

[72] Inventor **George Vischulis**
Menomonee Falls, Wis.
[21] Appl. No. **829,991**
[22] Filed **June 3, 1969**
[45] Patented **July 20, 1971**
[73] Assignee **Zerand Corporation**
New Berlin, Wis.

2,655,102	10/1953	Ross	101/157
2,809,582	10/1957	Crawford	101/157 X
3,006,275	10/1961	Allen	101/157
3,128,207	4/1964	Schmitt	101/169 X
3,187,718	6/1965	Coghill	101/169 X

Primary Examiner—Robert E. Pulfrey
Assistant Examiner—C. Cougenour
Attorney—James E. Nilles

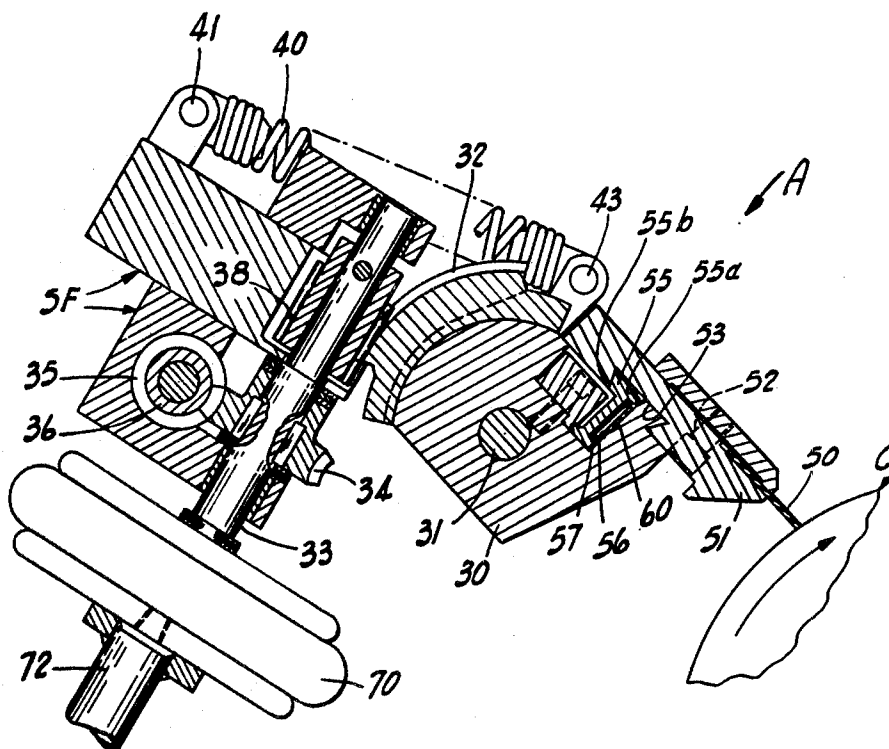
[54] **DOCTOR BLADE ASSEMBLY FOR PRINTING EQUIPMENT**
7 Claims, 6 Drawing Figs.

[52] U.S. Cl. 101/350,
101/157
[51] Int. Cl. B41f 9/10
[50] Field of Search. 101/157,
169, 350

[56] **References Cited**
UNITED STATES PATENTS

1,314,543	9/1919	Smith	101/157
2,593,344	4/1952	Richardson et al.	101/157
2,638,844	5/1953	Halley	101/169
2,644,394	7/1953	Harless	101/157

ABSTRACT: An assembly for holding a doctor blade in adjustable position with respect to the printing cylinder. An air loaded clamping device locks the doctor blade firmly in operative position in its holder and when the doctor blade is to be removed, the air load can be relieved and the doctor blade and its mounting quickly and easily withdrawn in an endwise direction from the printing equipment without disturbing any of the other printing equipment. The adjustment also includes an air load device for urging the doctor blade against the cylinder with a predetermined amount of pressure; this biasing of the blade into proper engagement with the cylinder is made by the air loaded device and through an adjustable gear; the adjustable gear in turn, can be adjusted initially to make the proper preliminary adjustment of the blade relative to the printing cylinder.



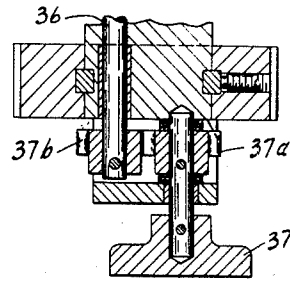
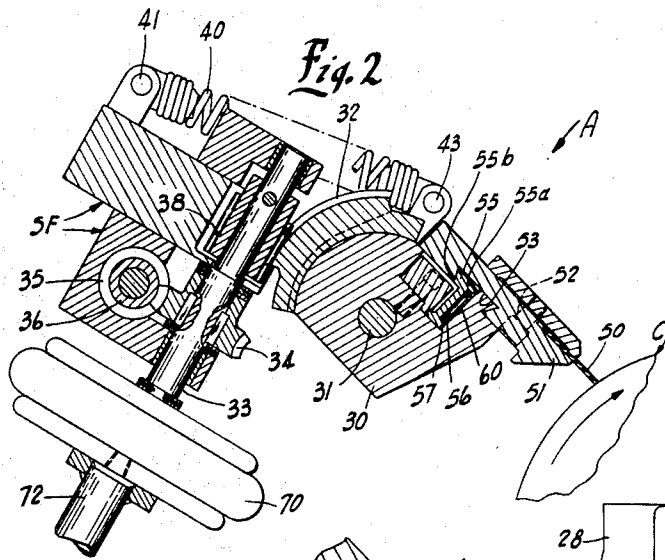


Fig. 3

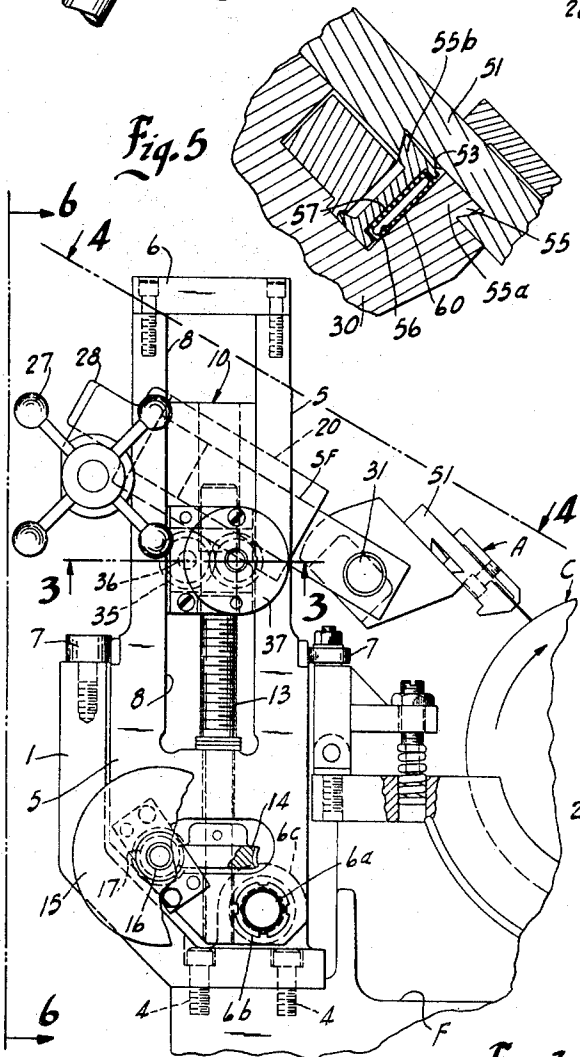


Fig. 5

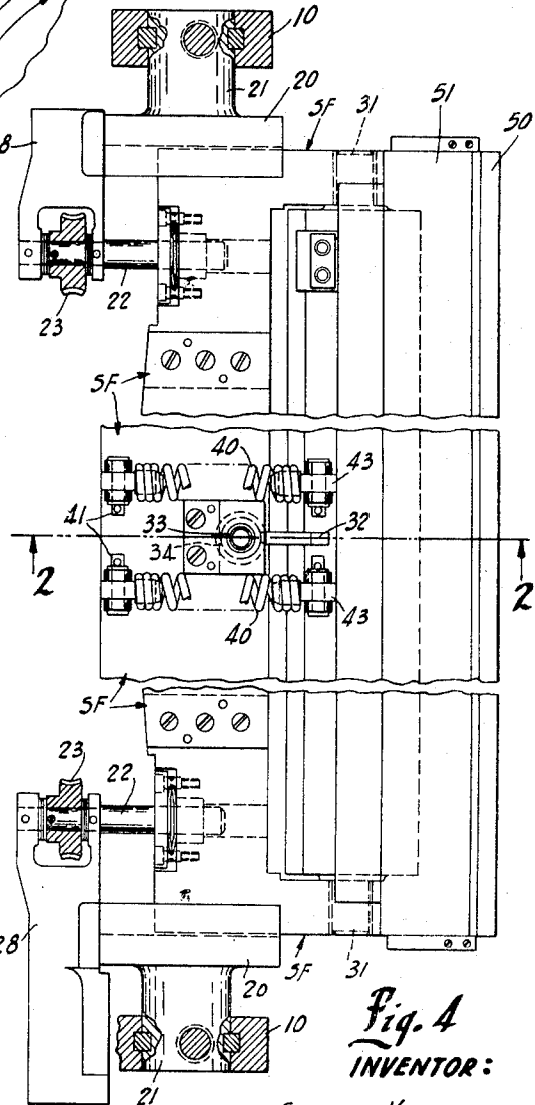


Fig. 4

INVENTOR:

GEORGE VISCHULIS

BY:

James E. Nilles
ATTORNEY

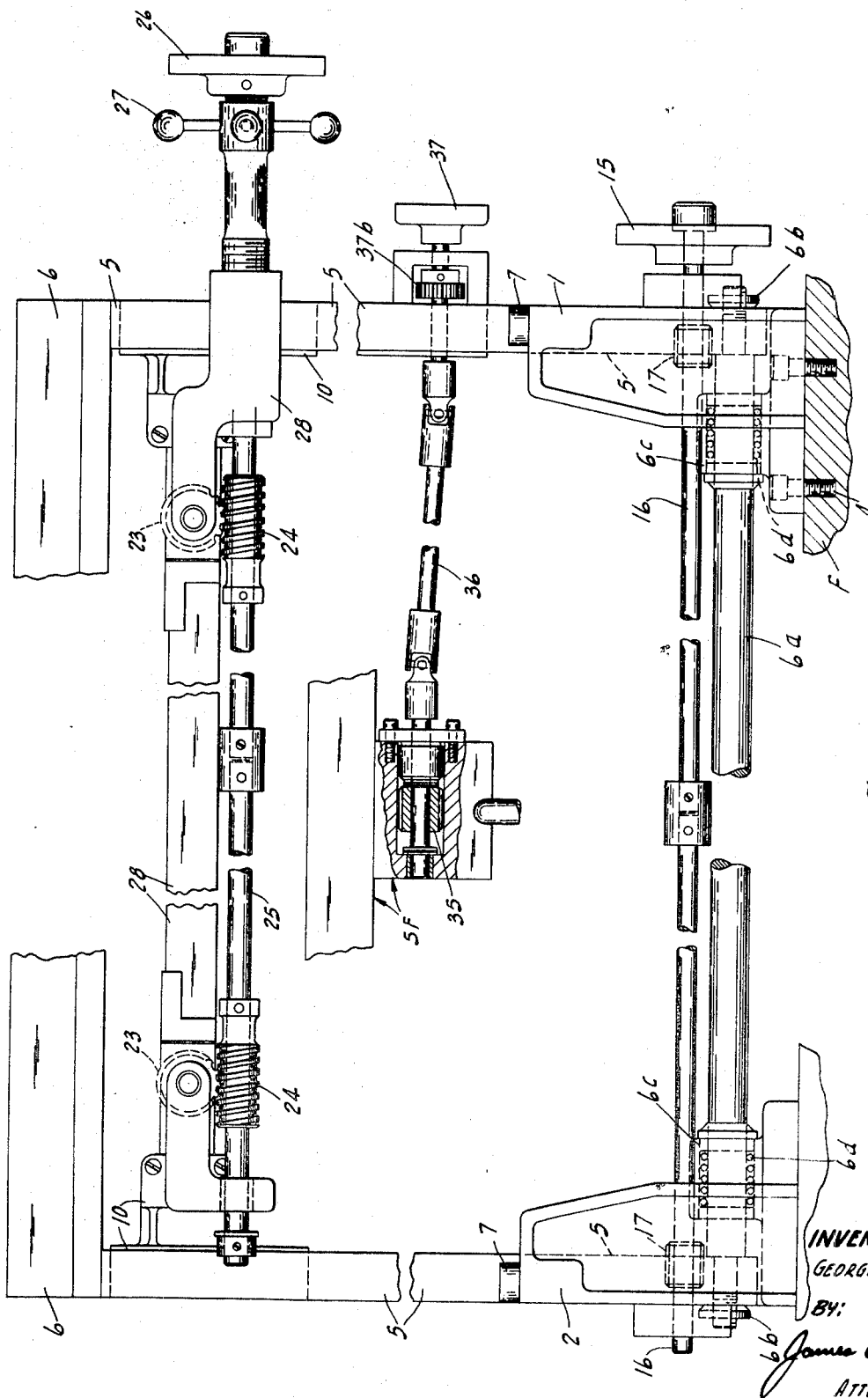


Fig. 6

INVENTOR:
GEORGE VISCHULIS

BY:
James E. Miller
ATTORNEY

DOCTOR BLADE ASSEMBLY FOR PRINTING EQUIPMENT

BACKGROUND OF THE INVENTION

The invention pertains generally to equipment for printing on running webs and in which ink is applied to the printing cylinders and must then be wiped off of the cylinder by a doctor blade. The invention relates to means for releasably and lockably holding the doctor blade in operative position and also for adjusting the doctor blade in any one of several directions so as to be able to precisely lock the doctor blade with respect to its distance from, its angle to, and its pressure engagement with the printing cylinder.

SUMMARY OF THE INVENTION

The present invention relates to an air loaded clamping device for releasably locking the doctor blade and its holder in operative position, and which can then be released so that the doctor blade and its holder can be slid endwise out of the printing line and without the necessity for removing or adjusting other parts of the machine.

Another aspect of the invention relates to means for adjusting the angle of the doctor blade in respect to the cylinder. This means includes a pivotal bar on which the blade and its mounting are located, a gear means for adjusting the pivot bar, and a pressurization device for urging the pivot bar through the adjustable gear means, into contact with the printing cylinder and with the correct predetermined pressure.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a side elevational view of a doctor blade assembly made in accordance with the present invention;

FIG. 2 is a cross-sectional view of a portion of the device shown in FIG. 1, certain parts being shown as being removed, broken away for the sake of clarity in the drawings;

FIG. 3 is a sectional view taken along line 3-3 in FIG. 1;

FIG. 4 is a sectional view taken along line 4-4 in FIG. 1;

FIG. 5 is an enlarged detailed view of the releasable locking means for the doctor blade holder as shown in FIG. 2; and

FIG. 6 is a transverse, elevational view, taken generally from the line 6-6 in FIG. 1, but showing the several shafts as pulled apart or in slid out fashion for clarity in the drawings, certain parts being removed, broken away, or in section for the sake of clarity in the drawings.

DESCRIPTION OF A PREFERRED EMBODIMENT

The doctor blade assembly A of the present invention can be used in various types of printing equipment and has been shown in the present disclosure as being mounted on a frame F of a gravure cart, which cart may be of the type shown in the copending U.S. Pat. application, Ser. No. 829,990 filed June 3, 1969, and entitled "Rotary Printing Equipment," and which has been assigned to an assignee common with the present invention.

The printing cylinder C, which the doctor blade assembly services, may be a gravure type cylinder and is also mounted on the frame F in the conventional and known manner. This cylinder rotates in the direction indicated by the curvilinear arrow in FIG. 1. The cart frame F includes a pair of laterally spaced apart mounting brackets 1 and 2. The doctor blade assembly is mounted on the mounting brackets as follows.

A pair of vertically positioned slide plates 5 are rigidly connected together at their upper end by a tie plate 6 and their lower ends are rigidly connected together by a shaft 6a which extends through the slide plates and holds them captive thereon by means of the nuts 6b threaded on the ends of the shaft 6a. Thus, the two laterally spaced apart slide plates 5 are rigidly connected together and can slide, in an axial direction relative to the cylinder C, within the brackets 1 and 2. For this purpose, rollers 7 are mounted at the upper ends of the brackets and on opposite sides of the slide plates and bear

against the slide plates so that the slide plates and the doctor blade assembly which they carry can be reciprocated during the printing operation. The shaft 6a is slidably mounted on the frame by means of the pillow blocks 6c which form part of the frame. Antifriction bearing assemblies 6d are journaled in the pillow blocks and shaft 6a is mounted in these bearings to provide smooth reciprocatory movement. The means for reciprocating the slide plates and its associated doctor blade are not shown.

The slide plates 5 have a vertically elongated recess 8 formed in their central portion. It is in these recesses that a pair of slide blocks 10 are guidingly and vertically positionable by means to be described, thus providing for a vertical adjustment of the doctor blade assembly relative to the cylinder. This vertical adjustment is provided by a pair of threaded shafts 13 which are rotatable at their lower ends in their respective slide plate 5, and which shafts have a worm gear 14 fixed adjacent their lower ends. The two vertical shafts 13 are simultaneously rotated by the hand wheel 15 fixed to shaft 16, the shaft 16 in turn having a pair of pinions 17 fixed thereto for constant mesh with their respective worm gear 14 or shafts 13. The upper ends of the shafts 13 are in threadable engagement with their respective slide blocks 10. Thus, rotation of the hand wheel 15 in one direction or the other causes vertical shifting of the slide blocks 10 and the doctor blade assembly A carried thereby.

The doctor blade assembly also has an adjustment for varying its position toward and away from the gravure cylinder as follows. The slide frame SF of the doctor blade assembly is slidable in angularly disposed slide blocks 20 which are fixedly held by their shafts 21 in frame SF. Shifting movement of the frame SF in the slide blocks 20 is accomplished by the pair of spaced, rotatable, and threaded shafts 22 mounted in the slide frame SF. These shafts 22 are threadably engaged in the frame SF and each have a worm gear 23 fixed thereto. These worm gears 23 are in constant mesh with their respective worms 24 (FIG. 6) fixed to a transverse shaft 25. The transverse shaft is rotatably mounted in a bracket 28 and it has a hand wheel 26 fixed at its outer end. Thus, rotation of the hand wheel causes simultaneous rotation of both of the threaded shafts 22 and consequent movement of the frame SF and its doctor blade assembly A in either direction toward or away from the gravure cylinder C.

Means are also provided for skewing the doctor blade relative to the cylinder, that is to say, for moving one end of the blade closer to the cylinder, while the other end is moved away from the cylinder. This is accomplished by turning the spoken handwheel 27 (FIGS. 1 and 6), which is in threaded engagement with the elongated bracket 28. The gears 23 are mounted on this bracket so when the latter is shifted slightly, the threaded shafts 22 which are of opposite thread, rotate slightly, thus skewing the blade.

Referring in particular to FIG. 2, the slide frame SF of the assembly has a pivot bar 30 pivoted at 31 and a worm gear segment 32 is fixed with the bar 30 at a transversely central disposed location thereon. A shaft 33 is rotatably mounted in the frame SF and has a worm gear 34 fixed thereto for constant mesh with a worm 35. Worm 35 is fixed to shaft 36 which in turn is rotatably mounted in a sliding block 10. Hand wheel 37 (FIG. 6) is connected through pinions 37a and 37b (FIGS. 3 and 6) to the end of shaft 36 and can be turned in either direction to consequently rotate its gear and also shaft 33 of the doctor blade assembly in one direction or another. Also fixed to shaft 33 is a worm gear 38 and this worm gear 38 is in constant engagement with worm gear segment 32 of the pivot bar. Thus, the arcuate position of the doctor blade can be varied by rotation of the hand wheel 37. A pair of springs 40 (FIG. 2) are fixed at one end as at 41 to the frame SF, and are mounted at their other ends to the pivot yoke 43. These springs act to urge the doctor blade assembly away from the gravure engaging position and their function is to take up the backlash between the gear segment 32 and the worm 38.

As shown in FIGS. 2 and 5, the doctor blade 50 is rigidly clamped in a holder 51 by means of cap screws 52. The holder has a dove tailed shaped recess 53 formed along its lower side and by means of which it is slideably mounted on the complementary guideway 55 which extends from the upper side of the pivot bar.

The guideway 55 is actually comprised of two parts; 55a which is formed as an integral part of the pivot bar and 55b which is a separate guidebar and is located adjacent the wall 56 of the pivot bar. The guidebar 55b has a recess 57 and it is in this recess that the expansible, flexible belt 60 is located. The belt 60 is held at one end and its other end adapted to receive fluid pressure. The belt gears against the wall 56 and also the guidebar so that when it is pressurized, the guidebar is forced away from the wall 56, thus acting to tightly clamp the two piece extending guideway 55 into rigid engagement with the dove tailed recess 53 of the holder.

To assemble the holder and the doctor blade in the pivot bar, the expansible belt 60 is not pressurized and the holder can be easily slid in an endwise direction over the two piece guide 55. When it is in position, the flexible, hollow belt 60 is pressurized, thus forcing the two piece guide 55 apart and locking the holder on the pivot bar.

The entire pivot bar, its holder 51 and the doctor blade 50 can be pivoted about point 31 by means other than the gear segment 32 and worm 38. This additional means takes the form of an expansible air actuator 70 which is fixed at the end of shaft 33. A source of fluid pressure, such as air, is introduced into the air actuator by means of the conduit 72 on which it is mounted at its other side. When the air actuator is pressurized, it expands, thus forcing the shaft 33 and its gear 38 in an upward direction as viewed in FIG. 2, thus causing a thrust on gear segment 32 and the pivot bar to which it is fixed. The amount of pressure in the air actuator can be varied so as to in turn, vary the amount of twisting or pivoting force applied to the pivot bar and its doctor blade. This amount is predetermined so that the doctor blade is always applied with the same amount of pressure to the gravure cylinder.

RESUME

The present invention provides a quickly releasable and tightly lockable mounting for the doctor blade holder. The holder and its doctor blade can thereby be axially withdrawn, in a transverse direction in respect to the printing equipment, and without disturbing any part of the machine. The doctor blade and its holder can then be readily assembled simply by sliding it endwise into the press and is quickly locked in place by introducing fluid pressure into the expandable belt 60. The doctor blade can also be quickly and accurately adjusted as to the amount of pressure on the gravure cylinder and this adjustment is made by the air actuator acting through the gear adjustment 32 and 38. The gear adjustment may be considered to the preliminary adjustment for initially adjusting the angular blade relative to the cylinder and the air actuator is the final and more sensitive means for adjustment of the doctor blade.

I claim:

1. A mounting for adjusting a doctor blade relative to a printing cylinder and comprising, a support frame, a rotatable shaft mounted in said frame for axial shifting in said frame, a pivot bar along said frame and pivotally mounted thereto; gear means connected to and between said frame and said pivot bar

for adjusting the pivotal position of said bar, said gear means including a worm gear segment fixed to said pivot bar, and a helical gear fixed to said rotatable shaft and in constant mesh with said worm gear segment; a doctor blade mounted on said pivot bar, and an expansible fluid actuator connected to said shaft for axially shifting said shaft and also connected to said gear means for shifting said gear means and thereby pivoting said bar and blade.

2. The arrangement set forth in claim 1 including an adjustable means for rotating said shaft and thereby causing pivotal movement of said bar and said doctor blade.

3. The arrangement set forth in claim 1 including spring means between said frame and said pivot bar for eliminating backlash between said worm gear and said worm gear segment.

4. In rotary printing equipment, a printing cylinder, a support frame extending along the length of said cylinder, a rotatable shaft mounted in said frame and axially shiftably therein, a pivot bar extending along said frame and adjacent said cylinder and pivotally mounted to said frame, gear means between said frame and said pivot bar for adjusting the pivotal position of said bar with respect to said cylinder, said gear means including a worm gear segment fixed to said pivot bar and a helical gear fixed to said shaft and in constant mesh with said worm gear segment, a doctor blade mounted on said pivot bar for engagement with said cylinder, and an expansible fluid actuator connected to said gear means for shifting the latter and consequently shifting said pivot bar to thereby urge said doctor blade through said gear means into engagement with said cylinder with the pressure determined by the amount of pressurization of said actuator.

5. The arrangement set forth in claim 4 including spring means between said frame and said pivot bar for eliminating backlash between said worm gear and said worm gear segment.

6. The arrangement set forth in claim 4 including means for bodily and reciprocally shifting said bar and doctor blade toward and away from said cylinder.

7. In rotary printing equipment, a gravure cylinder, a support frame extending along the length of said cylinder, a shaft mounted in said frame for rotation and axial shifting therein, a pivot bar extending along said frame and adjacent said cylinder and pivotally mounted to said frame, gear means between said frame and said pivot bar for adjusting the pivotal position of said bar with respect to said cylinder, said gear means including a worm gear segment fixed to said pivot bar, and a helical gear fixed to said shaft and in constant mesh with said worm gear, and an expansible fluid actuator connected to said shaft and to said gear means for shifting the latter and consequently pivoting said pivot bar; an elongated doctor blade holder having a guideway recess along one side thereof, said pivot bar having a guide extension along one side thereof which is complementary to and engageable by said guide recess of said holder whereby said holder can be slid axially along said extension and be held thereby, said extension being formed as two parts which are relatively separable from one another, and an expansible belt means between said two parts and pressurizable so as to force said parts apart and into binding engagement with said holder recess whereby, when said belt is pressurized said holder is rigidly held on said bar, and when said belt is not pressurized said two parts release said holder so that it can be withdrawn axially from said bar.