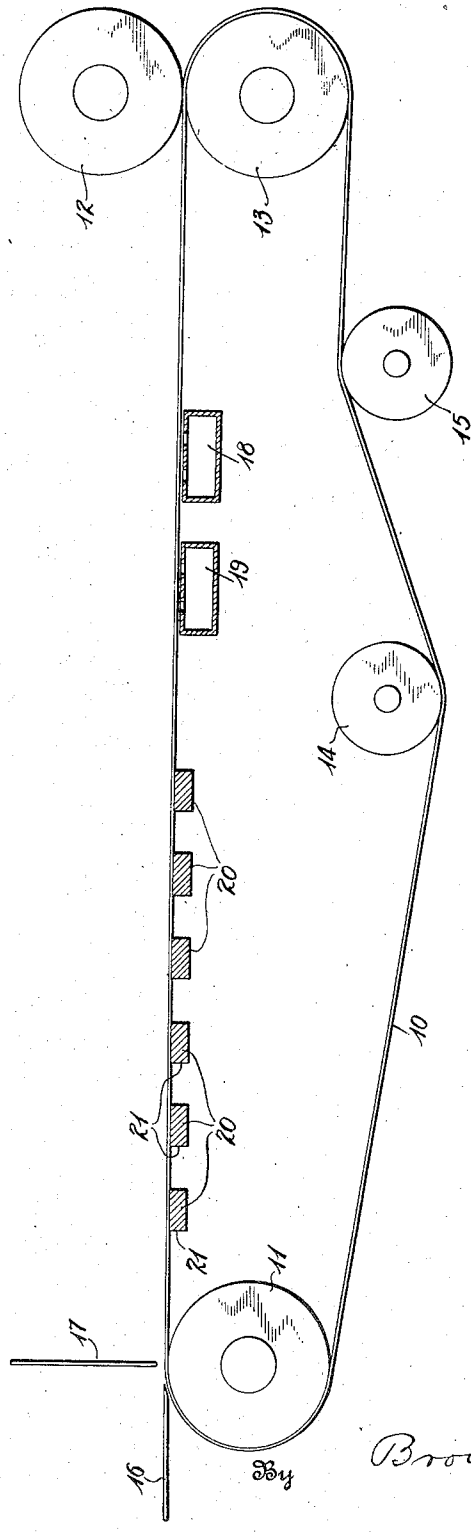
April 5, 1927. 1,623,526

A. E. COFRIN

METHOD AND APPARATUS FOR MAKING PAPER

Original Filed Aug. 13 1925




Inventor
Austin E. Cofrin
By Browne & Phelps
Attorneys

Patented Apr. 5, 1927. 1,623,526

# UNITED STATES PATENT OFFICE.

AUSTIN E. COFRIN, OF GREEN BAY, WISCONSIN.

## METHOD AND APPARATUS FOR MAKING PAPER.

Application filed August 13, 1925, Serial No. 50,127. Renewed May 24, 1926.

The invention relates to paper making machines of the Fourdrinier type, and has as an object the provision of means for removing the water from the pulp upon the wire after leaving the breast roll, in such a manner as to cause the fibers of the pulp to gather into a sheet more quickly and to produce a better product.

It is a further object of the invention to enable a machine of this type to be run at a much greater speed than has heretofore been possible, when producing tissue paper.

It is a further object of the invention to provide means, of the nature referred to, such that the finished product will be superior to that heretofore produced, even though the machine is run at a greatly increased speed.

It is a further object of the invention to provide an improved method of making paper particularly directed to the step of removing moisture from the pulp carrying member, as the Fourdrinier wire.

Further objects of the invention will appear from the accompanying drawing showing a diagrammatic side elevation of the Fourdrinier portion of a paper making machine.

The substantially universal practice in paper making machines is to employ what are known as tube rolls, over which the wire runs immediately adjacent to the breast roll. It has been the accepted theory in this type of machine that these tube rolls draw the water from the lower side of the wire and thus hasten the drying of the film of pulp. A decreasing percentage of fibre passes through the wire with the water as the film becomes felted together.

I have found that the tube rolls do not function exactly as has been supposed. The water which passes through the wire immediately after leaving the breast roll contains nearly as much of the fibre as does the material remaining upon the upper surface of the wire, the whole of the material at this point comprising substantially 95% water. A heavy film of water and fibre is threfore present upon the lower side of the wire when the first tube roll is reached, which tube roll is revolving at the velocity of the wire. The usual speed of travel of the wire in machines of this type in the making of tissue paper has been substantially 600 feet per minute.

The tubes of the usual size revolving at this speed give a high centrifugal velocity to the water and fibres coming in contact therewith, which results in throwing the water back through the Fourdrinier wire, thereby upsetting the forming film upon the wire and tending to keep up the percentage of fibre passing through with the water. This action, in a gradually decreasing amount, takes place at the passage of the wire over each tube roll and results in a "mushy" product.

In addition to this action of the tube rolls, the parting of the surface of the tube roll from the wire at the angle formed between the surface of the roll, of the usual diameter, and the wire, produces a suction effect upon the film carried by the wire to again produce a harmful effect upon the film. The total result of thus equipped machines, when manufacturing very thin tissue paper, has been a tissue paper which has a mushy or mottled porous appearance.

In a machine embodying the invention as shown in the diagrammatic view of the drawing, there is indicated a Fourdrinier wire belt 10, a breast roll 11, couch rolls 12 and 13, and tension rollers 14 and 15. An apron board is shown at 16 and a slice at 17. Vacuum boxes are shown at 18, 19.

The parts described are the usual parts of a machine of this character.

In the position usually occupied by tube rolls, there is provided, according to the invention as shown, a series of bars 20 having flat upper surfaces along which the wire travels in contact therewith.

As shown, the leading edges 21 of the bars are formed at right angles to the wire. This angle may be varied to some extent, but it is preferable to provide a sharp angle at the juncture of the edges 21 and the upper surfaces of the bars 20.

The film of water and pulp carried by the lower surface of the bars coming in contact with the angle of the bars 20 successively is stripped off without causing any disturbance of the film of material upon the upper surface of the wire. The water passing through the wire in contact with the wetted upper surface of the top of each bar, by surface tension effect, is dragged over the surface of the bar and produces a suction effect to draw water downwardly from the film of material upon the upper surface of the wire. The

wire, after passage over the plurality of bars 20, may be led over suction boxes as 18, 19 in the usual manner.

It is found that a machine equipped according to the present invention can be run at substantially 60% greater speed than machines as heretofore equipped with tube rolls and at this increase of speed will produce a product superior to that produced at the former lower speed.

It has been found possible with a machine thus equipped to produce tissue papers at speeds which have formerly been available in the manufacture of news print paper, the tissue paper thus produced being superior to that produced heretofore.

Minor changes may be made in the physical embodiment of the invention without departing from the spirit.

I claim:

1. In a Fourdrinier machine, the combination of a traveling wire, means for feeding pulp to said wire, means to remove moisture from the lower side of said wire by contact with the moisture, said means precipitating the moisture on the contact side thereof.

2. In a Fourdrinier machine, the combination of a traveling wire, means for removing moisture from the forming film upon said wire, comprising a series of flat surfaces closely adjacent the lower side of said wire and adjacent the feed end of the machine.

3. In a Fourdrinier machine, the combination of a traveling wire, means for feeding pulp to said wire, means for removing moisture from the lower surface of said wire comprising a bar having a flat upper surface over which the wire passes, and an edge facing said feeding means and joining said surface at an abrupt angle.

4. In a Fourdrinier machine, the combination of a breast roll, a traveling wire passing about said roll, means for feeding pulp to said wire, and means for removing moisture from the lower side of said wire comprising a plurality of stationary bars having plane upper surfaces in contact with said wire and edges facing toward said breast roll joining said respective surfaces at abrupt angles.

5. In a Fourdrinier machine, the combination of a breast roll, a traveling wire passing about said roll, means for feeding pulp to said wire, means for removing water from said pulp comprising a plurality of bars having flat upper surfaces over which said wire passes and having edges facing said roll joining said surfaces in abrupt angles not greater than a right angle.

6. The process of making paper which comprises delivering pulp to a traveling member adapted to allow a portion of the water of the pulp to pass therethrough, wiping seepage from the underside of said member by means approaching the same within the thickness of the layer of seepage.

AUSTIN E. COFRIN.