United States Patent [19]

Bennett et al.

[11] **3,734,822**

[45] **May 22, 1973**

[54] **HEADBOX FOR VERTICAL DOUBLE-WIRE PAPER MACHINE**

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[22] Filed: **Oct. 16, 1970**

[21] Appl. No.: **81,447**

[52] **U.S. Cl.** **162/343,** 162/344, 162/347

[51] **Int. Cl.**.....**D21f 1/06**

[58] **Field of Search**..... 162/344–347, 303, 203, 301, 343, 336, 300, 302, 272, 199

[56] **References Cited**

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[57] **ABSTRACT**

The headbox for a vertically oriented double-wire papermaking machine is formed with one fixed slice lip parallel to the forming zone defined by the wires and another, adjustable slice lip in converging relationship to the first. The second slice lip is formed with a fixed upper section and a pivotally mounted lower section, and the first slice lip includes a chamber on the side opposite the second slice lip which has inlet and outlet openings which allow for heated liquid recirculation therethrough so that the first slice lip may be preheated and the opening between the slice lips adjusted before stock is passed therebetween.

1 Claim, 2 Drawing Figures

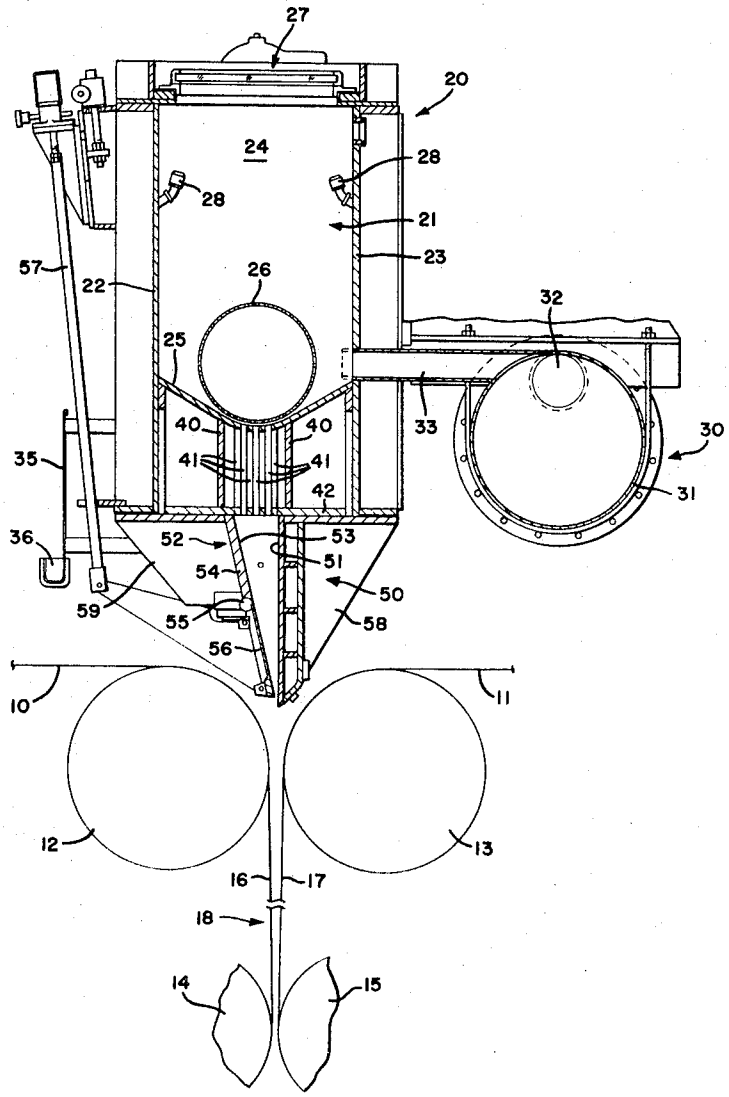


FIG-1

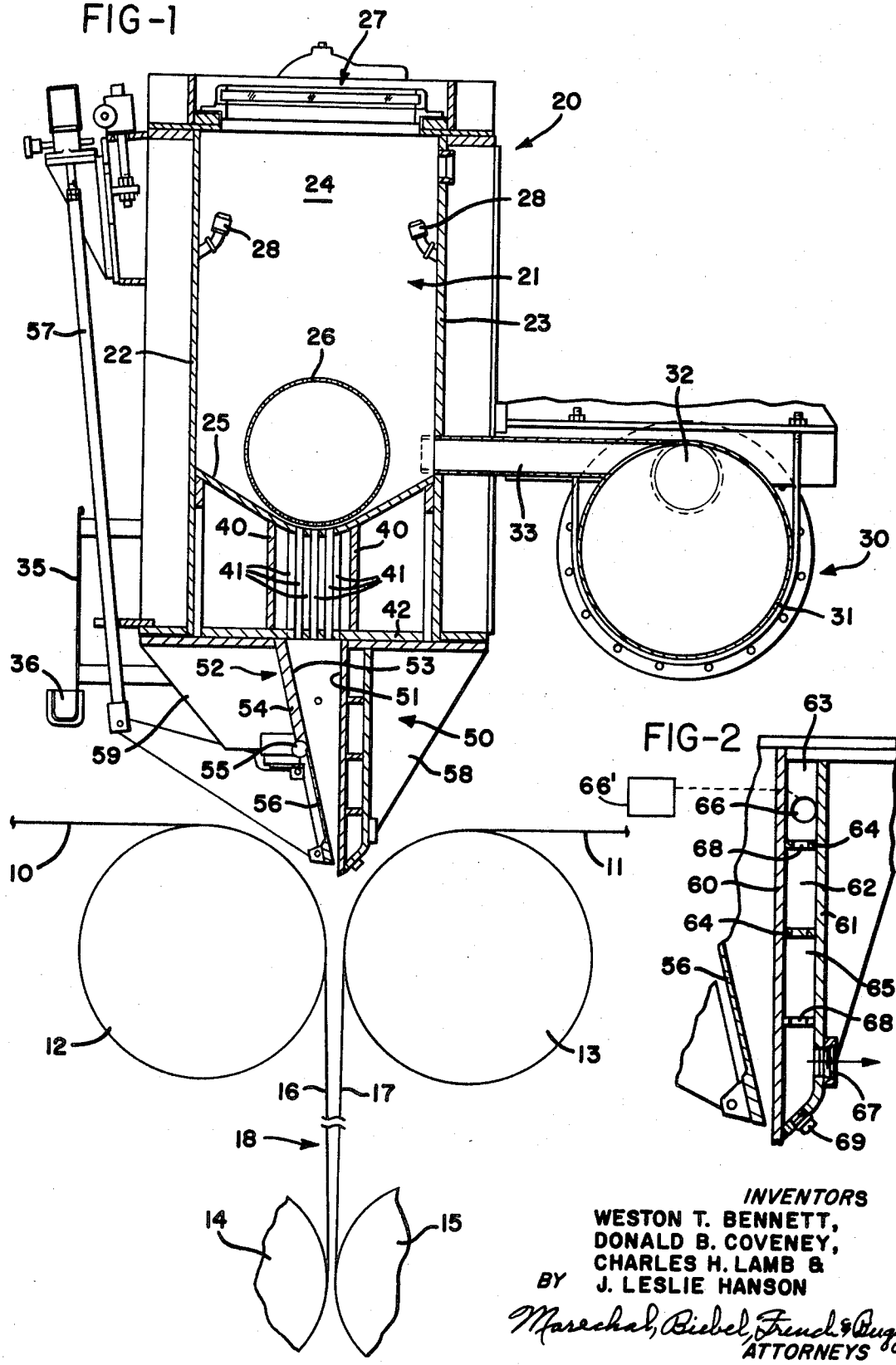


FIG-2

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HEADBOX FOR VERTICAL DOUBLE-WIRE PAPER MACHINE

CROSS REFERENCE TO RELATED APPLICATION

Vertical Paper Machine; Ser. No. 755,602; filed Aug. 27, 1968; Willard C. Notbohm et al. now U.S. Pat. No. 3,578,556.

BACKGROUND OF THE INVENTION

Papermaking machines of the type utilizing a pair of vertically oriented opposed forming wires have gained increasing acceptance in recent years. One reason for this acceptance is that the use of a pair of drainage surfaces greatly increases the dewatering rate and permits an appreciably shortened forming zone. It will be apparent, however, that in order to obtain good formation and to take full advantage of the improved dewatering capabilities of paper machines of this type, the position of the slice jet with respect to the forming zone defined by the opposed wires must be controlled with greater precision than is required in a conventional Fourdrinier type machine where the papermaking stock is spouted out in a substantially horizontal plane and allowed to drop by gravity onto the forming surface of the machine.

Additionally, since the slice jet is substantially vertically oriented, it is, in contradistinction to the horizontally directed jet of a Fourdrinier machine, susceptible to movement in two directions with respect to the vertical. It is, therefore, of importance to have a relatively stable jet.

The temperature of the papermaking stock flowing through the headbox will generally be of appreciably greater temperature than that of the surrounding atmosphere. It will, therefore, tend to distort the components of the machine through differential heating. As a result, it is difficult, if not impossible, to adjust the slice opening until the stock has heated the headbox to a stable temperature.

SUMMARY OF THE INVENTION

The present invention provides a headbox in which a series of tubes extend from the papermaking stock chamber to a slice or discharge opening defined by a pair of slice lips, one of which is substantially parallel to the forming zone of the papermaking machine and the other of which converges toward the first. In this way, the first slice lip serves as a datum for orienting the remaining components of the machine with respect to the forming zone.

It has also been found that by utilizing a slice lip having a surface which is substantially aligned with the forming zone defined by the vertically extending forming wires and extends downwardly past the opposing lip, the slice jet stability with respect to the vertical is greatly improved, and the tendency for the slice jet to wander from one forming wire to the other, with resulting undesirable formation, is eliminated. Additionally, hydraulic stability is enhanced by the convergence of the lips toward the forming zone.

It has also been found that by making provision for preheating at least one of the slice lips, preferably the lip which is aligned with the forming zone, the slice opening may be adjusted before the papermaking stock is run through the machine.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 of the drawings is a vertical section illustrating principles of the present invention; and

FIG. 2 is an enlarged view of a portion of FIG. 1.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

In papermaking machines of the vertically oriented, double-wire type, a pair of endless porous belts **10** and **11** are trained about a pair of spaced parallel breast rolls **12** and **13** and support means, shown as couch rolls **14** and **15**, positioned beneath the breast rolls and wrapped by the belts **10** and **11** to provide a pair of opposed, substantially vertically extending reaches **16** and **17** defining therebetween a forming zone **18**.

Positioned above the forming zone defined by the reaches **16** and **17** is a headbox, referenced in its entirety by the numeral **20**. Headbox **20** comprises a stock chamber **21** defined by front and back walls **22** and **23**, a pair of side walls, only one of which is shown at **24**, and a bottom wall **25**. Bottom wall **25** slopes inwardly from the front and back walls **22** and **23** downwardly toward the forming zone defined by the reaches **16** and **17**. Mounted within the chamber **21** is a perforated roll **26** which may be of conventional construction and rotated by any suitable means, not shown. The headbox will be usually of the pressurized type and provided with an upper cover **27** and showers **28** to prevent the accumulation of stock particles on the interior of the headbox.

A manifold **30** extends transversely of the papermaking machine and is tapered inwardly from its inlet end **31** to its outlet end **32** to provide stock at substantially uniform pressure to each of the connecting conduits **33** which extend from the manifold to the chamber **21**. On the side of the headbox opposite the side to which manifold **30** is attached a spray shield **35** is mounted and serves to prevent liquid and the like carried by the belt **10** from being thrown up onto the lower surface of the box. In the absence of the shield **35** material thrown up onto the box would not only eventually cause corrosion, but particles would tend to drop from the bottom of the box onto the belt **10** and adversely offset the quality of the paper being made. As seen in FIG. **1**, shield **35** terminates in a trough **36** which may be drained by suitable drain means, not shown.

A central portion of the bottom wall **25**, defined by the vertically extending plates **40**, has a series of openings formed therein and receives the inlet ends of a plurality of tubes **41** which extend from the bottom wall downwardly in parallel relationship to each other and are arranged in a plurality of rows extending transversely of the papermaking machine. The tubes are staggered with respect to each other, and as shown in FIG. **1**, are arranged in seven transversely extending rows. A flat plate member **42** extends across the headbox and has a series of openings formed therein for receiving the outlet ends of the tubes **41**.

Mounted beneath plate member **42** and extending vertically downwardly therefrom is a first slice lip **50** having a substantially planar inner surface **51**. Surface **51**, as seen in FIG. **1** of the drawings, extends substantially parallel to the reaches **16** and **17** and is in substantial alignment with the forming zone defined therebetween. A second slice lip **52** having an inner surface **53** extending in opposed relationship to the surface **51**

is also mounted beneath the box and extends in converging relationship to the surface **51** in the direction away from the outlet ends of the tubes **41** towards the forming zone.

Slice lip **52** is formed in two sections, including an upper fixed section **54** which is rigidly attached to the bottom of the headbox, and a movable lower section **56** which is pivoted at **55** on the lower edge of the fixed section **54.** A series of adjusting rods **57** are mounted across the headbox, only one being shown in FIG. **1,** and serve to pivot section **56** about pivot point **55** and thereby to vary the space between the lower edges of the slice lips. It will also be seen that ribs **58** and **59** extend from the bottom of the headbox to the lips **50** and **52,** respectively, and serve as stiffeners. While only one of each of the ribs is shown it will be apparent that a plurality of such ribs are provided spaced along each of the slice lips.

It will be noted in FIG. **1** that the outer edges of the tubes in the outermost rows of tubes are substantially aligned with the upstream ends of the two slice lips. It will also be noted that the planar surface **51** of the slice lip **50** is oriented in parallel relationship to the reaches **16** and **17** and substantially aligned with the center of the forming zone defined by the reaches. This construction, it has been found, greatly improves the stability of the jet issuing from the slice and decreases the tendency of the jet to wander from one surface to the other. While the surface **51** is described as substantially aligned with the forming zone it will be noted that this description contemplates small variations from an exact alignment of the surface **51** and the center of the forming zone. Similarly, the reaches **16** and **17,** although described as substantially vertically oriented, will in practice, deviate somewhat from a precisely vertical plane.

In any event, the surface **51** provides a datum plane from which the other components of the machine may be positioned and at the same time provides a highly stable jet of papermaking stock. The slice lip **52,** through the provision of the lower pivoted section **56,** permits the opening between the slice lips to be varied as necessary for varying operating conditions. Additionally, the force generated by the pressure of the papermaking stock, which must be resisted by the adjusting mechanism, is proportional to the surface area of the movable section. With only the lower portion of the slice lips movable, rather than the entire slice lip, this force is greatly decreased.

Turning now to FIG. **2** of the drawings, it will be seen that the slice lip **50** is formed by a pair of spaced vertically extending walls **60** and **61** defining between them a chamber **62.** It will be apparent, of course, that provision is made for sealing off the ends of the space defined by the walls **60** and **61,** such as by end walls, one of which is shown at **63.** A series of horizontally extending baffles **64** are mounted within the chamber **62** and serve to divide the chamber into a series of compartments **65.** Openings **66** and **67** are formed in the upper and lower compartments **65,** and each of the baffles is provided with openings **68** therethrough to provide interconnection between the compartments.

With the above construction, a heated liquid may be pumped into the slice lip **50** through the upper opening **66,** from a supply source **66',** from whence it circulates downwardly through the various compartments **65** and outwardly through the lower opening **67.** In this manner, the slice lip may be preheated to the temperature of the papermaking stock, and the slice opening may be more accurately adjusted prior to the flow of stock through the slice opening. Conveniently, the liquid used to heat the slice lip **50** may be white water which may be tapped from the white water supply line so that the slice lip will have the same temperature as the stock. It will also be noted, that it will usually be preferable to provide the chamber **62** with a drain, as at **69,** to permit the removal of sedimentation and like from the chamber.

While the form of apparatus herein described constitutes a preferred embodiment of the invention, it is to be understood that this invention is not limited to this precise form of apparatus and that changes may be made therein without departing from the scope of the invention.

What is claimed is:

1. In a papermaking machine including a pair of breast rolls positioned in spaced parallel relationship to each other, support means positioned beneath each of said breast rolls in spaced relation thereto, and an endless porous belt wrapping each of said breast rolls and support means therebelow to provide a pair of opposed vertically extending reaches defining a forming zone, the improvement comprising:

a. a stock chamber having a bottom wall mounted above and extending across said papermaking machine,

b. a plurality of tubes having inlet ends mounted in said bottom wall,

c. said tubes being arranged in a plurality of rows transversely of said papermaking machine and extending in substantially parallel relationship to each other from said bottom wall toward said forming zone,

d. a first slice lip having an inner substantially planar surface extending from outlet ends of said tubes to a point adjacent said breast rolls in substantially parallel relationship to said reaches and in substantial alignment with said forming zone,

e. a second slice lip having an inner surface mounted in opposed relationship to said first slice lip and extending from said outlet ends of said tubes toward said forming zone in converging relationship to said first slice lip inner surface,

f. the outer edges of said tubes in the outermost rows being substantially aligned with upstream ends of said inner surface of said slice lips,

g. said first slice lip further including a wall extending in spaced parallel relationship to said substantially planar surface and a pair of end walls cooperatively defining a chamber therebetween,

h. means defining a liquid inlet into said chamber,

i. means defining a liquid outlet from said chamber, and

j. means for supplying fluid to said liquid inlet defining means.

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