

May 26, 1959

W. S. CORBIN ET AL

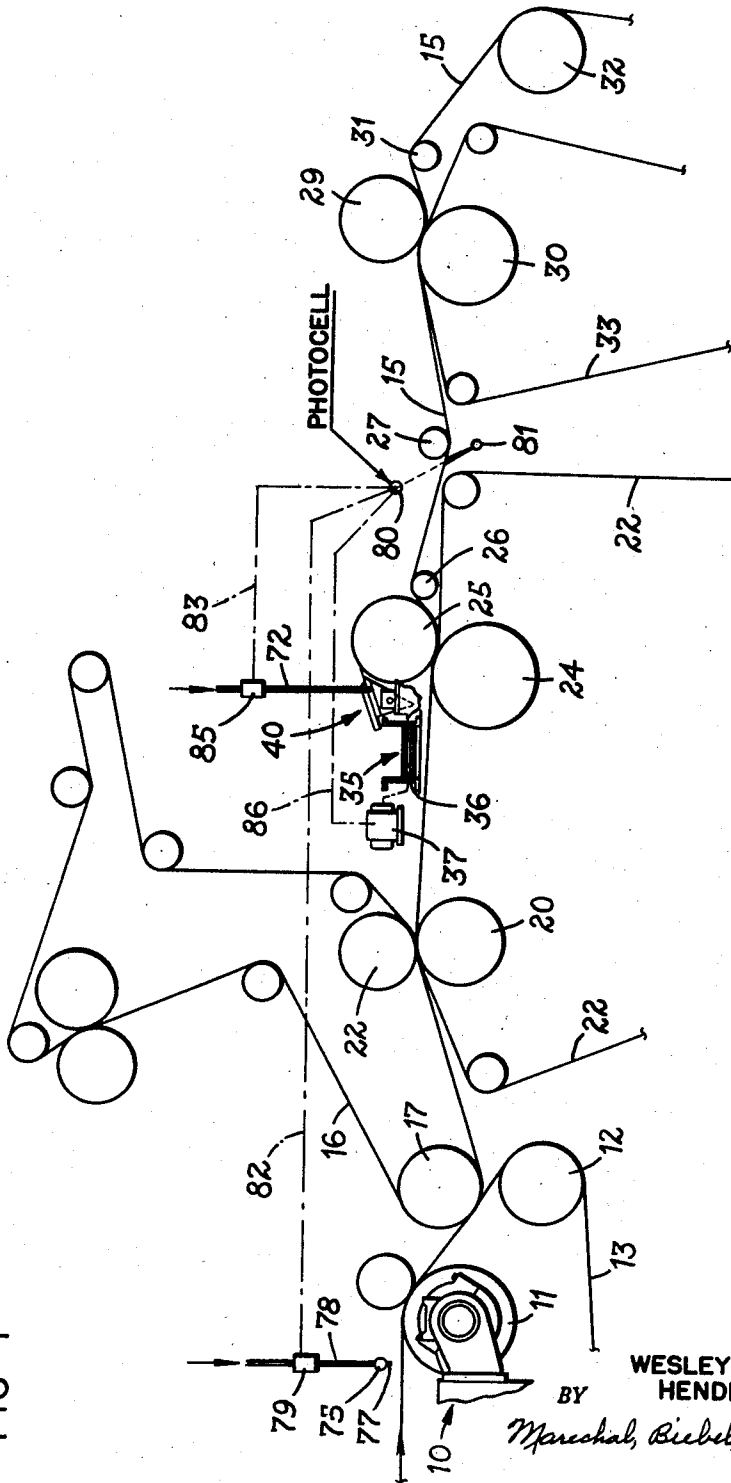
2,888,073

BROKE REMOVAL UNIT FOR PAPER MACHINERY

Filed Aug. 3, 1956

2 Sheets-Sheet 1

FIG-1



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2 Sheets-Sheet 2

FIG-3

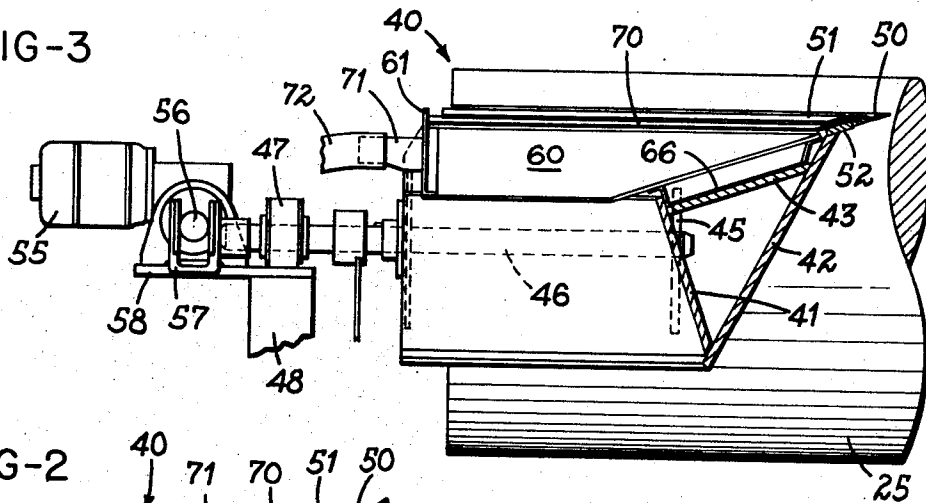


FIG-2

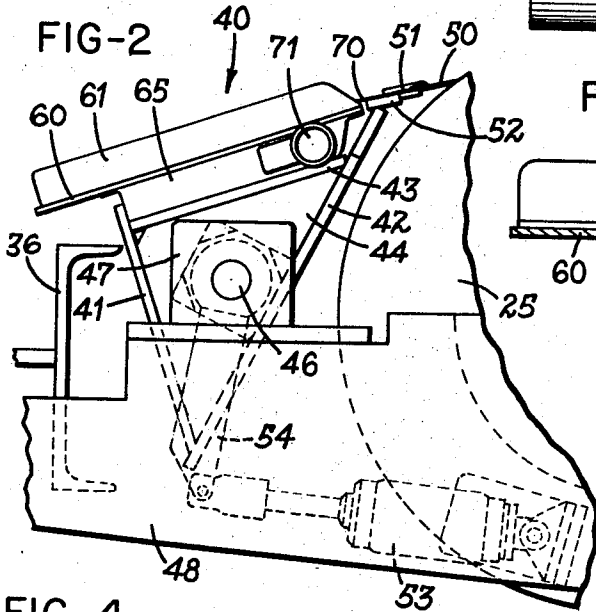


FIG-5

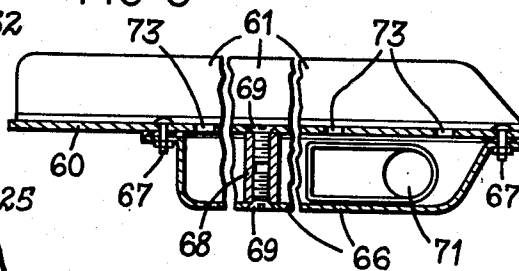


FIG-6

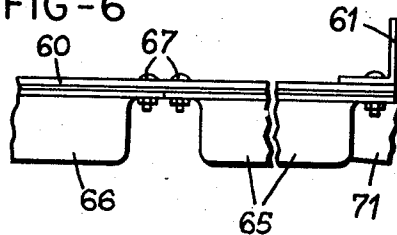
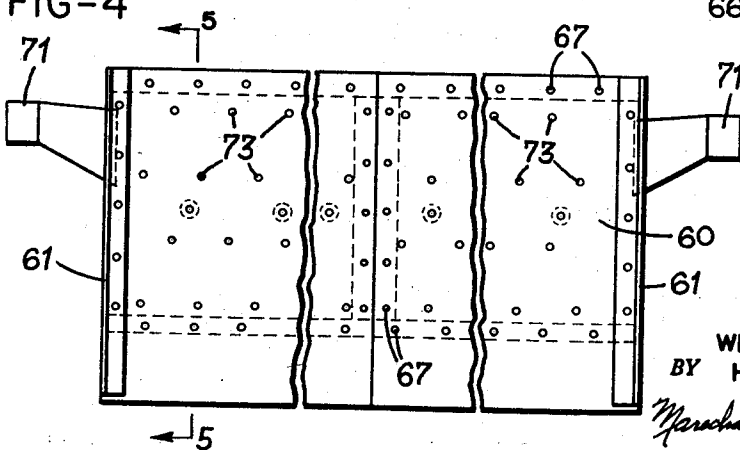


FIG-4



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1

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**BROKE REMOVAL UNIT FOR PAPER
MACHINERY**

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5 Claims. (Cl. 162—255)

(Filed under Rule 47(a) and 35 U.S.C. 116)

This application relates to paper machines, and it has special relation to the handling of damaged paper sheet commonly known as "broke" which results when a break occurs in the newly formed paper web during operation of the paper machine.

The invention is particularly concerned with the removal of broke which might otherwise tend to wind up on a roll such as a press roll in the paper machine, and which must not only be prevented from accumulating on the roll but must also be quickly removed laterally of the machine for further disposal such as transfer to a pulper. For example, it is a common practice to provide a conveyor extending crosswise of the paper machine adjacent a roll at which a web break is likely to occur, with the objective of directing the web of broke onto such conveyor for transfer to one side of the machine where it can be more readily disposed of. However, operation of such a broke conveyor requires that the direction of web travel be shifted through a full 90° from the machine direction, and this is often difficult to accomplish, with the difficulty increasing in accordance with the width of the web and the speed of the paper machine.

A typical example of a location at which the difficulties of broke accumulation and removal may become acute is at the first main press section, as the result of a web break in the open jump of the web between the first and second main press sections. In such event, the natural tendency of the broke web is to follow around the top press roll in the first press section, and it is essential both to doctor this relatively soggy sheet off the roll and also to remove it to one side of the machine. This in turn requires a substantially right angled turning of the web out of the machine direction, which must also be effected rapidly before the broke has time to accumulate to the extent that it becomes unmanageable. In fact, unless this is done rapidly, the broke will tend to pile without moving until it begins to fall over the front of the roll rather than traveling to the broke conveyor.

It is a primary object of the present invention to provide a doctor unit for use in conjunction with a roll in a paper machine where broke is likely to accumulate which will act initially to remove the broke continuously from the roll, which includes an inclined plate across which the broke is adapted to travel downwardly for further disposal, and which incorporates provision for supplying a film of lubricating fluid to the upper surface of the inclined plate to facilitate travel of the broke thereacross.

A further object of the invention is to provide a doctor unit as outlined above wherein the plate across which the broke is adapted to travel is perforated and wherein provision is made for supplying a lubricating fluid such as water to the under surface of this plate under pressure for overflow through the perforations in the plate to form the desired film of lubricating fluid.

An additional object of the invention is to provide a paper machine which incorporates a doctor unit as outlined above for effecting continuous removal of broke

2

and which also incorporates provision for slitting the web of broke lengthwise thereof in advance of its arrival at the doctor unit to facilitate the lateral deflection thereof for removal to one side of the paper machine.

It is also an object of the invention to provide a paper machine as outlined above wherein slitting of the web of broke is effected by a plurality of water jets operated by a control which is automatically responsive to a break in the web to initiate a supply of water simultaneously to the doctor unit and to the water jets and also to start operation of the broke conveyor.

Additional objects and advantages of the invention will be apparent from the following description, the accompanying drawings and the appended claims.

In the drawings—

Fig. 1 is a diagrammatic view of a portion of a Fourdrinier paper machine incorporating broke removal apparatus in accordance with the present invention;

Fig. 2 is an enlarged fragment of Fig. 1 illustrating the installation of a doctor unit in accordance with the invention in conjunction with the first main press section of the paper machine of Fig. 1 and its associated broke conveyor;

Fig. 3 is a fragmentary view looking from left to right in Fig. 2;

Fig. 4 is a partial detail view looking downwardly on the doctor unit of Figs. 2 and 3;

Fig. 5 is an enlarged fragmentary section on the line 5—5 of Fig. 4; and

Fig. 6 is a fragmentary detail view looking from left to right in Fig. 5.

Referring to the drawings, which illustrate a preferred embodiment of the invention, Fig. 1 shows at 10 a fragment of the wire section of a Fourdrinier paper machine including the couch roll 11 and guide roll 12 over which the forming wire 13 travels. The newly formed web 15 is transferred from the wire 13 to the top felt 16 by the suction pickup roll 17 for travel to the transfer press formed by a suction roll 20 and top press roll 21. At this suction press, the web 15 is transferred to the lower felt 22 for travel to the first main press section comprising the suction roll 24 and top roll 25. The web then travels over a blow roll 26 and below the draw roll 27 to the second main press section comprising the top roll 29 and suction roll 30, after which the web travels over an additional blow roll 31 and a small dryer drum 32 to the next processing section (not shown).

One of the locations at which a web break is most likely to occur is in the open jump between the first and second main press sections and their associated felts 22 and 33. In the event of such break, the web will tend to wind on the top press roll 25 of the first press section, since there will no longer be a drawing force on the sheet at the second press section. The machine is accordingly shown as provided with a continuous conveyor 35 extending crosswise of the machine on a frame 36 just ahead of the first press section and between the levels of the press roll 25 and the felt 22. This conveyor is shown as having a drive motor 37 and operates to remove the broke to the back of the machine whence it can be disposed of manually or by an additional conveyor (not shown) to the broke pulper in the usual way. The present invention is concerned with the provision of a doctor unit identified generally at 40 for the purpose of assuring effective removal of the broke from the roll 25 and rapid delivery thereof to the conveyor 35.

Referring particularly to Figs. 2-6, the doctor unit 40 includes a generally triangular supporting frame comprising plates 41, 42 and 43 welded or otherwise secured together and provided with end plates 44 and interior plates 45. This frame is supported on the frame of the paper machine by a pair of stub shafts 46 mounted

3

for rocking and sliding movement in bearings 47 mounted on the machine frame 48. The doctor blade 50 which is adapted to engage the surface of the roll 25 is carried by a blade holder 51 bolted on a bar 52 which is in turn welded to the upper edge of the frame plate 42. Rocking of the frame to move the blade 50 into and out of engagement with roll 25 is effected by a pair of fluid pressure cylinders 53 each having its piston rod connected with one of the shafts 46 by a lever arm 54. This doctor unit is reciprocated lengthwise of roll 25 during use by means of the motor 55 through an eccentric cam 56 and cam follower 57 slidable on the bracket 58 and secured to the end of one of the shafts 46.

Broke removed from the roll 25 by the doctor blade 50 must be rapidly delivered to the broke conveyor 35. The invention provides an elongated plate 60 of substantially the same length as the face of roll 25 which has angles 61 bolted along its opposite ends to form a chute extending from the doctor blade to the conveyor 35. A pair of pans 65 and 66 are secured to the under side of the plate 60, two pans being used on wide machines for purposes of simplicity of construction and adequate pressure condition as described hereinafter. The edges of these pans are flanged outwardly for convenient attachment to the plate 60 as by means of bolts 67 and suitable gaskets. Reinforcing connections are provided along the centers of these pans in the form of spacers 68 secured to the pans and the plate 60 by screws 69.

The pans 65 and 66 are adapted to be received on the frame plate 43 with the lower edges thereof seating against the upwardly projecting upper edge portion of the frame plate 41. These parts are so proportioned as to support the upper surface of plate 60 in approximately coplanar relation with the frame bar 52, and the gap therebetween is bridged by a flat strip 70 which may be secured on the bar 52 by the same screws which mount the blade holder 51. As shown in Fig. 3, the parts are also so proportioned that in the operative position of the doctor blade 50, the plate 60 is inclined downwardly from the doctor blade into overhanging relation with the conveyor 35.

In order to assure effective operation of the plate 60 in delivering broke from the doctor blade to the conveyor 35, each of the pans 65 and 66 is provided at its outer end with an inlet connection 71 for attachment to a line 72 for delivering water thereto. In addition, the portion of the plate 60 which overlies and covers the pans 65 and 66 is provided with multiple spaced perforations 73. As a result, when water is supplied to the interior of the pans, this water will overflow under pressure through the perforations 73 in such manner as to form a film on the upper surface of the plate 60, and this film provides effective lubrication for the broke delivered to the plate by the doctor blade 50 so that the broke will slide rapidly down onto the conveyor 35 instead of tending to accumulate on and around the doctor blade.

It has been found in the operation of paper machines of substantial widths that broke is difficult to handle in wide strips, particularly where it is necessary to change the direction of travel of the web through 90° out of the machine direction as in the installation shown in the drawings. Accordingly, the invention also provides the paper machine with means for slitting the web of broke before it reaches the conveyor 35, and the operation of the slitting means is coordinated with that of the doctor unit 40 in such manner that slitting begins only after a web break has occurred and simultaneously with the supply of water to the doctor unit 40.

Referring to Fig. 1, a header 75 is mounted at the end of the wire section 10, a convenient location being the position shown in Fig. 1 just above and to the left of the couch roll 11. The header 75 is provided along its underside with multiple jet nozzles 77 spaced at suitable distances from each other such as approximately four feet, and the header 75 is connected to receive

4

water from a supply line 78 shown diagrammatically as controlled by an electrically operated valve 79. The jet nozzles 77 should of course not be operated except while the machine is producing broke which must be removed. Accordingly, means are provided for automatically operating the nozzles 77 and the doctor unit 40 as soon as a web break occurs.

For this purpose, a photoelectric cell 80 is mounted adjacent the path of travel of the web 15 across the open jump between the two felts 22 and 23, and it is adapted to be actuated by a light source 81 positioned on the opposite side of the web so that the light therefrom is normally blocked from reaching the photocell by the web. The photocell 80 is connected as indicated at 82 to actuate the valve 79, and it is also connected as indicated at 83 to actuate an electrically operated valve 85 in the supply line 72 to the pans in the doctor unit 40. If desired, the photocell 80 may also be connected as indicated at 86 to actuate the motor 37 driving the broke conveyor.

With this arrangement as shown in Fig. 1, so long as the web 15 is traveling properly through both main press sections, water supply to the doctor unit 40 and the jet nozzles 77 is shut off, and the broke conveyor 35 need not operate. However, as soon as a web break occurs between the two press sections, the light from the source 81 will actuate photocell 80. As soon as this occurs, the water supply will be turned on the valve 85 to provide water to the upper surface of the plate 60 as described. At the same time, the conveyor motor 37 will be started to drive the conveyor 35, and the valve 79 will be opened to supply water to the jet nozzles 77. Thus the broke which would otherwise tend to collect on the press roll 25 and the plate 60 will be removed and delivered continuously to the conveyor 45 for delivery to one side of the machine. At the same time, the jet nozzles 77 will be turned on to cause slitting of the web of broke in advance of its arrival at the roll 25 and thus to effect further simplification of the operations of broke removal.

While the forms of apparatus herein described constitute preferred embodiments of the invention, it is to be understood that the invention is not limited to these precise forms of apparatus, and that changes may be made therein without departing from the scope of the invention which is defined in the appended claims.

What is claimed is:

1. A doctor unit adapted for use on a paper machine to remove broke from a roll comprising a plate of substantially the same length as the roll, means for mounting said plate adjacent and in downwardly inclined relation with the roll, a doctor blade connected with the upper edge of said plate for engagement with the roll to remove broke therefrom onto said plate, and means for supplying a flow of lubricating fluid through said plate to the upper surface thereof to provide a film of said fluid lying between said plate surface and broke delivered thereto by said blade to facilitate travel of such broke across said plate.

2. A doctor unit adapted for use on a paper machine to remove a broke from a roll comprising a plate of substantially the same length as the roll, means for mounting said plate adjacent and in downwardly inclined relation with the roll, a doctor blade connected with the upper edge of said plate for engagement with the roll to remove broke therefrom onto said plate, a pan secured to the underside of said plate with a portion of said plate forming the cover thereof, said portion of said plate overlying said pan having perforations therethrough, and means for supplying a lubricating fluid to the interior of said pan for overflow through said perforations onto the upper surface of said plate to provide a film of said fluid lying between said plate sur-

5

face and broke delivered thereto by said blade to facilitate travel of such broke across said plate.

3. A doctor unit adapted for use on a paper machine to remove broke from a roll and to deliver the broke to a broke conveyor arranged crosswise of the machine adjacent and at a level below the top of the roll, comprising a plate of substantially the same length as the roll, means for mounting said plate at a level above said conveyor and in downwardly inclined relation toward said conveyor from said roll, a doctor blade connected with the upper edge of said plate for engagement with the roll to remove broke therefrom onto said plate, and means for supplying a flow of water through said plate to the upper surface to provide a film of water lying between said plate surface and broke delivered thereto by said blade to facilitate travel of such broke across said plate.

4. A doctor unit adapted for use on a paper machine to remove broke from a roll and to deliver the broke to a broke conveyor arranged crosswise of the machine adjacent and at a level below the top of the roll, comprising a plate of substantially the same length as the roll, means for mounting said plate at a level above said conveyor and in downwardly inclined relation toward said conveyor from said roll, a doctor blade connected with the upper edge of said plate for engagement with the roll to remove broke therefrom onto said plate, a pan secured to the underside of said plate with a portion of said plate forming the cover thereof, said cover portion of said plate having perforations therethrough, and means for supplying water to the interior of said pan

6

for overflow through said perforations onto the upper surface of said plate to provide a film of water lying between said plate surface and broke delivered thereto by said blade to facilitate travel of such broke across said plate.

5. In a paper machine including a press roll and a broke conveyor arranged crosswise of the machine adjacent and at a lower level than said roll, the combination of a doctor unit for delivering broke from said roll to said conveyor comprising a plate of substantially the same length as said roll, means for mounting said plate at a level above said conveyor and in downwardly inclined relation toward said conveyor from said roll, a doctor blade connected with the upper edge of said plate for engagement with said roll to remove broke therefrom onto said plate, and means for supplying a flow of water through said plate to the upper surface thereof to provide a film of water lying between said plate surface and broke delivered thereto by said blade to facilitate travel of such broke across said plate.

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