April 20, 1926. 1,581,655

F. W. MONAGHAN

PAPER MAKING MACHINE

Filed Jan. 14, 1921

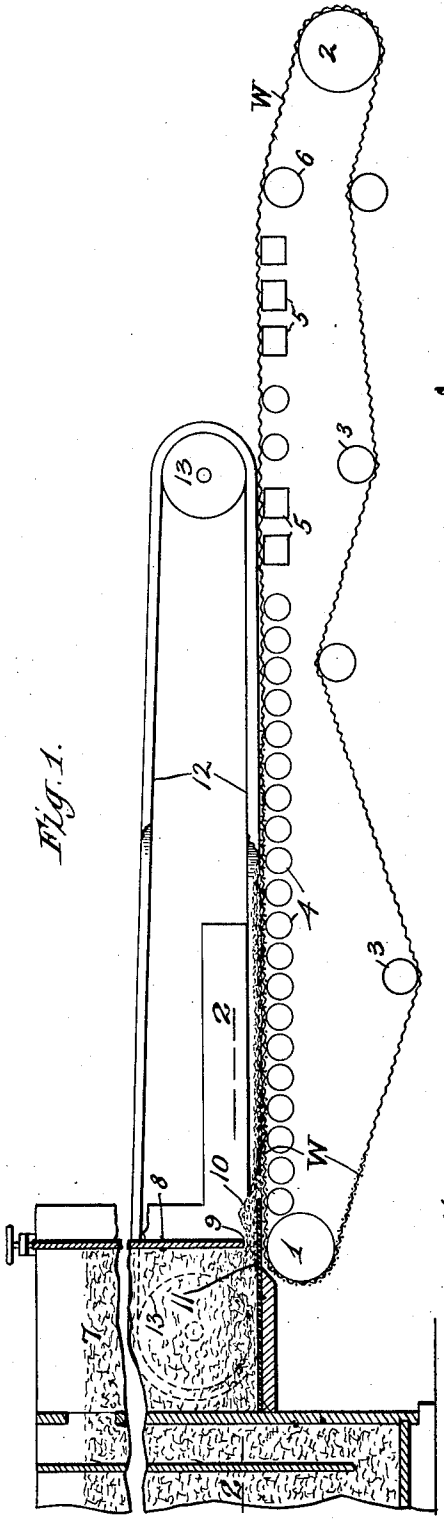


Fig. 1.

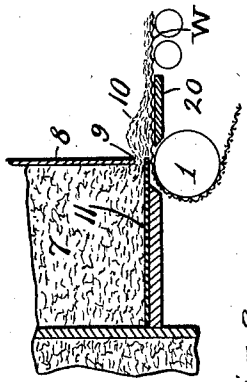


Fig. 4.

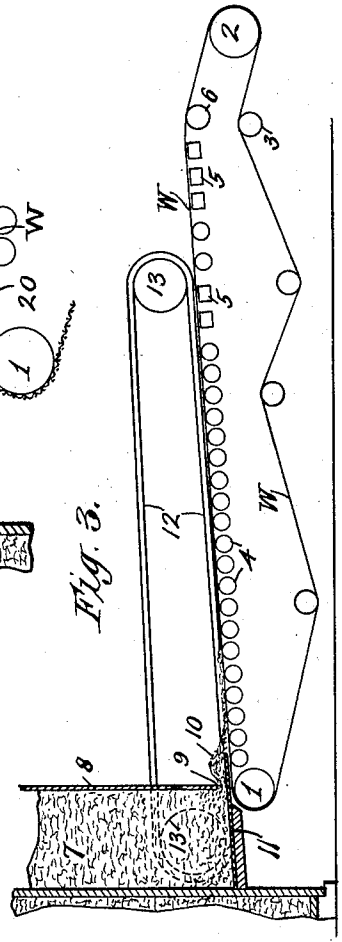


Fig. 3.

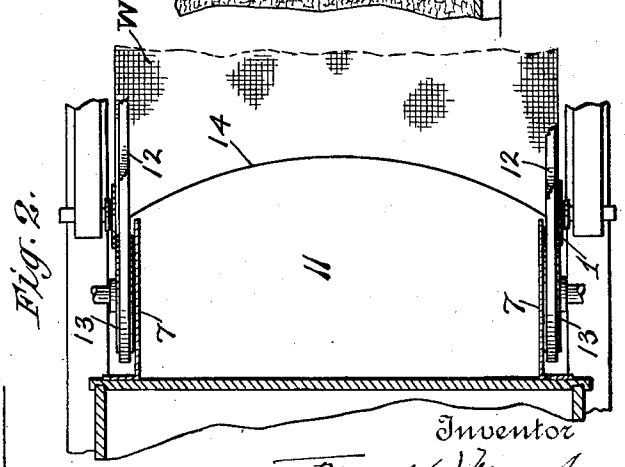


Fig. 2.

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By his Attorneys

Phelps Fowler Rice & Kenney

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# UNITED STATES PATENT OFFICE.

FRANK W. MONAGHAN, OF WATERTOWN, NEW YORK, ASSIGNOR TO THE BAGLEY AND SEWALL COMPANY, A CORPORATION OF NEW YORK.

## PAPER-MAKING MACHINE.

Application filed January 14, 1921. Serial No. 437,150.

*To all whom it may concern:*

Be it known that I, FRANK W. MONAGHAN, a citizen of the United States, residing at Watertown, county of Jefferson, and State of New York, have invented certain new and useful Improvements in Paper-Making Machines, fully described and represented in the following specification and the accompanying drawings, forming a part of the same.

This invention relates to certain improvements in paper making machines.

In a co-pending application Serial No. 437,151 I have disclosed a process or method for producing continuously a web or sheet of paper at speeds greater than the speed at which paper has been made by methods heretofore known or practiced. Such method or process disclosed in the application aforesaid, consists broadly in the formation and maintenance of a pool or reservoir above the wire in, to and through which the water and stock is caused to move at approximately the speed of the making wire, with agitation and intermingling of the fibers of the stock in the pool, the wire taking the water and stock from this pool to form the web.

The present invention has for its especial object to improve the wet end of a Fourdrinier paper making machine so as to produce an apparatus particularly adapted for carrying out my method.

For a full understanding of the invention a description of an apparatus embodying the same will be given in connection with the accompanying drawings, in which—

Figure 1 is a partial diagrammatic side elevation of the wet end of a Fourdrinier machine, showing the wire and table rolls in full lines, and the flow box a slice and apron in cross section.

Figure 2 is a plan view of a part of the construction shown in Fig. 1, showing one form of resistance surface which may be employed.

Figure 3 is a form similar to Fig. 1 showing an arrangement of the wire by which the water and stock may be caused to flow uphill from the breast roll; and

Figure 4 is a detail showing a modification in the arrangement of the resistance surface which may be employed.

Referring now to these drawings, a wire of any suitable mesh is indicated by W. This wire is, as is usual, continuously driven, passing over a breast roll 1, and couch roll 2 being driven in any suitable manner, not shown, to give the wire a continuous travelling movement at the desired speed. The wire on its return to the breast roll passes over carrying rolls 3, and from the breast roll passes over and is supported on a series of free running rolls, termed table rolls, and marked generally 4. As the wire passes over these rolls, the rolls contact with and support the wire and act to extract water from the water and stock carried on the wire. The wire also passes over a number of suction boxes 5 located beyond the rolls, and from the suction boxes is guided to the couch roll by a guide roll 6.

The mixture of water and stock is supplied continuously to the wire or breast roll end, and the web is formed as the water and stock passes along with the wire over the rolls and suction boxes.

The pool or reservoir from which the wire takes the water and stock to form the web as set forth in my copending application, may be formed and maintained in the quantity of water and stock which the wire will take to properly form the web desired in various ways. I preferably form this pool by means of pressure sufficient to cause the water and stock to move into and through the pool with a velocity approximately equal to the speed of the wire and to maintain in the pool the quantity of water and stock required to properly form the desired web. This pressure may be obtained in various ways, a simple and convenient one being by utilizing the pressure head of the water and stock, and I obtain the required pressure by the height of the water and stock in the flow box and behind the slice or other controlling device. In the particular machine illustrated the stock is delivered from a flow box indicated by the numeral 7 and the slice is marked 8 which is vertically adjustable to regulate the opening 9 through which the stock is delivered. While one slice is shown, it will be understood that more than one may be used if desired and that controlling devices other than a slice may be used for controlling the flow of water and pulp.

The pressure head produced by the height of the flow box and consequently the amount

of water and stock which may be maintained therein causes the water and stock to issue from the flow box with a velocity depending on the head, which is regulated in accordance with the speed of the wire. As the water and stock issues through the opening 9 under the slice and forms a pool or reservoir indicated at 10 in front of the slice from which the wire takes the water and stock. This pool may be maintained in quantity of water and stock required to properly form the web desired by increasing or decreasing the water, or increasing or decreasing the stock, or by adjusting the slice, or by the speed of the wire.

The resistance offered by the wire to which the stock passes under the slice may be sufficient to cause the formation and maintenance of the pool. I prefer, however, to provide a resistance or resistance surface in addition to the wire at the point where the water and stock issues under the slice to impede the flow of water through the wire. While this resistance may be formed and arranged in various ways, one construction which has worked out satisfactorily in practice, is to extend the apron under the slice over the breast roll and a distance after the slice so as to provide resistance into which the water and stock issuing from under the slice form the pool or reservoir. This apron is indicated by the numeral 11, and is as shown in Figs. 1 and 2, a flat surface of any suitable material extending across the machine under the slice.

As is usual in Fourdrinier machines, the water and stock are kept on the wire by the use of deckle and deckle frames or other suitable devices. These deckle straps 12 are in the form of bands which pass over drums 13. These bands moving along with the wire under the deckle frames 13′ act to keep the stock from flowing sidewise off the wire. The stock will flow under the slice onto the wire more readily in the middle than at the sides, and consequently the web is apt to form unevenly. To overcome this, therefore, where the apron is extended forwardly over the wire a greater distance than at the sides, and as in the present construction, the apron is preferably made of a curve form, as indicated at 14 in Fig. 2, the apron extending out on to the wire further at the center than at the sides. In Fig. 4 is illustrated a modified construction which may be employed if desired to provide the resistance for impeding the flow of water through the wire. In this construction a board 20 or other flat surface of suitable material is arranged below the wire, extending forwardly from the breast roll, and preferably formed like the apron 11 before referred to.

In the method disclosed in my co-pending application, the water and stock in the reservoir or pool are agitated so as to cause the fibers to lie at various angles to each other and thus effect a better interlocking and matting together of the fibers when they felt on to the wire than is obtained in prior practice. The formation and maintenance of the pool or reservoir by pressure as described gives an opportunity for this agitation and intermingling of the fibers and this agitation will, therefore, be preferably thus accomplished in the present apparatus.

Where, as in the present apparatus, the pressure necessary to form the pool or reservoir is obtained by a pressure head of the water and stock, this head is preferably obtained by increasing the amount of water used, and where this water is supplied in great quantity to obtain a high pressure head, as in carrying out the invention at the high speeds contemplated, difficulty may be experienced in taking this large quantity out by the table rolls and the suction boxes. To overcome this, therefore, I may operate so as to cause the water and stock in effect to run up hill from the breast roll toward the couch roll end, and thus give the water more opportunity to drain from the stock. This may be effected by depressing the breast roll or elevating the suction box end of the wire, and I have shown a construction for effecting this in Fig. 3, in which the wire at the breast roll end is depressed to cause the wire to run upwardly at an angle to the horizontal, and opportunity is provided for the water to be extracted. This upward inclination may of course be varied as required.

With the apparatus described, a continuous web of paper may be made at high speeds, a 1000 feet per minute having been actually obtained in practice, and a satisfactory web is formed.

While a simple and convenient apparatus has been described, it will be understood that various changes may be made in the specific form and construction thereof without departing from the invention.

What I claim is:

1. In a Fourdrinier paper making machine, the combination of a breast roll and a making wire passing around the roll, a slice over the wire, means for delivering the water and stock past the slice under pressure, and a resistance surface below the slice and extending forwardly over the roll and wire on to which the water and stock flow and form a pool or reservoir after the slice from which the wire takes the water and stock to form the web.

2. In a Fourdrinier paper making machine, the combination of a breast roll and a making wire passing around the roll, a slice over the roll, means for delivering water and stock past the slice under pressure, and an apron between the slice and roll and extending forwardly from the slice on to which

the water and stock flow to form a pool or reservoir from which the wire takes the water and stock to form the web.

3. In a Fourdrinier paper making machine, the combination of a breast roll and a making wire passing around the roll, a slice over the roll, means for delivering water and stock past the slice under pressure, and an apron between the roll and slice extending forwardly over the roll and wire on to which the water and stock flow to form a pool or reservoir from which the wire takes the water and stock to form the web.

4. In a Fourdrinier paper making machine, the combination with a slice or other controlling device and the making wire, of means for delivering the water and stock past the slice under pressure, and a resistance surface below the slice and extending forwardly and over the wire to a greater distance centrally than at its sides on to which surface the water and stock flow and form a pool or reservoir from which the wire takes the water and stock to form the web.

5. In a Fourdrinier paper making machine, the combination with a slice or other controlling device and the making wire, of means for delivering the water and stock past the slice under pressure, and an apron below the slice and extending forwardly out over the wire to a greater distance centrally than at its sides, on to which apron the water and stock flow and form a pool or reservoir from which the wire takes the water and stock to form the web.

6. In a paper making machine, the combination with the making wire, of a slice, and an apron under the slice and extending forwardly therefrom to a greater distance centrally than at its sides.

7. In a paper making machine, the combination of the making wire, a slice, and an apron extending forwardly from the slice and curving from its center to its sides.

In testimony whereof, I have hereunto set my hand.

FRANK W. MONAGHAN.