April 12, 1932. L. L. LAPEYROUSE 1,853,625

FOURDRINIER MACHINE

Filed Aug. 16, 1930 2 Sheets-Sheet 1

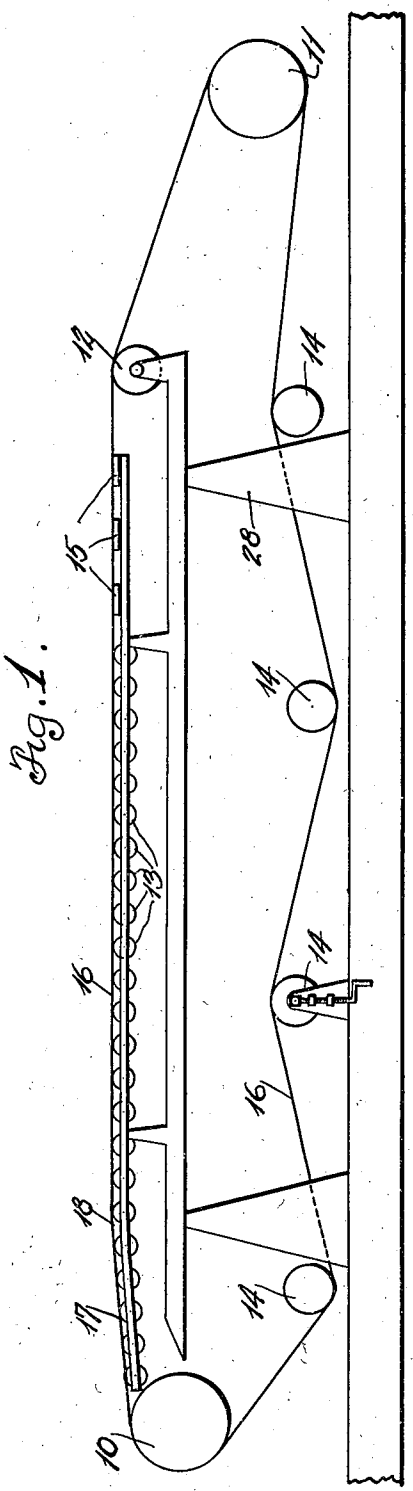

Fig. 1.

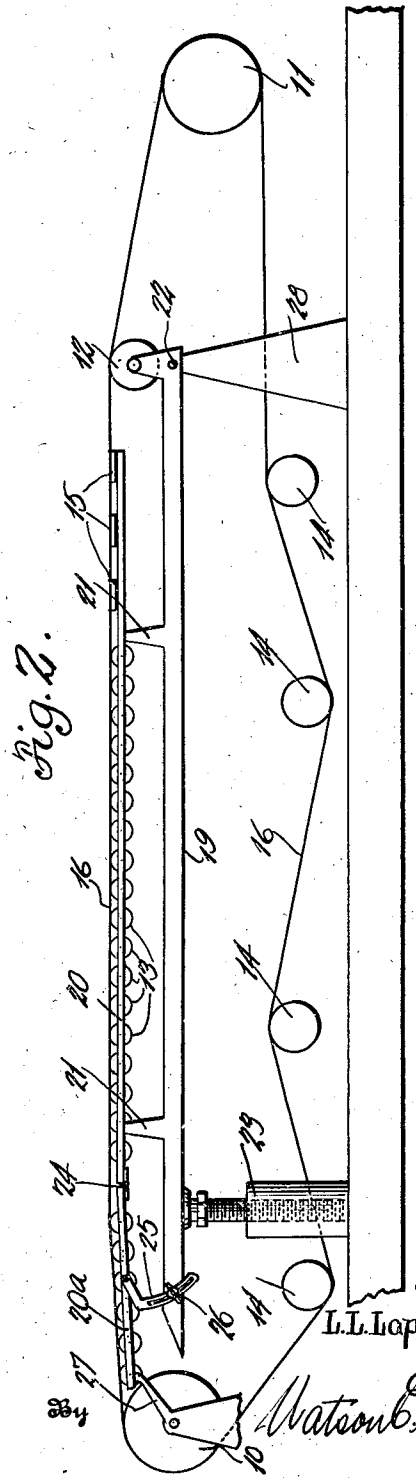

Fig. 2.

Fig. 2A.

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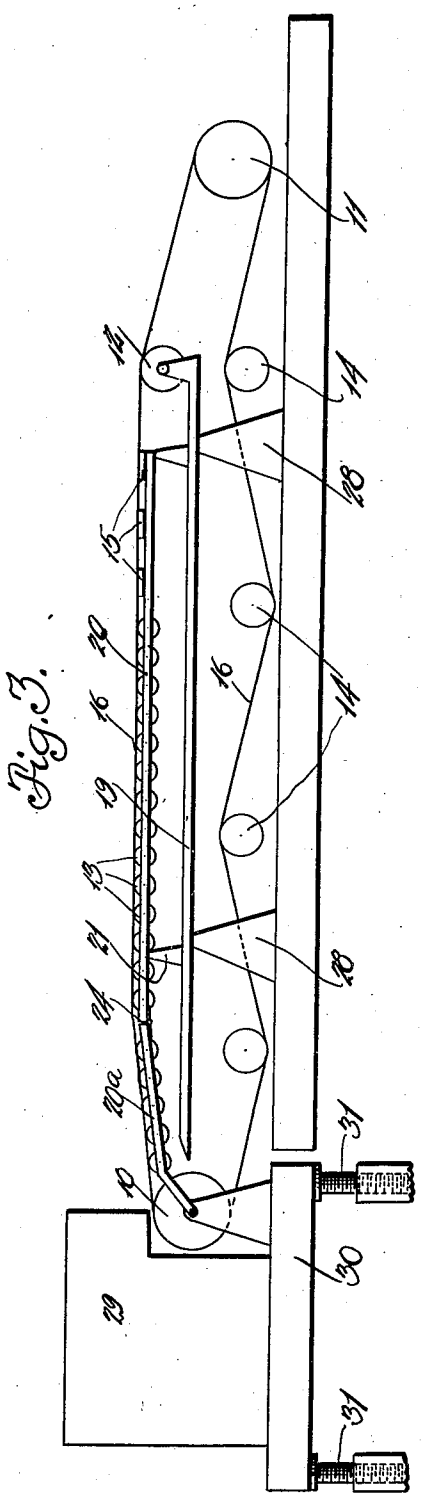

Fig. 3.

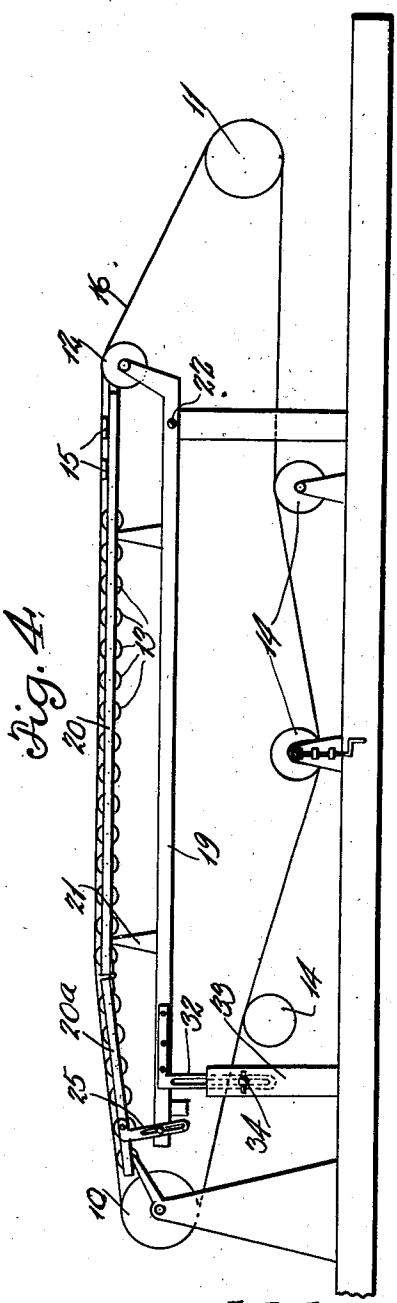

Fig. 4.

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UNITED STATES PATENT OFFICE

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FOURDRINIER MACHINE

Application filed August 16, 1930. Serial No. 475,724.

This invention relates to machines used in the making of paper and particularly in the making of what is known as Fourdrinier board or calipered paper that is, relatively thick paper board. In the making of a sheet of paper on a Fourdrinier machine, the pulp is mixed with a quantity of water. The water acts as a conveyor for the pulp fibre. After the fiber is conveyed to the desired place, it is necessary to get rid of the water. This is accomplished by making the stock water flow over a mechanically driven sieve or wire. The meshes of this sieve are large enough to permit the water to go through but are too small to allow the pulp fibre to go through. The result is that as the water passes through the sieve, the fibres in the water settle on the sieve in the form of a web or sheet. This wire or sieve runs over a series of rolls called tube or table rolls. These rolls which hold the sieve level are in the form of a table and play a very important part in making the water go through the sieve as the water is pulled away from the sieve by the slight suction or vacuum effect caused by the surface of the roll pulling away (in its rotation) from contact with the sieve. On a Fourdrinier machine a sheet of paper is formed by the stock water acting as a conveyor for the fibre flowing over a sieve or wire. The greatest part of the water drops or flows through the sieve by gravity. The remaining part of the water must be forced out through the suction boxes by means of powerful vacuum pumps. The stock water does not "flow" after it reaches the suction boxes. It is, therefore, an accepted fact that a sheet of paper is formed before it reaches the suction part. It is formed while the sieve is traveling over the table rolls and not while it is traveling over the suction part, because when it reaches the suction part, the sheet or web, although still wet, is far too thick or heavy to allow the water to "flow." Different formations of a sheet of paper are effected by changing the flow of the stock water. In making board or calipered paper, the general practice is to run the sieve table on an incline. The stock water is rushed by the head pressure over the inclined sieve, this rushing of the stock water causing the fibre to form into a bulky sheet, (very important where a thick sheet and light weight is required.) This rushing does not continue all the way over the sieve table, but at a certain point along the table, as for instance at a point one-third the distance from the breast roll to the suction part, the head pressure is spent and the stock which is still traveling over the inclined sieve, seeks its own level and drags back for the remaining two-thirds the distance between the breast roll and the suction part. This dragging disrupts the sheet. Because of this dragging effect, only a limited amount of inclination can be used on the ordinary Fourdinier machine.

The object of this invention is to overcome this trouble and provide means whereby the making wire may be run on a steeper incline for a certain distance over that part of the sieve table adjacent the breast roll and then carried rearward for the remaining part of the distance either in a horizontal plane, an upwardly inclined plane, or at a declination, thus eliminating the difficulty experienced from "dragging." In this construction, the stock water will be "rushed" on the inclined portion of the wire but at the point where the head pressure is spent, the wire will travel either on a less inclined table or level table or a table which is downwardly inclined to thus prevent the stock water from dragging. In making the Fourdrinier board or calipered paper it is necessary that said board or paper shall have a certain thickness to comply with railroad shipping requirements.

On the other hand, the paper box manufacturers want their board to weigh as little as possible and at the same time have a high bursting strength. We have thus the obviously difficult problem of combining little weight, bulk and strength all in the same sheet, and therefore it is an object of this invention to provide means whereby this light weight, bulk and strength may be secured.

By preventing the stock water from dragging, less hydration of the stock is necessary thus making the sheet easier to dry and assuring a well formed even sheet free from the well known "lumpy" appearance.

Other objects will appear in the course of the following description.

My invention is illustrated in the accompanying drawings wherein:

Figure 1 is a diagrammatic elevation of a Fourdrinier machine constructed according to my invention;

Figure 2 is a like view of Figure 1 showing an adjustable form of the invention;

Figure 2a is a fragmentary elevation partly broken away of the forward end of the sieve table and a portion of the breast roll;

Figure 3 is a like view to Figures 1 and 2 but showing a slightly different form of my invention; and

Figure 4 is a diagrammatic elevation as in Figures 1 to 3 showing a still further modification of my invention.

In Figure 1 I have illustrated diagrammatically a Fourdrinier machine in which is provided the usual breast roll 10, the couch roll 11, the guide roll 12, tube rolls 13, the wire rolls 14 and the suction boxes 15. The web, sheet or wire netting 16 passes around the rolls 10 and 11 and over the rolls 12 and 13 and over and under the rolls 14 in the usual manner. This machine may be constructed in any suitable manner but as illustrated in Figure 1, the forward part of the wire 16 is upwardly inclined as at 17 from the breast roll 10 for a certain distance and then is horizontally disposed from this point 18 to the guide roll 12; thus the front portion of the wire is upwardly inclined and the rear portion of the wire is horizontal. In this construction the inclination at 17 is fixed. I am aware of the fact that, as before stated, in this type of paper making machine it has been proposed to have the upper flight of the wire extend at an inclination from the breast roll to the guide roll that is, to a point just in advance of the suction boxes 15 but under these circumstances the stock water is "rushed" by the head pressure for a part of the distance over the sieve table and then this stock water drags back tending to disrupt the sheet which is formed on the first part of the wire over the sieve table.

In the construction shown in Figure 1, however, the stock is caused to flow on an inclined making wire at that part of the sieve table or wire from the breast roll to the point 18 and then the stock moves over a wire of less inclination or a wire which is absolutely horizontal or slightly declined, thus preventing the stock water from dragging on the last part of its journey over the sieve table.

In Figure 2 I show another form of my invention which is preferable inasmuch as it permits the adjustment of the table as a whole as well as the separate adjustment of the first part of the wire immediately following the breast roll. In the drawings, 19 designates the supporting beam for the rolls 13, these rolls being carried by a frame 20 supported from the beam 19 by the supports 21. The figure 10 designates the breast roll as before; 11 designates the couch roll; 12 the guide roll; 13 the wire supporting rolls and 14 the wire rolls for the lower flight of the wire. The beam 19 is illustrated as being pivoted at 22 at its rear end while the forward end of the beam is vertically movable by any suitable means as for instance the jack designated generally 23 which may be of any desired suitable character. The frame 20 includes a section 20a which is pivoted to the section 20 at 24 so that this section 20a may be shifted to any desired angular relation within certain limits to the section 20. The section 20a is held in this angularly adjusted position by means of the slotted braces 25 which are pivoted to the frame section 20a and extend down over the beam 19 and are held thereto by means of set screws 26. Thus, it will be seen that by loosening the set screws 26 and raising or lowering the free ends of the beam 19 that the inclination of the forward section 20a may be varied with reference to the rear section 20.

A support 27 is disposed between the axis of the breast roll 10 and the free end of the adjustable section 20a of the sieve table. It will be seen that in this case I have provided for the adjustment of the whole sieve table so as to change its angularity and for an adjustment of the section 20a to increase or decrease its angularity with reference to the section 20. By this means the section 20a may be independently shifted and changed without changing the inclination of the section 20 of the sieve table and that by raising the jack 23 the main section 20 of the sieve table may be given any desired inclination.

In Figure 3 I have shown another structure having the same essential features as found in Figure 2 but differing therefrom in that the breast roll is adjustable while the main portion of the sieve table is fixed. In these figures, 10 designates the breast roll, 11 the couch roll; 12 the guide roll, 13 the tube rolls, 14 the wire rolls, 15 the suction boxes, 16 the wire and 19 the beam. This beam is held in horizontal or in any other desired position by means of the usual supports 28. The main section of the sieve table is designated 20 while the forward section of the sieve table is designated 20a and is hinged to the main section at 24 as previously described. This forward section 20a has its side frames connected to the axis of the breast roll 10. So far I have shown a construction which is the same as that shown in Figure 2. In the construction shown in Figure 3 the breast roll and the head box 29 are mounted upon a vertically adjustable member 30 adjusted vertically by means of the jacks 31. By means of these jacks the head boxes and the breast roll may be raised or

lowered thereby adjusting the hinged section 20*a* of the sieve table.

In Figure 4 I have shown a form of my invention which is very much like that shown in Figure 2 and which therefore bears the same numerals except as hereinafter stated. In this form, the beam 19 is pivoted at 22 as before described. The forward end of the sieve table is vertically adjustable by means of the brace or braces 25, and the beam 19 is tiltable by means of the slotted member 32 extending down over a vertical support 33, it being engageable at any desired position with this vertical support by means of a set screw 34 passing through a slot within the member 32.

It will be seen in all forms of my invention I have illustrated a sieve table which is inclined to a certain degree at a relatively steep angle for a certain distance from the breast roll but which is horizontal or declined or inclined at a lesser degree for the remainder of the table, thus enabling the stock water to be "rushed" up a relatively steep incline for a part of the distance over the sieve table and on a less incline or a level or on a slight decline, thereby preventing the stock water from dragging on the latter part of its journey over the sieve table.

Due to excessive dragging on the Fourdrinier machines now in use, a limited amount of inclination of the sieve table is used. The more inclined this table is, the more dragging will take place. With my improvement it is possible to use a much greater inclination on that part of the sieve table adjacent the breast roll without experiencing any difficulty in dragging.

While I have illustrated four separate forms of my invention, I have illustrated these diagrammatically and I do not wish to be limited to all details of construction or arrangement of parts which are shown, as obviously many changes might be made without departing from the spirit of the invention as defined in appended claims.

It will be understood that in Figures 2 and 4, the member 27 constitutes a mere support for the free end of the sieve table. This is not fastened to the sieve table, the free end of the sieve table merely resting thereon. Normally the braces 25 and the supports 27 hold the weight of the sieve table, but when adjusted to the inclination of the table, the brace 25 is released by loosening the set screw 26 and under these circumstances, the table is supported by the support 27.

It is also to be understood that one of the rolls 14 is to be what is known as a "stretch roll" adjustable so that the tension of the roll may be increased or decreased, thus permitting of a loosening on the tension of the wire 16 so as to permit of the section 20*a* being swung to different angles. The use of a stretch roll is common in machines of this general character.

I claim:

1. A Fourdrinier machine having a breast roll, a couch roll, a guide roll, suction boxes, a series of tube rolls disposed between the suction boxes and the breast roll, a sieve table upon which the tube rolls are mounted, and a wire passing over the breast roll, the tube rolls, the suction boxes, the couch rolls, and back to the breast roll, that portion of the sieve table from the breast roll rearward for a certain distance less than the distance between the breast roll and the suction boxes being upwardly inclined, the remainder of the wire to the suction boxes being at an angle to the forward portion of the wire.

2. In a Fourdrinier machine, a breast roll, a sieve table formed in two sections, and suction boxes at the rear end of the rear section, that section of the table adjacent the breast roll, being relatively short in comparison with the rear section and being pivoted to the rear section of the table and being operatively connected to the axis of the breast roll, and means for raising or lowering the breast roll and the end of the section adjacent thereto, thus altering the inclination of the forward section of the sieve table.

3. In a Fourdrinier machine, a breast roll and a sieve table forming two sections, that section adjacent the breast roll being relatively short being pivoted to the rear section at a point forward of the suction boxes and being operatively connected to the axis of the breast roll, and means for raising or lowering the breast roll thus changing the angular inclination of the forward section of the table relative to the rear section thereof.

4. In a Fourdrinier machine, a breast roll and a sieve table formed in two sections, that section of the sieve table adjacent the breast roll being relatively short and being pivoted to the rear section of the table at a distance from the forward suction box of the machine, and means for raising or lowering the forward end of the rear section of the table to thus change the inclination of the forward section of the table relative to the rear section thereof.

5. In a Fourdrinier machine, a breast roll, a sieve table, and suction boxes coacting with the sieve table at a point remote from the breast roll, the table from the breast roll to a point between the breast roll and the suction boxes being disposed at an upward and rearward inclination, the remainder of the sieve table extending rearward to the suction boxes at an angle to the forward portion of the sieve table.

6. In a Fourdrinier machine, a breast roll, a sieve table, suction boxes disposed remote from the breast roll, the sieve table extending upward and rearward at a predetermined inclination from the breast roll to a point ap-

proximately one-third of the distance between the breast roll and the suction boxes and then extending rearward to the suction boxes at an angle to the forward portion of the sieve table.

7. In a Fourdrinier machine, a breast roll, a sieve table and suction boxes disposed remote from the breast roll, the sieve table being formed in two sections, the forward section, adjacent the breast roll, being pivoted to the rear section at a point between the suction boxes and the breast roll, this forward pivoted section being vertically adjustable, and means for adjusting the forward section into an angular relation to the rear section.

8. In a Fourdrinier machine, a breast roll, a sieve table, a member extending longitudinally beneath the sieve table, a roll supporting frame mounted upon said member and formed of a relatively short section adjacent the breast roll and a relatively long section extending rearward to the suction boxes, the forward section of the table adjacent the breast roll being angularly adjustable with reference to the rear section of the table, and means for adjusting the angularity of the section of the table.

9. In a Fourdrinier machine, a breast roll, a sieve table, a member extending longitudinally beneath the sieve table, a roll supporting frame mounted upon said member and formed of a relatively short section adjacent the breast roll and a relatively long section extending rearward to the suction boxes, the forward section of the table adjacent the breast roll being angularly adjustable with reference to the rear section of the table.

10. In a Fourdrinier machine, a breast roll, a sieve table formed to provide a relatively short section adjacent the breast roll and a relatively long section extending rearwardly therefrom, the two sections being hinged to each other, means for vertically shifting the forward end of the rear section of the table, and means for angularly adjusting the forward section of the table independently of the adjustment of the rear section.

11. In a Fourdrinier machine, a breast roll, a sieve table formed to provide a relatively short section adjacent the breast roll and a relatively long section extending rearwardly therefrom, the two sections being hinged to each other, means for vertically shifting the forward end of the rear section of the table, and means for angularly adjusting the forward section of the table independently of the adjustment of the rear section including a brace pivotally engaged with the forward section of the table.

12. In a Fourdrinier machine, a breast roll, a sieve table, the table being formed in two sections, one of said sections adjacent the breast roll being relatively short, the other section extending rearward to the suction boxes being relatively long, the two sections being hinged to each other, a beam supporting the rear section of the breast table, the beam being pivoted at its rear end and vertically adjustable at its forward end, and means for angularly adjusting the forward section of the sieve table independently of the adjustment of the rear section including a brace pivotally engaged with the forward section and slidably engaged with said beam.

In testimony whereof I hereunto affix my signature.

LAWRENCE L. LAPEYROUSE.