

Jan. 6, 1942.

M. J. A. McGUIRE ET AL
SLICE FOR PAPERMAKING MACHINES

2,268,840

Filed May 6, 1939

2 Sheets-Sheet 1

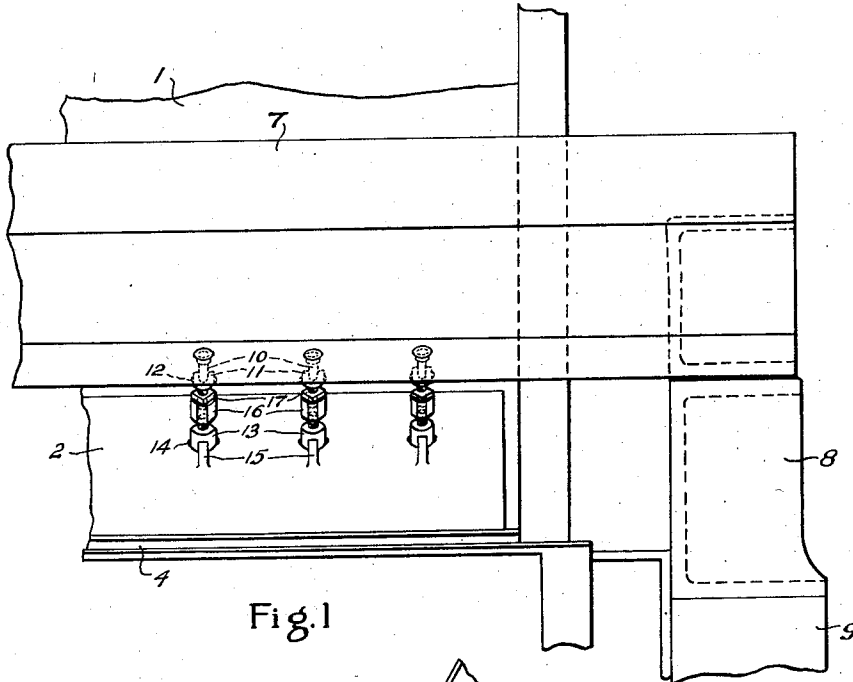


Fig. 1

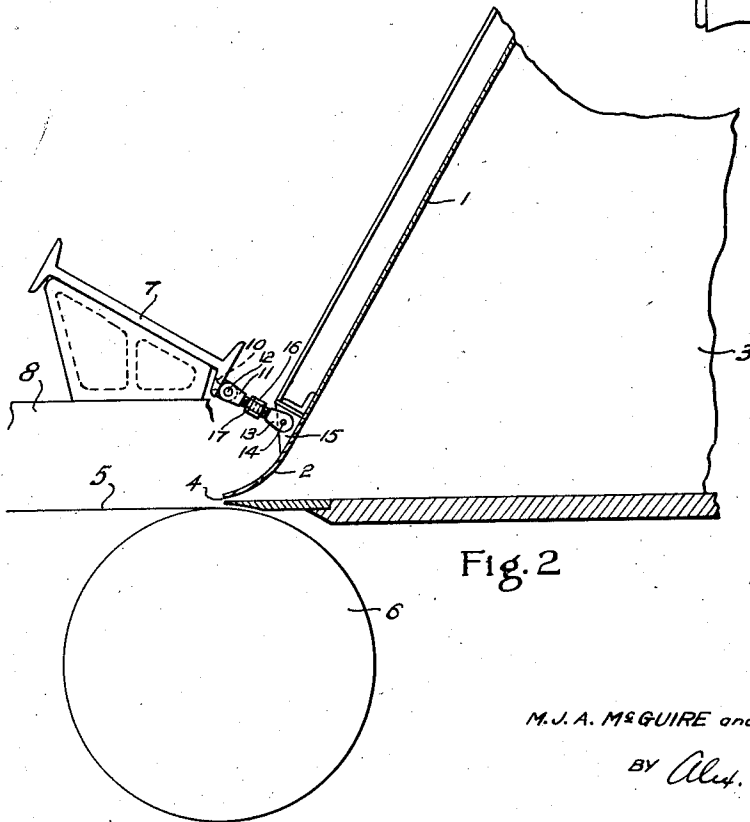


Fig. 2

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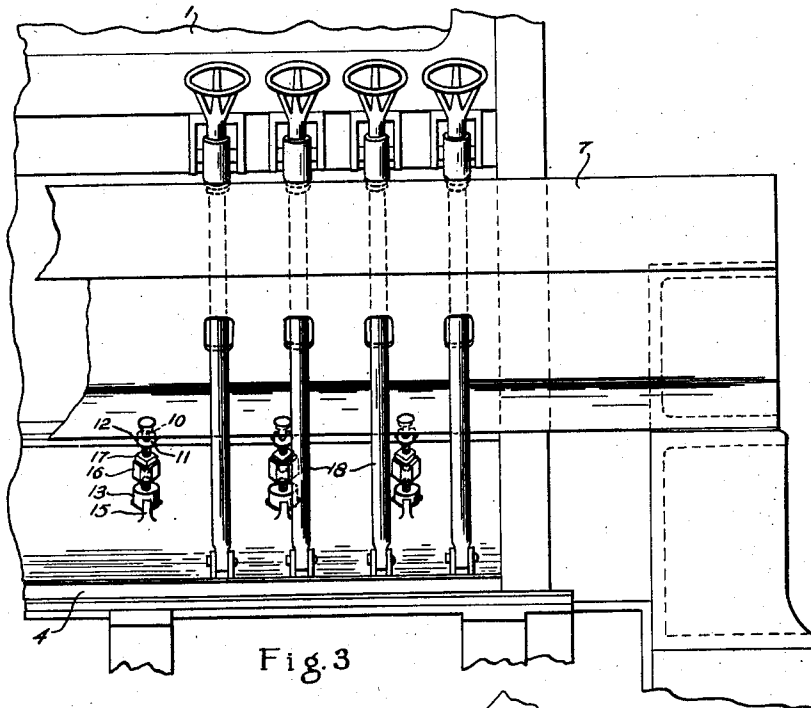


Fig. 3

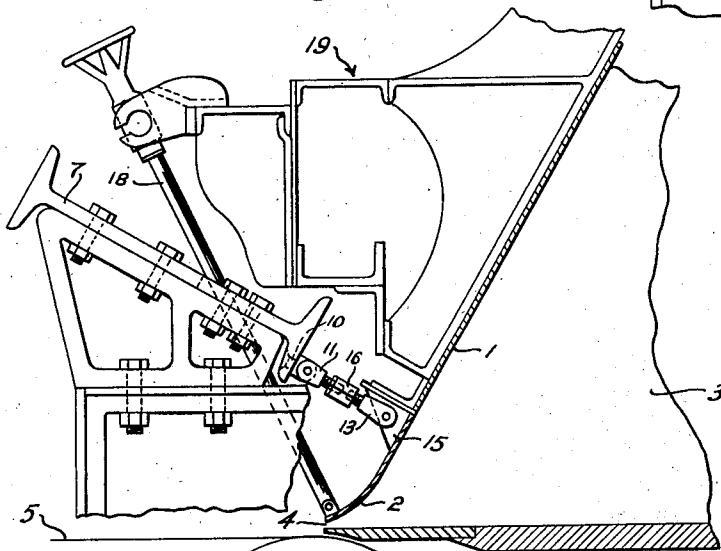
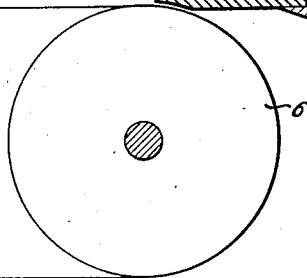


Fig. 4



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UNITED STATES PATENT OFFICE

2,268,840

SLICE FOR PAPERMAKING MACHINES

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Application May 6, 1939, Serial No. 272,072
In Canada February 15, 1939

5 Claims. (Cl. 92-44)

This invention relates to paper making machines of the Fourdrinier type and more particularly to a method and means of maintaining uniformity in the pulp sheet delivered at various speeds to the wire in such machines.

In present day machines of the type referred to, pulp sheets formed at high speeds are frequently defective in that they contain longitudinal areas of excessive thickness and/or thinness. Such defects are usually caused by a high static head in the head box resulting in a high pressure on and a consequent bulging of the slice which in turn causes distortion of the slice lip. Currents of pulp flow are frequently set up in the head box and these influence the uniformity of pulp sheet formation. Moreover, the normal vibration of the slice during operation of the machine at high speeds results in variations in the pulp sheet thickness. The presence of thick and thin streaks in the pulp sheet results in an incomplete and irregular extraction of water therefrom by the vacuum means. The relatively rapid passage of water and air through the thin portions prevents the water in the thick portions from being completely extracted, and when the web is transferred from the wire to the felt it is subject to failure at such thick portions. Moreover, the uneven moisture content of the web results in an uneven drying thereof and uneven shrinkage. In some cases the latter is sufficient to pull the sheet apart and in other cases to cause the lesser shrunk portions to fold over on themselves and these folds are cut when passing through the calendars. These defects result in loss due to higher costs for drying steam, loss of time due to breakage and production of paper which is below standard in quality and finish.

Various means have heretofore been suggested and used for overcoming these defects but such means have the disadvantage that they are subject to definite limitations in the formation speed of the pulp sheet. Moreover, such means are usually mounted on or connected to the slice itself and thus do not take care of defects caused by vibration of the slice.

The object of the present invention is to provide a method and means for maintaining a uniform thickness of pulp sheet regardless of operating conditions of the machine.

The invention will be described with reference to the accompanying drawings, in which,

Figure 1 is a partial side elevation of a machine embodying the invention,

Figure 2 is a partial sectional end elevation, and

Figures 3 and 4 are corresponding views including the usual lip adjusting device.

In the drawings, 1 represents the upper main plane portion of an inclined slice constituting the front wall of a head box 3 containing pulp stock, 2 a lip member forming the lower portion

of the slice, and 4 an orifice between the lip and apron being an extension of the floor of the head box and through which the pulp is delivered onto the wire 5 on the breast roll 6, all of which are conventional parts of a paper making machine.

While the lip portion of the slice is shown in the drawings as curved, it will be understood that the invention is equally applicable to use with a slice the lip portion of which is not curved or flared outwardly as shown. Conventional means for specifically adjusting the edge portion of the lip may be provided as shown in Figures 3 and 4 and comprises a plurality of adjustable rods 18 supported in a framework 19 carried by the slice.

In accordance with the invention, an I-beam or the like 7 is mounted, independently of the slice, on supports 8 carried by the main frame 9 of the paper machine on either side of the wire. As shown, the beam 7 extends transversely of the machine above the wire and a short distance in front of the slice, the beam being angularly positioned so that its flange faces are parallel to the inclined slice face.

A series of independently adjustable devices are provided between the slice and the adjacent flange of the I-beam. Such adjustable devices or connections may take various forms as, for instance, a wedge or cam member or a hydraulic jack or as in the preferred form shown, an eye bolt 10 is mounted on the I-beam flange and a bolt 11 having a forked head is fitted thereto by means of pin 12. A second forked-head bolt 13 is fitted by means of pin 14 to a web, gusset or the like 15 on the slice adjacent the point where the lip begins to curve outwardly. One of the bolts 11 and 13 has a right hand thread and the other a left hand thread. An elongated nut 16 having threads at either end corresponding to the threads of bolts 11 and 13 forms a connection between such bolts. A lock nut 17 may also be provided.

In operation, when distortions occur in the orifice 4, one or more of the nuts 16, as required, are adjusted to move the slice inwardly or outwardly at the points of connection an amount sufficient to remove the distortions in the orifice.

It will be observed that the forces exerted by the adjustable devices of the present invention are applied along a line spaced above the lower edge of the slice and lying within the zone of maximum static head pressure of pulp stock on the slice. The latter zone comprises a band extending transversely of the slice immediately above the point at which the static head pressure on the slice is somewhat reduced by virtue of the outward flow of the pulp through the orifice 4. The band may vary somewhat with size of slice and depth of pulp stock. As shown the line of application of the adjusting forces is also in the plane of the main portion 1 and the forces are

applied in a direction perpendicular to such plane. In the form shown, this line of application is adjacent the top of the lip of the slice. Below the zone of maximum static head pressure, the pulp has begun to flow towards the orifice and the relieved pressure in this area does not have the same distorting effect on the lip. Thus, the forces are applied within the proper zone for an effective and accurate adjustment of the slice. If adjustment of the slice were made a substantial distance above this zone, there would be a possibility of distortion in the slice below the adjustment line which could not be overcome. The usual adjustment of the slice lip by means of the rods 18 may be made to control minor variations in the pulp flow.

Distortions caused by operating vibrations in the slice are also eliminated by the adjustable devices since they are carried by a member which is supported on the main frame entirely independent of the slice.

There is thus provided a method and means for accurately maintaining the delivery to the wire of a pulp sheet of uniform thickness regardless of operating conditions of the machine.

We claim:

1. In a paper-making machine having an apron, a head box containing pulp stock and a wire, said head box having its front wall constituting a slice and a pulp stock orifice between the lower edge of said front wall and said apron whereby a pulp sheet may be delivered through the orifice onto the wire, means for maintaining uniform thickness in said sheet comprising a beam extending transversely of said front wall in parallel relation thereto, supports for said front wall extending therefrom to said beam, said supports being anchored to the front wall at points spaced above the lower marginal portion thereof adjacent the top of the lip of the slice and lying within the zone of maximum static head pressure of pulp stock on the wall, and means for independently adjusting the length of each of said supports to apply adjusting forces to said front wall at said points and thereby maintain said lower edge a uniform distance from said apron.

2. In a paper-making machine having an apron, a head box containing pulp stock and a wire, said head box having its front wall constituting a slice and the lower edge portion of the front wall constituting a slice lip and a pulp stock orifice between the lower edge of the front wall and said apron whereby a pulp sheet may be delivered through the orifice onto the wire, means for maintaining uniform thickness in said sheet comprising a rigid member extending in adjoining relation to said front wall, supports for said front wall extending therefrom to said rigid member, said supports being anchored to the front wall at points spaced above the lower marginal portion thereof adjacent the top of the slice lip and lying within the zone of maximum static head pressure of pulp stock on the wall, and means for independently adjusting the length of each of said supports to apply adjusting forces to said front wall at said points and thereby maintain said lower edge a uniform distance from said apron.

3. In a paper-making machine having an

apron, a head box containing pulp stock and a wire, said head box having its front wall constituting a slice, the lower edge portion of said front wall being outwardly flared and constituting a slice lip, and a pulp stock orifice between the lower edge of the front wall and said apron whereby a pulp sheet may be delivered through the orifice onto the wire, means for maintaining uniform thickness in said sheet comprising a rigid member extending in adjoining relation to said front wall, supports for said front wall extending therefrom to said rigid member, said supports being anchored to the front wall at points spaced above the lower marginal portion thereof adjacent the top of the slice lip and lying within the zone of maximum static head pressure of pulp stock on the wall, and means for independently adjusting the length of each of said supports to apply adjusting forces to said front wall at said points and thereby maintain said lower edge a uniform distance from said apron.

4. In a paper-making machine having an apron, a head box containing pulp stock and a wire, said head box having its front wall constituting a slice and the lower edge portion of the front wall constituting a slice lip and a pulp stock orifice between the lower edge of the front wall and said apron whereby a pulp sheet may be delivered through the orifice onto the wire, lip-engaging means for adjusting the depth of said orifice, and means for maintaining uniform thickness in said sheet comprising a rigid member extending in adjoining relation to said front wall, supports for said front wall extending therefrom to said rigid member, said supports being anchored to the front wall at points spaced above the lower marginal portion thereof adjacent the top of the slice lip and lying within the zone of maximum static head pressure of pulp stock on the wall, and means for independently adjusting the length of each of said supports to apply adjusting forces to said front wall at said points and thereby maintain said lower edge a uniform distance from said apron.

5. In a paper-making machine having an apron, a head box containing pulp stock and a wire, said head box having its front wall constituting a slice, the lower edge portion of said front wall being outwardly flared and constituting a slice lip, and a pulp stock orifice between the lower edge of the front wall and said apron whereby a pulp sheet may be delivered through the orifice onto the wire, lip-engaging means for adjusting the depth of said orifice, and means for maintaining uniform thickness in said sheet comprising a rigid member extending in adjoining relation to said front wall, supports for said front wall extending therefrom to said rigid member, said supports being anchored to the front wall at points spaced above the lower marginal portion thereof adjacent the top of the slice lip and lying within the zone of maximum static head pressure of pulp stock on the wall, and means for independently adjusting the length of each of said supports to apply adjusting forces to said front wall at said points and thereby maintain said lower edge a uniform distance from said apron.

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