Feb. 21, 1950 E. R. LJUNGQUIST 2,498,213

DOCTOR DEVICE FOR ROLLS AND CYLINDERS

Filed June 17, 1946 2 Sheets-Sheet 1

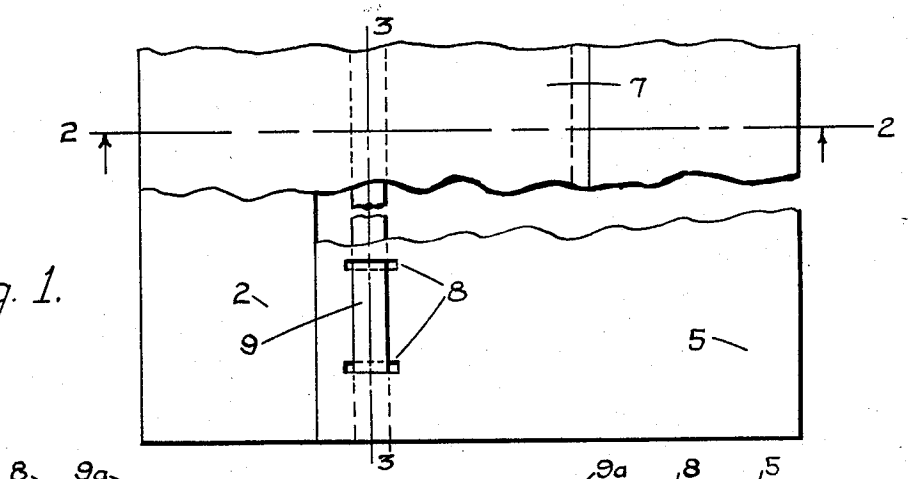


Fig. 1.

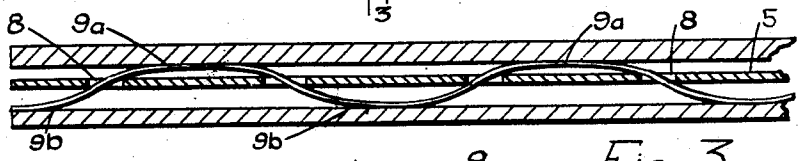


Fig. 3.

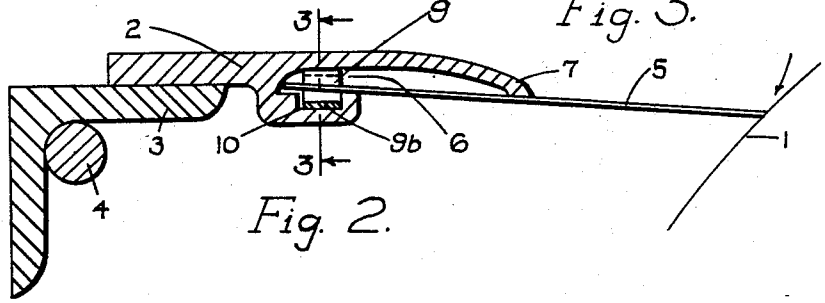


Fig. 2.

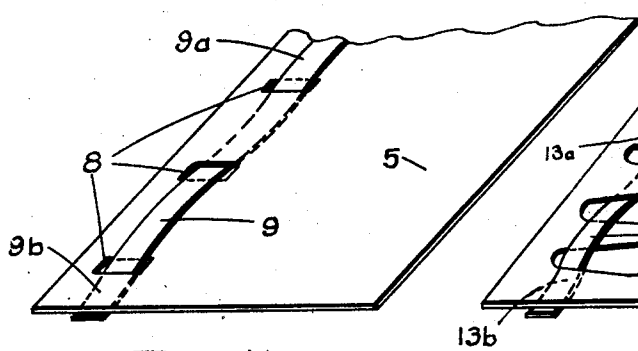


Fig. 4.

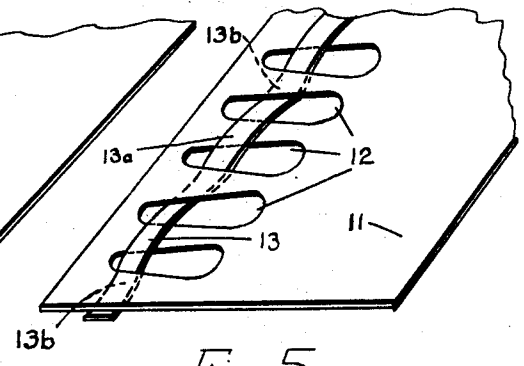


Fig. 5.

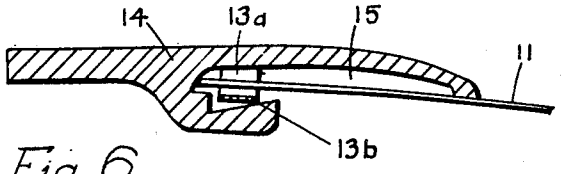


Fig. 6.

INVENTOR
Ernst R. Ljungquist
BY Owen R. Kennedy
ATTORNEY

Feb. 21, 1950 E. R. LJUNGQUIST 2,498,213

DOCTOR DEVICE FOR ROLLS AND CYLINDERS

Filed June 17, 1946 2 Sheets-Sheet 2

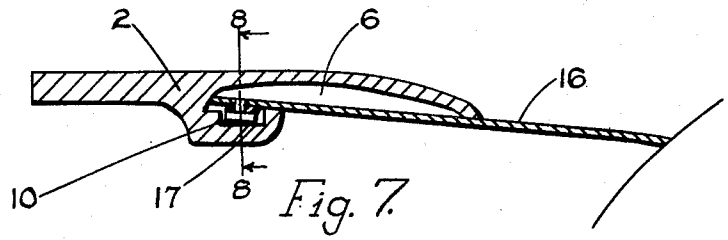


Fig. 7.

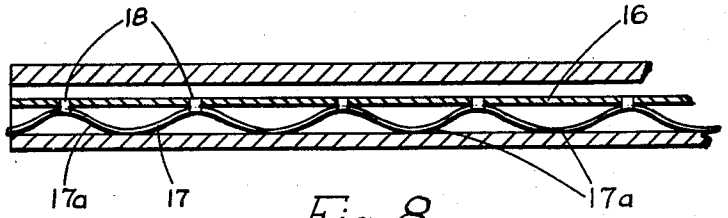


Fig. 8.

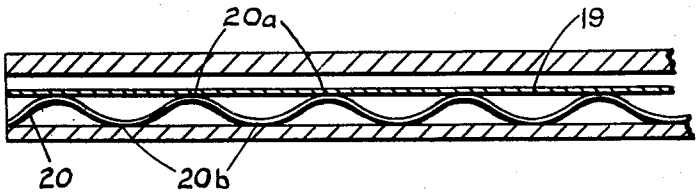


Fig. 9.

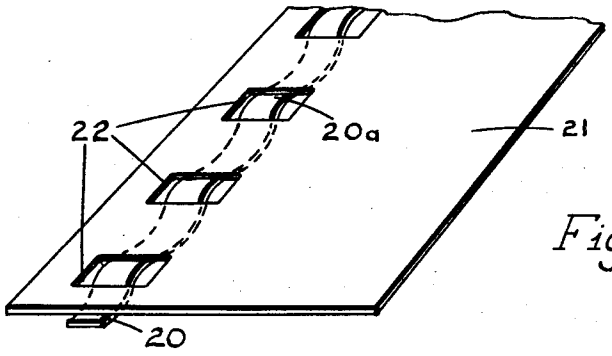


Fig. 10.

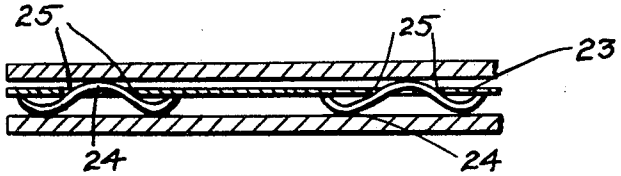


Fig. 11.

INVENTOR
Ernst R. Ljungquist
BY Owen W. Kennedy
ATTORNEY

Patented Feb. 21, 1950

2,498,213

UNITED STATES PATENT OFFICE

2,498,213

DOCTOR DEVICE FOR ROLLS AND CYLINDERS

Ernst R. Ljungquist, Worcester, Mass., assignor to Lodding Engineering Corporation, Worcester, Mass., a corporation of Massachusetts

Application June 17, 1946, Serial No. 677,324

2 Claims. (Cl. 92—74)

1

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 calender rolls, drier cylinders and the like, for the purpose of cleaning the surfaces of rolls and cylinders.

In Lodding Patent No. 2,117,032, issued May 10, 1938, there is shown and described a doctor mechanism of the above indicated character, characterized by the provision of a thin flexible doctor blade mounted in a pivoted holder which provides a pressure applying portion engaging the surface of the blade intermediate its edges. In operation, the holder is adapted to apply pressure between the edges of the blade, with the blade being self-alining on the doctored surface as it flexes between the surface being doctored and where it is supported along its rear edge by the rigid holder. In order to insure that the blade possesses a high degree of flexibility lengthwise of its scraping edge, it is important that the blade be substantially unconfined along its rear edge, and at the same time be mounted in its holder so that it cannot slide forwardly out of the holder should the blade be lifted from the surface being doctored.

According to the present invention, there is provided an improved doctor blade that possesses all the advantages of the blade shown in the above noted Lodding patent, as well as additional advantages having to do with the mounting of the blade in its holder so that it may be readily withdrawn therefrom for purposes of replacement, while at the same time being held from sliding forwardly out of its holder under operating conditions. The above and other advantageous features of the invention will hereinafter more fully appear from the following description with reference to the accompanying drawings, in which—

Fig. 1 is a plan view of a doctor mechanism provided with an improved blade embodying the present invention, with certain parts broken away.

Fig. 2 is a transverse sectional view along the line 2—2 of Fig. 1, looking in the direction of the arrows.

Fig. 3 is a longitudinal sectional view along the line 3—3 of Fig. 1, looking in the direction of the arrows.

Fig. 4 is a perspective view of the blade removed from its holder.

Fig. 5 is a perspective view of a modified form of blade.

Fig. 6 is a transverse sectional view showing the blade of Fig. 5 mounted in a modified form of holder.

Figs. 7 and 8 show a further modification in the form of the blade.

Figs. 9, 10 and 11 illustrate a modified form of mounting of the blade in its holder.

2

Referring to the drawings, a portion of the surface of a roll or cylinder is indicated at 1, and a blade holder 2 is carried by an arm 3 pivotally mounted with respect to the roll. The holder 2 is turnable about the pivot 4 of the arm 3 to apply a doctor blade 5 mounted in the holder to the rotating surface of the roll 1, such turning movement of the holder being accompanied by application of sufficient pressure to cause the free edge of the blade 5 to bear firmly on the rotating surface of the roll 1.

The holder 2 provides a longitudinal slot 6, within which the rear edge of the blade 5 is received, and the holder also provides a forwardly extending pressure applying portion 7 adapted to engage the blade 5 between its edges, in order to apply it to the roll 1. As best shown in Figs. 1 and 4, that portion of the blade 5 that is received within the slot 6 is provided along its entire length with a series of spaced transverse perforations 8, the primary purpose of which is to enable the blade to be readily provided with means whereby the blade will be maintained within the holder slot 6, so that it will not slide forwardly out of the holder 2 when the blade 5 is lifted from the surface being doctored, while at the same time permitting a ready removal of the blade from the holder for purposes of replacement.

To this end, the blade 5 provides a positioning strip 9 of flexible material that is passed back and forth through the perforations 8, as best shown in Fig. 4, so that some portions 9*a* of the strip are above the surface of the blade, while other portions 9*b* are below. These portions 9*a* and 9*b* are entirely free of the blade itself between their points of passage through the perforations 8, it being desirable to space the points where the strip 9 passes through the blade a considerable distance apart, so that the strip portions 9*a* and 9*b* will possess considerable resiliency. The above described relation between the blade 5 and the strip 9 is illustrated on an enlarged scale in Fig. 3.

Therefore, when a doctor blade 5 with the strip 9 applied thereto is inserted endwise in the holder slot 6, the curved portions 9*a* and 9*b* of the strip will yieldingly engage the walls of the slot, as shown in Fig. 2. In order to positively prevent frontwise removal of the blade 5 from the slot 6 should the blade be lifted from the roll, the bottom of the slot 6 provides a longitudinal groove 10 in which the lower strip portions 9*b* are received, it being noted that the width of the strip is substantially equal to the width of the groove 10, with the strip 9 being of somewhat less width, so that the portions 9*b* will readily slide in the groove 10 when inserting the blade 5. It is further to be noted that the rear edge of the blade 5 is positioned freely in the bottom

of the slot 6 when pressure is applied by the holder portion 7 so that the rear edge of the blade may yield as the blade flexes longitudinally in response to surface irregularities of the roll being doctored.

Referring now to Figs. 5 and 6, there is shown a modified form of doctor blade 11 which is provided with a series of transverse perforations 12, having their greatest width near the mid-section of the blade, it being noted that these perforations 12 are of such length as to be disposed outside of the zone to which pressure is applied to the blade by the portion 7 of the holder 2. As fully set forth in Lodding Patent No. 2,329,277, issued September 14, 1943, the existence of the perforations 12 in the blade 11 results in localizing any bending due to the pressure applied by the holder within the perforated portion of the blade, so that the scraping edge of the blade is adapted to adjust itself perfectly to the contour of the surface being doctored. At the same time, the rear edge of the blade within the holder possesses a high degree of longitudinal flexibility.

In carrying out the present invention with respect to the blade 11, a positioning strip 13 similar to the strip 9 is passed back and forth through the perforations 12, as shown in Fig. 5. By reason of the multiplicity of perforations 12, the strip 13 can be passed through any selected perforations so as to control the length of the flexible strip portions 13*a* and 13*b* above and below the plane of the blade 11, as will be apparent from Fig. 5.

The holder 14 which receives the blade 11 is similar in construction to the previously described holder 2, with the exception that its slot 15 does not provide any groove for receiving the lowermost portions 13*b* of the strip. As shown in Fig. 6, the walls of the holder slot 15 converge slightly towards each other in the direction of the roll, so that when the blade 11 is inserted in the slot 15, the resiliency of the strip portions 13*a* and 13*b*, combined with the convergence of the slot walls, will effectively prevent the blade from sliding forwardly out of the holder.

Referring now to Figs. 7 and 8, there is shown a further modification of the invention wherein the blade 16 is provided along its rear edge with a resilient member 17 in the form of a wave-like strip that is attached at intervals to the blade 16 by suitable securing means, such as rivets or spot welds 18. The holder 2 shown in Fig. 7 is of exactly the same form as the holder of Fig. 2, so that when the blade 16 is inserted endwise into the holder slot 6, the curved resilient portions 17*a* of strip 17 between its points of attachment 18 enter into the holder groove 10. Thus the resilient strip portions 17*a* perform a double function in supporting the rear edge of the blade with a maximum degree of flexibility, while at the same time effectively preventing frontwise removal of the blade 16 from the slot 6.

In Fig. 9, the blade 19 is shown without any attachments whatsoever, with a strip 20 composed of resilient material, such as metal, thin fiber, or rubber positioned loosely in the holder groove 10. With this arrangement the curved portions 20*a* and 20*b* of the strip 20 alternately engage the under side of the blade 19, and the bottom of the groove 10 with considerable pressure, so that the rear edge of the blade is held frictionally within the holder slot. This frictional engagement is sufficient to normally prevent frontwise removal of the blade 19 from the holder slot 6, while permitting the blade 19 to be withdrawn in this direction under conditions where space limitations prevent endwise withdrawal of the blade from the holder.

In Fig. 10 the blade 21 is shown with a series of relatively wide openings 22 adjacent its rear edge. These openings 22 are of sufficient width to permit curved portions 20*a* of the strip 20 to extend therethrough when the strip 20 is bottomed in the holder groove 10. From a consideration of Fig. 10 it is evident that the portions 20*b* of the strip 20 which extend below the blade openings 22 will serve to positively prevent frontwise removal of the blade 21 from the holder, while the portions 20*a* provide an extremely resilient support along the entire rear edge of the blade, so that the blade is free to yield as it flexes longitudinally in response to surface irregularities of the roll being doctored.

In Fig. 11 the blade 23 is shown provided with a series of short curved strips 24 spaced at intervals along the blade by passage through the openings 25. It is to be noted that the ends of each strip 24 are bent upwardly to engage the underside of the blade 23 and hold it frictionally in place.

From the foregoing, it is apparent that by the present invention there is provided an improved doctor device for rolls and cylinders, characterized by the yieldable mounting of a blade in its holder, so that the blade is unconfined along its rear edge and is therefore self-alining as it flexes under pressure, while at the same time being mounted so that it cannot slide forwardly out of the holder should the blade be lifted from the surface being doctored. Furthermore, the resilient mounting of the blade in its holder is such that the blade may be readily withdrawn for purposes of replacement, either endwise of the holder in one embodiment of the invention, or frontwise from the holder in another embodiment, under conditions where space limitations prevent the normal endwise withdrawal of the blade.

I claim:

1. A doctor device of the character described, comprising in combination, a rigid holder having a longitudinally extending slot therein and a groove formed within the confines of and extending lengthwise within said slot, a blade having its rear edge portion slidingly received lengthwise within said holder slot, the forward edge of said blade being adapted for doctoring a rotating surface, said blade having formed therein a series of perforations spaced longitudinally of and adjacent the said rear edge blade portion, and a flexible positioning strip extending sinuously through said perforations for yieldably engaging the opposed walls of said holder slot and having portions thereof received within said groove thereby to limit the lateral movement of said blade within said holder slot.

2. In a doctor device of the character described, comprising, a rigid holder having a longitudinally extending slot therein and a groove formed within the confines of and extending lengthwise within said slot, and a blade having its rear edge portion slidingly received lengthwise within said holder slot, the forward edge of said blade being adapted for doctoring a rotating surface, with said holder providing a forwardly extending pressure-applying portion of greater thickness than said blade and adapted to engage said blade substantially midway between its front and rear edges, said blade hav-

ing formed therein a series of perforations spaced longitudinally of and adjacent the rear edge blade portion; the combination therewith of a flexible strip extending sinuously through said blade perforations so as to be carried by said blade, said flexible strip having portions thereof engaging the opposed walls of said holder slot so as to afford a resilient rear edge mounting for said blade, while portions of said strip are received within said groove thereby to limit the lateral movement of said blade within said holder slot.

ERNST R. LJUNGQUIST.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
1,883,167	Vickery	Oct. 18, 1932
1,935,164	Russell	Nov. 14, 1933
2,077,816	Vickery	Apr. 20, 1937
2,329,277	Lodding	Sept. 14, 1943