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3,438,295

PAPERMAKING MACHINE

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3 Claims

ABSTRACT OF THE DISCLOSURE

An air distributing device for a cutter of the type having a rotating knife which has a shearing action with respect to a stationary knife for shearing a web passing over the stationary knife to form individual sheets, with the air distributing device being positioned below a web carrying curved forming board which is positioned below the web carrying nip of a pair of feed rolls and the air distributing device having an upper curved web carrying surface and being positioned to direct air on to the upper surface of the stationary knife for blowing off the leading end of the web from the stationary knife just after a cut has occurred so that the web may continue to move over the stationary knife without clogging the cutter.

The invention relates to paper converting apparatus and more particularly to cutters for webs of paper or other sheet material.

One type of cutter for such webs comprises a rotating knife which has a shearing action with respect to a stationary knife for shearing a web passed over the stationary knife to form individual sheets. When such a cutter is used with paper of a type that is lightweight, drapes easily, and is tacky due to a resin impregnation of the web, for example, the web tends to stick on the stationary knife after being cut, so that the cutter is eventually clogged.

It is an object of the present invention to provide an improved cutter arrangement of this general type which comprises means for moving the leading end of the web off of the stationary knife just after a cut has been made so that the web may continue to pass over the stationary knife, even though the web may be of tacky material, and so that such clogging of the cutter cannot occur.

In brief, the invention contemplates that an air distributor may be provided to have an air outlet or discharge port immediately adjacent to the stationary knife for blowing off the leading end of the web from the stationary knife just after a cut has occurred so that the web may continue to move over the stationary knife without clogging the cutter.

The invention consists of the novel constructions, arrangements and devices to be hereinafter described and claimed, for carrying out the above stated objects, and such other objects, as will be apparent from the following description of a preferred form of the invention, illustrated with reference to the accompanying drawing, wherein:

FIG. 1 is a partial, longitudinal sectional view of a cutter for sheet material having an air distributor device for directing air to urge the sheet material in its intended path of movement; and,

FIG. 2 is a plan view of the air distributor device and taken from line 2—2 of FIG. 1.

Like characters of reference designate like parts in the several views.

Referring now to FIG. 1 in particular, the cutter shown therein may be seen to comprise a bottom feed roll 10, a top feed roll 11 having a nip with the roll 10, a pair of forming boards 12 and 13, a stationary knife 14 disposed

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on and fixed with respect to a knife bed 15, and a rotating knife 16.

The two feed rolls 10 and 11, or either of them, may be drivingly rotated so as to feed a web A of sheet material, such as paper, between the rolls 10 and 11 and over the forming boards 12 and 13. The forming boards 12 and 13 have upper surfaces 12a and 13a, respectively, which are rounded and are generally cylindrical, and these surfaces are so disposed as to guide the web A on to and over the stationary knife 14.

The stationary knife 14 has a sharpened corner or edge 14a, and the rotating knife 16 has a sharpened edge 16a that has a shearing action with respect to the edge 14a as the knife 16 is rotated. The knife 16 is carried by any suitable rotor having a center of rotation at the point 17, for example, so that the knife 16 has the shearing action with respect to the knife 14 as just mentioned.

An air distributor 18 extends between the forming boards 12 and 13. The distributor 18 comprises an upper casing portion 18a and a lower casing portion 18b providing an air passage 19 between them. A supply pipe 20 extends into the distributor, and the pipe 20 is provided with a plurality of spaced air discharge ports 20a along its length in communication with the passage 19. The pipe 20 is located at the upper and relatively wide end of the air passage 19, and the distributor 18 extends around and in close proximity to the cylindrical upper surface 13a of the forming board 13 and terminates with a relatively thin discharge port 19a adjacent to the upper, horizontally extending, plane surface 14b of the stationary knife 14. The upper and lower casing portions 18a and 18b are connected together at a plurality of intermediate places by short, internal ribs 21 for the purpose of holding the portions 18a and 18b fixed with respect to each other. The ends of the distributor 18 are sealed at 21a and 21b.

A source 22 of air under pressure is connected through a conduit 23 with the pipe 20, and a pressure regulator 24 and a pressure gauge 25 are connected respectively in and to the conduit 23.

In operation, the web A passes between the rolls 10 and 11, and these rolls in rotating move the web A over the upper cylindrical surfaces 12a and 13a of the forming boards 12 and 13 and over the stationary knife 14. The knife 16 is at the same time rotating about the center 17; and, for every revolution of the knife 16, its edge 16a passes over in shearing contact with the edge 14a of the knife 14 and shears off a length of the web A.

Particularly in the case in which the web A is a tacky material, such as paper which is highly saturated with hot, partially cured resin, for example, the cut end of the web A tends to adhere to the upper horizontal surface 14b of the stationary knife 14 and clog the cutter. The cut end of the web A is thrown backwardly slightly on to the upper horizontal surface 14b of the stationary knife 14 as a shearing cut is being made, and this action in particular tends to cause the end of the web A to adhere to the upper horizontal surface 14b of the stationary knife 14.

The air distributor 18 is provided in order to move the end of the web A off of the upper horizontal surface 14b of the stationary knife 14. The discharge port 19a of the passage 19 and the ends of the housing portions 18a and 18b are located immediately adjacent to and directly above the horizontal plane surface 14b with only a very slight spacing, such as 1/8 inch, therebetween. Air is thus directed by the distributor 18 on to the surface 14b, and the air flows toward the left as seen at FIG. 1 to move the cut end of the web A off of the surface 14b in this direction just after a cut has been made by the rotating knife 16. The web A thus is moved to drape over the cutting edge 14a so that the web A may continue its

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movement over this edge. It will be observed that the lower side edge of the forming board 13 extends into contact with the upper surface 14b of the stationary knife so that all of the air flowing from the discharge port 19a of the passage 19 must flow to the left as seen in FIG. 1 against the web A so as to tend to move the web in this direction.

Since the web A may well be tacky, particularly if the web is impregnated with hot, partially cured resin, the upper casing portion 18a with which the web A may at times come into contact, is preferably made of a material which tends to release such a tacky web. The casing portions 18a and 18b may actually constitute a single piece of material which has been folded about the pipe 20 for ease of construction, and thus the materials of the housing portions 18a and 18b may be the same. Materials that have been found satisfactory for releasing tacky webs and which therefore are quite suitable for the distributor 18 are "Teflon" and silicone rubber, for example; and, as will be apparent, other similar materials which tend to release from tacky surfaces may also be used. In view of the fact that the distributor 18 extends from the pipe 20 located beneath and between the forming boards 12 and 13, and since the distributor 18 extends in close proximity to the upper cylindrical surface 13a of the forming board 13, the air distributor 18 does not impede the movement of the web A from the rolls 10 and 11 and is out of the path of web movement even though the end of the distributor is located very close to the upper horizontal surface 14b of the stationary knife 14.

The air distributor 18, extending in close proximity to the upper cylindrical surface 13a of the forming board 13, provides a flow of air which is evenly distributed for the entire length of the cut by the knife 16 on the knife 14, which may for example, be 60 inches. A large volume of air flow need not be provided through the distributor 18 for it to be effective, and we have found that only 8 to 12 pounds per square inch air pressure need be applied to the distributor and the flow of air may be at only about 200 feet per minute, for example, giving a gentle moving action to the end of the web A when a cut has been made. The pipe 20, for example, may only have a one-half inch inside diameter, for example, and the discharge port 19a of the passage 19 defined by the upper and lower casing portions 18a and 18b may only be about $\frac{1}{16}$ inch in thickness.

The distributor 18 advantageously constitutes a simple device for distributing air in connection with the moving web A, acting to force the end of the web A from the upper horizontal knife surface 14b on to any sheet collecting device located beneath the knife bed 15, such as for example, moving tapes (not shown). The ribs 21 hold the upper and lower casing portions 18a and 18b together so as to maintain the spacing of the casing portions uniform at the discharge port 19a of the passage 19 for the complete length of the distributor 18. Since the casing portions 18a and 18b are preferably constructed of material that allows a tacky surface to slide over it, even though the web A may have tacky surfaces, the web may pass over the upper casing portion 18a without adhering to it even though the web may come into contact with the casing portion at times.

Our improved air distributor, particularly in connection with a cutter, thus allows a cutter to be effective with a sheet which is limp and plastic or resin impregnated and in which the resin is intentionally not fully cured, so that the sheet is limp, drapes easily, and has tacky surfaces. The distributor, since it need not be provided with a large quantity of air, gently blows the end of the web A off of the upper knife surface 14b at a critical position at which the web A would otherwise stick. The distributor 18 is of such construction that it directs air evenly over the entire width of the web A, utilizing low air pressures and volumes. Even though the configuration and construction of the cutter, as illustrated, may tend to prevent the use of conventional

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means of air distribution, the air distributor is of such construction to allow this air distribution even though the upper surface 14b of the knife 14 may be considered to be a difficult position for the application of air; and, at the same time, the distributor 18 does not obstruct the path of the web A. The distributor 18, being curved and long and thin provides air movement intimately at or near the shearing edges 14a and 16a.

We wish it to be understood that the invention is not to be limited to the specific constructions and arrangements shown and described, except only insofar as the claims may be so limited, as it will be understood to those skilled in the art that changes may be made without departing from the principles of the invention.

We claim:

1. In a cutter, a stationary knife blade, a moving knife blade adapted to move across the stationary knife blade to shear off a web of sheet material between the two blades, said moving knife blade being mounted for rotation about a center at one side of said stationary knife blade, a pair of feed rolls disposed on the other side of said stationary knife blade for feeding a web across the stationary knife blade from this side, the shearing edge of said stationary knife blade defining an edge of a surface on the stationary knife blade toward which said moving knife blade moves in its movement, an air distributor for directing a flow of air across the shearing edge of said stationary knife blade so as to move the sheet material web out of contact with said stationary blade and the distributor being arranged to direct the flow of air onto said surface so as to move the cut end of the web off of said surface, and a pair of forming boards having upper curved surfaces over which the web may travel from said feed rolls to said stationary knife blade and said distributor being curved and extending across and in close proximity to the one of said forming boards more adjacent to said stationary knife blade.

2. In a cutter, a stationary knife blade, a moving knife blade adapted to move across the stationary knife blade to shear off a web of sheet material between the two blades, said moving knife blade being mounted for rotation about a center at one side of said stationary knife blade, a pair of feed rolls disposed on the other side of said stationary knife blade and having a nip between them which is located at a higher level than said center of rotation and said stationary knife blade so as to feed a web across said stationary knife blade from this side, the shearing edge of said stationary knife blade defining an edge of an upper surface of the stationary knife blade toward which said moving knife blade moves in its movement, and an air distributor extending lengthwise of said stationary knife blade and having a curved upper surface extending from a place below said nip to a place adjacent said upper surface of the stationary knife blade so that the web passing through said nip may facily pass over the air distributor and the air distributor having its air outlet adjacent the upper surface of said stationary knife blade so as to direct a flow of air onto said surface so that the air from the distributor moves the cut end of the web off of said surface.

3. In a cutter, a stationary knife blade, a moving knife blade adapted to move across the stationary knife blade to shear off a web of sheet material between the two blades, said moving knife blade being mounted for rotation about a center at one side of said stationary knife blade, a pair of feed rolls disposed on the other side of said stationary knife blade and having a nip between them which is located at a higher level than said center of rotation and said stationary knife blade so as to feed a web across said stationary knife blade from this side, the shearing edge of said stationary knife blade defining an edge of an upper surface of the stationary knife blade toward which said moving knife blade moves in its movement, a forming board having an upper curved surface

located adjacent and below said nip and an air distributor extending lengthwise of said stationary knife blade and having a curved upper surface extending from a place below said forming board to a place adjacent said upper surface of the stationary knife blade so that the web passing through said nip may facilely pass over the forming board and then over the air distributor to said stationary blade, said air distributor having its air outlet adjacent the upper surface of said stationary knife blade so as to direct a flow of air onto said surface so that the air from the distributor moves the cut end of the web off of said surface.

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