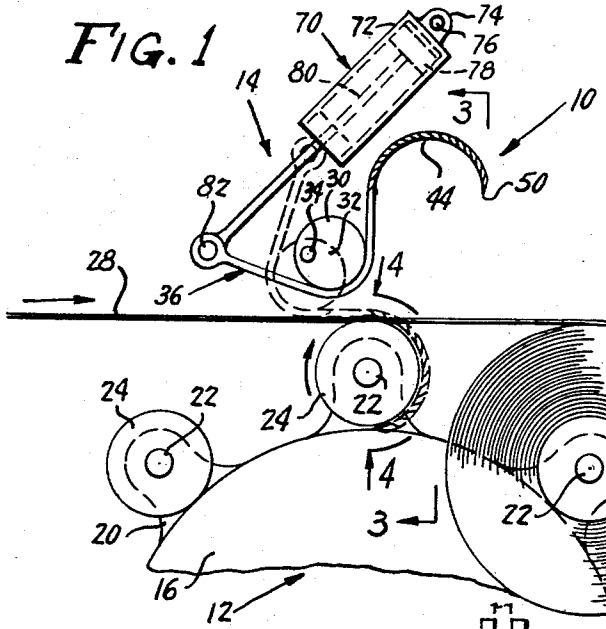
June 6, 1967 A. T. DEMING 3,323,739

PAPER MILL KNIFE AND MOUNTING THEREFOR

Filed June 8, 1965

FIG. 1



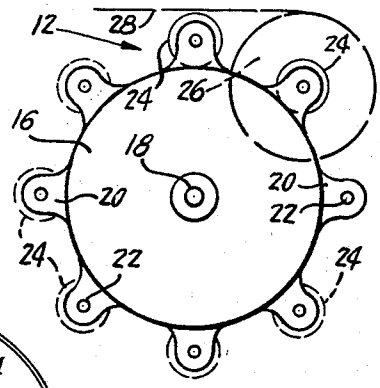


FIG. 2

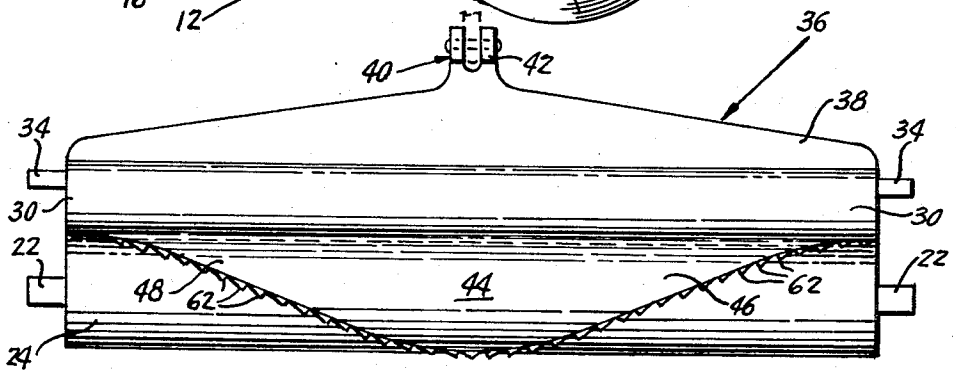


FIG. 3

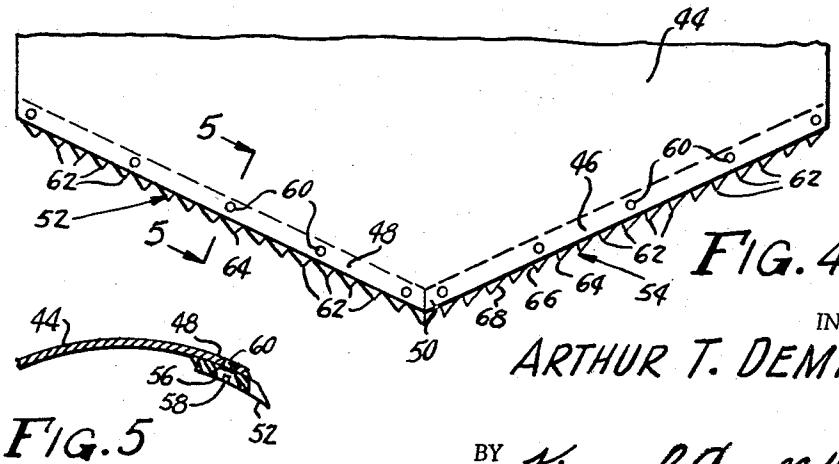


FIG. 4

FIG. 5

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United States Patent Office

3,323,739

Patented June 6, 1967

3,323,739

PAPER MILL KNIFE AND MOUNTING THEREFOR

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Filed June 8, 1965, Ser. No. 462,299
8 Claims. (Cl. 242—56)

This invention relates to paper mill knives and their mountings, and more particularly to a device which is utilized to sever a continuous discharge from a paper making machine after a first roll of paper is wound and to immediately thereafter begin the winding of a second paper roll.

Devices are known in the prior art which both sever a continuous web of paper and which place the severed end of the continuous web adjacent a core for starting a new roll. Generally these devices are characterized by a plurality of rollers over which the continuous web moves. Often a shear plate is used beneath a cutter as a support for the paper to be cut. Likewise, the devices of the prior art often fail to effect complete adhesion of the severed continuous web to a new core.

It is an object of the instant invention to provide a paper mill knife and mounting which insures adhesion of the continuous web to a new core on which the web may be wound.

Another object of the instant invention is to provide a simplified means for starting a continuous web of paper on a new core.

It is a further object of this invention to provide a means for severing a continuous web of paper utilizing the tension of a winding roll to avoid the requirement of shear plates.

A further object of this invention is to provide a paper mill knife and mounting which is inexpensively manufactured and installed, which requires little maintenance, and which is substantially foolproof in operation.

Other objects and advantages of the instant invention will be in part apparent and will be in part more fully pointed out hereinafter and disclosed in the accompanying drawing, wherein there is shown a preferred embodiment of this inventive concept.

In the drawings:

FIGURE 1 is a side elevational view of the paper mill knife and mounting of the instant invention, certain parts being broken away for clarity of illustration;

FIGURE 2 is a side elevational view of a movable turret on which paper may be wound;

FIGURE 3 is a cross-sectional view of the device of FIGURE 1, taken along line 3—3 thereof and viewing in the direction of the arrows;

FIGURE 4 is a view of the knife of FIGURE 1 taken along line 4—4 and viewing in the direction of the indicated lines, showing a flattened knife; and

FIGURE 5 is a cross-sectional view of the knife of FIGURE 4 taken along line 5—5 thereof and viewing in the direction of the arrows.

Referring now to the drawings, wherein like reference characters designate like elements throughout the several views thereof, there is indicated generally at **10** a device for severing a continuous web of paper comprising a turret shown generally at **12** and a paper mill knife and mounting indicated generally at **14**.

Movable turret **12** comprises a substantially circular plate **16** having a centrally disposed pivot axis **18** of any conventional type. Located about the periphery of plate **16** are a series of radially extending arms **20** having a rotatable pin **22** secured on the outer end thereof to accommodate a core **24** on which may be wound a roll of paper **26**. As shown in FIGURE 2, plate 16 provides

eight equally spaced radially extending lugs **20** for purposes more fully explained hereinafter. Pins **22** may be rotatably powered in any suitable manner to provide the motive means necessary to wind a continuous web of paper **28** on core **24**.

As shown in FIGURE 1, continuous web **28** exits from the discharge of a paper making machine or the like in a substantially horizontal plane and trails over uppermost core **24** onto paper roll **26**. Paper mill knife **14** comprises an elongate regular geometric shaped member such as a substantially cylindrical body **30** having a longitudinal axis **32** pivotally mounted by eccentrically placed pivot pins **34** on a suitable mount above uppermost core **24** and toward the discharge of a paper making machine as shown in FIGURE 1.

Fixedly secured to the periphery of cylindrical body **30** is a knife holder shown generally at **36**. Knife holder **36** includes a transverse body **38** extending throughout the length of cylindrical member **30** and core **24** and a pivot connection shown generally at **40** comprising a pair of arms **42** having a transversely aligned pair of apertures into which an operating means may be pivotally secured as more fully explained hereinafter.

Secured to the outer end of knife holder **36** is a knife blade **44** which has a radius of curvature coaxial with the curvature of cylindrical core **24** as shown in FIGURE 1. Knife blade **44** includes a pair of centrally converging front edges **46**, **48** which would be straight if blade **44** were planar, but which describe a pair of intersecting reversed cylindrical spirals when blade **44** is formed about a radius of curvature as shown in FIGURES 3 and 4. Front edges **46**, **48** converge into a forwardly disposed apex **50** which is centrally disposed with respect to cylindrical member **30** and core **24**.

Secured along each of front edges **46**, **48** is a replaceable cutting edge indicated generally at **52**, **54**, each of which is an elongated substantially trapezoidal metal strip and each of which is a substantial mirror image of the other. Cutting edges **52**, **54** include a series of spaced frusto-conical apertures **56** in which resides a flush head screw **58** which may be secured to front edges **48**, **50** by a series of threaded apertures **60**. Cutting edges **52**, **54** includes a series of forwardly disposed teeth **62** having an initial cutting point **64**, a sharply inwardly inclined cutting edge **66** and a gradual outwardly inclined cutting edge **68**.

Although not essential to the operation of paper cutter **10**, a spray of water or glue may be effected by any suitable means to wet core **24** so that web **28** will readily adhere thereto.

When it is desired to sever continuous web **28** knife blade **44** is rotated about pivot axis **34**, as more fully pointed out hereinafter, such that the forwardmost cutting points of cutting edges **52**, **54** engages the tensioned web **28**. Continued rotation of knife blade **44** about pivot axis **34** results in additional lateral cutting of tensioned web **28**. Immediately prior to the complete severance of continuous web **28** the first cut portion thereof, i.e. that portion cut by cutting points adjacent apex **50**, will be placed into contact with core **24** so that core **24** may accommodate the discharge of a paper making machine.

The retraction of blade **44**, as more fully explained hereinafter, allows core **24** to build up a paper roll **26** since rotatable pins **22** are drivingly connected to core **24**. It has been found that the placing of continuous web **28** adjacent the next core **24** in such a manner precludes web **28** from backlashing and allows rapid and convenient winding of rolls **26**. Roll **26** is removed from pins **22**, either manually or by automatic means so that the next roll may build to a convenient size.

Paper mill knife and mounting **14** is also equipped with a pneumatic cylinder indicated generally at **70** com-

prising a cylindrical casing **72** having an upwardly facing lug **74** which is pivotally mounted by a pivot pin **76** on a suitable structure (not shown). Pneumatic cylinder **70** also includes an interiorly mounted piston **78** and a piston rod **80** fixedly secured thereto. Pneumatic cylinder is equipped with appropriate fluid inlets and outlets (not shown) which are operably connected to a pressurized air source (not shown). Piston rod **80** is pivotally mounted between lugs **42** of knife holder **36** and secured thereto by a pin **82**.

When paper roll **26** has achieved its desired size, pneumatic cylinder **70** is operated, either by manual actuation of a pressure control valve or by the automatic operation thereof to pivot knife blade **44** about pivot axis **34** as previously mentioned.

It is important that knife blade **44** extends throughout the width of paper web **28** so that the severed end thereof may be juxtaposed to rotating core **24** prior to or contemporaneous with the complete severance of web **28**. Failing to do so allows web **28** to back lash thus creating confusion and wastage of paper.

It is now seen that there is herein provided an improved paper mill kife and mounting having all the objects of this invention and others, including many advantages of great practical utility and commercial importance.

Since many embodiments may be made of the instant inventive concept, and since many modifications may be made of the embodiment hereinbefore shown and described, it is to be understood that the foregoing explanation is to be interpreted merely as illustrative and not in a limiting sense.

I claim:

1. A paper mill knife comprising

a cylindrical core adapted to receive a paper winding having a circumference, a length and a radius of curvature;

a knife blade having a length, a radius of curvature perpendicular to said length, two forwardly converging front edges which describe intersecting reversed cylindrical spirals forming an apex midway of said length, and a central semicircular cross-section, said semicircular cross-section being coaxial with and closely fitting said circumference of said core when said blade is placed around said core;

means mounting said core for rotatable movement; and

means pivotally mounting said blade adjacent said core for selectively placing said blade coaxial with said core.

2. The structure of claim **1** wherein said blade length is equal to said core length.

3. The structure of claim **1** wherein said mounting means includes an elongate regular geometric shaped member having an axis, and an aligned pivot pin positioned on said member eccentrically spaced from said axis, said member being secured to said blade.

4. The structure of claim **3** wherein said knife blade includes a blade holder secured to the periphery of said regular geometric shaped member.

5. The structure of claim **4** wherein said blade holder includes a pivot connection, and further comprising fluid power means pivotally connected with said pivot connection for pivoting said blade and blade holder.

6. The invention of claim **1** wherein the blade mounting means comprises:

an eccentrically pivotally mounted elongate member;

a blade holder secured intermediate the ends thereof to the elongate member for mounting the blade on one end; and

means secured to the other end of the blade holder for moving said other end to thereby eccentrically pivot the blade holder for moving the blade holder in a pivotal and translational path from a position spaced from said core to a position adjacent said core.

7. The invention of claim **6** wherein the means for moving the other end of the blade holder comprises:

a substantially linearly operating fluid motor.

8. The invention of claim **6** wherein the blade mounting means comprises:

a blade holder, comprising

a first generally linear portion,

a second generally linear portion,

a first arcuate portion connecting one end of the first and second generally linear portions, and

a second arcuate portion having a semicircular cross section adapted to fit coaxially with said core and closely adjacent the circumference of said core;

a linearly operating fluid motor pivotally connected to the other end of the first generally linear portion;

an elongate cylindrical member secured in the first arcuate portion; and

pivotal mounting means eccentrically mounting the cylindrical member for pivotal eccentric movement for moving the second arcuate portion in a pivotal and translational path from a position spaced from said core to a position closely adjacent said core for cutting a paper web and directing said web onto said core, said first generally linear portion being adjacent and generally parallel to the line of travel of said web in the last named position.

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