

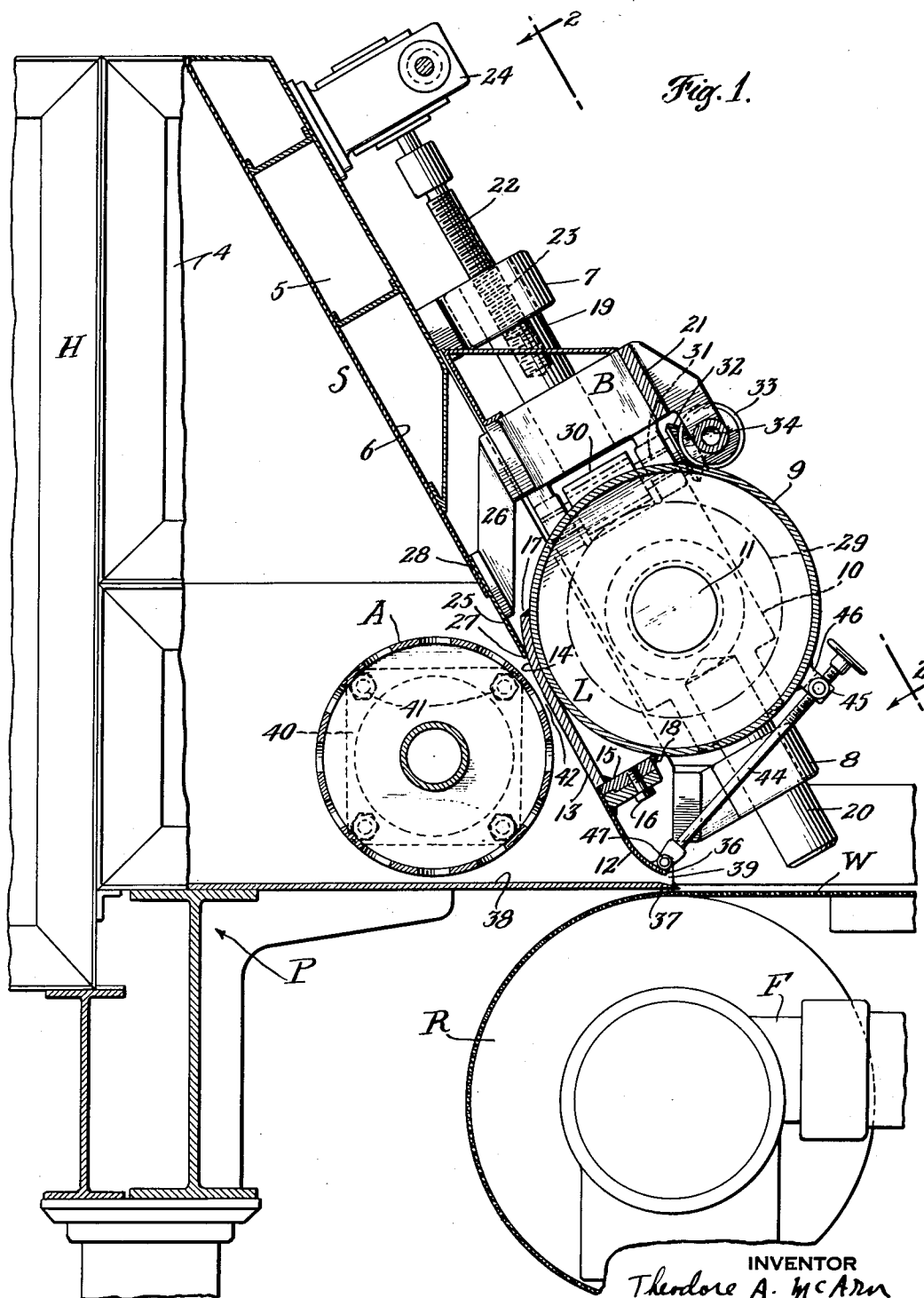
June 19, 1956

T. A. McARN
ADJUSTABLE SLICE

2,750,854

Filed March 26, 1953

3 Sheets-Sheet 1



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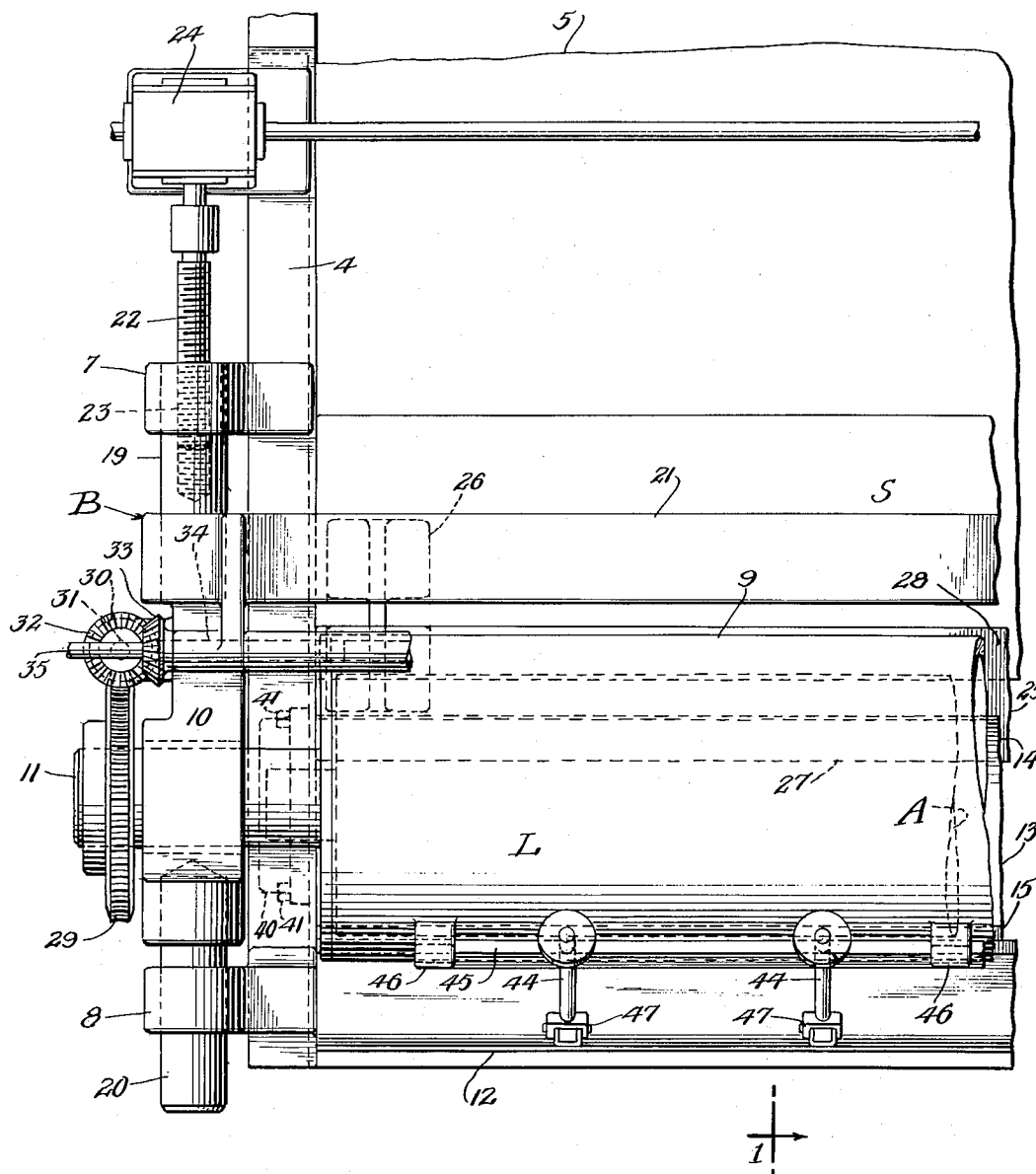
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Fig. 2.



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ADJUSTABLE SLICE

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4 Claims. (Cl. 92—44)

This invention relates to improvements in paper stock delivering apparatus for delivering the stock to a paper making machine, for example, to the wire of a Fourdrinier or analogous machine.

In this art such apparatus is known as a "slice" and the slice extends across the front of a head box containing the dilute stock. The slice is positioned to deliver the stock onto the wire at the breast roll of the Fourdrinier.

The slice apparatus includes a stock agitating roll located in close proximity to the slice lip and the bottom slice plate (referred to hereinafter as plate or apron 38) in a predetermined dimensional relationship.

This relationship is to compel the paper stock to pass through the agitating roll to break up flocculations, and eliminate the possibility of any appreciable amount of stock by-passing the roll.

It would be possible, with the agitating roll mounted in eccentric bearing housings, to keep a close relationship with the slice lip when same is moved, but the relationship with the bottom slice plate would change. With the arrangement covered in this application, both relationships are held when the slice lip is moved.

It is just as important that the agitating roll be held close to this member as it is to hold it close to the slice lip. The usual eccentric mounting of the agitating roll housing makes it impossible to hold both when the slice lip is moved. The main purpose of this application is to hold both when the slice lip is moved as described.

In order to alter the position and size of the stock discharge opening to take care of different grades of stock and to ensure correct paper formation, the slice is made adjustable. However, in making adjustments it is essential, in order to maintain proper stock flow, that the agitating roll and slice plate and lip remain substantially in the predetermined dimensional relationship in all positions of adjustment.

To the accomplishment of this end it has been customary heretofore to mount the slice lip for back and forth movement and to mount the agitating roll for movement toward and away from the slice lip, by adjustment independent of the adjustment of the slice lip, to provide the proper dimensional relation of roll to slice lip as adjustments of the lip are made. The adjustment of the roll has been accomplished by mounting the bearings of the roll in eccentrics or slides. This is not only expensive from the standpoint of bearing structure, but it also presents difficulties from leakage, thus necessitating the employment of special sealing means.

Such prior practice is very time consuming, first because of the necessity of making two separate adjustments, i. e., adjustment of the slice, and adjustment of the agitating roll, and, secondly, because the machine must be shut down while making the adjustments, with consequent loss of production.

The primary object of the present invention is the provision of an adjustable slice of such character that the given

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dimensional relationship of the agitating roll is substantially maintained in all positions of adjustment of the slice by merely adjusting the slice.

Another object of the invention is the provision of adjustable slice apparatus including a stock agitating roll mounted in fixed bearings in given dimensional relationship to the slice front and means for adjusting the slice front to alter the stock discharge opening thereof while substantially maintaining the given dimensional relationship between slice and agitating roll substantially constant.

Another object of the invention is the provision of adjustable slice apparatus including a pivotally mounted lip portion adapted substantially to maintain a given dimensional relationship between the lip portion and an associated stock agitating roll in all positions of adjustment of the lip portion.

Another object of the invention is the provision of adjustable slice apparatus in association with the wire of a Fourdrinier including a pivoted slice lip portion mounted for bodily movement toward and away from the wires of the Fourdrinier.

A further object of the invention is the provision of a slice for use in association with the wire of a paper making machine which is adjustable to alter the position and size of the stock discharge opening as required for different grades of stock, and to ensure correct paper formation, and which is adjustable to provide ample clearance between the slice lip and the wire for cleaning purposes.

A further object is the provision of a slice of the character described having a slice lip portion mounted for pivotal adjustment in a support which is adjustable in a direction toward and away from the wire of a paper making machine.

A further object is the provision of a slice for paper making machines having an inclined front and a correspondingly inclined lip portion mounted on the front for up and down and pivotal adjustment.

A more specific object of my invention is the provision of an adjustable slice of the character described having a supporting frame mounted for up and down movement toward and away from the wire of an associated paper making machine and a slice lip portion rotatably mounted in the movable supporting frame.

How the foregoing, together with such other objects and advantages as may hereinafter appear or are incident to the invention, are realized is illustrated in the accompanying drawings, in which—

Figure 1 is a fragmentary sectional elevational view of an adjustable slice constructed in accordance with my invention, the section being taken substantially on the line 1—1 of Figure 2.

Figure 2 is a fragmentary front view of the device taken as indicated by the line 2—2 of Figure 1; and

Figure 3 is a sectional elevational view similar to Figure 1 but showing the device in another position.

Referring to the drawings, the adjustable slice S of the invention is shown associated with the wire W carried by the breast roll R of a Fourdrinier, the framework of which is indicated at F.

The fixed portion of the slice is suitably supported at P and is secured to the head box H containing the paper stock.

The slice comprises in general fixed side wall structure 4, fixed front wall structure 5 preferably inclined and having an inner plate 6, a perforated agitator roll A, a slice lip portion indicated as a whole by the reference letter L and a supporting frame B mounted for up and down movement in brackets 7 and 8 secured to the fixed structure of the slice.

The slice lip portion L comprises a cylindrical structural

member 9 rotatably mounted in the bearing blocks 10 of the frame B by means of shaft extensions 11, a flexible slice lip 12, and a lip extension plate 13 secured to the cylindrical member 9.

The plate 13 has its upper portion 14 curved to conform with the curvature of the cylindrical member 9 and has a lower flange 15 to which the flexible slice lip 12 is detachably secured by means of bolts 16. The plate 13 is secured to the cylindrical member 9 at the curved portion 14 and at the flange 15 as by means of welding indicated at 17 and 18.

The slidable supporting frame B is provided with the bearing blocks 10 above mentioned and with aligned upper and lower guide members 19 and 20 respectively having sliding fit in the brackets 7 and 8 of the fixed structure of the slice.

Figure 2 illustrates the portion of the supporting frame B which is located at the left hand side of the slice, but it is to be understood that the construction at the right hand side of the slice is the same and that these portions may be interconnected as by means of a cross brace 21.

Up and down movement is imparted to the frame B, preferably at both the left and right hand portions thereof, by means of rotatable screws 22 having screw threaded engagement at 23 in the upper guide members 19 of the frame.

The screws 22 are rotated by suitable power drive means such as the motor driven reduction gear units 24 mounted on the framework of the slice.

In order to maintain a seal between the fixed slice front 5 and the movable lip portion of the slice in the up and down adjustments thereof, a seal plate 25 is secured to the movable supporting frame B by brackets 26. This seal plate engages the curved portion 14 of the plate 13 at 27 and well overlaps the inner plate 6 of the front slice wall at 28.

Rotative motion is imparted to the slice lip by means of gear drive, preferably provided at both ends of the slice lip, comprising a worm wheel 29 secured on the cylinder shaft 11, a worm 30 rotatably mounted in the supporting frame B by shaft 31, a bevel gear 32 secured on the shaft 31 and a meshing bevel gear 33 secured on a cross shaft 34. The gearing is preferably power driven as by a motor suitably connected to extension 35 of the shaft 34.

In Figure 1 the slice lip is shown adjusted to a position in which the plate 13 is aligned with the inner plate 6 of the front wall of the slice and in which the tip portion 36 of the flexible slice lip 12 lies substantially at the front edge 37 of the bottom plate or apron 38 of the slice. The height of the slice opening 39 is adjusted by means of the screws 22 to suit the particular grade of stock being run and to give proper paper formation. In this connection it has been found in actual practice that an opening of seven eighths of an inch in height is just about the maximum height employed in delivering the stock to the wire.

The perforated agitating roll A is rotatably mounted in bearings 40 fixedly secured by means of bolts 41 to the side framing of the slice. The bearings are so positioned that the agitating roll is in close proximity to the lip plate 13 in a given or predetermined dimensional relationship. In actual practice it has been found that by having a space 42 of approximately one-half inch between the roll and the plate this prevents flocculation or the formation of lumps in the stock and ensures that the stock delivered to the slice opening will pass through it in even flow.

In Figure 3 the slice lip is shown in full lines adjusted to a point well above the apron 38 and also rotated in the bearing blocks 10 to move the lip forwardly of the front edge 37 of the apron, and it is to be noted that the space 42 between the agitating roll A and the plate 13 has been maintained approximately the same as in the adjustment of Figure 1. Thus it will be seen that even in such an extreme adjustment of the slice the dimensional relationship between the roll and plate is not substantially altered.

In Figure 3 another position of adjustment of the slice is indicated in dot and dash lines at 43, in which position the slice lip in the angular position shown in full lines has been lowered by means of the screws 22 closer to the wire W. It will be noted that in this position of adjustment the tip of the lip is positioned well forward of the front edge 37 of the apron 38.

It is to be observed that the height of the discharge opening can be increased with the lip in the angular position of Figure 1 by merely rotating the screws 22, or the height can be increased and the tip moved forwardly of the apron by merely rotating the worm gearing to change the angular position of the lip, or the height of the opening and the forward position of the lip can be altered by operating both the screws 22 and the worm gearing, and all without substantially altering the dimensional relationship of the agitating roll and lip extension plate.

It is also pointed out that by rotating the screws 22 the slice lip portion can be raised upwardly a distance to provide ample clearance between the slice lip and wire for cleaning purposes, as shown in full lines in Figure 3.

The tip of the flexible slice lip 12 may be adjusted along the length thereof to ensure proper formation for the entire width of the slice by means of adjustable screw rods 44 located at spaced intervals along the length of the slice. These screw rods are threaded in swivel bar 45 mounted in lugs 46 on the cylindrical member 9 and are connected to the flexible slice lip at 47. The flexible slice lip is replaceable in the event of wear or it may be replaced by one of different shape or style as desired.

It will be seen from the foregoing that I have provided a simple and effective adjustable slice having capacity for a large range of adjustments and one in which the adjustments can be made without substantially altering the position of the associated agitating roll to maintain a given relation between the roll and slice as has been necessary heretofore. Thus by simple adjustment of the slice this important relationship is essentially maintained and the adjustments can be readily made in a very short time, thus avoiding lengthy shut downs with consequent loss of production.

The member 9 being in tubular form, is light, yet rigid. I claim:

1. An adjustable slice of the character described for the head box of a paper making machine comprising an apron forming a lower slice lip, a front wall mounted in fixed rearwardly inclined relation with said apron and having the lower edge thereof spaced above said apron to leave a gap therebetween extending across the width of the head box, a frame supported on the lower portion of said inclined wall for up and down adjusting movement along said inclined wall toward and away from said apron, a structural member carried by said frame for rotational movement thereon about a horizontal axis parallel with said wall and for movement with said frame with respect to said apron, a slice plate mounted on said structural member for rotation therewith in position to extend across said gap and including an upper slice lip depending from the lower edge thereof, means for effecting adjusting movement of said frame on said wall to vary the effective slice opening below said upper slice lip, means for rotating said structural member on said frame to vary the horizontal position of said upper slice lip, a sealing strip mounted on the lower edge of said frame and depending therefrom along the upper edge of said gap, a cylindrically curved surface portion on said slice plate located substantially coaxially with said axis of said structural member for maintained sealing engagement with said sealing strip throughout the rotational movements of said structural member, and said curved surface portion extending substantially tangent to the remainder of said slice plate and having a relatively large radius to provide for smooth flow of the stock therepast to said slice opening.

2. An adjustable slice of the character described for

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the head box of a paper making machine comprising an apron forming a lower slice lip, a front wall mounted in fixed rearwardly inclined relation with said apron and having the lower edge thereof spaced above said apron to leave a gap therebetween extending across the width of the head box, a frame supported on the lower portion of said inclined wall for up and down adjusting movement along said inclined wall toward and away from said apron, a structural member carried by said frame for rotational movement thereon about a horizontal axis parallel with said wall and for movement with said frame with respect to said apron, a slice plate mounted on said structural member for rotation therewith in position to extend across said gap and including an upper slice lip depending from the lower edge thereof, an agitating roll mounted in closely spaced relation behind said slice plate and in at least partially underlying relation with the lower edge of said wall, means for effecting adjusting movement of said frame on said wall to vary the effective slice opening below said upper slice lip while maintaining said spaced relation of said slice plate and said roll, means for rotating said structural member to vary the horizontal position of said upper slice lip, a cylindrically curved surface portion of substantial radius on said slice plate located substantially coaxially with said axis of said structural member and extending substantially tangent to the remainder of said slice plate and to the projection of said inclined wall to maintain an effectively constant spaced relation of said surface portion and said roll throughout the rotational movements of said structural member in each adjusted position of said frame while providing for smooth flow of the stock therepast to said slice opening, and means maintaining a seal between said structural member and the lower edge of said wall.

3. An adjustable slice of the character described for the head box of a paper making machine comprising an apron forming a lower slice lip, a front wall mounted in fixed rearwardly inclined relation with said apron and having the lower edge thereof spaced above said apron to leave a gap therebetween extending across the width of the head box, a frame supported on the lower portion of said inclined wall for up and down adjusting movement along said inclined wall toward and away from said apron, a structural member carried by said frame for rotational movement thereon about a horizontal axis parallel with said wall and for movement with said frame with respect to said apron, a slice plate mounted on said structural member for rotation therewith in position to extend across said gap and including an upper slice lip depending from

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the lower edge thereof, an agitating roll mounted in closely spaced relation behind said slice plate and in at least partially underlying relation with the lower edge of said wall, means for effecting adjusting movement of said frame on said wall to vary the effective slice opening below said upper slice lip while maintaining said spaced relation of said slice plate and said roll, means for rotating said structural member to vary the horizontal position of said upper slice lip, a sealing strip mounted on the lower edge of said frame and depending therefrom along the upper edge of said gap, a cylindrically curved surface portion on said slice plate located substantially coaxially with said axis of said structural member for maintained sealing engagement with said sealing strip throughout the rotational movements of said structural member, and said cylindrically curved surface being substantially tangent to the remainder of said slice plate and to the projection of said inclined wall to maintain an effectively constant spaced relation of said surface portion and said roll throughout the rotational movements of said structural member in each adjusted position of said frame while providing for smooth flow of the stock therepast to said slice opening.

4. An adjustable slice as defined in claim 3 wherein said structural member is a cylindrical tube of substantial diameter and wherein said sealing strip includes an upper portion positioned between said frame and the lower edge portion of said inclined wall to form a sliding seal therebetween.

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