Dec. 5, 1961 L. E. FORD 3,011,733

LOOSE PAPER WEB HANDLING APPARATUS FOR PAPER MACHINES

Filed March 12, 1958 4 Sheets-Sheet 1

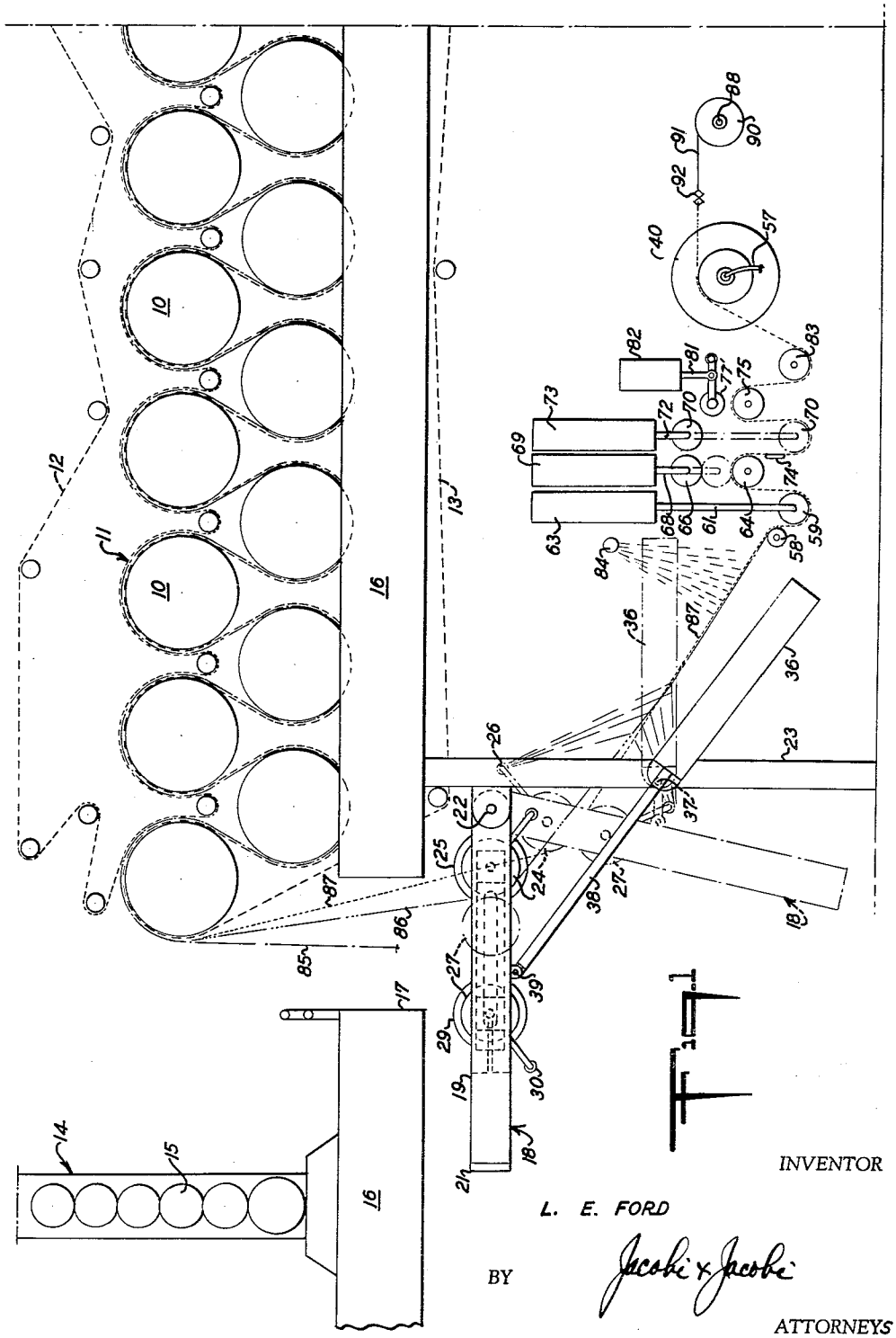


FIG. 1

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Filed March 12, 1958 4 Sheets-Sheet 2

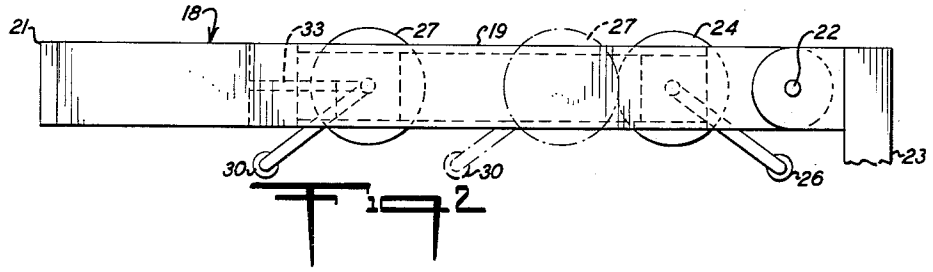


FIG. 2

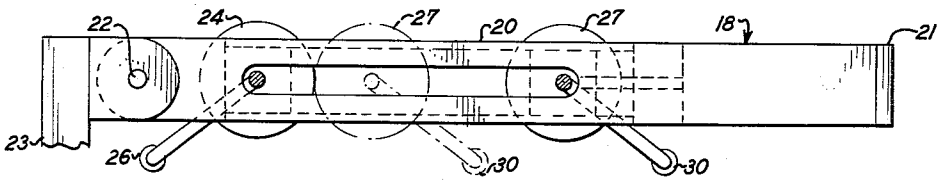


FIG. 3

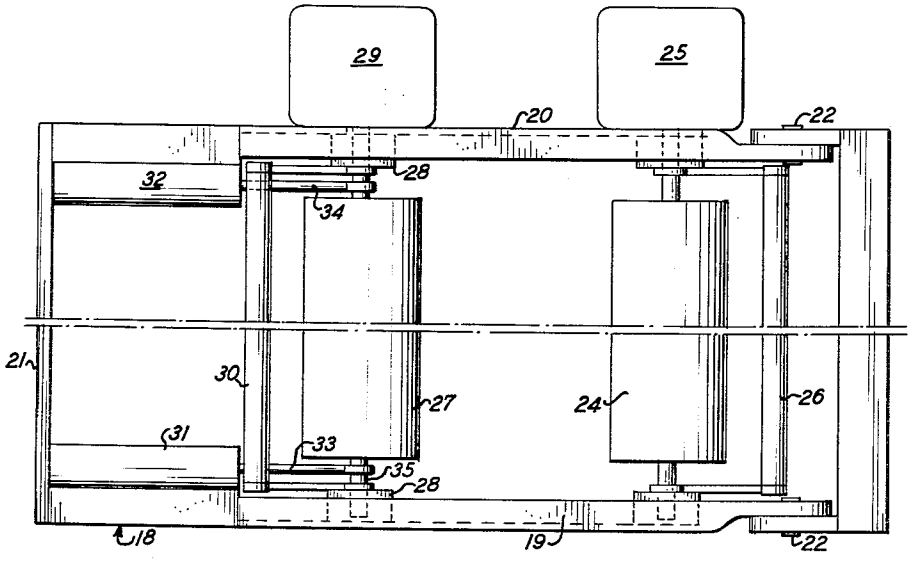


FIG. 4

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Filed March 12, 1958 4 Sheets-Sheet 3

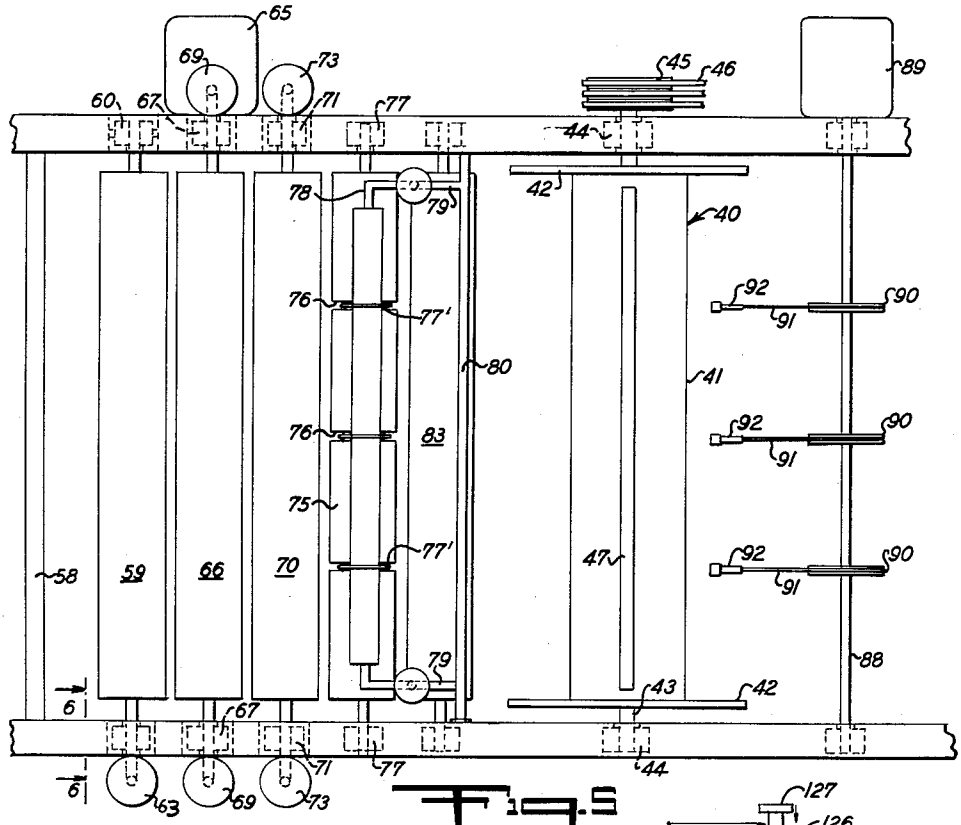


FIG. 5

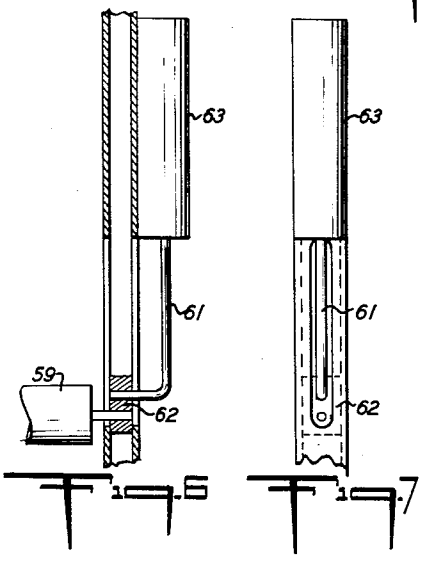


FIG. 6

FIG. 7

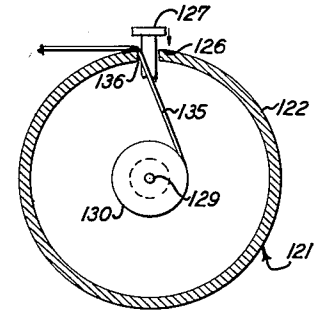


FIG. 11

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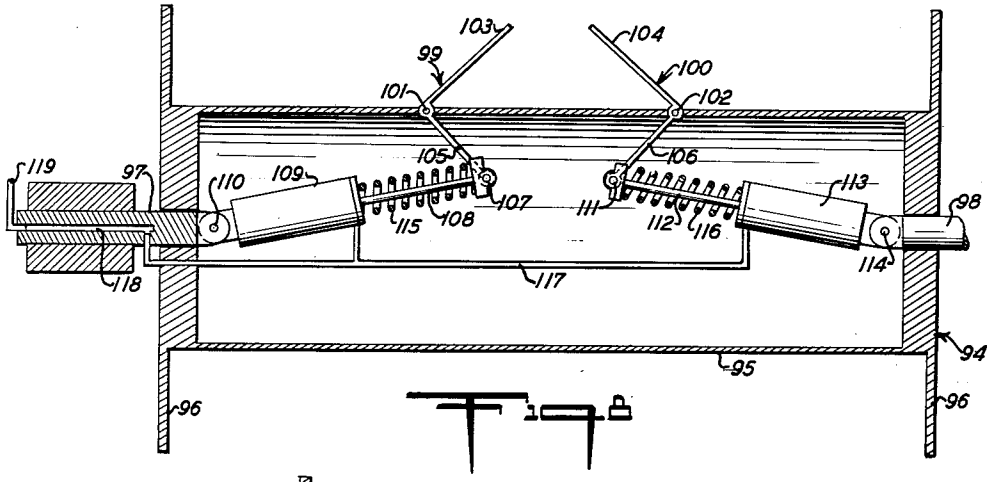


Fig. 9

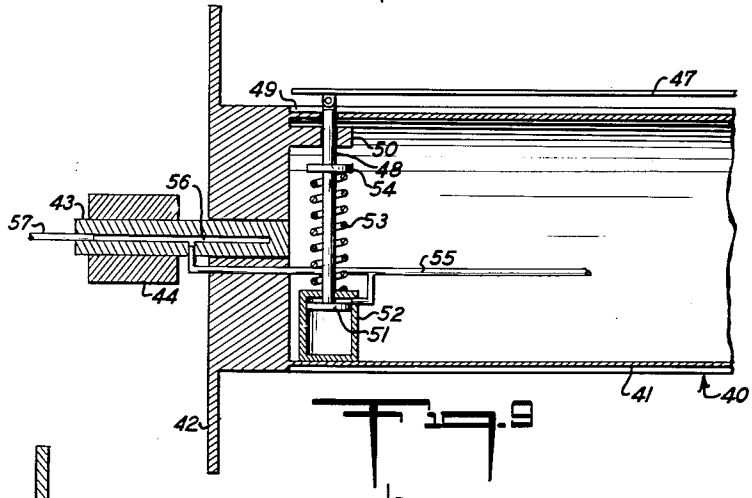
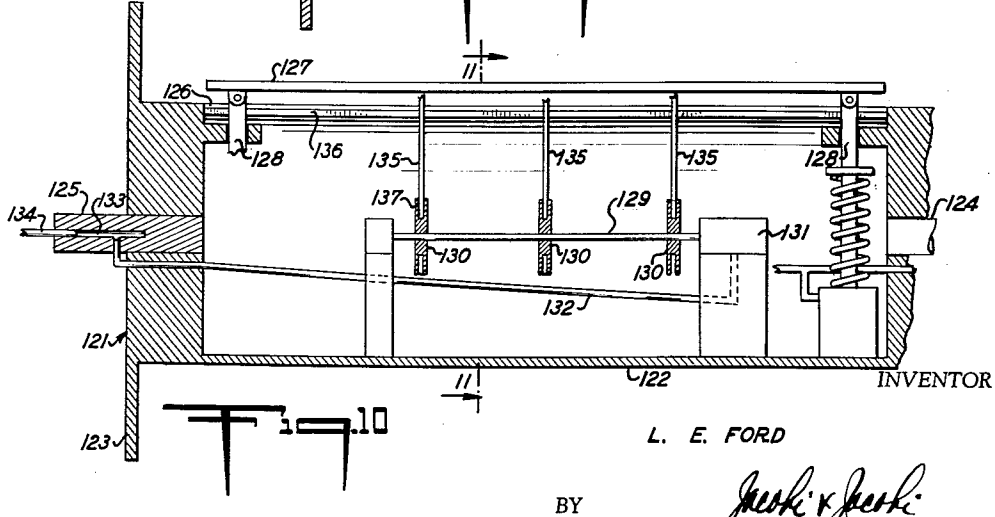


Fig. 10



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United States Patent Office

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3,011,733

LOOSE PAPER WEB HANDLING APPARATUS FOR PAPER MACHINES

Lawrence E. Ford, 213 Front St., Georgetown, S.C.

Filed Mar. 12, 1958, Ser. No. 720,844
6 Claims. (Cl. 242—67.2)

This invention relates to paper making and more particularly to an apparatus for automatically handling and storing the waste paper web resulting from breakage of such web during passage through paper making machinery and particularly where such breakage occurs between the drier section and the calender section of the paper machine.

Heretofore it has been customary in paper making plants to provide an opening in the floor of the building leading to the basement between the drier section and the calender section and upon breakage of the paper web, it has been customary to manually feed or push such web through the opening into the basement and to manually pull the paper away from beneath such opening until such time as the paper making apparatus may be shut down or the web properly threaded through the apparatus in order to permit continuation of the paper making operation. This method of handling waste paper web has become completely impractical due to the increase in the production of paper making machines and in view of the fact, that the web in some cases may be as much as twenty feet wide and the production rate of the machine may be as much as forty tons per hour. Obviously, manual handling of such a quantity of paper is extremely difficult, if not impossible, and accordingly an apparatus for automatically performing this operation, particularly where it is necessary to operate the paper making machine for an appreciable length of time after breakage occurs, represents a significant step forward in the art. There is not only the problem of manually handling the large quantity of paper involved when breakage occurs at the present high production rate, but there is also the problem of storing a relatively large quantity of paper web in the basement of the building until such time as normal production may resume. Since, with the present method, a number of men are required to perform the manual operations necessary, obviously, an automatic apparatus, such as that proposed by this invention, operates to materially reduce the cost of paper manufacture. It is also to be noted, that the manual operations now utilized are rendered more difficult by the fact that the paper web after passing through the drier section of the paper making apparatus is at an extremely high temperature and consequently, protective clothing must be utilized and the danger of injury due to contact with the high temperature paper web is always present.

Briefly stated, the apparatus of this invention includes means for automatically gripping the broken end of a paper web after the same has passed through an opening in the floor of a building between the drier section and the calender section of the paper making machine and, at the same time, pulling such web from the drier section at the same rate as the web moves through the drier section and also including means to direct the broken end of the web rearwardly in the basement of the building beneath the drier section of the paper making machine. Automatic means is also provided for gripping the end of the broken paper web to thread the same through a feeding and slitting section and for engaging and gripping the end of the broken web on a winding drum in order that the same may be wound thereon to provide a roll of broken paper web which serves to store the same in a relatively small space. After resumption of the paper making operation, the broken web which has

been wound on a roll may be unwound through the feeding and slitting section in order to slit the same into as many strips as necessary and, at the same time, pull such web from the roll and feed the same to appropriate apparatus, such as a broke beater or hydropulper in which the broken web is treated for re-use in the paper making machine. The operation of this apparatus is substantially automatic and the same operates to handle the broken end of a paper web with little or no attention from an operator.

It is accordingly an object of the invention to provide an automatic apparatus for handling waste paper web resulting from breakage of such web in a paper making machine.

A further object of the invention is the provision of an automatic apparatus for handling waste paper web, including feed rolls for automatically gripping the broken end of a paper web and feeding the same downwardly through an opening in the floor of a building and directing the same rearwardly beneath the drier section of the paper making machine in the basement of the building.

A still further object of the invention is the provision of an automatic apparatus for handling waste paper web and including means for automatically threading such web through a feeding and slitting section prior to winding the same on a drum for storage.

Another object of the invention is the provision of an automatic apparatus for handling waste paper web and including automatically operable means for clamping the end of such web to a winding drum to facilitate winding of the web thereon.

A further object of the invention is the provision of an automatic apparatus for pulling waste paper web from the drier section of a paper making machine and for winding such web on a winding drum, the apparatus including automatic means for shifting the paper web laterally, in order to provide a uniform roll on the winding drum.

A still further object of the invention is the provision of automatically operable waste paper web handling apparatus for paper machines in which the waste paper web is wound on a drum and including means for pulling such web from the drum and slitting the same for feeding a hydropulper or the like with the waste paper web.

Another object of the invention is the provision of automatically operable waste paper web handling apparatus for paper machines in which the broken end of the paper web passes through an opening in the floor of the building to the basement and in which the web thereafter is automatically directed onto a winding drum and wound thereon for storage until such time as the waste paper may be re-used.

A further object of the invention is the provision of pneumatically operated automatic means for gripping the end of a paper web on a winding drum to facilitate winding thereof on such drum.

A still further object of the invention is the provision of a winding drum for waste paper web and incorporating means wthin the drum for pulling such web through a feeding and slitting section and also including means for clamping the web to the drum to facilitate winding of the web thereon.

Another object of the invention is the provision of a waste paper web handling apparatus for paper machines which may be conveniently and economically manufactured from readily available materials and installed in connection with existing paper making machines without requiring alteration or modification of such machines.

Further objects and advantages of the invention will

be apparent from the following description taken in conjunction with the accompanying drawings wherein:

FIG. 1 is a diagrammatic side elevational view showing the drier and calender sections of the paper making machine and also showing the apparatus of this invention installed in the basement of a building below the paper making machine;

FIG. 2 is a fragmentary side elevational view showing the frame carrying the web gripping and feeding rolls;

FIG. 3 is a side elevational view similar to FIG. 2, but from the opposite side;

FIG. 4 is a top plan view of the frame shown in FIG. 2 and also showing the drive motors for the feed rolls, as well as the fluid pressure cylinders for moving one roll with relation to the other;

FIG. 5 is a fragmentary top plan view of the feeding and slitting section of the apparatus of this invention, as well as the winding drum and the means for pulling the web through the feeding and slitting section;

FIG. 6 is a fragmentary sectional view taken substantially on the line 6—6 of FIG. 5;

FIG. 7 is a fragmentary side elevational view of the parts shown in FIG. 6;

FIG. 8 is a longitudinal sectional view of a winding drum and showing fluid pressure operated automatic means for clamping the end of a paper web to the drum to facilitate winding of the same thereon;

FIG. 9 is a fragmentary longitudinal sectional view of a winding drum and showing another form of automatically operable clamping means for clamping the end of a paper web thereto;

FIG. 10 is a longitudinal sectional view of a still further form of winding drum and showing means incorporated within the drum for pulling and threading a paper web through the feeding and slitting section, together with means for clamping the end of the web to the drum; and

FIG. 11 is a sectional view taken substantially on the line 11—11 of FIG. 10.

With continued reference to the drawing and particularly FIG. 1, there is shown a conventional paper making machine which may well include a series of drier rolls 10 providing a drier section 11 and in which the rolls 10 are engaged by a conventional drier felt 12 and a carrier rope 13. Also included as part of the paper making machine is a calender stack 14 consisting of a series of calender rolls 15 and both the drier section 11 and the calender stack or section 14 are supported on the floor 16 of a suitable building in spaced relation and with an opening 17 between the drier section 11 and the calender section 14, the purpose of which will presently appear. The opening 17 provides access to the basement of the building in which the paper making machine is installed and as shown in FIG. 1, the apparatus comprising this invention for handling waste paper web is located in the basement below the paper making machine.

With particular reference to FIGS. 1 to 4, the paper web handling apparatus of this invention may well include a generally rectangular frame 18, which as shown in FIG. 4, may comprise side rails 19 and 20 and a cross member 21 at the outer end thereof. The frame 18 may be pivotally mounted at 22 on a suitable post or upright 23 for movement downwardly and rearwardly from a substantially horizontal position as shown in full lines in FIG. 1 to a substantially vertical position as shown in broken lines in this figure. A feed roll 24 may be rotatably mounted in the side rails 19 and 20 of the frame 18 adjacent the pivoted end of such frame and the feed roll 24 may be driven by a variable speed motor 25. An air manifold 26 provided with a series of apertures, not shown, may be provided for a purpose to be presently described.

A second feed roll 27 may be rotatably mounted in bearings 28 which in turn are slidably mounted on the rails 19 and 20 to permit movement of the roll 27 toward and away from the roll 24 and the roll 27 may be driven

by a variable speed motor 29 which will, of course, be synchronized to the speed of the motor 25 driving the roll 24. Also provided adjacent the roll 27 is an air manifold 30 having a series of apertures, not shown, the purpose of which in conjunction with the manifold 26 will presently appear. In order to move the feed roll 27 toward and away from the feed roll 24, there may be provided fluid pressure cylinders 31 and 32 having piston rods 33 and 34 connected to the axle 35 of the roll 27 with the result that operation of the fluid pressure cylinders 31 and 32 will move the roll 27 and driving motor 29 toward and away from the feed roll 24 for a purpose to be later described.

Movement of the frame 18 and the rolls 24 and 27 carried thereby from horizontal to vertical position as shown in FIG. 1, may be afforded by a fluid pressure cylinder 36 pivotally mounted as at 37 on the upright 23, the cylinder 36 being provided with a piston rod 38 pivotally connected at 39 to the frame 18 and as will be seen from an inspection of FIG. 1, operation of the cylinder 36 will operate to move the frame 18 from the horizontal position to the vertical position and back to the horizontal position as occasion demands. One cylinder 36 and piston rod 38 has been shown, it will be understood, that this structure may be duplicated on the opposite side of the frame 18 in order to provide balanced operation and, of course, depending upon the particular arrangement, one or two such cylinders may be employed.

With particular reference to FIGS. 1 and 5, the broken paper web may be wound and stored on a winding drum 40 disposed below the drier section 11 of the paper making machine and as shown, the winding drum 40 may include an elongated drum section 41 having end flanges 42, the drum 41 being mounted on a shaft 43 rotatably carried in bearings 44 and having fixed to one end thereof a pulley 45 which may be engaged by driving belts 46 or other suitable drive means. The drum 40 may be driven by a variable speed motor, not shown, or by any other suitable means.

The winding drum 40 may be of the type shown in FIG. 9 and may be further provided with means for clamping the end of a paper web to be wound thereon, such clamping means as shown in FIG. 9 being provided in the form of an elongated clamping bar 47 which is secured at each end to supporting and actuating rods 48 for movement into and out of a groove 49 in the surface of the cylinder 41 forming the winding drum 40. The supporting and actuating rod 48 are slidably mounted in brackets 50 for radial movement and provided on the ends of the rods 48 are pistons 51 disposed in fluid pressure cylinders 52. A compression spring 53 may be disposed about each rod 48 with one end of the spring 53 engaging the cylinder 52 and the opposite end of the spring 53 engaging a collar 54 fixed to the rod 48. Fluid pressure may be supplied to the cylinders 52 through a conduit 55 which may be connected to a passage 56 in the shaft 43 which in turn is connected to a pipe or other suitable fluid pressure supply means 57.

In operation, the end of a paper web may be disposed between the clamping bar 47 and the groove 49 in the cylinder 41 forming the winding drum 40 and upon the introduction of fluid pressure to the cylinders 52, the pistons 51 will move inwardly thereby moving the rods 48 radially inwardly to move the clamping bar 47 into the groove 49 and into clamping engagement with the paper web thereby firmly securing the same to the winding drum 40. Subsequent rotation of the winding drum 40 will serve to wind the paper thereon.

Disposed between the winding drum 40 and the frame 18 carrying feed rolls 24 and 27 is a feeding and slitting section which as best shown in FIGS. 1 and 5, may well include an idler roll 58 rotatably mounted on a suitable frame and followed by a guide roll 59 which is pivotally and rotatably mounted on a suitable bearing 60 at one end thereof. The opposite end of the guide roll 59 may

be moved vertically by a piston rod 61 connected to the bearing 62 rotatably mounting the opposite end of the roll 59, the piston rod 61 having a piston slidably disposed in a fluid pressure cylinder 63. Operation of the cylinder 63 will serve to raise or lower one end of the roll 59 for a purpose to be presently described.

Following the guide roll 59 is a feed roll 64 which may be driven by a variable speed motor 65 and disposed above the feed roll 64 is a vertically movable pressure roll 66 which is rotatably mounted on bearings 67 which in turn are connected to piston rods 68 having pistons slidably disposed in fluid pressure cylinders 69 disposed at opposite ends of the pressure roll 66. Operation of the fluid pressure cylinder 69 will serve to move the pressure roll 66 toward and away from the feed roll 64 in order to vary the pressure exerted on a paper web passing over the feed roll 64.

Following the feed roll 64 is a vertically movable tension roll 70 rotatably mounted at each end in suitable bearings 71 which bearings in turn are connected to piston rods 72 having pistons slidably disposed in fluid pressure cylinders 73. Operation of the cylinders 73 will serve to move the tension roll 70 vertically in order to vary the tension on a paper web passing thereover.

Disposed between the feed roll 64 and the tension roll 70 is a contact member or paddle 74 for engaging the edge of a paper web passing over the feed roll 64 and tension roll 70 and the contact member 74 is connected through mechanism, not shown, for controlling the operation of the fluid pressure cylinder 63 in order to raise or lower the guide roll at one end to move the paper web passing over the rolls laterally in either direction.

A backing roll 75 having axially spaced peripheral grooves 76 therein is rotatably mounted in suitable bearings 77 following the tension roll 70 and mounted above the backing roll 74 are a series of vertically movable rotary slitting knives 77′ disposed above the backing roll 75 and in alignment with the grooves 76. The slitting knives 77′ may be rotatably mounted on a shaft 78 which in turn is carried by a frame 79 fixed to a shaft 80 pivotally mounted on the apparatus to permit vertical pivotal movement of the knives 77′. In order to control such vertical pivotal movement, the frame 79 may be connected to piston rods 81 provided with pistons slidably mounted in fluid pressure cylinders 82 which upon operation will serve to raise and lower the frame 79 carrying the shaft 78 and slitting knives 77′. Disposed between the backing roll 75 and the winding drum 40 is a crowned idler roll 83 over which the paper web passes prior to being wound on the drum 40. In order to strengthen and also to cause the same to wind tighter on the drum 40, there may be provided a water spray in the form of a manifold disposed above and in advance of the idler roll 58, the manifold 84 being provided with apertures, not shown, for directing a spray of water onto the dry paper web being fed to the slitting and feeding section.

In the operation of the above described apparatus and with particular reference to FIG. 1, the broken end of the paper web is shown as a dot dash line 85 and this broken end is passed downwardly through the opening 17 in the floor 16 of the building and between the driven feed rolls 24 and 27 on the frame 18. It is, of course, assumed that the feed rolls 24 and 27 are rotating at the same peripheral speed as the movement of the broken paper web 85 and movement of the feed roll 27 toward the feed roll 24 will result in gripping the paper web 85 therebetween to feed the same downwardly through the opening 17, as indicated by the broken line 86. Movement of the feed roll 27 toward the feed roll 24 to grip the paper web 85 is, of course, accomplished by actuation of the fluid pressure cylinders 31 and 32 on frame 18.

At this time the fluid pressure cylinder 36 is actuated to move the frame 18 downwardly and rearwardly to the position shown in dotdash lines in FIG. 1 and at the same time, the air jets 26 and 30 impinge on the upper and lower surfaces of the paper web indicated by the dotted line 87 to direct the same rearwardly beneath the drier section 11 of the paper making machine. The operation of the frame 18, as well as the air jets 26 and 30 preclude the necessity for manually moving the end of the paper web rearwardly beneath the drier section 11.

It is now necessary to thread the end of the paper web, indicated by the dotted line 87, through the feeding and slitting section and beneath the clamping bar 47 on the winding drum 40 and for this purpose there may be provided a web pulling and threading mechanism which as shown in FIGS. 1 and 5, may comprise a rotatably mounted shaft 88 disposed rearwardly of the winding drum 40 and driven by a variable speed motor 89. Fixed to the shaft 88 in spaced relationship are a plurality of spools 90, each of which serves to receive a flexible cable 91 to the outer end of which is secured a paper web engaging clip 92 of any suitable type. It is to be noted, that the flanges forming the spools 90 are spaced substantially the same distance as the diameter of the cable 91 in order to insure that all of the cables 91 are wound on the spools 90 in the same manner and thereby provide for equal pulling movement of all of the cables 91.

In the operation of the web threading and pulling mechanism, the cables 91 are passed beneath the clamping bar 47 between the same and the surface of the cylindrical portion 41 of the winding drum 40 and the cables 91 are passed under the rolls 83, 70 and 59 and over rolls 75 and 64 as well as over idler roll 58 of the feeding and slitting section in the same path that the paper web will follow when traveling through such section. The gripping means 92 is attached to the leading end of the paper web 87 and upon operation of the shaft 88 to wind the cables 91 on the spools 90, the paper web 87 will be pulled through the feeding and slitting section and beneath the clamping bar 47 on the winding drum 40. Actuation of the fluid pressure cylinders 52 to move the clamping bar 47 into the groove 49 will operate to securely clamp the leading end of the paper web 87 to the winding drum 40 and upon release of the gripping means 92 from the paper web, the winding drum 40 may be operated to wind the paper web thereon. This winding operation will continue until such time as it is desired to again resume paper production with the web passing from the drier setcion 11 to the calendar section 14. Since the paper web may tend to shift laterally and thereby provide an uneven roll on the winding drum 40, as described above, the web engaging member or paddle 74 which engages the edge of the paper web between the rolls 64 and 70 of the feeding and slitting sections, operate to control the operation of the fluid pressure cylinder 63 which in turn may raise or lower one end of the guide roll 59 which will result in compensating for lateral movement of the web thereby maintaining travel thereof in substantially a straight line in order to provide a substantially even and uniform roll of such paper on the winding drum 40.

Upon completion of the winding operation, the fluid pressure cylinder 36 may be actuated to return the frame 18 to the horizontal full line position shown in FIG. 1 and the fluid pressure cylinders 31 and 32 may be actuated to move the feed roll 27 away from the feed roll 24 thereby conditioning the apparatus to again receive the broken end of a paper web in order to repeat the operation above described when the same may become necessary. It will thus be seen that the above described apparatus operates to automatically handle the broken end of a paper web passing from the drier section 11 of a paper making machine and to wind the same on a winding drum 40 for storage purposes and the only manual operation required in addition to the control of the various motors and fluid pressure cylinders is to engage the web gripping means 92 on the cables 91 with the leading end of the paper web and to detach the same therefrom upon clamping of the web to the winding drum 40. Since all of the feed rolls and winding drums are driven by variable

speed motors, obviously, the apparatus may handle broken paper web at any desired rate which may be dictated by the rate of production of the paper making machine at the time of web breakage.

Since the broken paper web wound on the winding drum 40 is normally re-used by feeding the same to a beater or hydro-pulper, the above described apparatus is also designed to accomplish this purpose and when it is desired to unwind the paper web from the winding drum 40, the feed roll 64 of the feeding and slitting section is actuated to pull the paper web from the winding drum 40 and also the slitting knives 77' are lowered into engagement with the web to slit the same during travel thereof over the backing 75 thereby providing a series of paper strips which may be conveniently fed to the beater or hydropulper for treatment of the broken paper web prior to re-use in the paper making machine. As stated above, any desired number of slitting knives 77' may be employed and likewise, the tension roll 70 and pressure roll 66 may be suitably adjusted by actuation of the fluid pressure cylinders 73 and 69 in order to provide for proper movement of the paper web from the winding drum 40 through the feeding and slitting section. This operation is also substantially automatic and the slitted paper web may be conveyed from the feeding and slitting section to the beater or hydropulper in any desired manner.

A modified form of winding drum and paper web gripping mechanism is shown in FIG. 8 in which winding drum 94 may be provided with an elongated cylindrical portion 95 and end flanges 96 and the winding drum 94 may be provided with shafts 97 and 98 at opposite ends thereof in order to permit suitable rotatable mounting thereof.

The cylindrical portion 95 of the winding drum 94 is hollow and web gripping means in the form of axially spaced generally L-shaped gripping members 99 and 100 may be pivotally mounted at 101 and 102 in axially spaced relationship on the cylindrical portion 95 of the drum 94 with one end 103 and 104 of each member 99 and 100 providing a web gripping arm disposed exterially of the cylindrical portion or drum 95 and movable to grip the end of the paper web between the arms 103 and 104 and the surface of the cylindrical portion 95 of the winding drum 94. The opposite ends 105 and 106 of the members 99 and 100 provide actuating arms extending interiorly of the cylindrical portion 95 and arm 105 is pivotally connected at 107 to a piston rod 108 having a piston slidably disposed in a fluid pressure cylinder 109 which is pivotally secured at 110 to the winding drum 94, while the other actuating arm 106 is pivotally connected at 111 to a piston rod 112 having a piston slidably disposed in a fluid pressure cylinder 113 which is pivotally mounted at 114 on the winding drum 94. Compression springs 115 and 116 may be disposed about the piston rods 108 and 112 respectively and serve to move the gripping member 99 and 100 to open position as shown in FIG. 8

Fluid pressure may be supplied to the cylinders 109 and 113 through a suitable conduit 117 which may be connected to a passage 118 in the shaft 97 and the passage 118 may be connected through a suitable joint, not shown, to a fluid pressure supply conduit connected to a suitable source of fluid pressure. Operation of the fluid pressure cylinders 109 and 113 will serve to move the piston rods 108 and 112 inwardly, thereby moving the gripping arms 103 and 104 into engagement with the end of a paper web disposed between the same and the surface of the cylinder portion 95 of the winding drum 94 to grip such paper web preparatory to winding the same on the drum. It is, of course, understood, that the end of the paper web is tapered in order to be disposed beneath the gripping arms 103 and 104. Release of fluid pressure from the cylinders 109 and 113 will result in the compression springs 115 and 116 returning the gripping arms 103 and 104 to open position as shown in FIG. 8.

A combined winding drum and web pulling and threading apparatus is shown in FIGS. 10 and 11 in which a winding drum 121 may be provided with a hollow cylindrical drum portion 122 and end flanges 123. The drum 121 may be mounted on suitable shafts 124 and 125 which in turn are carried in bearings for rotatably mounting the drum 121. The cylindrical drum portion 122 may be provided with a groove 126 in the surface thereof for receiving a web clamping bar 127 which may be carried by inwardly extending rods 128 connected to suitable mechanism, such as that shown in FIG. 9, for moving the bar 127 inwardly and outwardly to grip and release a paper web disposed between the bar 127 and the surface of the cylindrical drum portion 122 of the winding drum 121.

Rotatably mounted within the hollow drum 121 and extending axially thereof is a shaft 129 having a series of spools 130 fixed thereto in axially spaced relationship. Shaft 129 is drivingly connected to a suitable fluid pressure operated motor 131 which may be supplied with fluid pressure through a conduit 132 connected to a passage 133 in the shaft 125 which in turn is connected through a suitable joint, not shown, to a fluid pressure supply conduit 134 leading to a suitable source of fluid pressure. A flexible cable is connected to each spool 130 and the cable 135 may pass through a slot 136 in the bottom wall of the groove 126 and the ends of cables 135 will be provided with suitable web gripping means, such as that shown at 92 in FIG. 1. It is to be noted, that the flanges 137 of the spools 130 are spaced a distance substantially equal to the diameter of the cables 135 thereby causing winding of such cables in an even manner to provide equal movement of all of the cables 135.

In the operation of the apparatus shown in FIGS. 10 and 11, the cables 135 are passed through the slot 136 with the gripping means on the end thereof engaged with the paper web to be wound on the winding drum 121 and upon operation of the motor 131, the spools 130 will revolve to pull the cables 135 and paper web attached thereto until the end of the paper web passes through the slot 136 into the interior of the winding drum 121. At this time, the clamping bar 127 is moved into the groove 126 to securely clamp the paper web in place and thereafter the winding drum 121 may be rotated to wind the paper web thereon. The structure shown in FIGS. 10 and 11 would, of course, serve to replace the shaft 88, spools 90 and cables 91 shown in FIG. 1 and either structure may be utilized as desired.

It will be seen that by the above described invention there has been provided a substantially automatic apparatus for handling broken paper web from a paper machine and for storing the same until such time as production is resumed and thereafter, the apparatus also provides means for unwinding the paper web and slitting the same for treatment in a beater or hydropulper prior to re-use thereof.

It will be obvious to those skilled in the art that various changes may be made in the invention without departing from the spirit and scope thereof and therefore the invention is not limited by that which is shown in the drawing and described in the specification, but only as indicated in the appended claims.

What is claimed is:

1. For use with a paper machine having a drying section and a calender section with an opening between the sections for permitting downward passage of the broken end of a paper web passing forwardly through the drying section, a paper web handling apparatus comprising a frame pivotally mounted below said opening for movement downwardly and rearwardly from a substantially horizontal position to a substantially vertical position, pneumatic means for moving said frame, a driven feed roll rotatably mounted on said frame, a second driven feed roll rotatably and slidably mounted on said frame,

pneumatic means for moving said second feed roll toward and away from said first feed roll, whereby with said frame in horizontal position said paper web may pass downwardly through said opening and between said rolls and upon movement of said second roll toward said first roll to engage said web, rotation of said rolls will operate to feed said web downwardly, movement of said frame to a substantially vertical position serving to feed said web rearwardly in a substantially horizontal direction, means on said frame for directing air jets against the upper and lower surfaces of said web on the exit side of said rolls to direct said web away from said rolls in said substantially horizontal direction, winding apparatus for said web including a feeding section, a winding drum and pulling means for initially pulling said web through said feeding section and over said winding drum, said feeding section comprising a guide roll rotatably and pivotally mounted at one end, pneumatic means for raising and lowering the opposite end of said guide roll, a driven feed roll following said guide roll, a movable pressure roll above said last named feed roll, means for moving said pressure roll toward and away from said last named feed roll, a vertically movable tension roll following said last named feed roll, means for engaging the edge of said web between said last named feed roll and said tension roll to control the vertical movement of said opposite end of said guide roll, a crowned roll following sad tension roll, said winding drum for said web following said crowned roll and pneumatically operated means on said drum for gripping the end of said web.

2. For use with a paper machine having a drying section and a calender section with an opening between the sections for permitting downward passage of the broken end of a paper web passing forwardly through the drying section, a paper web handling apparatus comprising a frame pivotally mounted below said opening for movement downwardly and rearwardly from a substantially horizontal position to a substantially vertical position, fluid pressure means for moving said frame, a driven feed roll rotatably mounted on said frame, a second driven feed roll rotatably and slidably mounted on said frame, fluid pressure means for moving said second feed roll toward and away from said first feed roll, whereby with said frame in horizontal position said paper web may pass downwardly through said opening and between said rolls and upon movement of said second roll toward said first roll to engage said web, rotation of said rolls will operate to feed said web downwardly, movement of said frame to a substantially vertical position serving to feed said web rearwardly in a substantially horizontal direction, means on said frame for directing air jets against the upper and lower surfaces of said web on the exit side of said rolls to direct said web away from said rolls in said substantially horizontal direction, winding apparatus for said web including a feeding section, a winding drum and pulling means for initially pulling said web through said feeding section and over said winding drum, said feeding section comprising a guide roll rotatably and pivotally mounted at one end, fluid pressure means for raising and lowering the opposite end of said guide roll, a driven feed roll following said guide roll, a movable pressure roll above said last named feed roll, means for moving said pressure roll toward and away from said last named feed roll, a vertically movable tension roll following said last named feed roll, means for engaging the edge of said web between said last named feed roll and said tension roll to control the vertical movement of said opposite end of said guide roll, an idler following said tension roll, said winding drum for said web following said idler roll and fluid pressure operated means on said drum for gripping the end of said web.

3. For use with a paper machine having a drying section and a calender section with an opening between the sections for permitting downward passage of the broken end of a paper web passing forwardly through the drying section, a paper web handling apparatus comprising a frame pivotally mounted below said opening for movement downwardly and rearwardly substantially horizontal position to a substantially vertical position, means for moving said frame, a driven feed roll rotatably mounted on said frame, a second driven feed roll rotatably and slidably mounted on said frame, means for moving said second feed roll toward and away from said first feed roll, whereby with said frame in horizontal position said paper web may pass downwardly through said opening and between said rolls and upon movement of said second roll toward said first roll to engage said web, rotation of said rolls will operate to feed said web downwardly, movement of said frame to a substantially vertical position serving to feed said web rearwardly in a substantially horizontal direction, winding apparatus for said web including a feeding section, a winding drum and pulling means for initially pulling said web through said feeding section and over said winding drum, said feeding section comprising a guide roll rotatably and pivotally mounted at one end, means for raising and lowering the opposite end of said guide roll, a driven feed roll following said guide roll, a movable pressure roll above said last named feed roll, means for moving said pressure roll toward and away from said last named feed roll, a vertically movable tension roll following said last named feed roll, means for engaging the edge of said web between said last named feed roll and said tension roll to control the vertical movement of said opposite end of said guide roll, an idler roll following said tension roll, said winding drum for said web following said idler roll and means on said drum for gripping the end of said web.

4. For use with a paper machine having a drying section and a calender section with an opening between the sections for permitting downward passage of the broken end of a paper web passing forwardly through the drying section, a paper web handling apparatus comprising a frame pivotally mounted below said opening for movement downwardly and rearwardly from a substantially horizontal position to a substantially vertical position, means for moving said frame, a driven feed roll rotatably mounted on said frame, a second driven feed roll rotatably and slidably mounted on said frame, means for moving said second feed roll toward and away from said first feed roll, whereby with said frame in horizontal position said paper web may pass downwardly through said opening and between said rolls and upon movement of said second roll toward said first roll to engage said web, rotation of said rolls will operate to feed said web downwardly, movement of said frame to a substantially vertical position serving to feed said web rearwardly in a substantially horizontal direction, winding apparatus for said web including a feeding section, a winding drum and pulling means for initially pulling said web through said feeding section and over said winding drum, said feeding section comprising a guide roll rotatably and pivotally mounted at one end, means for raising and lowering the opposite end of said guide roll, a driven feed roll following said guide roll, a movable pressure roll above said last named feed roll, means for moving said pressure roll toward and away from said last named feed roll, a vertically movable tension roll following said last named feed roll, means for engaging the edge of said web to control the vertical movement of said opposite end of said guide roll, an idler roll following said tension roll, said winding drum for said web following said idler roll and means on said drum for gripping the end of said web.

5. For use with a paper machine having a drying section and a calender section with an opening between the sections for permitting downward passage of the broken end of a paper web passing forwardly through the drying section, a paper web handling apparatus comprising a frame pivotally mounted below said opening for movement downwardly and rearwardly from a substantially horizontal position to a substantially vertical position,

means for moving said frame, a driven feed roll rotatably mounted on said frame, a second driven feed roll rotatably and slidably mounted on said frame, means for moving said second feed roll toward and away from said first feed roll, whereby with said frame in horizontal position said paper web may pass downwardly through said opening and between said rolls and upon movement of said second roll toward said first roll to engage said web, rotation of said rolls will operate to feed said web downwardly, movement of said frame to a substantially vertical position serving to feed said web rearwardly in a substantially horizontal direction, winding apparatus for said web including a feeding section, a winding drum and pulling means for initially pulling said web through said feeding section and over said winding drum, said feeding section comprising a guide roll rotatably and pivotally mounted at one end, means for raising and lowering the opposite end of said guide roll, a driven feed roll following said guide roll, a movable pressure roll above said last named feed roll, means for moving said pressure roll toward and away from said last named feed roll, a vertically movable tension roll following said last named feed roll, means for engaging the edge of said web to control the vertical movement of said opposite end of said guide roll and means on said drum for gripping the end of said web.

6. For use with a paper machine having a drying section and a calender section with an opening between the sections for permitting downward passage of the broken end of a paper web passing forwardly through the drying section, a paper web handling apparatus comprising a frame pivotally mounted below said opening for movement downwardly and rearwardly from a substantially horizontal position to a substantially vertical position, means for moving said frame, a driven feed roll rotatably mounted on said frame, a second feed roll rotatably and slidably mounted on said frame, means for moving said second feed roll toward and away from said first feed roll, whereby with said frame in horizontal position said paper web may pass downwardly through said opening and between said rolls and upon movement of said second roll toward said first roll to engage said web, rotation of said rolls will operate to feed said web downwardly, movement of said frame to a substantially vertical position serving to feed said web rearwardly in a substantially horizontal direction, winding apparatus for said web including a winding drum and pulling means for initially pulling said web over said winding drum, a guide roll rotatably and pivotally mounted at one end, means for raising and lowering the opposite end of said guide roll, means for engaging the edge of said web to control the vertical movement of said opposite end of said guide roll and means in said drum for gripping the end of said web.

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