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E. R. LJUNGQUIST

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DOCTOR MECHANISM FOR ROLLS AND CYLINDERS.

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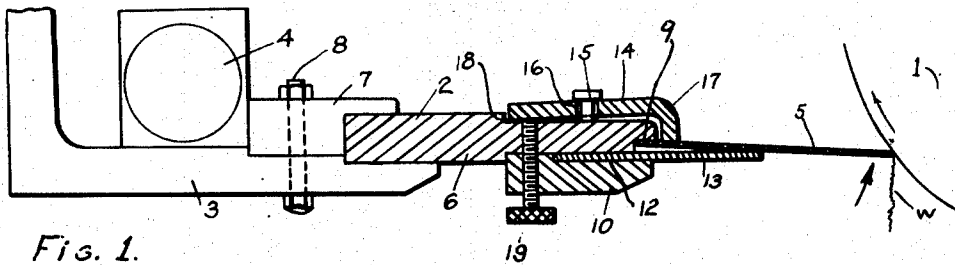


Fig. 1.

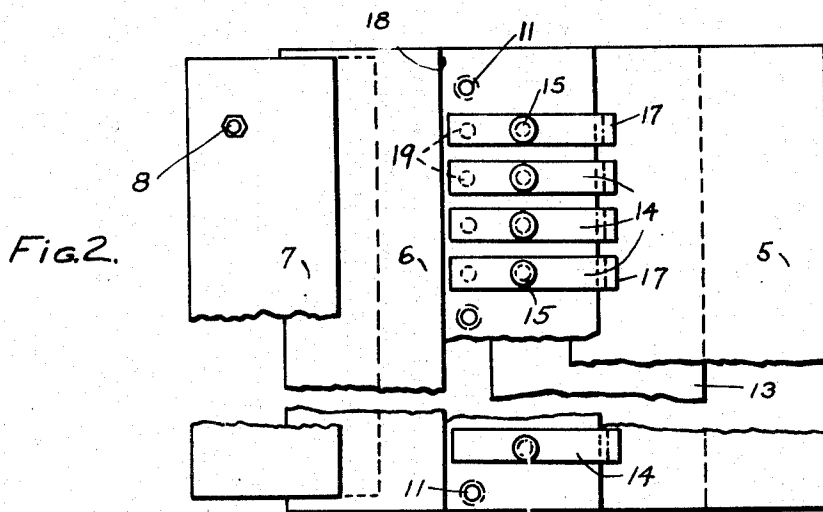


Fig. 2.

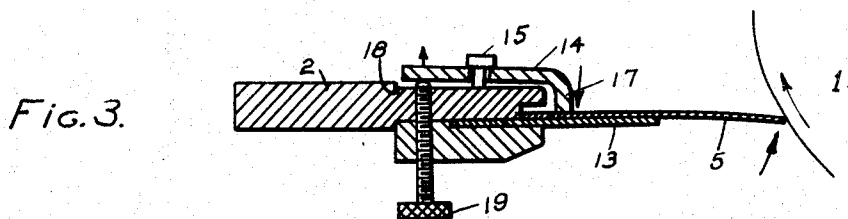


Fig. 3.

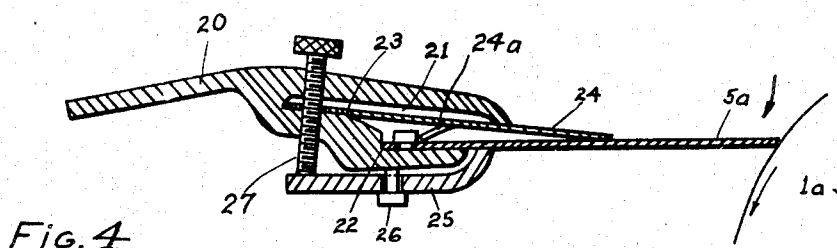


Fig. 4.

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## UNITED STATES PATENT OFFICE

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## DOCTOR MECHANISM FOR ROLLS AND CYLINDERS

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2 Claims. (Cl. 92-74)

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The present invention relates to devices known in the paper making art as doctors or scrapers, such devices being customarily employed in connection with rotating calendar rolls, drier cylinders, and the like, for the purpose of cleaning the surfaces of such rolls and cylinders, or removing a web of paper therefrom, as in the manufacture of crepe paper.

In Lodding Patent No. 2,117,032, issued May 10, 1938, there is shown and described a doctor mechanism of the above indicated type, characterized by the provision of a thin flexible doctor blade carried by a relatively stiff holder that is pivotally mounted to turn about an axis parallel to the axis of the rotating surface being doctored. In operation, the holder of the Lodding patented doctor is adapted to apply pressure to the blade in a direction opposite to reactions set up along the edges of the blade by the surface being doctored and by the rigid holder, through operation of a member of greater stiffness than the blade for engaging the blade surface intermediate such edges.

The object of the present invention is to provide certain improvements in the above described patented construction, as regards the manner of supporting and applying pressure to the blade, so that the blade can bend longitudinally throughout its width and thereby adjust itself to the moving surface being doctored. Briefly stated, the present invention contemplates the provision of an improved holder for the doctor blade, so constructed that while the blade is applied, as a whole, to the roll by turning of the holder, auxiliary pressure can be applied in varying amounts to localized areas of the free or back edge of the blade to cause the blade to fit itself closely to the surface being doctored. Such blade adjustment is particularly advantageous when using the blade as a creping doctor to remove a web of paper completely from the roll surface.

The above and other advantageous features of the invention will hereinafter more fully appear from the following description, with reference to the accompanying drawing, in which:

Fig. 1 is a transverse sectional view of a doctor mechanism embodying the present invention.

Fig. 2 is a plan view of the mechanism shown in Fig. 1.

Fig. 3 is a sectional view similar to Fig. 1, illustrating the manner of adjusting the free or back edge of the doctor blade.

Fig. 4 is a sectional view illustrating a modified form of blade holder embodying the invention.

Referring to the drawings, a portion of the sur-

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face of a roll or cylinder is indicated at 1, and a holder 2 embodying the invention is carried by an arm 3 turnable about a pivot 4 with respect to the roll 1. Suitable means, not shown, are provided for imparting a turning movement to the arm 3 about its pivot 4, thus tending to swing the holder 2 in the direction of the arrow to bring one edge of a doctor blade 5 carried by the holder 2 into engagement with the moving surface of the roll 1. The blade 5 is composed of any suitable thin flexible material, such as steel, brass, or a synthetic composition, such as Bakelite.

The holder 2 consists of a bar 6 secured to the pivoted arm 3 by means of a clamp 7 and bolts 8, and the outer end of the bar 6 provides a notch 9 in which is received the rear edge of the blade 5. The holder 2 also comprises a member 10 secured to the bar 6 by screws 11, and the member 10 also provides a seat 12 in which is received a portion of a pressure plate 13. The pressure plate 13 extends beyond the edge of the holder to engage the blade 5 between its edges, with the thickness of the pressure plate 13 being such that it is relatively stiff, as compared to the doctor blade 5.

Consequently when the blade 5 is applied to the roll surface 1 by turning movement imparted to the arm 3 about its pivotal axis, as indicated by the arrow, the free end of the plate 13 engages the blade 5 between its edges to cause the blade to assume the position of Fig. 1, wherein the blade is inclined with respect to the plate 13. That is to say, the free or back edge of the blade 5 tends to move away from the pressure plate 13 towards the upper side of the notch 9. This yielding of the blade 5 in response to pressure applied to the plate 13, in a direction opposite to the reactions set up along its scraping edge and its back edge as seated in the notch 9, results in an effective application of the blade, as a whole, to the surface being doctored.

As previously pointed out, the doctor blade mounting of the present invention is particularly adapted for use in connection with creping doctors, and in the illustrative embodiment of the invention shown in Fig. 1, the blade 5 is being utilized for the production of crepe paper, with the scraping edge of the blade serving to remove a paper web W from the surface of the roll 1 with a creping action. In the operation of such a creping doctor, it is of the utmost importance that the blade maintain firm contact with the roll surface, notwithstanding irregularities of the roll and resulting local deformations of the doctor blade, so that the paper web will be removed

evenly from the roll surface. Therefore, the present invention contemplates the provision of means, adjustable independently of the blade holder itself, for causing the blade to flex at different points along its length to insure uniform engagement of its scraping edge with the roll surface.

To this end, the holder 2 further provides a number of fingers 14 mounted on top of the bar 6 by means of studs 15. It is to be noted in Fig. 1 that the opening 16 in each finger 14 through which the stud 15 passes is slightly larger than the stud, so that the finger 14 is capable of limited pivoted movement about the stud 15. The end of each finger 14 extending toward the roll overhangs the edge of the bar 6, and provides a bent portion 17 adapted to engage the doctor blade 5 closely adjacent to where it emerges from the notch 9. The opposite end of the finger 14 extends over a seat 18 provided by the bar 6, and with the blade 5 occupying the position of Fig. 1, the pressure exerted on the blade by the plate 13 is normally sufficient to hold the finger 14 in an upwardly inclined position, with the left hand end of the finger 14 tending to bottom in the seat 18. The exact relation of each finger 14 with respect to its seat 18 is determined by an adjusting screw 19 in threaded relation with respect to the bar 6, and turnable to bring its upper end into engagement with the end of a finger 14 adjacent to the seat 18.

Assuming that the blade 5 has been applied to the roll 1 by turning of the arm 3 about its pivot 4, it is evident that the paper web W will be removed from the roll 7 with a creping action, as indicated. While the pressure applied to the blade 5 by the plate 13 is normally sufficient to cause the blade to perform satisfactorily upon a perfectly cylindrical roll surface, it has been found that irregularities of the roll surface will tend to deform the blade locally, thereby preventing uniform contact of its scraping edge with the roll surface. According to the present invention, the undesirable results of any such abnormalities in operation are overcome by individually operating the fingers 14 through their screws 19 to exert localized pressure on the back edge of the doctor blade, opposite to the pressure exerted by the plate 13 in applying the blade to the roll.

The operation of a finger 14, in so applying localized pressure to the blade 5, is illustrated on an exaggerated scale in Fig. 3, wherein the screw 19 has been turned to engage the under side of the finger 14 and force it away from its seat 18. As a result, the finger 14 tends to swing about its loose mounting on the stud 15 to cause its bent-over end 17 to engage the free back edge of the blade adjacent the notch 9. Thus the particular portion of the blade engaged by the finger 14 is flexed sufficiently so as to unseat it from the notch 9, while adjacent portions of the blade remain seated, as indicated. The net result of such localized flexure of the blade, as opposed to its normal flexure by the pressure plate 13, results in applying that portion of the scraping edge opposite to the zone of deflection by the finger 14 more closely to the roll surface 1.

Therefore the several fingers 14 and their adjusting screws 19 provide readily operable means for causing the doctor blade 5 to firmly contact the roll 1 at all points along the scraping edge of the table, irrespective of irregularities of the roll surface, or the existence of any other factors tending to interfere with the uniform scrap-

ing action of the blade 5 along its whole length. As a result, the operator of a machine equipped with an improved doctor blade mounting of the present invention can, by selective manipulation of the adjusting screws 19, overcome any abnormalities of operation, by causing just the right amounts of secondary flexure of the blade independently of the primary pressure which serves to press the blade, as a whole, upon the roll.

Referring now to Fig. 4, there is shown the mounting of a doctor blade 5a in accordance with the present invention to perform a doctoring action on that portion of a roll surface 1a that is located above the roll axis, so that the blade 5a performs a cleaning action, as compared to the removal of a web by the creping doctor 5 shown in Fig. 1, which engages the roll below its axis of rotation. In this modified form of mounting, the pivotal arm 3 carries a one-piece holder 20 having a longitudinal slot 21 providing off-set seats 22 and 23. The doctor blade 5a is normally maintained in engagement with the lower seat 22 by a pressure plate 24 engaging the blade intermediate its edges, with the plate 24 providing ears 24a to maintain the blade 5a in the slot 21.

In order to provide for localized bending of the blade 5a adjacent its back edge, a number of fingers 25 are loosely supported by studs 26 from the under side of the holder 20. An adjusting screw 27 threaded into the holder is adapted to engage the inner end of each finger 25 and turn it about its stud 26, so as to engage the back edge of the blade 5a and flex it away from the seat 22. The screws 27 can also be utilized to maintain the pressure plate 24 in the slot 21, by freely passing through openings in the plate.

From the foregoing it is apparent that by the present invention there is provided an improved mounting for a doctor blade, characterized by the provision of means for obtaining localized flexure of the blade adjacent its free or back edge, to cause the working edge of the blade to firmly engage the moving surface being doctoring under conditions of operation such as might otherwise result in an uneven doctoring action. By reason of the fact that the auxiliary pressure fingers are adapted to operate on the back edge of the blade, they will perform their function irrespective of the width of the blade. Therefore any appreciable wear of the scraping edge will not upset the action of the fingers, since the screws 19 and 27 give a wide range of adjustment in the pressures applied thereby.

#### I claim:

1. A doctor mechanism for rolls and cylinders comprising in combination, a pivotally mounted holder providing a first and a second seat disposed lengthwise of the front end portion thereof, a flexible blade of a thickness substantially less than the depth of said first seat and having one edge portion freely received within said first seat, a plate of greater stiffness than said blade and having one edge portion mounted in said second seat with its opposite edge portion extending beyond said first seat and engaging said blade intermediate its edges thereby to apply the other edge of said blade to a rotating surface in response to movement of said holder about its pivot, accompanied by a primary flexure of said blade, a series of fingers pivotally mounted at intervals along said holder, with the ends of said fingers bearing on said blade at different points adjacent the front edge portion of said first seat, and adjusting screws threaded into said holder for engaging the opposite ends of said fingers

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thereby selectively to impart a secondary flexure to said blade about said plate with respect to said first seat in accordance with the individual adjustment of said screws, with said secondary flexure of the blade by said fingers being in a direction opposite to that in which the blade is flexed through its application to the surface being doctored by said plate.

2. A doctor mechanism for rolls and cylinders comprising in combination, a pivotally mounted holder providing a first and a second seat disposed lengthwise of the front end portion thereof, a plane imperforate flexible blade of a thickness substantially less than the depth of said first seat and having one edge portion freely received within said first seat, a plate of greater stiffness than said blade and having one edge portion rigidly mounted in said second seat with its opposite edge portion extending beyond said first seat and engaging said blade intermediate its edges thereby to apply the other edge of said blade to a rotating surface in response to movement of said holder about its pivot, accompanied by a primary flexure of said blade, a series of fingers pivotally mounted at intervals along said holder with the ends of said fingers bearing on said blade at different points between the front edge of the

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first seat and said plate, and adjusting screws threaded into said holder for engaging the opposite ends of said fingers thereby selectively to impart a secondary flexure to said blade with respect to said first seat in accordance with the individual adjustment of said screws, with said secondary flexure of the blade by said fingers being in a direction opposite to that in which the blade is flexed through its application to the surface being doctored by said plate.

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