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DOCTOR BLADE HOLDING ASSEMBLY

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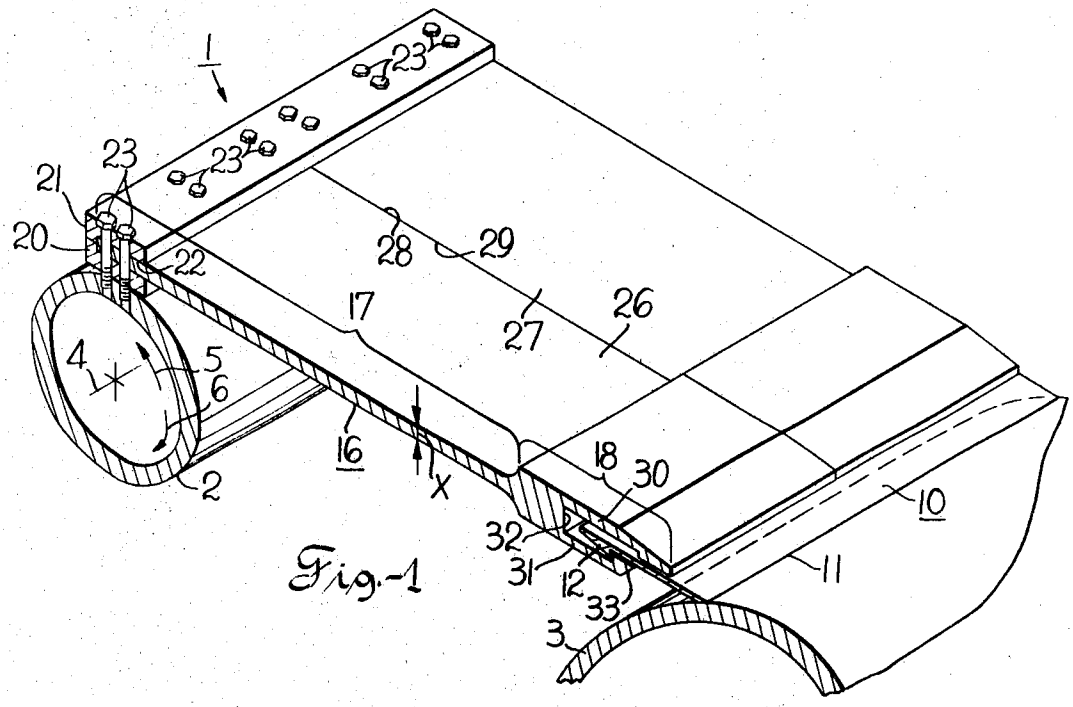


Fig.-1

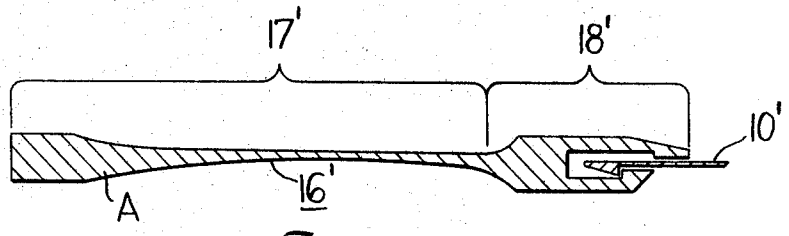


Fig.2

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DOCTOR BLADE HOLDING ASSEMBLY

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Int. Cl. D21g 3/00, 3/02, 3/04
U.S. Cl. 15—256.51 1 Claim

ABSTRACT OF THE DISCLOSURE

A doctor blade holding assembly is disclosed having a pivotable doctor back parallel to and spaced from a roll of a paper making machine. A resilient blade extends along the entire width of the roll for engaging and scraping the surface of the roll. A resilient means of one or more moldings having integral first and second portions connect the blade to the doctor back. The first portion of the molding is relatively long and thin so as to be resilient and is connected to the doctor back to project the entire molding as a cantilever toward the roll with the second portion of the molding providing a blade holder on the projecting end of the molding and the first portion providing resiliency to supplement the resiliency of the blade for improved contour following and pressurized scraping of the roll. The resilient means, either a single molding or segments bonded together along edges normal to the roll, may cover the entire space between the doctor back and the roll. A molding is also disclosed with a first portion that is tapered to provide a decreasing thickness from the doctor back end thereof toward the blade holding portion to provide desired flexibility and deflection characteristics with the greater thickness of the molding being in the area where the bending movement is concentrated, that results from bending the molding in a direction transverse to the blade.

CROSS REFERENCE TO RELATED PATENT APPLICATIONS

I have copending patent applications related to the type of apparatus disclosed herein, and entitled "Doctor Assembly" Ser. No. 785,199 and "Double Cantilever Supported Doctor Blade" Ser. No. 785,200, which were both filed concurrently with this application.

BACKGROUND OF THE INVENTION

Field of the invention

This invention relates generally to apparatus used in paper making machines and in particular to doctors which are used to scrape pulp and water from breast rolls in fourdriniers or forming cylinders in cylinder machines, wet broke and water from press rolls, and web crumbs from rolls and drums in web drying assemblies.

Description of the prior art

Arrangements for applying doctor blades to the surfaces of rolls in paper making or calendering machinery have been disclosed in many prior art patents beginning perhaps with U.S. Pat. 242,753 of 1881. Although U.S. Pat. 2,191,366 of 1940 disclosed a flexible strip doctor blade yieldably held against a roll surface by a resilient blade holder, it remained for my own U.S. Pat. 3,387,317 of 1968 to disclose a roll and a flexible strip doctor blade held in blade holders for endwise insertion and removal along a path parallel ot the roll with resilient rods of substantial length connecting each blade holder to a doctor back, so that the flexibility of the rods supplemented the flexibility of the blade itself to provide improved contour following and uniform pressure characteristics of the blade on the roll surface. As paper making machines have continued to become larger and wider rolls 300 to 400 inches wide are now needed where rolls of substantially less width were used in the past. Continued innovation in the field of this invention is therefore necessary in order to provide satisfactory doctoring of such wide rolls. The objects of the present invention such as are hereinafter set forth are directed to further improvements and advances in the state of the art illustrated by these prior art patents and in paricular my own U.S. Pat. 3,387,317.

SUMMARY OF THE INVENTION

An object of the present invention is to provide a doctor assembly with improved roll contour following and pressurized scraping characteristics.

Another object of the present invention is to provide a doctor assembly with an improved cantilever support for a blade holder and blade, which will eliminate a need for preloading blade holders in order to insert blades and eliminate a need for protective covering structure such as has been required with certain commercially popular prior art structures including my own U.S. Pat. 3,387,317 in order to prevent water or crumbs traveling over the blade holder and landing back on the roll from which such water or crumbs had been removed.

Another object of the present invention is to provide a new and improved doctor assembly in which a blade holding molding cantilevered from a doctor back is provided with desired flexibility and deflection characteristics and maximum molding strength at the area of maximum bending moment resulting from bendinng the molding about the pivot axis of a doctor back.

In a preferred embodiment of the present invention a pivotable doctor back is arranged parallel to and spaced from a roll of a paper making machine. A resilient blade extends along the entire widths of the roll for engaging and scraping the surface of the roll. A resilient means of one or more moldings having integral first and second portions connect the blade to the doctor back. The first portion of the molding is relatively long and thin so as to be resilient with a length to thickness ratio of at least 20:1 and this first portion is connected ot the doctor back to project the entire molding as a cantilever toward the roll with the second portion of the molding providing a blade holder on the projecting end of the molding. The first portion thereby provides resiliency supplementing the resiliency of the blade for improved contour following and pressurized scraping of the roll. The resilient means, either a single molding or segments bonded together along edges normal to the roll to provide an extended imperforate surface, may cover the entire space between the doctor back and the roll.

Other features and objects of the invention that have been attained will appear from the more detailed description to follow with reference to an embodiment of the present invention shown in the accompanying drawing.

BRIEF DESCRIPTION OF THE DRAWING

FIG.1 of the accompanying drawing shows a fragmentary perspective view of a paper making machine roll and doctor blade holding assembly according to the present invention; and

FIG. 2 is a view of a part of the doctor blade holding assembly according to another embodiment of the present invention.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring to FIG. 1 of the drawing a doctor assembly 1 is provided with a doctor back 2 parallel to and spaced from a roll 3 of such as a paper making machine. The back 2 is mounted on means (not shown) to pivot about the axis 4. An actuating means (not shown) is connected

to the back 2 to selectively rotate the back clockwise or counterclockwise as indicated by the arrows 5 and 6.

The assembly 1 is provided with a resilient blade 10 extending along the entire width of roll 3 and having a first portion 11 of the blade, i.e., its leading edge, engageable with the surface of roll 3. The blade 10 has a second portion 12, i.e., its trailing edge, with a particular cross sectional configuration, in part thicker than the first portion 11 of blade 10, for a purpose that will appear as this description proceeds.

Resilient means are provided for connecting the doctor back 2 to the blade 10 comprising a molding 16 having a first portion 17 and a second portion 18. The molding 16 may be made of any suitable material such as brass or such as is identified by the trademarks "Fiberglas," "Micarta" or "Panelyte." The first portion 17 of molding 16 may be attached to the doctor back 2 by any suitable means and as shown such means include a lower strip 20, upper strip 21 defining a slot 22 for holding the end of the first portion 17 and screws 23 secure this assembly to the doctor back 2. The first portion 17 projects as a cantilever from the doctor back 2 toward roll 3 and terminates with portion 18 on its free end, which is formed as a blade holder integral with portion 17. The first portion 17 of the molding 16 has a thickness indicated in the drawing by the reference character X, which is thinner than the portion 18 and the ratio of the lengths indicated by the reference numeral 17 to the thickness X is at least 20:1 and preferably 50:1 in order to provide the desired flexibility to bend in the general directions indicated by the arrows 5 and 6.

A single molding 16 may be provided of sufficient width to span (along with blade 10) not only the entire space between doctor back 2 and roll 3 but for the entire width of roll 3, or as shown, molding segments 26, 27 may be used which are bonded together along adjacent edges 28, 29 normal to roll 3 to provide a continuous imperforate surface. If the molding segments 26, 27 are made of the material sold under the trademark "Fiberglas," the segments may be easily bonded together with an epoxy glue.

The second portion 18 of the molding 16 is formed with upper and lower jaws 30 and 31 defining a slot 32 facing roll 3. The lower jaw 31, however, is formed with an upturned lip 33 that engages the thicker part of the trailing portion 12 of blade 10. The blade 10 is inserted into the slot 32 by sliding the blade in slot 20 along a path of movement parallel to the axis 4. The lip 32 prevents the blade 10 falling out of slot 32 toward roll 3. The lip 32 also limits movement of the blade 10 relative to the blade holder portion 18 of molding 16.

Referring to FIG. 2, a molding 16' is shown according to another embodiment of the present invention. As shown in FIG. 2 the first portion 17' of molding 16' is tapered to provide a decreasing thickness from the end that is connected to a doctor back 2, toward the blade holding second portion 18' to provide desired flexibility and deflection characteristics with the greater thickness of the molding 16' being area A which is where the maximum bending moment is concentrated resulting from bending the molding 16' in a direction transverse to blade 10.

In the assembly and operation of the described apparatus, with the portion 17 of moldings 16 attached to doctor back 2 and the blade holder portion 18 projecting as a cantilever toward roll 3, the doctor back 2 may be rotated about axis 4 in the direction of arrow 5 to raise the blade holder portion 18 above roll 3 for convenient insertion or removal of blade 10. A blade 10 can be inserted endwise, that is along a path of motion parallel to the axis 4, into the slot 32 without preloading the molding segments 26, 27, as these segments are bonded together along their edges 28, 29 and will maintain at all times the slot 32 in each molding segment 26, 27 in alignment for insertion of a blade 10. With a blade 10 inserted in slot 32, doctor back 2 may be rotated about axis 4 in the direction indicated by arrow 6 until blade 10 contacts the surface of roll 3 with the molding segments 26, 27 covering the entire space between doctor back 2 and roll 3 and molding 16 as an integral unit is free to flex and this resiliency supplements the resiliency of the blade 10 to provide for improved performance in the blade following the contour of roll 3 and applying pressure uniformly thereto across the entire widths of roll 3.

From the foregoing detailed description of the present invention, it has been shown how the objects of the invention have been attained in a preferred manner. However, modifications and equivalents of the disclosed concepts such as readily occur to those skilled in the art are intended to be included within the scope of this invention.

The embodiments of the invention in which an exclusive property or privilege is claimed are defined as follows:

1. A doctor assembly for a roll in a paper making machine, the doctor assembly comprising:

(A) a doctor back adapted for mounting in parallel spaced arrangement to a paper machine roll;

(B) a resilient blade having a first portion along the entire width thereof for engagement with the surface of the roll;

(C) resilient means connecting the blade to the back;

(D) the resilient means comprising a molding having an integral first and second portions, the first portion being connected to the doctor back to project the entire molding as a cantilevered projection from the back toward the roll, the second portion being a blade holding means on the projecting end of the first portion, and the first portion having a thickness less than the second portion and a dimension between the doctor back and the second portion having a ratio to the thickness of the first portion of at least 20:1;

(E) the resilient means being an assembly of segments each of which comprises a said molding, each providing an imperforate continuous surface between the doctor back and the blade, and each having said first and second portions as integral parts thereof with the segment moldings arranged to provide edges of adjacent segments in abutting relation and normal to a central axis through the roll; and

(F) the segment moldings being bonded together along the abutting edges to provide an integral assembly of moldings forming the resilient means of a total width corresponding to the width of the blade.

References Cited

UNITED STATES PATENTS

1,912,605	6/1933	Vickery	15—256.51
2,191,366	2/1940	Buccicone et al.	15—256.51

FOREIGN PATENTS

106,625	6/1927	Austria	15—256.51

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