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E. SMITH ET AL
DOCTOR KNIVES

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2 Sheets-Sheet 1

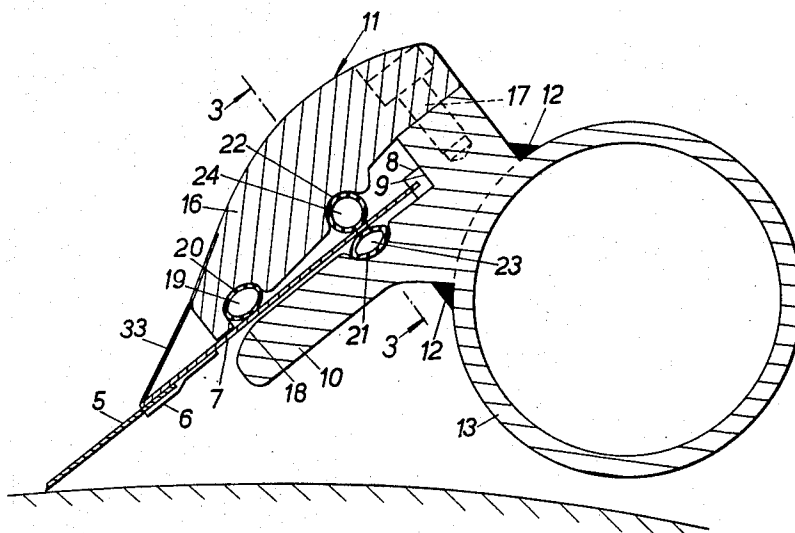


FIG. 1.

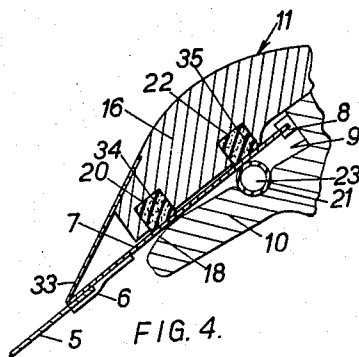


FIG. 4.

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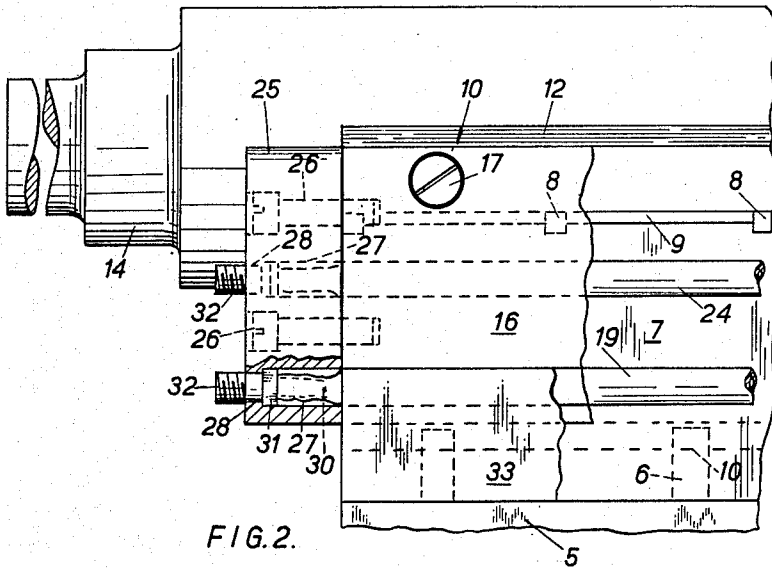


FIG. 2.

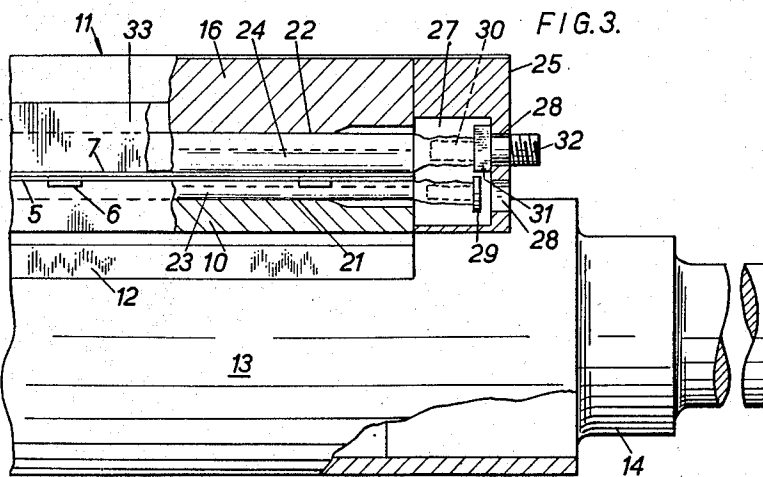


FIG. 3.

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7 Claims. (Cl. 15—256.5)

This invention relates to doctor knives, such as are used in connection with the roll or cylinder of a paper-making machine and bleaching and dyeing on printing machinery.

A basic requirement with any doctor knife is to obtain and maintain a pressure of the blade against the cylinder which is as uniform as possible throughout its length, preferably with the possibility of being able to increase or reduce the pressure at will substantially without loss of such uniformity.

The object of the present invention is a doctor knife having an improved construction and arrangement of parts.

According to the invention a doctor knife, comprising a blade and blade-back assembly mounted in a holder adjacent the roll or cylinder on which the blade is to press, is characterized in that said assembly co-operates with opposed fulcra provided in the holder so as to extend longitudinally of said assembly intermediate the latter's front and rear edges, the holder also incorporating longitudinally disposed resilient members engaging opposite sides of said assembly between said fulcra and its rear edge and one of said members being inflatable to urge the front edge of the blade against the roll or cylinder with an adjustable pressure uniformly distributed along such edge.

The inflatable member aforesaid conveniently comprises a tube located in the holder and engaging the blade/back assembly at the side thereof adjacent the roll or cylinder, and the opposing resilient member may be of similar construction, the tube or tubes employed being each plugged at one end and connectable at the other to a source of pressure fluid.

The fulcrum provided in the holder at the side of the blade/back assembly remote from the roll or cylinder may likewise be of a resilient nature (e.g. a tube inflatable as aforesaid), the opposing fulcrum being substantially rigid.

The holder may comprise detachably connected inner and outer parts, one of which serves as an abutment for the blade back, suitable clearance being left between such parts to permit angular adjustment of the blade/back assembly between the opposed fulcra under the control of the inflatable member or members acting near the rear edge of such assembly.

In the accompanying drawings:

Fig. 1 is a sectional side elevation of one form of doctor knife according to the present invention,

Fig. 2 is a plan view of one end of such knife,

Fig. 3 is a front elevation of the other end of the knife, sectioned on the line 3—3 of Fig. 1, and

Fig. 4 is a fragmentary view corresponding to Fig. 1 but showing a modified construction.

In the example illustrated in Figs. 1 to 3, the doctor knife comprises a steel blade 5 whose front edge is bevelled and whose rear edge is fixed in clips 6 spaced along the underside of a back plate 7.

The rear edge of this plate 7 carries a row of bronze

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slipper blocks 8 adapted to bear against an upstanding shoulder 9 on the lower part 10 of a holder 11, this part 10 being welded at 12 to the upper part of a tube 13 which has co-axial trunnions 14 fixed in the ends thereof.

By means of these trunnions the tube 13 and holder 11 are mounted parallel to the axis of the roll or cylinder 15 upon whose surface the blade 5 is to be pressed at a normal inclination of some 35 degrees to the tangent at the line of contact.

The holder 11 also includes an upper part 16, which is secured to the lower part 10 by a row of screws 17 behind the shoulder 9.

In front of the latter, the adjacent surfaces of the parts 10, 16 are mutually convergent to define a holder cavity which accommodates the rear portion of the back plate 7, the remainder of such plate, and the blade 5 carried thereby, projecting forwardly between the mutually-parallel front edges of the parts 10, 16.

The edge of the lower part 10 is rounded off at 18 to provide a rigid fulcrum upon which the blade back can rock, and directly opposite this fulcrum is another represented by an inflated rubber tube 19 housed in a longitudinal groove 20 in the other holder part 16.

Between the two fulcra aforesaid and the shoulder 9, the inner surfaces of the parts 10, 16 are formed with opposed grooves 21, 22 respectively, and rubber tubes 23, 24 corresponding to 19 are located in these grooves so as to grip the adjacent portion of the back plate 7 between them.

As shown in Figs. 2 and 3, corresponding ends of the holder parts 10, 16 are connected by cover plates 25 held in place by screws 26, each such plate being formed with internal recesses 27 and through-holes 28 opposite the ends of the holder grooves 20, 21, 22.

Each of the rubber tubes 19, 23, 24 projects into the cover-plate recesses 27 at both ends, one such end being blanked off by a headed gun-metal plug 29 whilst the other has fitted into it a gun-metal connector member 30 having a rectangular flange 31 adapted to locate in the adjacent recess 27 and a threaded outer end 32 which projects through one of the holes 28 for connection, by flexible piping, to a suitable source of pressure air or other fluid. Preferably the spigot portions of the plugs 29 and connectors 30 have circumferential ribs of ratchet section to resist their ejection from the tubes 19, 23, 24.

The engagement of the back plate 7 between the independently inflatable tubes 23, 24 ensures that the free edge of the blade 5 bears upon the roll or cylinder 15 with uniformity of pressure throughout its whole length, the reaction of the blade during use being taken by the fulcrum tube 19.

Furthermore by reducing the fluid pressure in one of the tubes 23, 24 and increasing it in the other, the blade 5 can be rocked between the rigid fulcrum 18 and tube 19 to alter its angle of inclination to the roll or cylinder surface.

A spring-steel plate 33 is preferably fixed along the front portion of the holder part 16 so as to press upon the blade-back 7 and to prevent the material removed by the blade from entering between the back-plate 7 and tube 19.

In the modified construction shown in Fig. 4, the tubes 19, 24 acting upon the upper surface of the blade back-plate 7 are replaced by sponge rubber or like resilient strips 34, 35 the former co-operating with the rigid fulcrum surface 18 and the latter opposing the expansion of the tube 23.

We claim:

1. In a doctor knife engageable with a surface for

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scraping the latter, in combination, a rigid, elongated holder, a blade assembly mounted on said holder having a bottom face facing said surface and an opposite top face, said faces extending between a scraping edge and a rear edge of said blade assembly; resilient fulcrum means mounted on said holder, said fulcrum means extending longitudinally of said assembly intermediate said edges and engaging said top face; resilient pressure means mounted on said holder and extending longitudinally of said assembly intermediate said fulcrum means and said rear edge and resiliently engaging said bottom face for urging said scraping edge of said blade assembly to pivot about said fulcrum means toward said surface, said resilient fulcrum means and said resilient pressure means being respectively formed by individual members easily flexible in longitudinal direction and compressible in transverse direction, said resilient fulcrum means and said resilient pressure means holding said top and said bottom face of said blade assembly out of engagement with said rigid holder; and means for adjusting the resiliency of at least one of said resilient means.

2. In a doctor knife engageable with a surface for scraping the latter, in combination, a rigid, elongated holder, a blade assembly mounted on said holder having a bottom face facing said surface and an opposite top face, said faces extending between a scraping edge and a rear edge of said blade assembly; resilient fulcrum means mounted on said holder, said fulcrum means extending longitudinally of said assembly intermediate said edges and engaging said top face; an inflatable tube mounted on said holder and extending longitudinally of said assembly intermediate said fulcrum means and said rear edge and resiliently engaging said bottom face for urging said scraping edge of said blade assembly to pivot about said fulcrum means toward said surface, said resilient fulcrum means and said resilient pressure means being respectively formed by individual members easily flexible in longitudinal direction and compressible in transverse direction, said resilient fulcrum means and said resilient pressure means holding said top and said bottom face of said blade assembly out of engagement with said rigid holder; and means for inflating said tube whereby the pressure of said scraping edge against said surface is adjustable.

3. In a doctor knife engageable with a surface for scraping the latter, in combination, a rigid, elongated holder, a blade assembly mounted on said holder having a bottom face facing said surface and an opposite top face, said faces extending between a scraping edge and a rear edge of said blade assembly; a first inflatable tube forming resilient fulcrum means mounted on said holder, said inflatable tube extending longitudinally of said assembly intermediate said edges and engaging said top face; a second inflatable tube mounted on said holder and extending longitudinally of said assembly intermediate said fulcrum means and said rear edge and resiliently engaging said bottom face for urging said scraping edge of said blade assembly to pivot about said fulcrum means toward said surface, said tubes holding said top and said bottom face of said blade assembly out of engagement with said rigid holder; and means for inflating said tubes whereby the pressure of said scraping edge against said surface is adjustable.

4. In a doctor knife engageable with a surface for scraping the latter, in combination, a rigid, elongated holder, a blade assembly mounted on said holder having a bottom face facing said surface and an opposite top face, said faces extending between a scraping edge and a rear edge of said blade assembly; a first inflatable tube forming resilient fulcrum means mounted on said holder, said inflatable tube extending longitudinally of said assembly intermediate said edges and engaging said top face; a second inflatable tube mounted on said holder and extending longitudinally of said assembly intermediate said fulcrum means and said rear edge and re-

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siliently engaging said bottom face for urging said scraping edge of said blade assembly to pivot about said fulcrum means toward said surface; a third inflatable tube mounted on said holder and extending longitudinally of said assembly opposite said second inflatable tube and resiliently engaging said top face so that said assembly is resiliently held adjacent said rear edge thereof between said second and said third tube, said tubes holding said top and said bottom face of said blade assembly out of engagement with said rigid holder; and means for independently inflating said tubes whereby the pressure of said scraping edge against said surface is adjustable.

5. In a doctor knife engageable with a surface for scraping the latter, in combination, a rigid, elongated holder, a blade assembly mounted on said holder having a bottom face facing said surface and an opposite top face, said faces extending between a scraping edge and a rear edge of said blade assembly; resilient fulcrum means mounted on said holder, said fulcrum means extending longitudinally of said assembly intermediate said edges and engaging said top face; a pair of opposed resilient pressure means mounted on said holder and extending longitudinally of said assembly intermediate said fulcrum means and said rear edge and resiliently engaging said top and bottom faces respectively for resiliently holding said assembly and for urging said scraping edge of said blade assembly to pivot about said fulcrum means toward said surface, said resilient fulcrum means and said resilient pressure means being respectively formed by individual members easily flexible in longitudinal direction and compressible in transverse direction, said resilient fulcrum means and said resilient pressure means holding said top and said bottom face of said blade assembly out of engagement with said rigid holder; and means for adjusting the resiliency of at least one of said resilient means.

6. In a doctor knife engageable with a surface for scraping the latter, in combination, a rigid, elongated holder, a blade assembly mounted on said holder having a bottom face facing said surface and an opposite top face, said faces extending between a scraping edge and a rear edge of said blade assembly; resilient fulcrum means mounted on said holder, said fulcrum means extending longitudinally of said assembly intermediate said edges and engaging said top face; resilient pressure means mounted on said holder and extending longitudinally of said assembly intermediate said fulcrum means and said rear edge and resiliently engaging said bottom face for urging said scraping edge of said blade assembly to pivot about said fulcrum means toward said surface, said resilient fulcrum means and said resilient pressure means being respectively formed by individual members easily flexible in longitudinal direction and compressible in transverse direction, said resilient fulcrum means and said resilient pressure means holding said top and said bottom face of said blade assembly out of engagement with said rigid holder; abutment means on said holder for limiting movement of said rear edge as said scraping edge pivots about said fulcrum means; and means for adjusting the resiliency of at least one of said resilient means.

7. In a doctor knife engageable with a surface for scraping the latter, in combination, a rigid, elongated holder, a blade assembly mounted on said holder having a bottom face facing said surface and an opposite top face, said faces extending between a scraping edge and a rear edge of said blade assembly; resilient fulcrum means mounted on said holder, said fulcrum means extending longitudinally of said assembly intermediate said edges and engaging said top face; resilient pressure means mounted on said holder and extending longitudinally of said assembly intermediate said fulcrum means and said rear edge and spaced therefrom, said pressure means resiliently engaging said bottom face for urging said scrap-

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ing edge of said blade assembly to pivot about said fulcrum means toward said surface, said resilient fulcrum means and said resilient pressure means being respectively formed by individual members easily flexible in longitudinal direction and compressible in transverse direction, said resilient fulcrum means and said resilient pressure means holding said top and said bottom face of said blade assembly out of engagement with said rigid

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holder; and means for adjusting the resiliency of at least one of said resilient means.

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