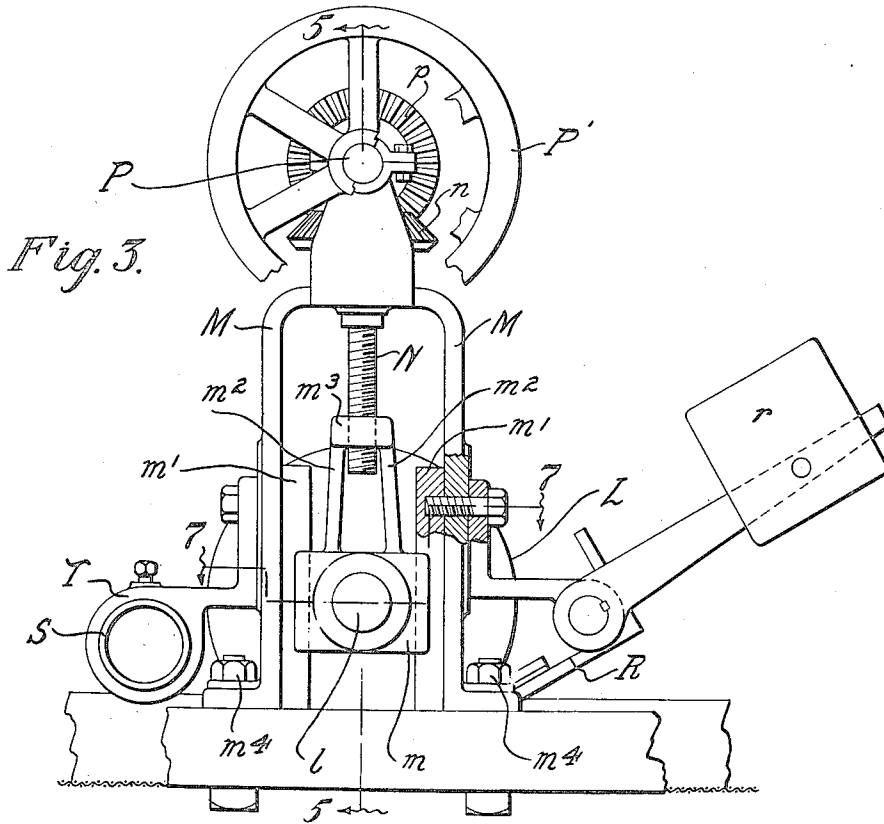


Fig. 4.

G. S. Witham, Sr.

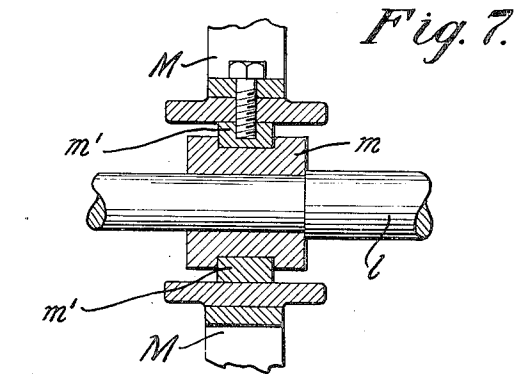
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3 SHEETS—SHEET 3.



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UNITED STATES PATENT OFFICE.

GEORGE S. WITHAM, SR., OF HUDSON FALLS, NEW YORK.

PAPER-MAKING MACHINE.

Application filed August 31, 1921. Serial No. 497,118.

To all whom it may concern:

Be it known that I, GEORGE S. WITHAM, Sr., a citizen of the United States, residing at Hudson Falls, in the county of Washington and State of New York, have invented certain new and useful Improvements in Paper-Making Machines, of which the following is a specification.

My invention relates to paper making machines in which paper pulp is delivered to a Fourdrinier wire on which the pulp is deposited and through which the water in the pulp is drained and removed by suction before the pulp web passes to other parts of the paper-making machinery.

One object of my invention is to provide improved and efficient means whereby a paper-making machine may be run at increased speed in such manner as to produce a sheet of paper as good or better than that produced when running at a lower speed. Another object of the invention is to provide mechanism whereby the quality of the paper sheet will be equally distributed in all directions by the proper filling and interweaving of the pulp fibers and whereby the presence of slugs, unbroken bundles of fibers and of such particles that cause breaks at the couch rolls and other parts of the machine may be eliminated.

In most modern paper-making machines of the class above referred to, the pulp is distributed on the Fourdrinier wire as it passes thereto from the head box by metallic slices or dams extending across the wire at the lower edge of the apron, causing a pond to be formed consisting of water and fiber. The slice is held at an elevation from one-half to one and one-half inches above the wire and the fibers mixed with water gush out from under the lower edge of the slice and onto the wire in direct proportion to the height of the liquid in the pond. The higher the pond back of the slice the more rapidly the stock gushes from under the slice, thus causing ripples to form which gradually flatten out as they approach the suction boxes of the machine, but experience has demonstrated that these ripples do not flatten out quickly enough to prevent formation of a sheet more or less granular because the fibers, which are long and thin, have a tendency to straighten out away from the grain and the ripples tend to leave their impression in the paper web as these ripples con-

tain more or less stock than the adjoining deflation of fiber and water. Devices have heretofore been used which tend to cross the fibers and have been placed at or near the slices or in the pond with the object of intermixing the fibers at these points. This method is, however, defective because the sheet is not completely formed and set at this time. As a matter of fact the fibers straighten out at various points during their passage towards the suction boxes.

According to my invention, the paper pulp or stock is delivered to the Fourdrinier wire in the usual way and preferably passes under slices or dams of the usual kind. Beyond the pond, formed in the manner before described, and between this pond and the suction boxes of the machine, I provide a revolving roll preferably of the same diameter as the carrying rolls of the Fourdrinier wire and which serves to distribute the fibers and force them forwards. The roll is mounted in suitable journal boxes which are adjustable vertically and preferably also horizontally and this roll is driven by a suitable motor such as a variable speed motor. The roll is held quite close to the wire without touching it and is driven at the same surface speed as the wire so that the fibers are compelled to pass under the roll in a compact manner, the roll being associated with a compressed air shower which is arranged immediately in front of the roll. The air shower has the effect of puddling the water and stock slightly in front of the roll so that in the pinch between the roll and the wire the fibers are forced compactly together and are crowded through a relatively narrow space.

The compressed air shower operating in conjunction with the revolving roll not only serves as an extensive source of energy by pushing the fibers onwards to coincide or nearly coincide with the increased speed of the roll, but also serves as an excellent mixer of the fibers. It serves also to break up bubbles, eliminate froth and separate colonies and lumps of fibers so that they will pass under the roll and issue beneath it in a thoroughly level and mixed state.

My improvements are shown in the accompanying drawings, in which—

Figure 1 shows diagrammatically and in section portions of a Fourdrinier paper-making machine with my improvements applied,

Figure 2 is a sectional view on the line 2—2 of Fig. 1.

Figure 3 shows an end elevation with parts in section of my improved attachment.

Figure 4 is a plan view of the mechanism shown in Fig. 3.

Figure 5 shows a section on the line 5—5 of Fig. 3.

Figure 6 shows a section on the line 6—6 of Fig. 2 and illustrates certain adjustments of the roll.

Fig. 7 shows a section on the line 7—7 of Fig. 3.

The head box of a paper-making machine is indicated at A. B indicates the breast roll, C the pond above the breast roll, D the deckle straps, and E one of their supporting rollers. The wire F is supported by rollers G and passes over a grating H above the catch-all I. A slice or dam of usual construction is indicated at J.

My improved attachment is indicated generally at X, and it will be observed that it is located above the wire a considerable distance beyond the pond C, and beyond the dam J. It is, however, located between the pond C and the suction boxes of the machine.

The roll L is preferably hollow and of approximately the same diameter as the carrying rolls G of the wire. It has a smooth, cylindrical surface and its shaft l is mounted in journal boxes m which are vertically adjustable in frames M. The journal boxes m at opposite ends of the shaft are guided vertically by rails m' in the frames which frames are bifurcated as shown, and the boxes m are provided with yokes m^2 having top-threaded portions m^3 engaged by adjustable screws N. The frames M may be bolted, as indicated at m^4 , to the machine frame. The roll L fits closely between the deckle straps, as indicated in Fig. 2, and it is driven by power applied at O. The screws N carry at their upper ends bevel gears n engaging corresponding gears p on a shaft P provided with hand wheels P'. By this mechanism the roll L may be adjusted vertically relatively to the wire to provide an opening between the wire and the roll of the desired size. The frames M may be secured any desired distance from the pond C and if necessary they may be made adjustable longitudinally of the wire towards and from the pond. Preferably a doctor R counterbalanced at r is mounted in rear of the roll L to remove therefrom any fibrous matter that may adhere to it.

Co-operating with the roll L is a shower pipe S, preferably supplied with air under pressure and having a series of perforations s . This pipe is supported in brackets T attached to the frame M and it delivers a shower or air jets on the stock immediately in front of the roll L.

The compressed air shower at the nip of the roll and wire causes a violent boiling of the stock and water resulting in a thorough intermixing of the fibers and the issuance of the same in a like condition in the pinch of the roll on the wire while the force exerted keeps the fibers in the same relative positions.

From this treatment a very uniform web or paper results with the fibers thoroughly crossed and criss-crossed so that the paper will tear as well in one direction as another. This eliminates the very objectionable feature of a distinct grain. In other words, the bursting strength of a paper with the grain will be several points below the testing of the grain in the other direction if the fibers are not thoroughly crossed. If, however, as they are when treated accordingly to my invention, thoroughly crossed and evenly filled, the result will be such as to give a like test in all directions.

By increasing or decreasing the action of the compressed air shower and by raising or lowering the roll the amount of stock delivered or the speed of delivery may be readily governed without raising or lowering the Fourdrinier wire or changing its inclination.

By my improvements the Fourdrinier wire may be maintained in a horizontal plane, the compressed air shower co-operating with the vertically adjustable roll serving to provide the force necessary to govern the speed of delivery.

Any suitable means may be employed for adjusting the position of the roll and the air shower longitudinally of the Fourdrinier wire so that they may be set to most efficiently operate under varying conditions. A variable speed motor is preferably provided to drive the slice roll. The motor should be run at a speed corresponding to the speed at which the paper is to be made and the other adjustments of the roll and shower should be made to correspond with varying conditions.

In order to obtain the proper puddling effect and interlacing of the fibers, the compressed air shower should be placed at various points varying with the basis of weights inasmuch as the shower must act on the fibers when they are in a free state and yet not so far distant from the suction boxes that they will straighten up before getting in a fixed state. The position of the slice roll is dependent upon the amount of water used.

Heretofore the speed of a Fourdrinier machine in many cases has been fixed by the condition of the web and the method of forming it fast enough to secure the properly closed and felted web of paper. By my improvements I have provided for not only furnishing the stock at the maximum

rapidity at which the machine can be made to operate, but I have provided for forming a sheet equally as good or better than when operating under conditions existing prior to the use of my invention. I have also secured these advantages without altering the position of the wire which I prefer to keep in a constant or uniform plane.

I claim as my invention:

10 1. In a paper-making machine the combination with a Fourdrinier wire, of means for feeding stock thereto, a vertically adjustable roll arranged above the wire at a point distant from the breast roll of the
15 wire and which co-operates with means for discharging a shower of air upon the paper web in advance of the vertical plane of contact between the roll and the web.

20 2. In a paper-making machine the combination with a Fourdrinier wire, of means for feeding stock thereto, a vertically adjustable smooth cylindrical roll arranged above the wire at a point distant from the breast roll of the wire and which co-operates with means for discharging a shower

of air upon the web a short distance in front of its point of contact with the web.

3. In a paper-making machine the combination with a Fourdrinier wire, of means for delivering pulp thereto, and a vertically adjustable smooth cylindrical roll arranged between the pulp-delivering means and the suction box of the machine, and a perforated pipe for delivering a shower of air upon the paper web close to the vertically adjustable roll for the purpose specified. 30 35

4. In a paper-making machine the combination of a head box, a Fourdrinier wire, a dam near one end of the Fourdrinier wire for producing a pond thereover, suction boxes, and a slicing apparatus comprising a vertically adjustable roll located a considerable distance from the first-mentioned slice and between said slice and the suction boxes, and means for delivering a shower of air close to said vertically adjustable roll. 40 45

In testimony whereof, I have hereunto subscribed my name.

GEORGE S. WITHAM, Sr.