Jan. 17, 1928. 1,656,853

H. D. BEAN

PAPER MACHINE

Filed June 14, 1926 2 Sheets-Sheet 1

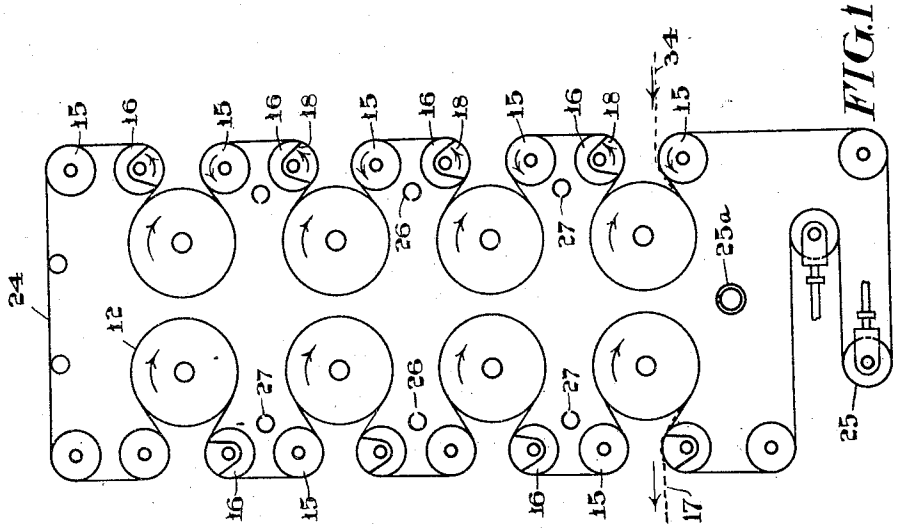

FIG. 1

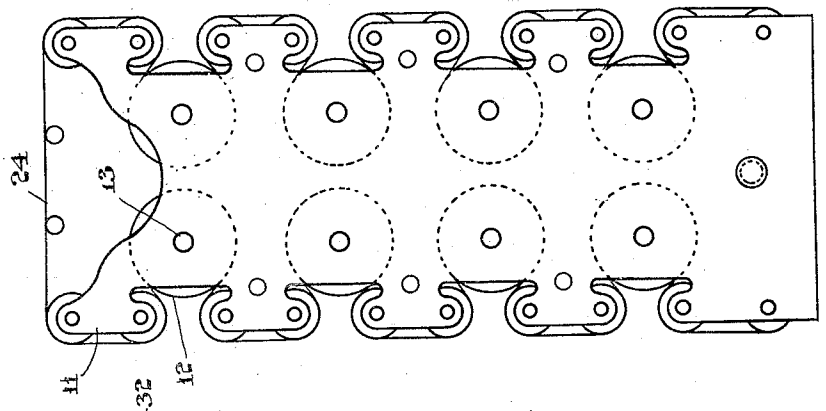

FIG. 2

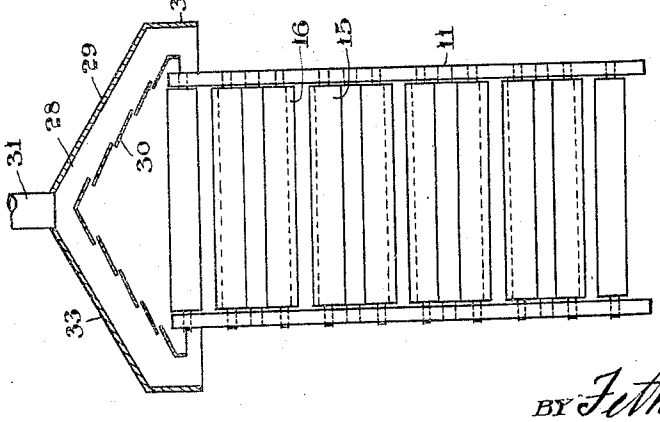

FIG. 3

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2 Sheets-Sheet 2

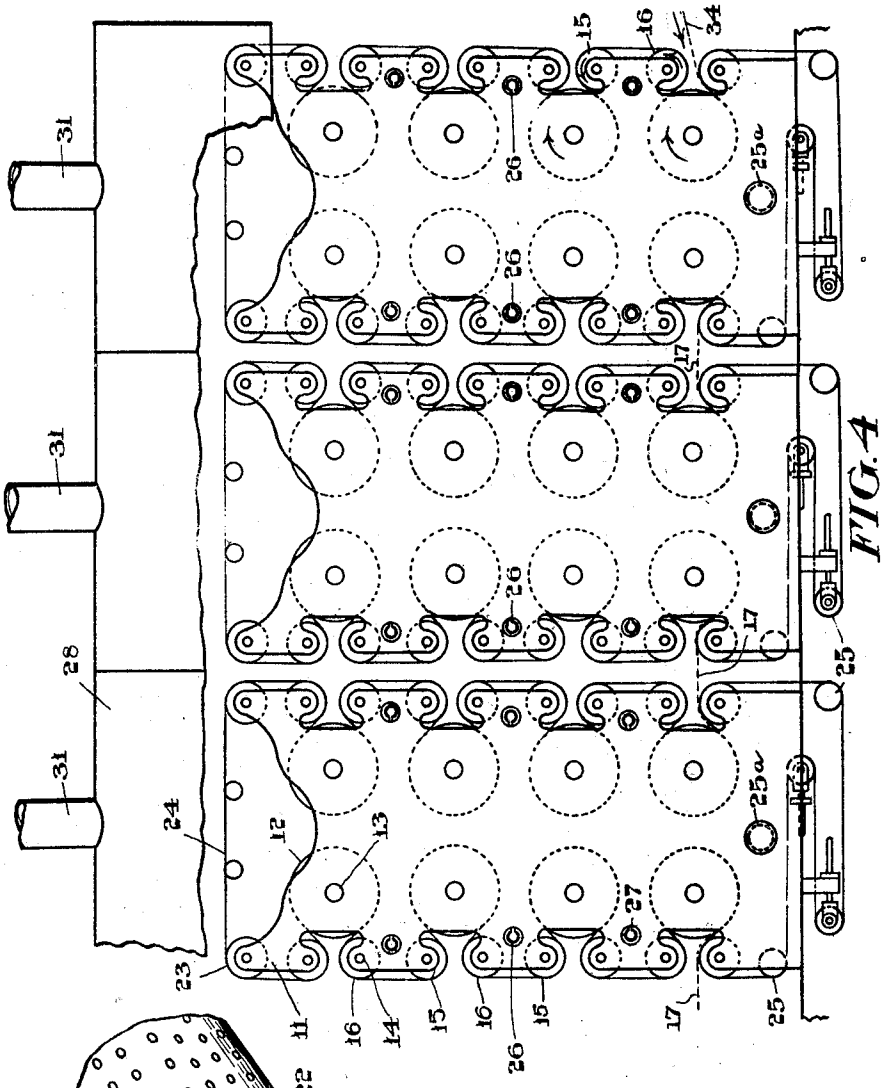

FIG. 4

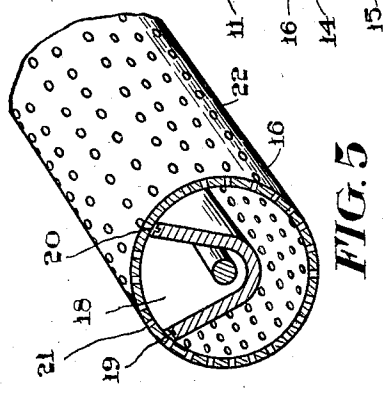

FIG. 5

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Patented Jan. 17, 1928. 1,656,853

UNITED STATES PATENT OFFICE.

HARRY D. BEAN, OF MONTREAL WEST, QUEBEC, CANADA.

PAPER MACHINE.

Application filed June 14, 1926. Serial No. 115,967.

This invention relates to paper making machines in which the paper is carried alternately over heated drier rolls and guide rolls, as it passes through the machine, and the object of the invention is to provide a machine having a new and improved drier section which will greatly facilitate the drying of paper in a more efficient manner than with machines at present employed for this purpose.

Another object is to provide a machine of simple construction which will take comparatively little floor space and at the same time provide means to allow large volumes of air to circulate freely over and between the rolls, over both surfaces of the paper, and through the machine and thus reduce the time usually taken to dry paper.

A further object is to provide a drying machine in which the paper may be easily inspected while it passes through the machine.

In my invention I provide a plurality of drier units each unit comprising a frame having a plurality of drier rolls rotatably mounted therein, and arranged in vertically disposed relation. Also mounted in the frame are a plurality of guide rolls so positioned that they hold the paper in maximum circumferential contact with the faces of the drier rolls. Some of the guide rolls are arranged in proximity to the drier rolls and are provided with suction boxes to withdraw the moisture released from the paper and the felt through contact with the drier rolls. Means are also provided in the machine to induce a circulation of air therethrough and prevent air pockets from forming therein.

In the drawings which illustrate one form of my invention;

Figure 1 is a diagrammatic side elevation of one section of the machine showing my preferred arrangement of the guide, drier, and suction rolls.

Figure 2 is a side elevation of the drier frame.

Figure 3 is an end elevation of one of the units showing means for circulating air through the machine.

Figure 4 is a side elevation of a plurality of drier units in assembled relation.

Figure 5 is a perspective view of one of the suction guide rolls.

Referring more particularly to the drawings, 11 designates the side frames of the drier section of the machine, and 12 the drier rolls which are rotatably mounted in the bearings 13 formed in the frame. The drier rolls are arranged in vertically disposed parallel rows, and may be of the usual type employed in this art, that is connected to a source of heat in such a manner that the heating agent will pass through the interior of the roll. Rotatably mounted in suitable bearings 14 formed in the frame, are the guide rolls 15 and suction guide rolls 16, which are mounted in pairs in close proximity to each drier roll so that the paper sheet 17 in passing through the machine in the direction indicated by arrows is held in maximum circumferential contact with the faces of the drier rolls. The guide roll bearings are formed in rows parallel to the rows of bearings supporting the drier rolls. The suction rolls 16 are of the perforated type shown in Figure 5 and are each provided with a suction box 18, the upper edges 19 of which may be provided with a sealing medium 20 contacting with the inner surface 21. The suction boxes are stationary within the roll and the perforated shell 22 is so mounted that it rotates independently of the suction box in the manner well known in this art. Felt supporting rolls 23 are also provided to guide the felts 24 over the upper end of the section of the machine. The felts which are of the endless type pass over rolls 25 at the bottom, said rolls being mounted to allow adjustments to be made to the felts to tighten same in the well known manner. Extending across the frame parallel to the rolls and positioned at the bottom of the frame, is the perforated pipe 25ª through which air may be blown to circulate through the section and between the rows of drier rolls. Between each pair of drier rolls are the pipes 26, which may be connected to a blower, not shown. The pipes 26 are provided with perforations or slots 27 adapted to direct air blown through said pipes towards the centre of the machine to induce a circulation of air away from the pockets formed between the felts, drier rolls, and the adjacent guide rolls.

Mounted above each section of the machine is the ventilator 28 which is built in two sections 29 and 30, spaced from one another, the section 29 being provided with an air outlet pipe 31. The lower edges 32 of

the section 29 extend downwardly over the upper part of the frame and are spaced therefrom to allow the air to pass freely through the machine and between the sections of the ventilator to the outlet pipe. The sections 30 of the ventilators are of the louver type and are arranged parallel to the upwardly tapering wall 33 of the section 29.

In operation the paper enters the drier section at the point marked 34, over a guide roll 15 and around the drier roll, partially around the suction roll in the direction indicated by the arrows. The paper sheet is supported on the endless felts which are driven through frictional contact with the drier rolls which may be driven in any suitable manner from a source, not shown. The paper in passing through the drier section is alternately subjected to the drying action of the heated drier rolls and to suction guide rolls, so that moisture absorbed by the felt through the drying of the paper sheet in passing over the drier rolls, is drawn into the suction rolls. Air is circulated through the machine by means of the blower pipes and is drawn through the ventilators positioned above each section. In the drawings, three sections are shown, each section consisting of eight rolls, but it will be readily understood that the number of sections and also the number of rolls in each section, may be modified according to requirements.

A drier section built in the manner herein disclosed, that is with a combination of heated and suction drier rolls, greatly reduces the time taken to dry paper as it comes from the wet end of a paper machine, when compared with the time taken when only heated rolls are used. Another feature is that a machine arranged in vertically disposed parallel rows of rolls takes up less space than the usual machine in which two horizontally disposed rows of rolls are used, and in which difficulty is encountered in creating a circulation of air within the drier, a feature overcome by the construction detailed herein. By using suction rolls in conjunction with the heated rolls the number of rolls required in a machine of this class is greatly reduced when compared with the ordinary type of drier.

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

1. In a drier section of a paper making machine, a frame, a plurality of heated drier rolls rotatably mounted in the frame, a plurality of suction rolls rotatably mounted in the frame and an endless paper carrying felt contacting with the heated and the suction rolls as it passes through the section.

2. In a drier section of a paper making machine, a frame, a plurality of heated rolls rotatably mounted therein, a plurality of suction rolls also rotatably mounted in the frame, one between each pair of heated rolls and an endless paper carrying felt passing alternately over one heated and one suction roll throughout the machine.

3. In a drier section of a paper making machine, a frame, a plurality of heated drier rolls, rotatably mounted therein, a plurality of guide rolls also rotatably mounted in the frame, some of the guide rolls being plain and the remainder being provided with internally disposed suction boxes, said guide rolls being mounted in pairs, one plain and one suction roll to each heated drier roll, said guide rolls being so positioned that they will hold paper passing through the machine in circumferential contact with the drier rolls.

4. In a paper drier section, a frame, a plurality of heated drier rolls rotatably mounted therein, a plurality of guide rolls also rotatably mounted in the frame in proximity to the heated rolls and in pairs, one pair to each heated roll, one roll of each pair being perforated and provided with a fixed suction therein, and a paper carrying felt threaded through the machine contacting successively with one guide, one heated and one suction roll as it passes through the machine.

5. In a paper drying unit, a frame, a plurality of vertically disposed rows of spaced heated drier rolls, rotatably mounted in the frame, a plurality of vertically disposed rows of guide rolls rotatably mounted in the frame, a pair of guide rolls to each heated roll and so mounted that they will hold paper in maximum circumferential contact with the heated rolls as it passes through the machine, one of each pair of guide rolls being provided with a perforated shell and a stationary suction box, and an endless paper carrying means contacting successively with a plain guide roll and a heated drier roll and a suction roll, as it passes through the machine.

6. In a paper drying unit, a frame, two parallel vertically disposed rows of heated drier rolls rotatably mounted in the frame, two parallel rows of guide rolls also rotatably mounted in the frame, and in proximity to the heated rolls, said guide rolls being arranged in pairs, one pair to each heated roll, and one of each pair being provided with a perforated shell and a stationary suction box, an endless felt passing successively over a plain guide roll, a heated roll and a suction roll as it passes through the machine, means to support the felt as it is passing from one row of rolls to the other row of rolls, and means adjustably mounted at the bottom of the frame to support the felt and to allow easy adjustment thereof.

7. In a paper drying unit, a frame, two parallel vertically disposed rows of heated

drier rolls rotatably mounted in the frame, a pair of guide rolls rotatably mounted in the frame in proximity to each drier roll, one of each pair of rolls being provided with a perforated shell and a suction box fixed within the said shell, a paper supporting felt of the endless type passing successively over a plain guide roll, a heated roll and a suction roll in vertically inclined passage through the machine, means to support the felt as it passes from one row of drier rolls to the other row at the top of the machine, means to support and allow adjustment of the felt at the bottom of the machine, and means to circulate air through the machine.

8. A paper drying unit according to claim 7, having the air circulating means comprising a blower pipe positioned at the bottom of the machine and midway between the rows of heated rolls, and blower pipes between each pair of heated rolls and in proximity to the guide rolls.

9. A paper drying unit according to claim 7, having a ventilator positioned above the frame, said ventilator comprising spaced sections tapering towards the centre of the machine, one of said sections being of the louver type and the other of the closed type terminating in an air outlet pipe.

10. Apparatus for drying paper comprising a plurality of alternately arranged and rotatably mounted heating and suction rolls over which a wet web of paper is adapted to pass and suction means other than said rolls for drawing off the moistened air in the vicinity of the paper.

In witness whereof, I have hereunto set my hand.

HARRY D. BEAN.