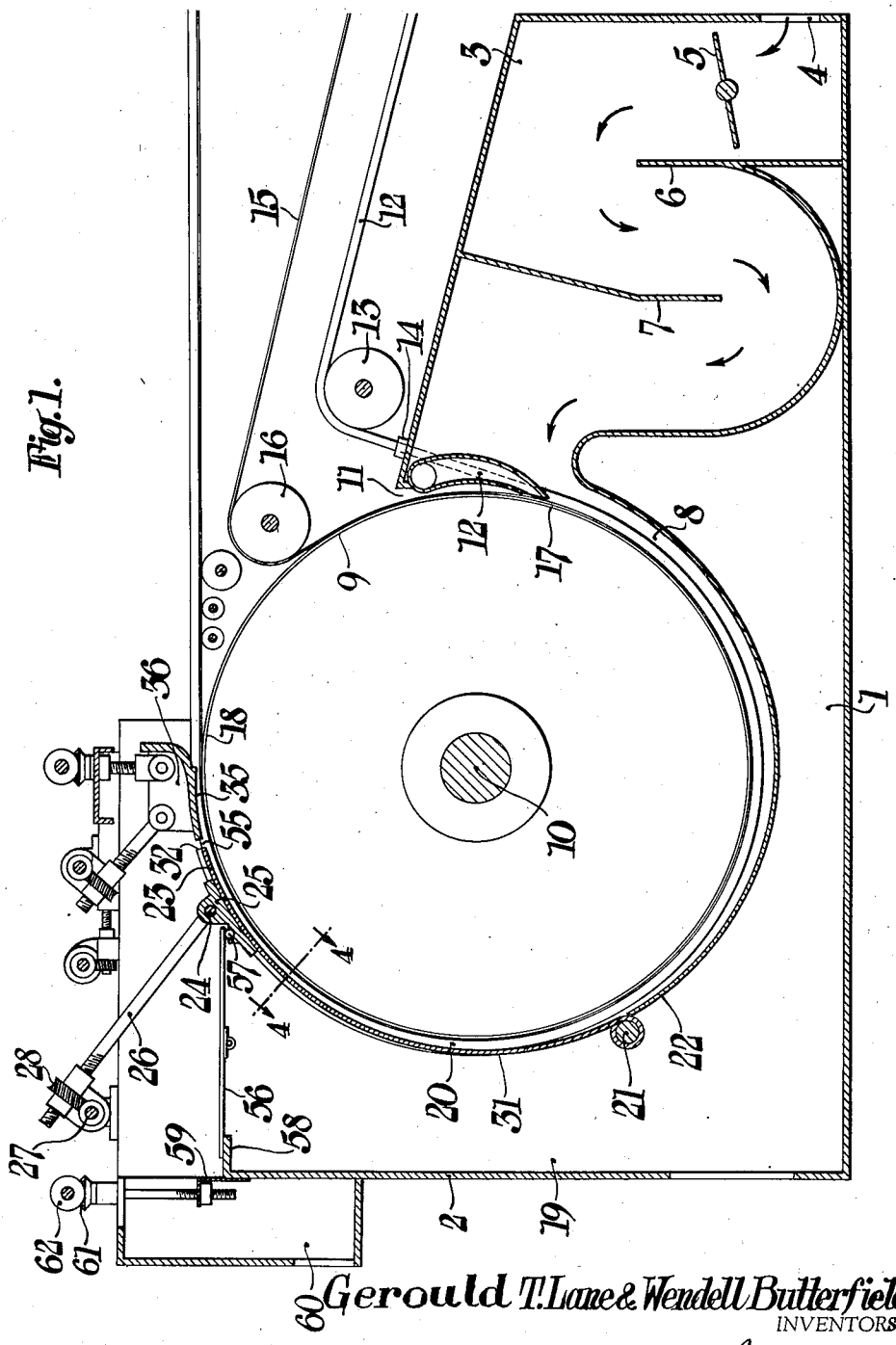
May 7, 1940. G. T. LANE ET AL 2,200,002

PAPER MAKING MACHINE

Filed Jan. 16, 1937 2 Sheets-Sheet 1

Fig. 1.




Gerould T. Lane & Wendell Butterfield,
INVENTORS:

BY Newton M. Perrins
Donald H. Stewart
ATTORNEYS.

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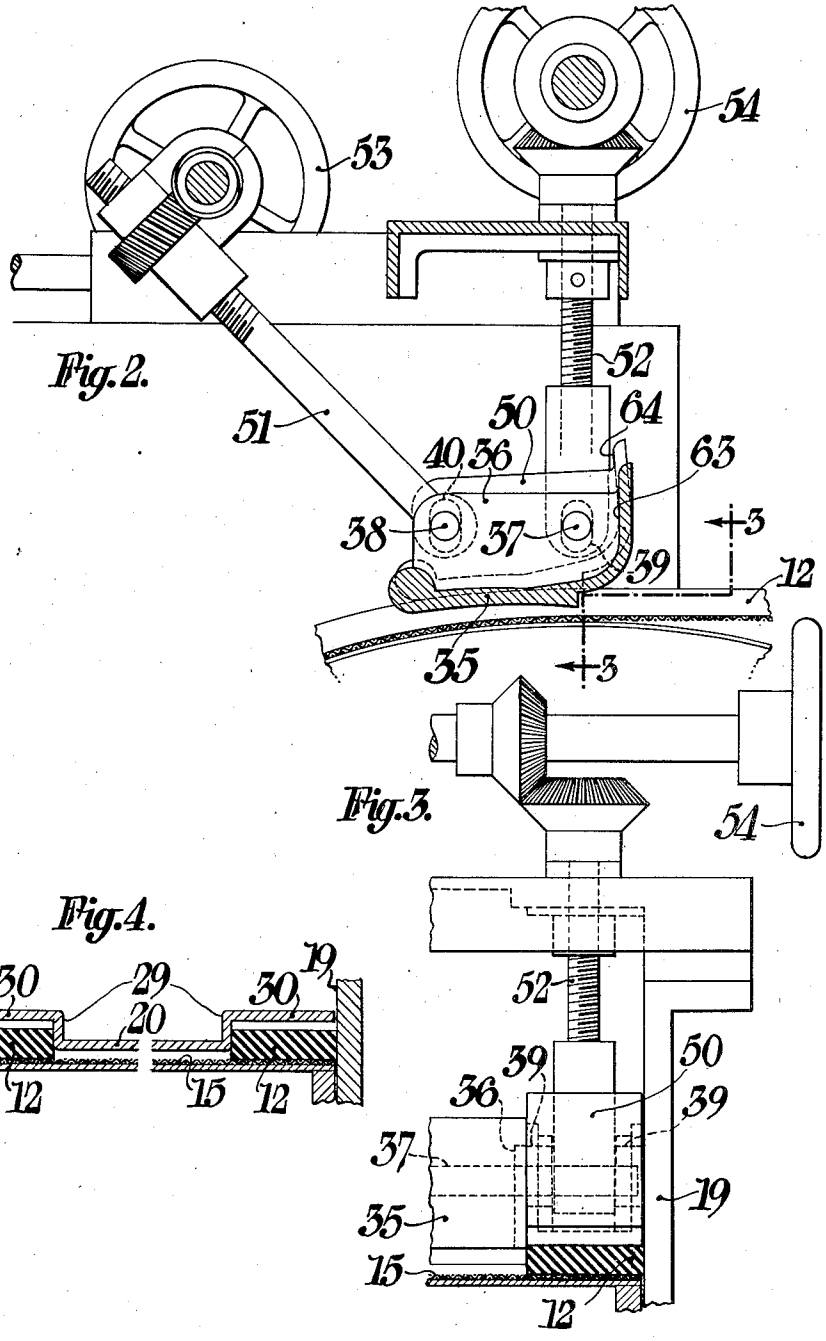
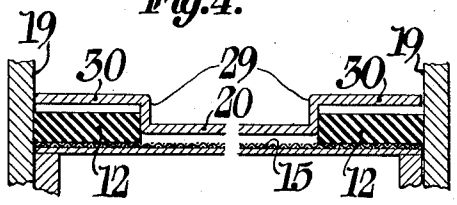



Fig. 2.

Fig. 3.

Fig. 4.




Gerould T. Lane & Wendell Butterfield,
INVENTORS;

BY Newton M. Perrin
Duncan H. Stewart
ATTORNEYS.

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# UNITED STATES PATENT OFFICE

2,200,002

## PAPER MAKING MACHINE

Gerould T. Lane and Wendell Butterfield, Rochester, N. Y., assignors to Eastman Kodak Company, Rochester, N. Y., a corporation of New Jersey

Application January 16, 1937, Serial No. 120,971

10 Claims. (Cl. 92—43)

This invention relates to paper making machines and more particularly to a means for accurately controlling the flow of stuff over a machine employing a making drum and wire.

One object of our invention is to provide a machine in which a relatively high speed can be obtained through the use of an unusually large amount of water. Another object of our invention is to provide a machine in which the amount of stuff passing around the cylinder and flowing out over the top of a making wire moving horizontally away from the cylinder can be easily and accurately controlled. Another object of our invention is to provide a paper making machine with a flow controller which is so arranged that it may be moved between deckle straps to control a layer of stuff of less thickness than the thickness of the deckle straps. Still another object of our invention is to provide a flow controller which operates between the deckle straps and to provide supplementary sections for the flow controller which are adapted to ride on the deckle straps and fill the space between the main flow controller and the sides of the vat, so that, if necessary or desirable, a head may be built up to increase the pressure on the stuff flowing out over the horizontally moving wire, and other objects will appear from the following specification, the novel features being particularly pointed out in the claims at the end thereof.

The machine shown in the present application is an improvement over the machine shown in our Patent No. 2,046,270, Two-Stage gravity flow wet end paper making machine, granted June 30, 1936.

Coming now to the drawings wherein like reference characters denote like parts throughout:

Fig. 1 is a section through the wet end of a paper making machine constructed in accordance with and embodying a preferred form of our invention.

Fig. 2 is an enlarged fragmentary view partially in section of one flow controller showing the adjustments therefor.

Fig. 3 is an enlarged fragmentary view partially in section taken on line 3—3 of Fig. 2.

Fig. 4 is an enlarged fragmentary section taken on line 4—4 of Fig. 1.

Our machine consists broadly of a combination cylinder and wire paper making machine in which stuff is deposited on a wire passing around the cylinder and in which additional stuff is flowed out over the top of the wire leaving the cylinder in a horizontal direction. It is particularly directed to such a machine in which special means is provided for controlling the amount of stuff reaching the wire, particularly that portion of the stuff which passes out horizontally from the cylinder.

In the preferred embodiment of our invention which we have shown in somewhat diagrammatic form in the drawings, the stuff chest 1 is made much higher at the back 2 than it is at the front 3. Stuff may enter the chest through the opening 4, passing the valve 5 over the partition 6 and under the partition 7, and thence into a channel 8 which becomes progressively smaller in cross-section as it continues around the cylinder designated broadly as 9, this cylinder being mounted upon a suitable shaft 10. The stuff is prevented from leaking out through the opening 11 between the edge of the box 1 and the cylinder by means of a controlled leak 12 which is similar in structure to the controlled leak shown in our Patent No. 2,046,271, granted June 30, 1936.

Deckle straps 12 are brought into the machine over suitable guide rollers 13 through a stuffing box 14 so as to overlie a making wire 15 which is brought into the stuff chest over a guide roll 16 and beneath the controlled leak 12. Thus, stuff starts depositing upon the making wire 15 at a point 17 just below the controlled leak 12 and continues to be deposited upon the making wire up to the time the wire leaves the cylinder at 18, a small additional amount of stuff passing out over the making wire from the second flow control, as will now be more fully described.

The two side walls of the stuff chest or vat 19 are preferably spaced apart with considerable accuracy so that the deckle straps 12 may either touch or lie close to the side walls as they pass around the ends of the cylinder, which, as shown in Fig. 4, are spaced a short distance away from these walls. The deckle straps 12, as is customary, control the width of the sheet, and in order to control the thickness of the layer of stuff, we have provided a first flow controller 20 which is preferably hinged at 21 to the end of the vat circle plate 22 in such a manner that the end 23 of the flow controller can be moved to and from the surface of the drum. This may be accomplished by means of the pivot 24 which is carried in a suitable bracket 25 supported by the flow controller and which is pivotally attached to the screw 26 which may be adjusted through the worm 27 and worm-wheel 28. Thus, by turning a suitable hand-wheel (not shown) attached to the shaft 27, the screw 26 can be moved to alter the position of the flow controller 20.

It is desirable to permit this flow controller to

pass between the edges of the deckle straps 12, as indicated in Fig. 4. Consequently, on the edges of the flow controller 20, we form shoulders 29 which are spaced apart a distance equal to the spacing of the inner edges of the deckle straps 12. From these shoulders, flanges 30 extend outwardly a distance sufficient to lie close to the side walls 19 of the vat. The height of the shoulders 29 is progressively greater from a point 31 on the flow controller 20 to the end 32 of the flow controller, at which the height of the shoulders may be conveniently made substantially the same as the height of the deckle straps; although the flow controller 20 is never lowered until it actually touches the making wire 15 because room is always left for the layer of stuff which is to form the sheet of paper.

We also provide a second flow controller 35, this flow controller being of a width equal to the distance between the two deckle straps and having end flanges 36 which extend upwardly therefrom, as best shown in Figs. 2 and 3. From these flanges, shafts 37 and 38 extend outwardly through suitable slots 39 and 40 in the shoes 50 which are similar in cross-section to the flow controller 35 and which are of a width sufficient to fill the space between the ends 36 of the flow controller 35 and the side walls 19 of the vat. These shoes are adapted to ride on the deckles 12, which, being wet, are slippery, so that very little friction occurs through this action. Thus, the flow controller 35 and the shoes 50 form a dam or slice by which a level of stuff above that of the making wire, as it leaves the drum horizontally, can be controlled.

As will be noted from Figs. 2 and 3, the shafts 37 and 38 are supported by screws 51 and 52 which can be turned through a suitable gearing by means of hand-wheels 53 and 54 so as to alter the position of the flow controller 35. Until the ends of the slots 39 and 40 of the shoes are reached, these shoes are not moved when flow controller 35 is moved. However, when the flow controller 35 is moved up so that the bottom of the controller will lie substantially on a level with the top of the deckles 12, the shafts 37 and 38 engage the tops of the slots 39 and 40 so that further movement of hand-wheels 53 and 54 will cause the flow controller and shoes to move together as a unit with their bottom surfaces lying in substantially the same plane. However, we have found that best results can be obtained by having the flow controller 35 between the deckle straps 12 so the normal running positions of the shoes and flow controller are as shown in Fig. 2.

We prefer to leave a space 55 between the first and second flow controllers 20 and 35, since this permits pressure to be relieved and the stuff can flow back through this opening over the plate 56 which lies on the rod 57, carried by flow controller 20, and on a flange 58, carried by the rear wall of the vat. This stuff may then pass over the adjustable slice 59 and out through the exit 60. The height of the slice 59, which can be altered through suitable gears 61 and 62 by a hand-wheel, controls the level of the stuff which may be brought up against the rear sides 63 and 64 of the second flow controller 35 and the shoes 50.

The width of the opening 55 between the flow controllers and the height of the slice 59 control the pressure at which the stuff may pass under the flow controller 35 out over the fibers already laid on the wire as the wire moves horizontally away from the cylinder.

With the above described construction it is possible to control accurately the amount of stuff passing around the cylinder, and particularly passing around that part of the cylinder from which the wire leaves horizontally. This is desirable because it is necessary to control accurately the pressure on the stuff which is flowed over the fibers already laid on the wire as the wire moves horizontally away from the cylinder. For high-grade paper which must be made at high speed, these adjustments are rather critical, but we have found with the flow controllers constructed in accordance with the above description, that the stuff can be controlled with a high degree of accuracy so that "wash-off" lines which have always been troublesome with this type of machine can be completely eliminated.

On account of the unusually large amount of water which can be used with a machine of this type, we have found that by moving the stuff through the first flow controller at a speed substantially the same as that of the making wire at the same point that the fibers can be laid without the usual directional effects, and that a strong fine-grade paper can be readily produced.

We claim:

1. In a paper making machine, the combination with a vat, of a cylinder rotatably mounted therein, a making wire passing into the vat, around the cylinder and extending horizontally therefrom, deckle straps spaced apart and carried on the edges of the making wire, a vat circle extending around a large portion of the cylinder, a flow controller pivotally mounted adjacent the vat circle and including a curved face extending about a considerable portion of the cylinder, said curved flow controller including edge portions of different curvature connected to the curved face of the flow controller by spaced parallel walls spaced in accordance with the spacing of the deckle straps and being adapted to contact therewith, whereby the flow controller may lie partially between the deckle straps to control a relatively thin flow of stuff on the making wire as the same is lead horizontally from the vat.

2. In a paper making machine, the combination with a vat, of a cylinder rotatably mounted therein, a making wire passing into the vat, around the cylinder and extending horizontally therefrom, deckle straps spaced apart and carried on the edges of the making wire, a vat circle extending around a large portion of the cylinder, a flow controller pivotally mounted adjacent the vat circle and including a curved face extending about a considerable portion of the cylinder, said curved flow controller including edge portions of different curvature connected to the curved face of the flow controller by spaced parallel walls of progressively increasing height from the vat circle toward the opposite edge of the curved flow controller, spaced in accordance with the spacing of the deckle straps and being adapted to contact therewith, whereby the flow controller may lie partially between the deckle straps to control a relatively thin flow of stuff on the making wire as the same is lead horizontally from the vat.

3. In a paper making machine, the combination with a vat, of a cylinder rotatably mounted therein, a making wire passing into the vat, around the cylinder and extending horizontally therefrom, deckle straps spaced apart and carried on the edges of the making wire, a vat circle extending around a large portion of the cylinder, a flow controller pivotally mounted adjacent the vat circle and including a curved face extending

about a considerable portion of the cylinder, said curved flow controller including edge portions of different curvature connected to the curved face of the flow controller by spaced parallel walls of progressively increasing height from the vat circle toward the opposite edge of the curved flow controller, spaced in accordance with the spacing of the deckle straps and being adapted to contact therewith, and means for adjusting the flow controller to vary the contact between the curved parallel walls and the deckle straps, whereby the flow controller may lie partially between the deckle straps to control a relatively thin flow of stuff on the making wire as the same is lead horizontally from the vat.

4. In a paper making machine, the combination with a vat, of a cylinder rotatably mounted therein, a making wire passing into the vat, around the cylinder and extending horizontally therefrom, deckle straps spaced apart and carried on the edges of the making wire, a vat circle extending around a large portion of the cylinder, a flow controller pivotally mounted adjacent the vat circle and including a curved face extending about a considerable portion of the cylinder, said curved flow controller including edge portions of a width approximately the same as the width of the deckle straps and of different curvature connected to the curved face of the flow controller by spaced parallel walls of progressively increasing height from the vat circle toward the opposite edge of the curved flow controller, spaced in accordance with the spacing of the deckle straps and being adapted to contact therewith, and means for adjusting the flow controller to vary the contact between the curved parallel walls and the deckle straps, whereby the flow controller may lie partially between the deckle straps to control a relatively thin flow of stuff on the making wire as the same is lead horizontally from the vat.

5. In a paper making machine, the combination with a vat, of a cylinder rotatably mounted therein, a making wire passing into the vat, around the cylinder and extending horizontally therefrom, deckle straps spaced apart and at least partially carried by the making wire supported by the cylinder, means for controlling the layer of stuff upon the making wire between the deckle straps including a pair of spaced flow controlling plates extending across the vat adjacent the cylinder and deckle straps and extending around a major portion of the periphery of the cylinder, each plate including a section of a width to fit between said deckle straps and shoulders constituting parallel walls which may bear against the edges of the deckle straps, whereby stuff in said box may be confined to a relatively thin layer adjacent said cylinder, flow controlling plate sections between the shoulders and vat and overlying the deckle straps and means for relieving pressure on the stuff between the two flow controlling plates.

6. In a paper making machine, the combination with a vat, of a cylinder rotatably mounted therein, a making wire passing into the vat, around the cylinder and extending horizontally therefrom, deckle straps spaced apart and at least partially carried by the making wire supported by the cylinder, means for controlling the layer of stuff upon the making wire between the deckle straps including a flow controller of arcuate form, the width of the flow controller being substantially equal to the distance between the deckle straps and the length being sufficient to encircle a material portion of the cylinder, means to move the flow controller between said straps, supplementary flow controller sections adapted to substantially fill the space between the flow controller and vat and to overlie the deckle straps, means permitting movement of the supplementary sections relative to the flow controller, whereby these sections may ride directly on the deckle straps when the flow controller lies between said straps when said flow controller is in an operative position between the deckle straps.

7. In a paper making machine, the combination with a vat, of a cylinder rotatably mounted therein, a making wire passing into the vat, around the cylinder and extending horizontally therefrom, deckle straps spaced apart and at least partially carried by the making wire supported by the cylinder, means for controlling the layer of stuff upon the making wire between the deckle straps including a flow controller of arcuate form, the length of the flow controller being substantially equal to the distance between the deckle straps, parallel walls carried by the ends of the flow controller, means to move the flow controller between said straps, supplementary flow controller sections having parallel side walls adapted to substantially fill the space between the flow controller and vat and to overlie the deckle straps, said parallel walls of the flow controller and supplemental flow controlling sections lying adjacent each other, means permitting movement of the supplementary sections relative to the flow controller and including lost motion connections between adjacent parallel walls, whereby these sections may ride directly on the deckle straps when the flow controller lies between said straps, and means for raising the flow controller and said sections including said lost motion connection away from said deckle straps.

8. In a paper making machine, the combination with a vat, of a cylinder rotatably mounted therein, a making wire passing into the vat, around the cylinder and extending horizontally therefrom, deckle straps passing at least partially around said making wire supported by the cylinder, and a flow controller of a width substantially equal to the space between the deckle straps and of a length to cover a material portion of the cylinder, supplementary sections movably mounted with respect to said flow controller, parallel walls carried by the flow controller and supplementary sections lying adjacent each other, and cooperating elements on the parallel walls of the flow controller and each supplementary section for raising the sections from the drum with the flow controller, said cooperating elements permitting the supplementary sections to ride freely on the deckle straps when said flow controller is at a predetermined adjustment.

9. In a paper making machine, the combination with a vat, of a cylinder rotatably mounted therein, a making wire passing into the vat, around the cylinder and extending horizontally therefrom, deckle straps passing at least partially around said making wire supported by the cylinder, and a flow controller of a width substantially equal to the space between the deckle straps and of a length to encircle a material part of the cylinder, supplementary sections movably mounted with respect to said flow controller, parallel walls on the flow controller and supplemental sections adjacent each other, and cooperating elements on the flow controller and on a

parallel wall of each supplementary section comprising a pin and slot whereby said sections may ride directly on the deckle straps while connected to the flow controller whereby the flow controller may be adjusted to and from the cylinder and between the deckle straps.

10. In a paper making machine, the combination with a vat, of a cylinder rotatably mounted therein, a making wire passing into the vat, around the cylinder and extending horizontally therefrom, deckle straps passing at least partially around said making wire supported by the cylinder, and a flow controller of a width substantially equal to the space between the deckle straps and of a length to encircle a material portion of the cylinder, supplementary sections movably mounted with respect to said flow controller, parallel walls carried by the flow controller and the supplementary sections adapted to contact, and cooperating elements on the parallel walls of the flow controller and on each supplementary section comprising pins and slots, whereby said supplemental sections may ride directly on the deckle straps and block the flow of stuff from the ends of the flow controller, thereby forcing all the stuff to pass between the deckle strap edges, the flow controller and the drum.

GEROULD T. LANE.
WENDELL BUTTERFIELD.