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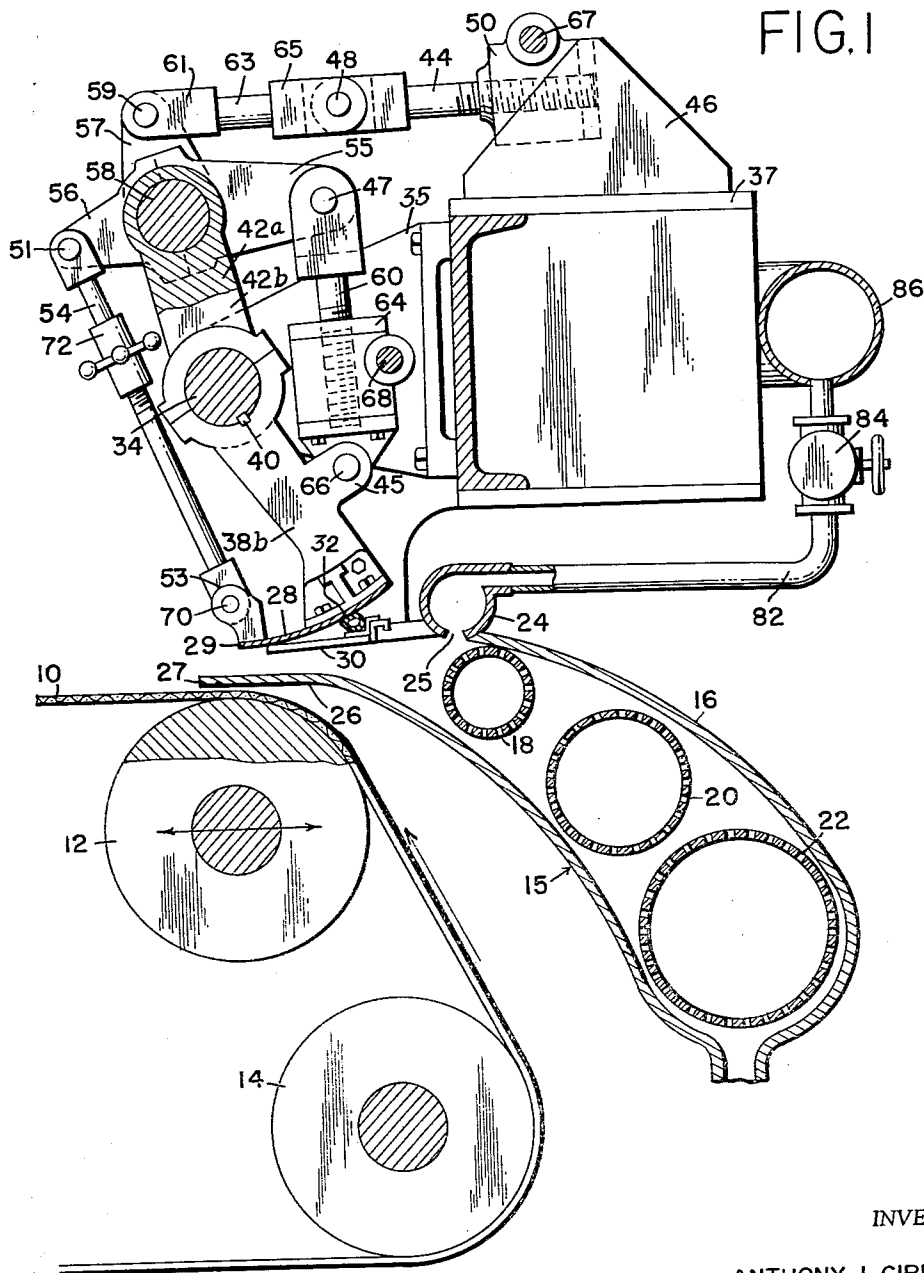
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SLICE CONTROL MECHANISM

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2 Sheets-Sheet 1



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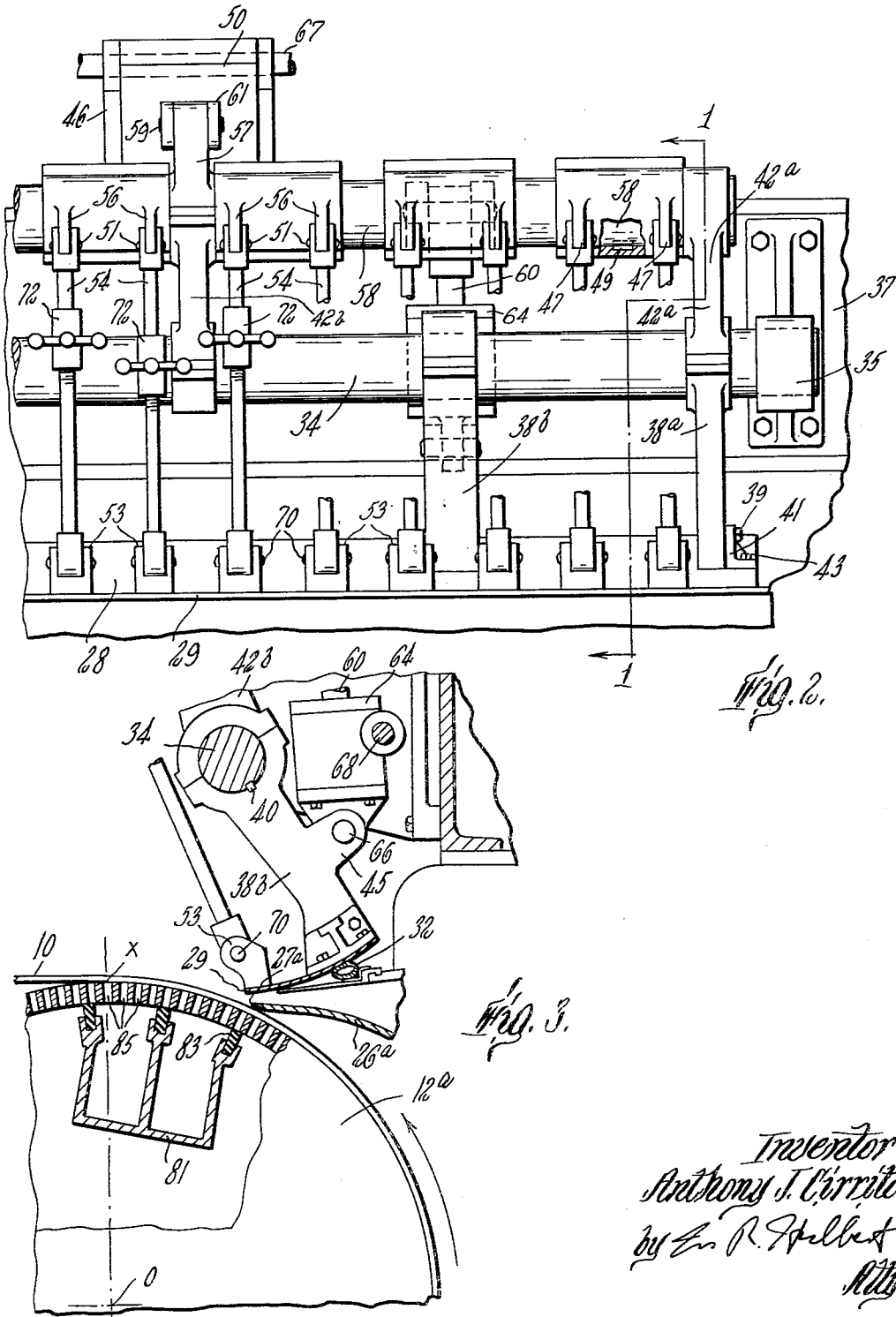
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2 Sheets-Sheet 2



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SLICE CONTROL MECHANISM

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This invention relates to slices for paper making machines, and more particularly provides an improved and highly versatile slice control mechanism for achieving fore-and-aft as well as up-and-down movement of the slice in such machines.

Adjustment of the slice and accurate control of the position of the outer edge of the upper slice lip are, of course, of great importance in paper making on a Fourdrinier type machine. The slice lip should be capable of operation in various positions relative to the breast roll in the machine direction and also vertically to permit accurate adjustment of the thickness of the slice opening independently of the upper slice fore and aft position. Variation of the latter parameter is necessary, of course, in any conventional slice, and additionally, variation in the machine-wise location of the upper slice lip during machine operation makes possible improved control of the delivery of the stock to the wire and breast roll surface and provides improved and sometimes necessary operating control of certain inlet passages for the stock.

An important object of the invention is the provision of a new and improved adjustable slice and slice lip construction, the slice plate being flexible and formed initially to approximate the arc of a circle in the area of the seal and constrained to swing about a center of curvature as a fixed axis for adjustment in the machine direction and to be flexed for accurate adjustment of its lip across its entire length in the vertical direction, the necessary linkages for the latter adjustment being mounted to pivot on an axis which is spaced from the fixed axis aforesaid and which also swings about such fixed axis when the slice is pivoted.

A feature of the invention is the provision of a fixed main shaft mounted at a predetermined location above the slice opening and from which the arcuate slice is suspended for swinging movement about the axis of such shaft to provide the said machine-wise adjustment.

Another feature of the invention is the provision of a secondary shaft mounted upon arms extending upwardly from and pivoting with the main shaft, the secondary shaft supporting the system of levers and adjusting rods which control the vertical adjustment of the slice lip for adjusting the slice opening, such system of levers and rods being isolated from stationary parts of the machine.

Still further objects, features and advantages of the invention will become apparent from the following detailed description of a presently preferred embodiment thereof taken in conjunction with the accompanying drawings, in which like numerals refer to like parts in the several views and in which:

FIG. 1 is a side elevation partially in cross section taken on line 1—1 of FIG. 2 through the stock inlet portion of a Fourdrinier type paper machine embodying features of the invention;

FIG. 2 is a partial front elevation of the same with portions broken away; and

FIG. 3 is a fragmentary side elevation, similar to the showing of FIG. 1, but partially broken away and partially in section, showing the slice mechanism of the invention as applied to a suction breast roll type of machine.

Referring to FIG. 1, a form of stock inlet construction is shown in cross section for flowing stock under pressure onto the wire 10 of a Fourdrinier type paper machine. Since Fourdrinier machines are old and well

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known in the art, the drawings are limited to those features of the stock inlet construction necessary to an understanding of the invention. The wire 10 travels around dual breast rolls 12 and 14, the former being adjustable in a machine-wise direction as indicated by the arrow, and is driven in the usual manner and provided with conventional means for draining liquid passing through the wire and for handling the web formed thereon.

The inlet construction has in place of the conventional head box a nozzle 15 forming a passageway through which the stock is forced under pressure and spouted as a wide flat jet onto the wire 10. The passageway is enlarged at 16 so as to contain a plurality of perforated rolls 18, 20, and 22, known in the art, through which the stock passes for the purpose of minimizing gross turbulence therein and inducing a uniform mixture and a streamlined flow. Above the discharge side of the roll 18 there may be provided a receiver 24 having a slot 25 opening into the inlet for taking off any foam on the top surface of the steam of stock through pipes 82, valves 84 and secondary receiver 86. The function and operation of the receiver 24 and its associated parts form no part of the present invention and will not be described in detail.

Beyond the receiver 24 the stock passes through the inlet itself, which is defined on the bottom by an apron 26 having a lip 27, and a two-part stock confining surface formed by the arcuate movable slice 28 having a lip 29 and a thin flexible blade 30, sealed at the rear by a seal 32. It will be understood, of course, that the apron 26, the blade 30 and the slice 28 extend the entire width of the machine, as indicated in FIG. 2. The construction and functioning of the blade 30 and seal 32 do not form part of the present invention and, therefore, have not been described in detail. Conventional seal structures may be substituted therefor, if desired.

The slice blade 28 and lip 29 are adjustable through a wide range by reason of the illustrated construction according to the invention. As seen in FIGS. 1 and 2 a main shaft 34 is rotatably mounted in bearing supports 35 on frame 37. At intervals along the shaft 34 a number (three, for example) of upper shaft supports 42a and 42b and slice casting supporting arms 38a, 38b cooperate to define a hole through which the shaft 34 passes, the upper shaft supports 42a, 42b and slice casting support arms 38a, 38b being secured together and made rotatable with the shaft 34 by keys 40. At their lower extremities the slice support arms 38a are secured by means of bolts 39 to slice holding castings 41, which are in turn secured by screws 43 to the curved flexible slice 28, toward the rear thereof. The shaft 34 lies on the center of curvature of the path of the blade tip 29. The inner arms 38b, however, are provided with rearwardly extending ears 45 between which are pivotally mounted on pins 66 up-and-down jack screws 64 actuated by turning shaft 68 (which simultaneously correspondingly operates all the jack screws 64, only one being shown) by means of a hand wheel or power means (not shown).

The rods 60 of up and down jack screws 64 are pivotally connected at their upper ends through pins 47 to up and down bell cranks 55, which are keyed, as at 49, to upper shaft 58 for rotation thereof. Also keyed to shaft 58 are the slice adjusting rod bell cranks 56, to the fronts of which are pivotally secured through pins 51 slice adjusting rods 54, which may be spaced say every five inches across the machine. The rods 54 have turnbuckles 72 for individual adjustment across the slice lip 29, and pivotally secured thereto through pins 70 and attaching brackets 53. The upper shaft 58 is rotatably mounted in upper shaft supports 42a, the entire shaft 58 being bodily movable in an arc about the axis of the main shaft 34. The upper shaft 58 is also rotatably mounted

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in upper shaft supports 42b, etc., and cooperating fore and aft bell cranks 57, the upper shaft supports 42b as well as 42a being keyed to the main shaft 34 so as to rotate therewith.

Pivotally secured to the end of fore and aft bell cranks 57 through pins 59 and clevises 61 are fore and aft links 63, which are also pivotally secured at their other ends by means of clevises 65 and pins 48 to fore and aft jack screws 44. The latter are held in mountings on supports 46 on the frame, and driven by a single screw 67 actuated by power means or a hand wheel (not shown).

In operation, fore and aft slice motion may easily be obtained by means of the novel mechanism by merely rotating screw 67 to actuate the fore-and-aft jack screws in the direction desired. The members 57 are either drawn toward or pushed away from the stationary support 46 in the machine-wise direction causing the entire slice supporting mechanism to pivot about the axis of the main shaft 34 to which it is keyed. Thus the composite arms consisting of the bell cranks 57 and the corresponding arms 42a, 42b swing in either direction about the axis of the shaft 34 rocking the same to cause similar swinging movement of the slice supporting arms 38a, 38b, and hence swinging the slice through an arc backwards or forwards as desired. The swinging of the members 42a, 42b and 57 will, of course, cause corresponding bodily swinging of the shaft 58 about the axis of the main shaft 34. So too, the slice lip control jack screws and associated parts will move with the members 58, 38a, 38b, 42a, 42b, and 57, on which they are mounted. The fulcrum of the lever system 55—56 thus is a moving one, namely, the axis of the shaft 58, and, therefore, the slice lip adjustment is made independent of the bodily adjustment of the slice itself.

Desired vertical movement of the slice lip 29 is given through actuation of up-and-down jack screws 64, which rock bell cranks 55, which are in turn keyed to the upper shaft 58 and thus rotate the latter about its own axis, in turn correspondingly rocking slice adjusting rod bell cranks 56, also keyed to shaft 58. Thereby are raised or lowered correspondingly the slice adjusting rods 54, thus giving the desired up and down movement along the entire length of the slice lip 29 and flexing the slice blade from a true arcuate contour. Individual adjustment along the length of the slice lip 29 can be had by means of turnbuckles 72, in the manner familiar to the art.

It will thus be apparent that by rotation of one screw driving the fore-and-aft jack screws, the desired fore and aft movement of the entire slice lip may be achieved, while by rotation of one screw driving the up-and-down jack screws, the desired up and down movement is achieved, all without upsetting or affecting individual variations at the lip achieved by means of the turnbuckles.

The novel slice control of the invention is shown as applied to a suction breast roll type of paper machine in FIG. 3. The roll is indicated by the numeral 12a having its axis at O and carries wire 10. The wire discharges from the roll tangentially approximately along a line x defined by the intersection with the roll surface of a vertical plane (indicated in broken lines) through the axis O. A suction box 81 is mounted within the roll and has sealing members or baffles 83 engaging the inner surface of the roll. The roll shell is perforated as at 85 so that liquid may be drawn therethrough by differential of air pressure. The apron 26a is curved, as shown, and has its lip 27a located opposite the first baffle 83, offset down the periphery of the roll 12a from the line x through a desired arc depending on stock pressure, flow, and the suction employed.

In the embodiment of FIG. 3 the construction of the rotatable slice and slice lip adjusting mechanism are the same as before. Particular advantages are obtainable, in accordance with the invention, in a machine wherein the slice opening is arranged below the top of the breast roll,

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as in FIG. 3, for in this environment the arcuate movement of the slice permits fore and aft adjustments of greater magnitude than that afforded by simple rectilinear movement of the ordinary slice blade. It will be seen that the swinging of the slice lip 29 coupled with vertical movement thereof by flexing the slice itself permits operation over a much wider arcuate area of the surface of roll 12a below the line x than would be the case if the slice had only straight line movement.

Although only a partial view is shown in the drawings, it will be apparent to those skilled in the art that the desired multiplicity of elements may be repeated across the width of a paper making machine, depending on the width thereof, the weight of the parts used, and the strength desired.

While I have herein disclosed and described a presently preferred form of the invention, it will nevertheless be understood that the same is susceptible of numerous modifications and changes by those skilled in the art. Therefore, I intend that the invention be limited only by the proper scope to be afforded the appended claims.

I claim:

1. Slice control mechanism mounted independently of the stock inlet or head box for fore-and-aft and vertical movement of the slice lip of a stock inlet, effectively independent of the movement of the stock inlet or any stock containing part thereof, which comprises a main shaft rotatable in fixed mountings, an upper shaft rotatable about its own axis, said axis being held in fixed relationship to said main shaft and rotating with said main shaft when the latter is rotated, a slice mounted for fore-and-aft arcuate movement responsive to rotation of the said main shaft and having its lip portion mounted for up-and-down movement responsive to rotation of said upper shaft about its own axis, means for rotating said main shaft, and independent means for rotating said upper shaft about its own axis.

2. The mechanism of claim 1 in which said slice depends from support arms operatively secured to said main shaft for rotation therewith and in which said independent means for rotating said upper shaft about its own axis includes members pivotally secured at their lower ends to said support arms at locations between said main shaft and said slice and pivotally secured at their upper ends in up-and-down bell cranks, said up-and-down bell cranks being operatively secured to said upper shaft to rotate the same, whereby said independent means is itself movable bodily in an arc about the axis of said main shaft.

3. Slice control mechanism of claim 1 which comprises in combination with a slice a main shaft held in fixed mountings for rotation about its own axis, a multiplicity of upper shaft supports mounted on said main shaft and operatively secured thereto for rotation therewith about the axis thereof, an upper shaft rotatably secured in said upper shaft supports, a multiplicity of fore-and-aft bell cranks pivotally mounted on said upper shaft and being operatively secured to said main shaft for rotation therewith about the axis thereof, a multiplicity of fore-and-aft jack screws operatively associated with the extremities of said fore-and-aft bell cranks for moving the same, a multiplicity of slice adjusting-rod bell cranks operatively secured to said upper shaft for rotation therewith about the axis thereof, a multiplicity of slice adjusting rods pivotally secured at their upper ends to said slice adjusting rod bell cranks and pivotally secured at their lower ends to the lip portion of said slice, a multiplicity of slice support arms operatively secured at their upper ends to said main shaft for rotation therewith about the axis thereof and secured at their lower ends to said slice, a multiplicity of up-and-down jack screws pivotally mounted at their lower ends intermediate portions of at least some of said slice support arms and at their upper ends in the extremities of a corresponding multiplicity of up-and-down bell cranks mounted on said upper shaft and operatively secured thereto for rotation therewith.

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4. In slice control mechanism for longitudinal and vertical movement of a slice mounted for movement relative to a stock inlet, the combination which comprises said slice, a first shaft mounted for rotation about a fixed transverse axis, longitudinal control means rotatable with said first shaft for supporting said slice and a second transverse shaft, whereby both travel in an arcuate path upon rotation of said first shaft, said second shaft, and vertical control means pivotally mounted on said second shaft and secured to said slice adjacent the lip thereof.

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