Feb. 5, 1929. 1,701,226

R. COLLINS

PAPER MAKING MACHINE

Filed Dec. 28, 1927

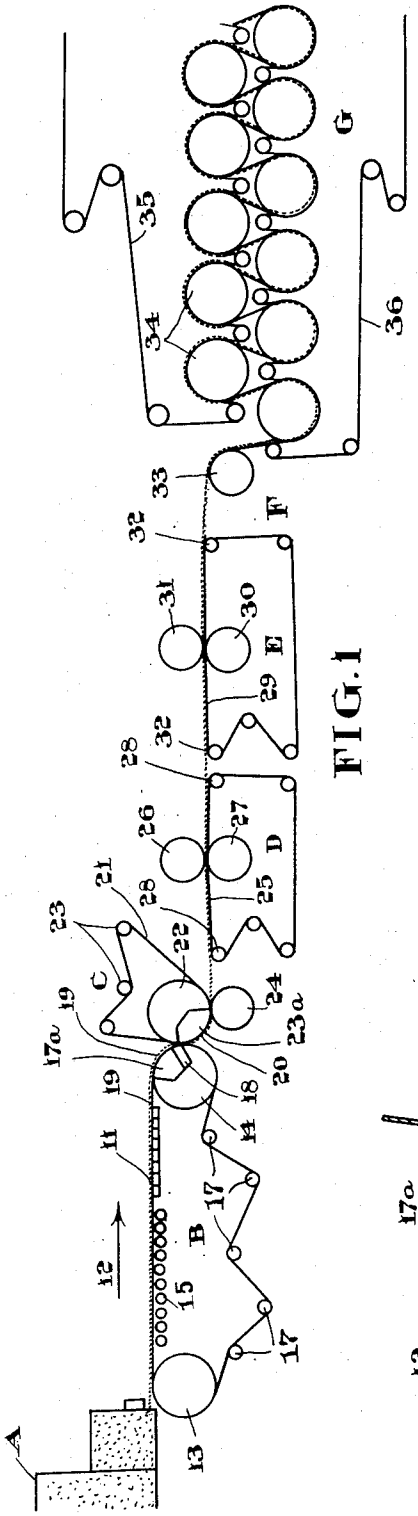


FIG. 1

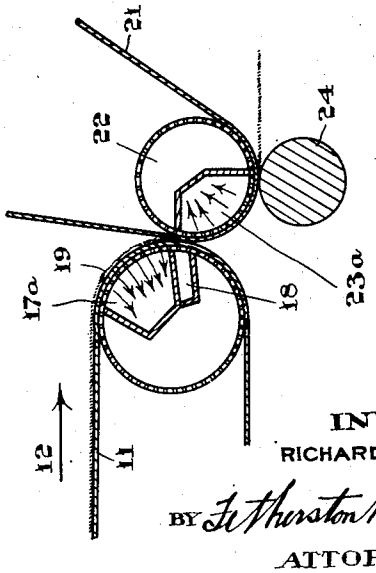


FIG. 2

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UNITED STATES PATENT OFFICE.

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PAPER-MAKING MACHINE.

Application filed December 28, 1927. Serial No. 243,141.

This invention relates to new and useful improvements in paper making machines.

In the manufacture of paper making machines, one of the essential features is to have the machine built so that the maximum speed can be obtained and a first-class product obtained at all times and as strong as possible. This is done by different methods according to the quality of sheet being made, but no matter how the paper stock is prepared before it enters the machine, a certain loss in strength always takes place on the machine itself, mainly owing to the sheet being pulled or stretched. The main point where the stretching or pulling of the paper takes place is where the sheet of wet paper leaves the wire. In the usual type of machine at present in use, the action of the suction boxes and suction roll on the stock draws the sheet into the mesh of the wire and, in taking off the wire to the first press, the sheet is pulled to such an extent that in many cases the wire is running from 8 to 10% slower than the rest of the machine. This is especially so on high speed machines. On machines running from 900′ to 1000′ per minute making newsprint, it is regular practice to find there is pulled off from seven to eight feet on a wire of from 80 to 100 feet long. If this pull or stretch were eliminated, it would be a great improvement in the paper making art, as the finished paper leaving the machine would be much stronger in every way.

I will take an example of the difference in strength between a machine-made and a handmade sheet of newsprint paper. The handmade sheet is not subjected to pulling or stretching and it will be found in test that it has a bursting strength of 60% and the bursting strength of a machine-made paper using the same stock, is 30 to 33%. The loss in strength is mostly caused by the excessive pulling or stretching in the power machine.

In the manufacture of paper machines it is necessary to supply or equip the machines with a certain number of drying presses and the action of these presses is to take out as much water as possible from the sheet before it passes to the drying cylinder. They also have the effect of putting a finished surface on the paper before it gets its finished surface in the calender stack. In the usual type of machine the paper is reversed at the third wet press, to press out the wire markings so that the paper is provided with a finish on both sides, but it is generally agreed that the finish on both sides is different.

The main object of my invention is first to eliminate the stretch in the paper sheet between the wet end and the first press, thereby making a sheet of paper of more uniform strength. Secondly, to keep the speed of the machine more uniform, and third, to give the sheet a more even finish before it passes to the drying and calendering section, and fourth, to provide a more economically manufactured sheet by reducing the amount of expensive chemical pulp, necessary for binding the fibres, to a minimum.

I accomplish the above objects by placing a suction press roll in contact with or adjacent the wire of the Fourdrinier part of the paper making machine and placing a press roll below the suction press roll, to iron out or finish the lower side of the sheet before it passes to the second and third presses. This construction allows easy access to all parts of the machine and the paper in making passes in a straight line to the baby drier and drier section, without reversing the paper sheet, which is common practice in the machines at present in use.

In the drawings which illustrate my invention:—

Figure 1 is a diagrammatic side elevation of my improved paper making machine.

Figure 2 is an enlarged side elevation showing diagrammatically my improved suction press and its location on the machine.

Referring more particularly to the drawings and in particular to Figure 1, A designates the flow box from which the pulp is fed to the wire of the Fourdrinier part B of the machine. The first press C is positioned in proximity to the wire and the paper sheet passes from the first press through the second and third presses D and E, over the baby drier F, on to the heated drier rolls G, and from thence to the calendering machine not shown. The wire 11 of the Fourdrinier section moves in the direction indicated by the arrow 12 and passes over the breast roll 13 and the suction roll 14, between which are mounted the guide rolls 15 and suction boxes 16. Suitable guide rolls 17 are provided for holding the wire tight. The suction roll 14 has mounted therein a suction box 17ª and a blower box 18. As the wet pulp 19 passes over the suction boxes and the suction roll, a great amount of water is drawn through the wire, so that

when the pulp comes to the discharge end of section B, it is in the form of a wet mat with the underside 20 roughened through contact with the wire. The suction press is positioned with its felt 21 close to the suction roll 14, so that the wet mat is transferred to and carried by the felt which passes partially around the suction roll 22. The felt passes around the guide rolls 23. The blower box within the suction roll 14 assists in clearing the wire of the wet pulp mat and transferring into the carrier felt 21. It will be seen that the suction box 23^a has its upper edge positioned between the blower box and the suction box in the roll 14, and its lower edge is positioned above the presser roll 24 below the suction roll 22. The presser roll tends to smooth out the wire marks in the mat and this occurs at a point where the pressure will be most effective, as the sheet is very wet and the marks will be easily pressed out of the sheet. The sheet is then transferred to the felt 25 which carries it between the press rolls 26 and 27, one positioned below the felt and the other above the felt. The felt passes over the guide rolls 28. The paper or sheet then passes on to the felt 29 of the press E which carries it between the press rolls 30 and 31, one positioned above the felt and the other below the felt, which is of the endless type and passes over the guide rolls 32. Wet presses D and E are of similar construction and the upper roll comes in contact with the upper side of the pulp mat or paper sheet. The sheet then passes directly to the baby drier roll 33 and from thence to the drier section, which is of ordinary construction consisting of heated drier rolls 34 arranged in double horizontally disposed rows in zig-zag fashion, and the paper is led over and brought in contact with these rolls by means of the endless felts 35 and 36. By moving the paper in zig-zag fashion both sides of same are brought in contact with the heated drier rolls.

It will be seen that the paper in passing through the machine does not pass through a reversing press between the wet press E and the baby drier F, as is customary in the machines at present in use, as this is unnecessary in my arrangement wherein the paper passes through the suction press immediately it leaves the Fourdrinier section of the machine. This press is placed in the position shown so that it will take out the wire markings when the paper or pulp mat is wet and bring the underside of the mat in contact with the granite roll of the suction press. In arranging the presses in the manner herein described, there is no long stretch of unsupported pulp sheet which would tend to stretch the paper, so that all parts of the machine may be run at comparatively even speed throughout its length. This results in a better class of paper being manufactured as the fibres of the paper are not pulled in their longitudinal direction and a more uniform strength of paper is obtained.

A cheaper class of pulp may be used as there will be no necessity for placing the high percentage of chemical pulp which is necessary to hold the fibres together as when the sheet is subjected to high tension between the presses. The common practice at the present time is to make the pulp from a mixture of 70 to 75 percent of ground wood and 25 to 30 percent of chemical pulp, whereas in my improved machine the pulp mixture fed thereto may consist of 90 to 95 percent pulp wood and 5 to 10 percent of more expensive chemical pulp. This results in a saving over the present method of making paper, particularly newsprint paper. The feed of the machine is in a straight line through the machine, so that the paper may be easily guided therethrough without using rope carriers or such like means. By eliminating the stretch in the paper, the width of the wire of the Fourdrinier or wet end of the machine may be made very slightly larger than the width of paper required, a condition which results in installation economies, as practically no allowance is necessary to take care of the stretch which occurs in machines where the paper passes from the wet end to the press D unsupported and in a very wet condition.

Having thus described my invention, what I claim is:—

1. In a paper making machine, a Fourdrinier section including an endless wire and a suction roll at the discharge end thereof, and a suction press including an endless felt passing around a suction roll, and a press roll below the last-mentioned roll.

2. In a paper making machine, a Fourdrinier section including an endless wire passing around a suction roll at the discharge end thereof, and a suction press roll in proximity to the suction roll, said press including an endless felt adapted to receive the paper sheet from the wire and carry same between a suction roll and a press roll, said press roll being positioned below the suction roll.

3. In a paper making machine, a Fourdrinier section including an endless wire passing around a roll at the discharge end thereof, said roll having a suction box and a blower section mounted therein, a suction press adapted to receive a wet paper sheet blown from the wire, said suction press including an endless felt in contact with the wet sheet from the wire to carry said sheet between a suction roll and a press roll, said press roll being adapted to contact with the paper sheet on its underside to press out the markings of the wire.

4. In a paper making machine, a Fourdrinier section including an endless wire passing over a roll at the discharge end thereof, said roll having a suction box and a blower box non-rotatably mounted therein, a suc-

tion press mounted in proximity to the roll, said press comprising an endless felt adapted to receive a wet sheet of paper blown from the first-mentioned suction roll and to carry same beween a suction press roll and a press roll beneath the suction press roll, said suction rolls being positioned close to one another to draw the paper from the wire of the Fourdrinier section.

5. In a paper making machine, a Fourdrinier section including an endless wire and suitable rolls, one of said rolls at the discharge end of the section being of the suction type, means within the said roll for blowing a wet mat of paper from the wire, a suction press in proximity to the discharge end of the Fourdrinier section, said press including a felt adapted to receive the wet mat and carry same between a suction roll and a press roll, the suction boxes in said rolls being so positioned that the wet mat is directly lifted from the wire.

6. In a paper making machine, a Fourdrinier section, a suction press in proximity thereto to lift the paper from the wire and press out the wire markings on the lower side of the mat, wet felt presses to partly finish the upper surface of the paper, a baby drier to receive the paper mat from the wet presses, and a heated press roll section.

In witness whereof, I have hereunto set my hand.

RICHARD COLLINS.