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FEED CONTROL OF PAPER MAKING MACHINES AND APPARATUS THEREFOR

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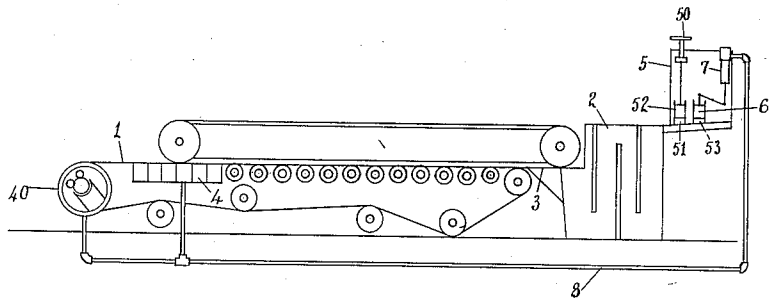


Fig 1

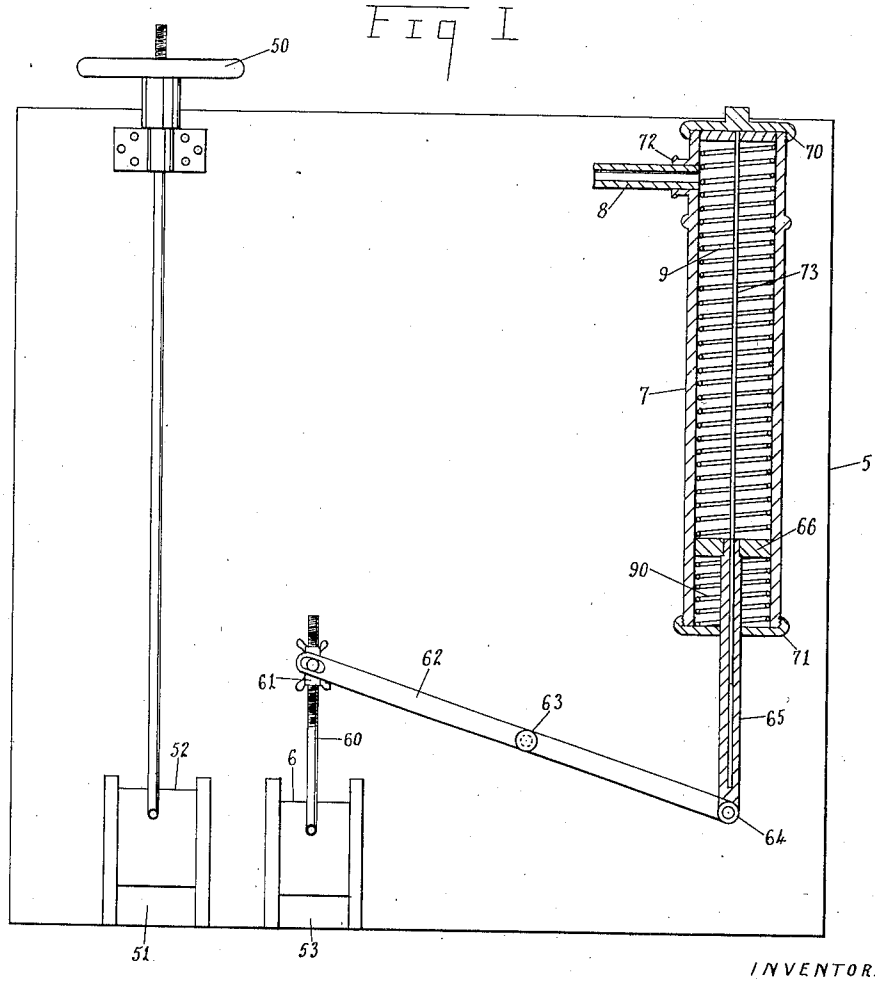


Fig 2

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UNITED STATES PATENT OFFICE.

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FEED CONTROL OF PAPER-MAKING MACHINES AND APPARATUS THEREFOR.

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This invention relates to paper making machines and particularly to a method and means whereby the flow of stock from the flow box is automatically controlled.

The object of the invention is to provide automatic regulation of the feed of stock to the machine in place of the system of manual control now employed for this purpose.

A further object is to provide means whereby the machine will produce a web of paper of more uniform weight and thickness than has hitherto been obtainable.

Further objects will be set forth hereinafter.

When the web of paper carried by the wire, reaches the suction boxes or suction rolls, the amount of vacuum in these devices will vary according to the density of the web passing over them. The heavier or more dense the web, the higher the vacuum will be, and the lighter or less dense the web, the lower the vacuum will be.

By means of this process, this variation of vacuum is employed to control the feed of the stock to the flow box, with the result that when the machine is adjusted to produce a web of a given density or weight, any variation from that density or weight will be immediately corrected, by either increasing or decreasing the flow of stock to the wire.

By this means the web of paper produced, will be maintained at a uniform weight or density automatically, and the operation of the machine will be more efficient and not dependent on the skill of the operator through manual adjustment.

In order to carry out this method of control and regulation in addition to the outlet of stock feed to the flow box with its manual adjustment, a second outlet is provided with a gate controlled by a pressure operated device.

This pressure operated device is connected by a pipe to the suction boxes or suction rolls, and is adapted to open or close the gate of the second outlet as the vacuum in the boxes or rolls varies.

In the operation of this method, the second outlet is adjusted to allow a normal flow of stock to the wire, and the adjustment of the complete flow is made by setting the gate of the main outlet by hand. When this adjustment has been made, and the machine is in operation, the flow to the wire will remain constant and regular until a change in the vacuum of the suction boxes or suction rolls occurs.

This change will at once operate the second gate and will adjust the flow of stock to the amount necessary to provide a web of the required weight or density.

In order to fully describe the invention and set forth means for carrying out the process, reference is made to the accompanying drawings, in which

Fig. 1 is a diagram of the wet end of a paper making machine, showing the position and connections of the means to be employed.

Fig. 2 is a detail vertical section of a gate controlling mechanism.

In the diagrammatic view of the wet end of a paper making machine as shown in Fig. 1, the flow box 2, feeds the stock to the apron or lip board 3, which then delivers it to the wire 1.

By varying the amount of stock fed to the flow box 2, the feed to the wire 1, will be correspondingly varied.

A stock box 5, arranged to feed into the flow box 2, has two outlets 51, and 53, with gates 52, and 6, which control the flow of stock into the flow box 2.

One of these outlets 51, has a gate 52, controlled by a hand wheel 50. The other outlet 53, has a gate 6, which is operated by a pressure valve mechanism in the cylinder 7, which is connected by the pipe 8, with the suction boxes 4, or the suction rolls 40.

The form of the pressure valve mechanism here shown consists of a cylinder 7, bored to receive a plunger 66 mounted on a tube 65, which travels through the center of the lower cap 71. A guide rod 73, secured to the upper cap 70, slides through the plunger 66, and in the tube 65.

A long coil spring 9, in the cylinder 7, above the plunger 66, and a short coil spring 90, below the plunger 66, retains its balance at its normal position.

The inlet 72, at the upper end of the cylinder 7, connects with the vacuum pipe 8, leading to either the suction boxes 4, or the suction rolls 40, in such a manner that the vacuum in the upper end of the cylinder 7, above the plunger 66, will be always equal to that in the suction boxes 4, or the suction roll 40.

Pivoted to the lower closed end 64, of the pipe 65, is a lever 62, mounted on a pin 63,

and coupled at the other end to an adjustable swivel 61, on a rod 60, attached to the gate 6, which it operates. The swivel 61, on the rod 60, by means of thumb nuts or equivalent means permits the adjustment of the gate 6, to regulate the opening 53.

The operation of the invention is as follows:—

The regulator gate 6, is set by means of the swivel 61, to allow a certain normal flow to the flow box, and the main feed gate is then adjusted by the hand wheel, to give a combined flow of the amount of stock required for the particular weight and density of the paper to be produced.

If the web of paper passing over the suction boxes or suction roll should become thinner or lighter than is desired and for which the feed has been adjusted, the vacuum in the suction boxes or suction roll will drop, and this drop will be immediately communicated to the cylinder above the plunger.

The long spring normally holds the plunger against the vacuum in the upper part of the cylinder. But when the vacuum in this part of the cylinder is reduced, the spring will exert a greater pressure on the plunger and will therefore force it downwards. This downward movement will raise the gate of the second outlet and will increase the flow of stock to the flow box and also to the wire, and thus increase the weight and density of the web of paper being produced.

Conversely, if the web of paper passing over the suction boxes or suction roll should become thicker or heavier than that for which the feed was adjusted, the vacuum will increase in the suction boxes or suction roll, and this increase of suction will be communicated to the upper part of the cylinder.

The effect of an increase of vacuum will be to raise the plunger against the tension of the spring and thereby to lower the gate of the second outlet. The lowering of this gate will cut off the flow of stock to the flow box and thereby reduce the rate of feed to the wire, so that the weight and density of the paper being produced will be that which is required.

The quick action of this method of control will prevent unevenness and variation of the weight and density in the output of the machine and relieve the operator of readjustment by hand.

By such a method of feed control, the web of paper will be produced of a uniform quality automatically, and any tendency to variation from the required weight and density will be immediately counteracted.

The result of an automatic control of this character will be the production of paper of improved quality and of uniform weight and thickness.

Increased production will also follow from the adoption of this method, by eliminating waste and by avoiding delay.

The application of this method of feed regulation by means of the variation in the vacuum of the suction devices, can be readily carried out by simple apparatus differing from that shown and described, and the specific example herein set forth is chosen merely as a practical form of applying the method and not in any way as a limitation of the scope of the invention.

What I claim is:—

1. In the process of paper making, the step of controlling the feed of stock to the machine, by means of the variation of vacuum in the suction devices.

2. In the process of paper making, the step of regulating the flow of stock to the machine, by means of a feed control operated by the variation of vacuum in the suction devices.

3. In the process of paper making, regulating the thickness of the web by the variation of the feed of stock to the machine, controlled by the vacuum of the suction devices.

4. In a paper making machine, the combination of a flow box with a feed regulator controlled by the variation of the vacuum in the suction devices of the machine.

5. In a paper making machine, comprising a flow box, a wire belt and suction devices, means to control the feed of stock to the flow box, by the variation of the vacuum in the suction devices.

6. In a paper making machine, comprising a flow box, a wire belt and suction devices, the combination of a hand regulated feed control with a feed control operated by the variation of the vacuum in the suction devices.

7. In a paper making machine, an automatic feed control operated by the variation of the vacuum in the suction devices of the machine.

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