

Dec. 27, 1932.

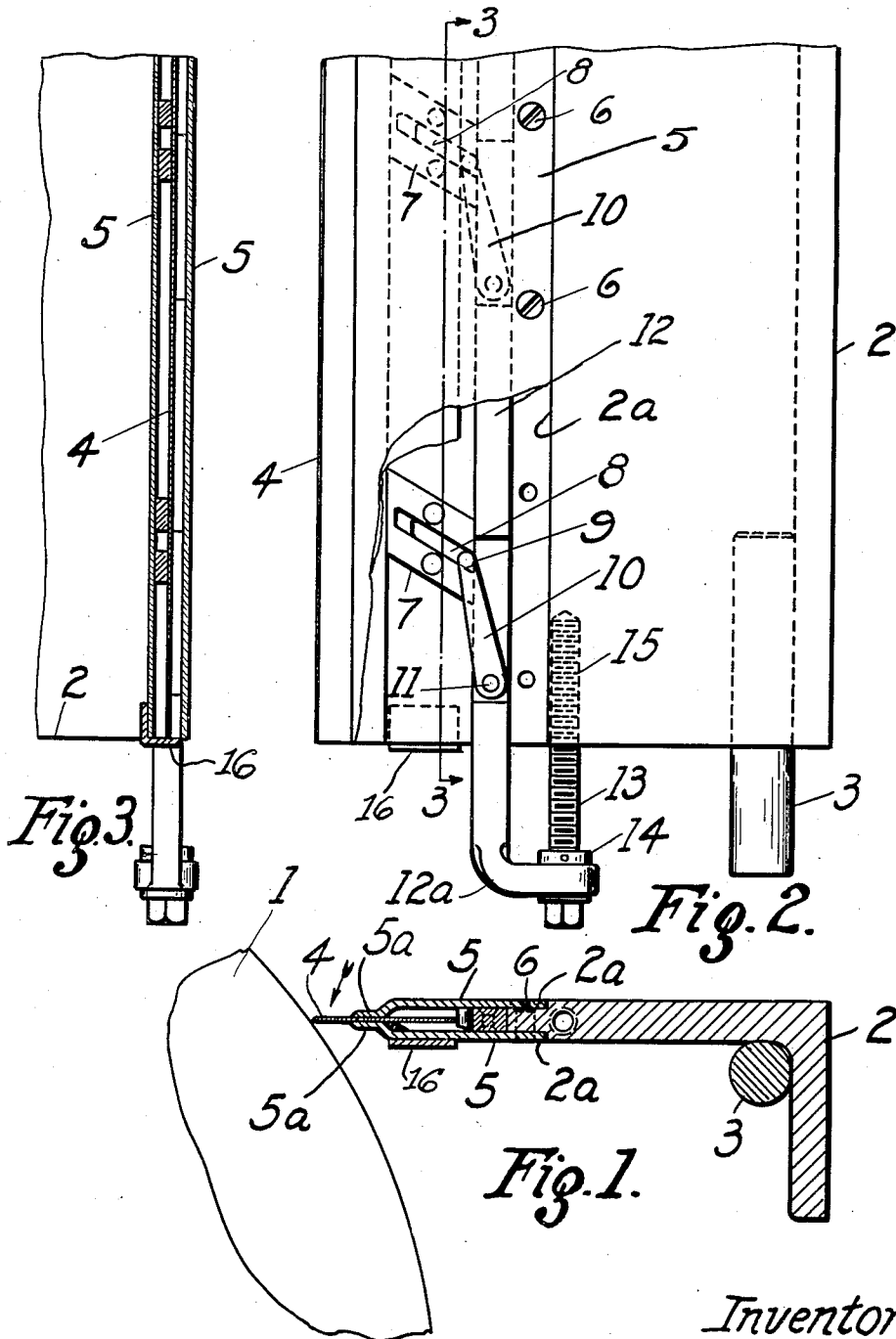
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DOCTOR MECHANISM FOR ROLLS AND CYLINDERS

Filed June 22, 1929

2 Sheets-Sheet 1



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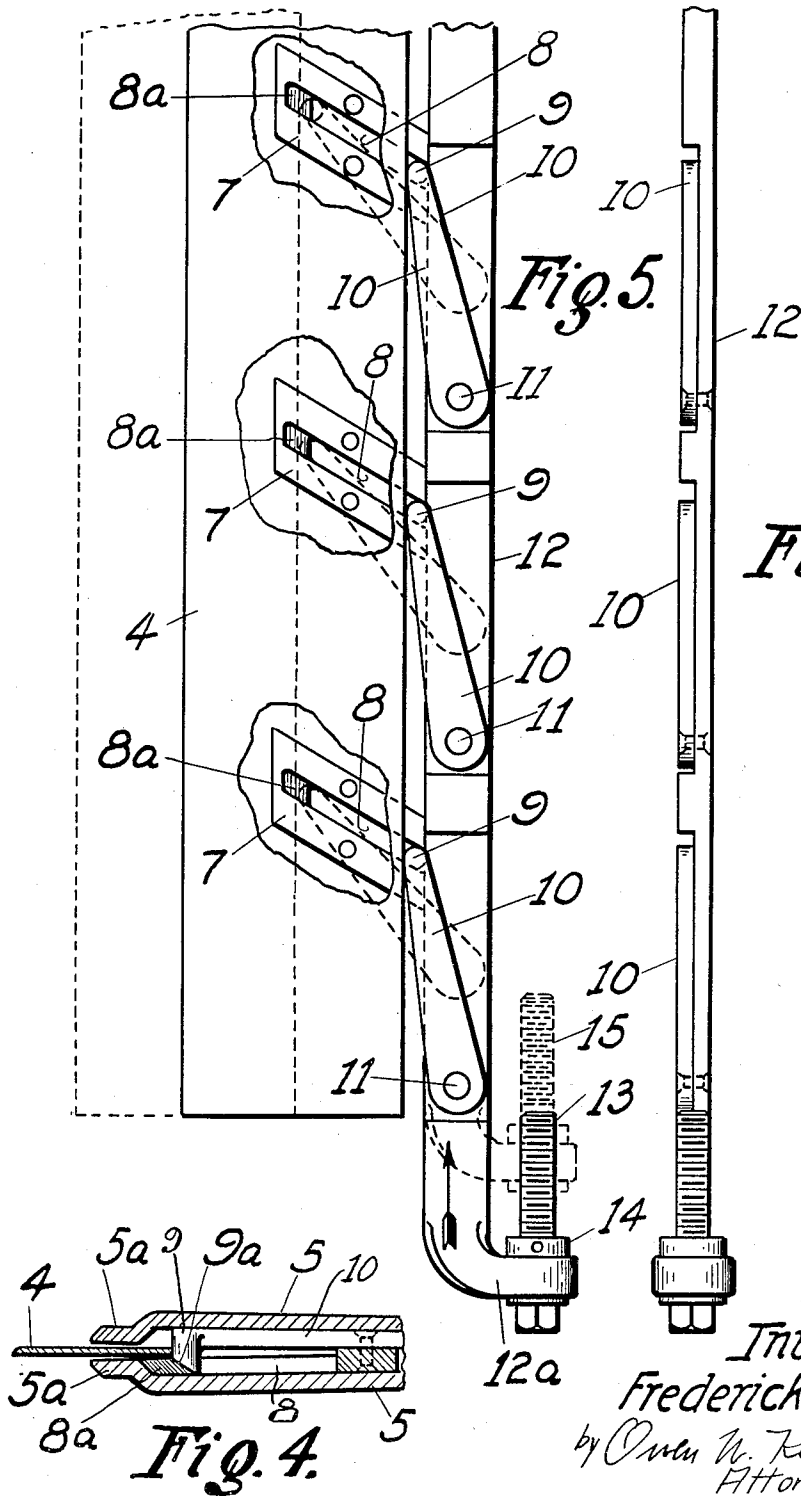
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DOCTOR MECHANISM FOR ROLLS AND CYLINDERS

Application filed June 22, 1929. Serial No. 372,889.

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, dryer cylinders etc. for the purpose of cleaning the rotating surfaces of the rolls and cylinders.

The present invention particularly relates to doctors of the type which are adapted to operate continuously while the rolls are rotating and, generally speaking, such doctor devices have heretofore been characterized by the provision of a thin blade mounted in such a manner that the force of gravity tends to swing the blade about the axis of its pivotal support so that the edge of the blade always bears on the rotating surface which is to be kept clean. In the use of doctor devices as heretofore constructed, difficulties have been encountered when employing flexible blades of considerable length owing to the tendency of such blades to buckle transversely, and attempts to prevent such buckling by stiffening the blades have resulted in reducing the efficiency of the blades as scrapers. Furthermore, difficulties have been encountered in compensating for the rapid wear of a doctor blade, for as the edge of the blade wears, the pivoted blade support tends to change its angle with respect to the rotating surface which is being cleaned. Furthermore, previous doctor devices have been difficult to get at for the purposes of adjustment or renewal.

According to the present invention, I provide a doctor mechanism comprising a thin flexible blade of any desired length mounted in such a manner that it is firmly supported on both sides along its entire length, with only a small portion of the blade exposed beyond its supports, thereby meeting the essential requirements for a successful doctor, namely that it be thin and flexible and that it be supported against flexure, laterally. Furthermore, the present invention provides

an improved mounting for the doctor blade adapted to permit the blade to be moved transversely, that is, at right angles to its scraping edge, when desired, in order to compensate for wear along the edge of the blade, the adjustment being easily carried out by means of an adjusting member located conveniently at the end of the doctor supporting structure where an operator may easily reach it. In addition, the adjustment of a doctor blade in accordance with my invention is carried out without affecting in any way the angle which the blade makes with the cooperating surface of the calender roll, or cylinder, so that the doctor always operates uniformly.

A still further advantageous feature of my invention resides in the fact that the entire doctor blade can be renewed without removing the whole doctor supporting structure from its position in the machine, thereby saving a large amount of time and labor which has heretofore been expended when renewing doctor blades of the types heretofore constructed. The above and other advantageous features of my invention will hereinafter more fully appear with reference to the accompanying drawings, in which—

Fig. 1 is a view in vertical section showing a portion of a roll surface with my improved doctor cooperating therewith.

Fig. 2 is a plan view of a portion of the doctor structure shown in Fig. 1, certain parts being broken away to show the construction more clearly.

Fig. 3 is a sectional view along the line 3—3 of Fig. 2, looking in the direction of the arrows.

Fig. 4 is a fragmentary sectional view showing a portion of the parts of Fig. 1 on an enlarged scale, and in different positions.

Fig. 5 is an enlarged plan view of a portion of the doctor mechanism removed from its support and illustrating the manner in which the doctor blade is adjusted.

Fig. 6 is an end view of the parts shown in Fig. 5.

Like reference characters refer to like parts in the different figures.

Referring to the drawings, a portion of the surface of a roll or cylinder is indicated at 1 and a bracket 2 is pivotally mounted with respect to the roll 1 on journals 3 so that the bracket 2 tends to swing about the axis of the journals 3 to bring a doctor blade 4 of thin flexible material into engagement with the rotating surface of the roll 1. The doctor blade 4 may be constructed of any suitable thin flexible material such as steel, brass or bakelite and it is held frictionally between two plates 5, 5 carried by the bracket 2. The bracket 2 provides suitable seats 2a for receiving the plates 5 and bolts 6 extending through the bracket 2 serve to hold the plates 5 together with their outer edges in engagement with the blade 4 and terminating only a short distance away from the surface of the roll 1. Consequently, the blade 4 is held on opposite sides along its entire length near its engagement with the roll surface, so that the edge of the blade 4 can not possibly buckle.

As previously stated, the plates 5 are adapted to frictionally engage the blade 4 and a preferred way of obtaining such frictional engagement is by forming each plate 5 with an offset portion 5a along the edge opposite to the points of attachment of the plate 5 to the bracket 2. Therefore, the plates 5 only engage the blade 4 along a comparatively narrow zone near the surface of the roll 1 and when the plates 5 are secured to the bracket 2 by the bolts 6, the opposed inner faces of the offset portions 5a tend to clamp the blade 4 between them, although permitting the blade 4 to be forcibly moved between the plates 5 for the purposes of adjusting the blade in a manner which will next be described.

As best shown in Figs. 2 and 5, the lower plate 5 has secured to the inner surface thereof a number of guides 7, each providing an inclined slot 8 of sufficient width to receive a lug 9 provided at the end of a finger 10 pivotally mounted at 11 on a bar 12. The bar 12 is slidably mounted between the plates 5 and is prevented from sidewise movement by its engagement with the end of the bracket 2 beyond the seats 2a and alined surfaces provided by the opposed ends of the guides 7. The bar 12 carrying the fingers 10 is movable longitudinally of the bracket 2 by means of a screw 13 carrying a collar 14 embraced by a turned over end portion 12a of the bar 12. The screw 13 is received in a threaded opening 15 provided in the bracket 2 and it is obvious that turning the screw 13 either in or out of the opening 15 will not only cause the bar 12 to be shifted longitudinally but at the same time will cause the lugs 9 at the ends

of the fingers 10 to be moved in the slots 8 of the guides 7. As best shown in Figs. 2 and 3, the rear portion of the blade 4 rests freely on the upper surfaces of the several spaced guides 7, with nothing in contact with the top of the blade 4 between its rear edge and its zone of engagement by the offset plate portions 5a.

As previously pointed out, the blade 4 is frictionally held between the opposed offset portions 5a of the plates 5 and when a new blade 4 is assembled within the holder, the screw 13 is turned out of the opening 15 so as to position the lugs 9 of the fingers 10 at the open ends of the slots 8, as shown in full lines in Fig. 5. With the fingers 10 in the position shown, the blade 4 can be initially positioned with the major portion thereof within the holder and its rear edge in engagement with the alined lugs 9 of the fingers 10. When this adjustment is being made, the bolts 6 may be slightly loosened to permit the blade 4 to be moved more or less freely between the plates 5, after which the bolts 6 may be tightened so that the blade 4 is held more firmly. The blade 4 is then ready for use and it is obvious from Fig. 1 that the bracket 2 will tend to swing in a counterclockwise direction on its journals 3 to bring the edge of the blade 4 into engagement with the surface of the roll 1, as indicated by the small arrow in Fig. 1.

As the bracket 2 turns on its axis, either in response to the force of gravity, or due to the application of an additional turning force as is customary in the operation of doctor devices, pressure is applied to the blade 4 by the portion 5a of the upper plate between its front edge, in engagement with the roll 1, and its rear portion, as supported by the guides. This application of pressure to the blade in a direction opposite to the reactions set up along the scraping edge of the blade and its rear portion as supported by the guides 7, results in a most effective adjustment of the blade to the roll surface. It has been found that the blade is practically self-aligning due to the fact that the blade is substantially unconfined, except along the zone of pressure as applied by the offset portion 5a of the upper plate 5, the resulting flexure of the blade between its edges causing the scraping edge to closely engage and adapt itself to the roll surface.

As previously pointed out, continued use of the doctor will result in wearing the scraping edge of the blade 4 which engages the surface of the roll 1 and when the blade 4 has worn to the extent that the holding plates 5 approach the roll 1 too closely, the blade 4 can be readily adjusted to force it out between the plates 5. This is done by merely turning the screw 13 into the opening 15 in the bracket 2, thereby shifting the rod 12 in

the direction of the arrow in Fig. 5. When this occurs, the lugs 9 of the pivoted fingers 10 move in the inclined slots 8 so as to engage the rear edge of the blade 4 and force it outwardly between the plates 5 in the direction of the roll 1. The large amount of adjustment that can thus be obtained with the blade 4 is shown by the dotted line position of the blade 4 in Fig. 5.

Obviously when the blade 4 has been fed outwardly within its holder repeatedly, the point is finally reached where the blade 4 is no longer serviceable and my improved holder contemplates means whereby the blade 4 can be readily removed without making it necessary to disassemble any of the parts carried by the bracket 2. As best shown in Figs. 4 and 5, the outer ends of the slots 8 each provide an inclined surface 8a while the ends of the lugs 9 are beveled at 9a with substantially the same inclination as the slot surfaces 8a; consequently when the adjusting screw 13 has been turned well into the opening 15 and the fingers 10 reach the end of the slots 8, further movement of the bar 12 causes the fingers 10 to force the plates 5 apart as the beveled ends 9a of the lugs 9 engage the inclined surfaces 8a of the slots 8. This effect is illustrated very clearly in Fig. 4, although on somewhat of an enlarged scale, from which it is apparent that the offset portions 5a of the plates 5 which normally clamp the blade 4 are separated by actual flexure of the plates 5. Consequently, the blade 4 can be readily withdrawn from between the plates 5 and a new blade inserted without in any way disturbing or making it necessary to remove any of the parts carried by the bracket 2.

When a new blade 4 has been inserted in the manner shown in Fig. 4, the screw 13 is turned out of the opening 15 to fully retract the bar 12 and move the lugs 9 of the fingers 10 to the far ends of the slots 8. When this has been done, the new blade 4 can be pushed in between the plates 5 until it engages the aligned lugs 9 and as there are quite a number of fingers 10, the rear edge of the blade 4 will readily adjust itself with its scraping edge parallel to the axis of the cylinder 1. Should it be found that the engagement of the plates 5 with the blade 4 is too tight, this pressure can be readily reduced by loosening the bolts 6 enough to permit relatively free movement of the new blade 4 between the plates 5 when setting it up. After this, the bolts 6 can be tightened somewhat so as to hold the blade 4 more tightly between the offset portions 5a for obviously the thrust of the fingers 10 is always strong enough to force the blade 4 between the plates 5 when it is desired to feed the blade 4 outwardly to compensate for the wearing of the same. In order to prevent endwise movement of the blade 4 between the plates 5, stops 16 are pro-

vided at the ends of the blade, these stops 16 being carried by the lower plate 5, as shown in Figs. 1 and 3.

I claim:

1. In a device of the class described, a thin flexible blade providing a straight scraping edge, and means for frictionally clamping said blade from opposite sides parallel to its edge and adjacent thereto to permit lateral adjustment of said blade by the application of a force outside of the area of frictional engagement by said clamping means.

2. In a device of the class described, a thin flexible blade providing a straight scraping edge, means for pivotally supporting said blade with its edge parallel to the axis of a rotating surface with which the edge engages, and means for frictionally clamping said blade on opposite sides parallel to said edge and adjacent to said surface to permit adjustment of said blade at right angles to its edge by the application of a force to said blade beyond the area of its frictional engagement by said clamping means.

3. In a device of the class described, a thin flexible blade providing a straight scraping edge, means for pivotally supporting said blade with its edge parallel to the axis of a rotating surface with which the edge engages, means for frictionally clamping said blade on its supporting means, and means for applying a force to said blade outside of its area of frictional engagement by said clamping means in order to adjust said blade with respect to the surface with which its edge is in engagement.

4. In a device of the class described, a thin flexible blade providing a straight scraping edge, means for pivotally supporting said blade with its edge parallel to the axis of a rotating surface with which the edge engages, and means for shifting said blade on its supporting means at right angles to its scraping edge to compensate for wear of said edge.

5. In a device of the class described, a thin flexible blade providing a straight scraping edge, means for pivotally supporting said blade with its edge parallel to the axis of a rotating surface with which the edge engages, means for frictionally clamping said blade on its supporting means, and means for shifting said blade in its clamping means to compensate for wear of its scraping edge.

6. In a doctor mechanism for cleaning a surface of rotation, a bracket pivotally mounted on a fixed axis parallel to the axis of said surface, a thin flexible blade frictionally mounted on said bracket with one edge engaging said surface, and means for forcibly shifting said blade on said bracket to compensate for wear of its scraping edge without removing said bracket from its pivotal support.

7. In a doctor mechanism, a pivotally

mounted bracket, plates carried by said bracket for frictionally holding between them a thin flexible blade with its projecting edge parallel to the pivotal axis of said bracket, and means cooperating with the inner edge of said blade, between said plates, for shifting said blade bodily between said clamping plates.

8. In a doctor mechanism, a pivotally mounted bracket, plates carried by said bracket for frictionally holding between them a thin flexible blade with its projecting edge parallel to the pivotal axis of said bracket, and means for simultaneously exerting pressure at several points along the inner edge of said blade between said plates for shifting said blade while maintaining its outer edge parallel to the pivotal axis of said bracket.

9. In a doctor mechanism, a pivotally mounted bracket, plates carried by said bracket for frictionally holding between them a thin flexible blade with its projecting edge parallel to the pivotal axis of said bracket, a plurality of fingers pivotally mounted between said plates, and means for moving said fingers in unison to cause them to engage the inner edge of said blade and shift it bodily between said plates.

10. In a doctor mechanism, a pivotally mounted bracket, plates carried by said bracket for frictionally holding between them a thin flexible blade with its projecting edge parallel to the pivotal axis of said bracket, a plurality of fingers pivotally mounted between said plates, and means for moving said fingers to cause them to separate said plates to permit the removal of said blade from said bracket.

11. In a doctor mechanism for rolls and cylinders, a thin flexible blade and a pivoted holder carrying said blade with one edge engaging a rotating surface and with its other edge supported against movement in one direction only, said holder providing a member of greater stiffness than said blade and extending longitudinally thereof for applying pressure between the edges of said blade in a direction to flex the same and seat the first mentioned edge on said rotating surface.

12. In a doctor mechanism for rolls and cylinders, a thin flexible blade and a pivoted holder carrying said blade with one edge engaging a rotating surface and with its other edge supported against movement in one direction only, said holder providing a member of greater stiffness than said blade for applying pressure between the edges of said blade in a direction to seat the first mentioned edge on said rotating surface, the surface of said blade engaged by the pressure applying member being substantially unconfined between its edges and the zone of application of pressure thereto to permit flexure of the blade.

13. In a doctor mechanism, the combina-

tion with a roll and a doctor blade pivotally mounted with one edge thereof bearing on the surface of said roll and its other edge supported against movement in one direction only, of a member for applying pressure between the edges of said blade in a direction opposite to the reactions set up along the edges of the blade, said pressure exerting member serving to flex the blade between its edges and seat its first mentioned edge on the surface of said roll.

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