

Nov. 2, 1937.

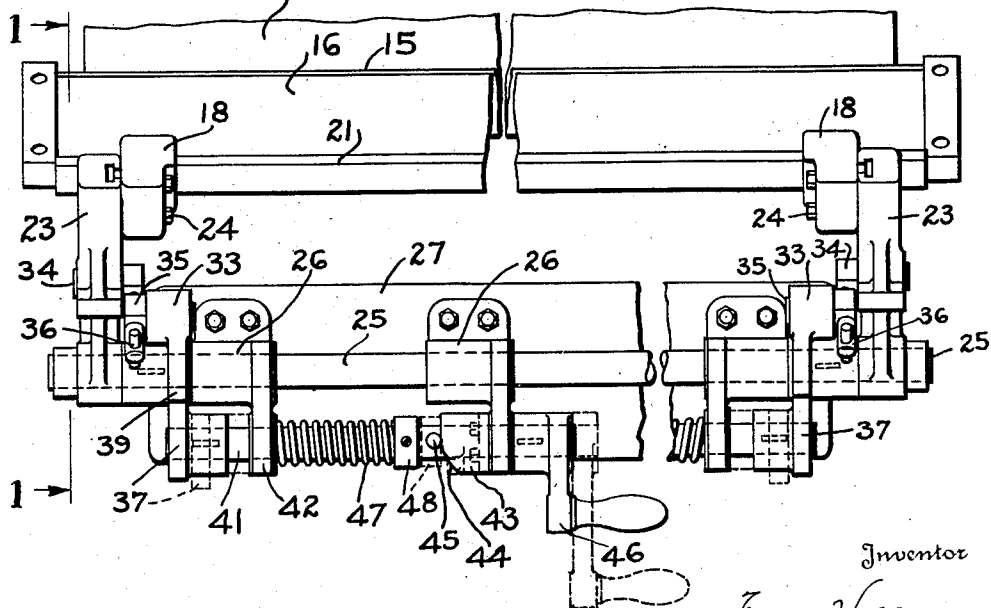
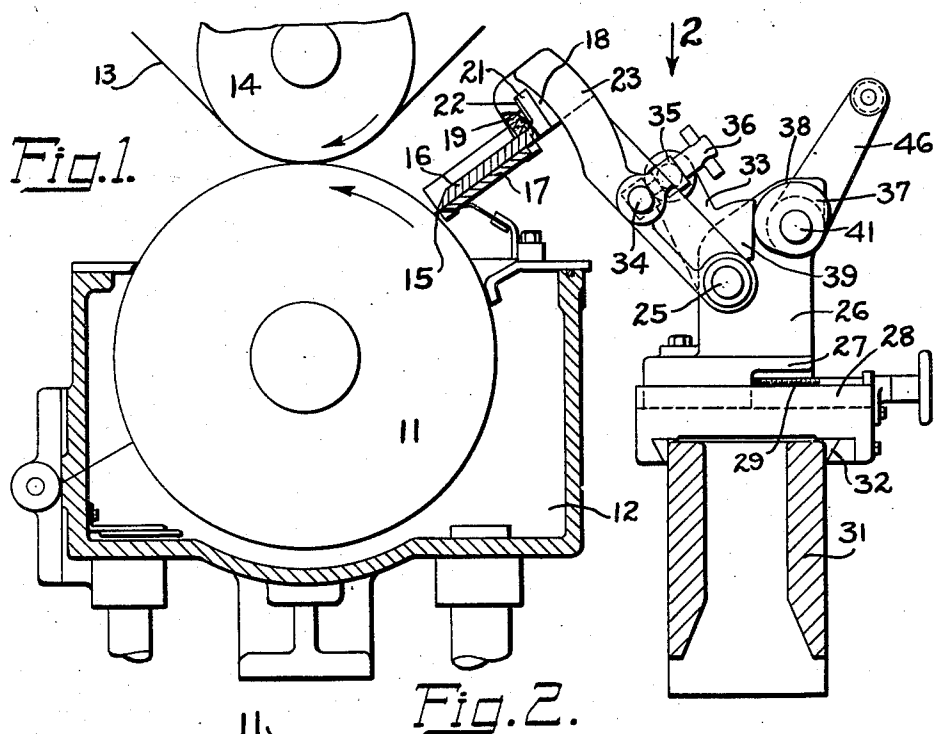
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2,097,791

INTAGLIO PRINTING MACHINE

Filed Aug. 3, 1935

2 Sheets-Sheet 1



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2 Sheets-Sheet 2

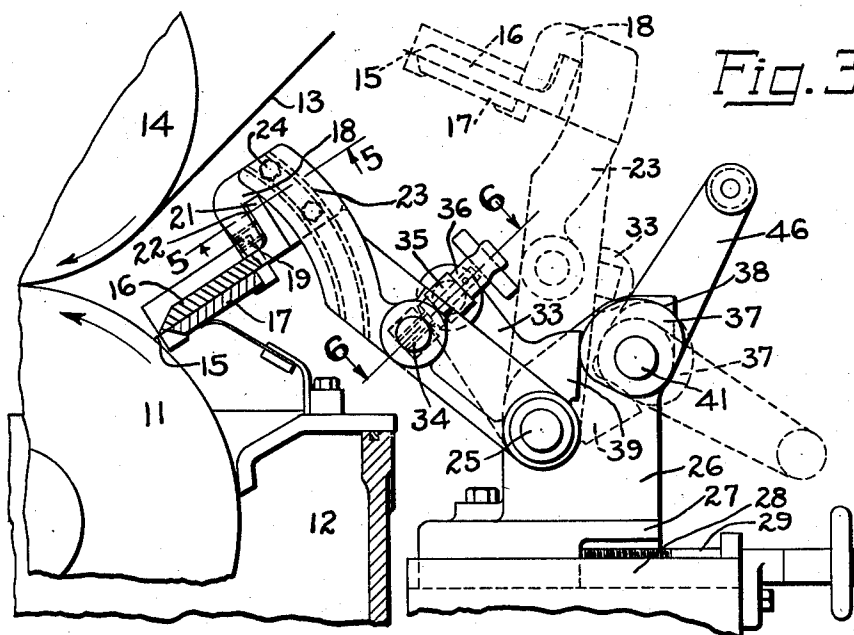


Fig. 3.

Fig. 4.

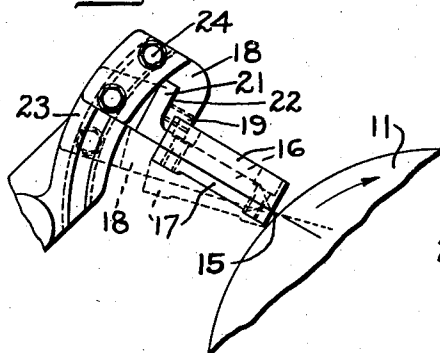


Fig. 6.

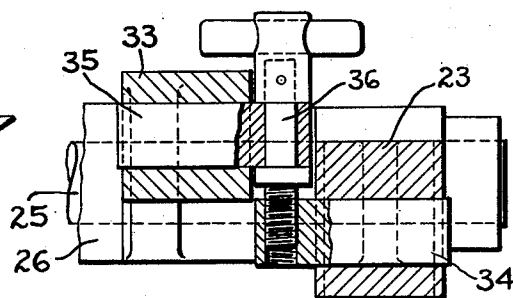
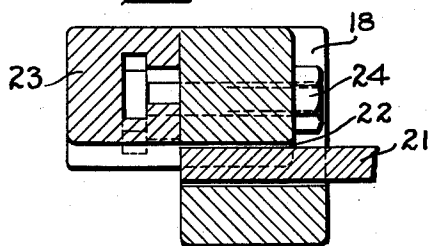


Fig. 5.



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UNITED STATES PATENT OFFICE

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INTAGLIO PRINTING MACHINE

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18 Claims. (Cl. 101—157)

This invention relates to rotary intaglio printing machines and more particularly to doctor blade mechanisms for such machines.

In these machines it is necessary to remove the excess ink from the surface of the printing cylinder prior to the printing impression. This is generally accomplished by a device known as a doctor blade which has its edge disposed to abut the surface of the cylinder, and while the cylinder rotates, to remove all surplus ink from its surface without disturbing the ink in the engraved portions thereof.

Preferably, the doctor blade is given a reciprocating movement axially with respect to the roller, is of comparatively thin metal, highly flexible and held rigidly, is arranged to be pressed upon the cylinder by the proper amount of tension, and is disposed relatively thereto at the desired angle to insure proper ink removal. Springs and weights have been more or less successfully used heretofore to provide the required pressure, but due to the liability of springs breaking and of varying in tension after use, and to the inconveniences occasioned by the use of weights the use of these devices is somewhat objectionable. It is particularly desirable that, due to the flexibility of the blade and to possible differences in flexibility between different blades, the pressure of the blade be readily and delicately adjustable and that provision be made to vary the angular disposition of the blade with respect to the cylinder surface contacted thereby.

One of the principal objects of this invention is to provide a doctor blade mechanism of improved form, inexpensive to manufacture and maintain in operation, and particularly efficient in the operation of ink removal.

Another object is to provide a doctor blade mechanism which will be positive in its action, sturdy in structure, and which does not require the use of springs and weights to provide the required pressure.

Still another object is to provide a doctor blade mechanism which is readily and conveniently operable to permit accessibility to the adjacent machine parts and mechanism.

A further object is to provide, in such mechanism, efficiently operable means to adjust the angular disposition of the doctor blade with respect to the cylinder.

A still further object is to provide blade pressure adjusting means whereby delicate adjustments thereof may be readily made and without removing the blade from the cylinder or disturbing its contact therewith.

Other objects include the provision of positive locating and locking means for the blade and the provision of the combination of the above features in a doctor blade mechanism whereby one may assist and enhance the operations and advantages of the others.

It is also an object of the invention to provide a doctor blade mechanism of generally improved construction, whereby the device will be simple, durable and inexpensive in construction, as well as convenient, practical, serviceable and efficient in its use.

With the foregoing and other objects in view, which will appear as the description proceeds, the invention resides in the combination and arrangement of parts, and in the details of construction hereinafter described and claimed, it being understood that various changes in the precise embodiment of the invention herein disclosed may be made within the scope of what is claimed without departing from the spirit of the invention.

The preferred embodiment of the invention is illustrated in the accompanying drawings, wherein:

Figure 1 is a sectional view of a portion of a printing machine, looking in the direction of arrows 1—1 of Figure 2, and showing an end view of a doctor blade mechanism embodying the features of this invention;

Figure 2 is a plan view of the doctor blade mechanism of Figure 1, looking in the direction of arrow 2 in Figure 1;

Figure 3 is a slightly enlarged end view of the mechanism and illustrates, by the use of dotted lines, the operation thereof;

Figure 4 is an end view of the doctor blade holder of this invention and illustrates, by the use of dotted lines, the adjustable feature of this device;

Figure 5 is an enlarged section on line 5—5 of Figure 3; and

Figure 6 is an enlarged section on line 6—6 of Figure 3.

The mechanism embodying the features of this invention is illustrated as being applied in operable association with a printing cylinder 11. The cylinder 11 is illustrated as being mounted for rotation in an ink well 12, wherein ink adheres to its peripheral surface. Impressions from the cylinder 11 are applied to a web 13 by an impression cylinder 14. Surplus ink, adhering to the surface of the cylinder 11 is removed by a doctor blade 15 which is, preferably, made of comparatively thin and flexible metal.

The blade 15 is herein shown clamped between bars 16 and 17 which are suitably secured together and which, as a unit are supported at each end and if desired at intermediate points, by inverted hook-like members 18, being secured thereto by set screws 19 clamping against a flange 21, formed on the bar 16, within the hook portion 22 of the member 18. The member 18 may be a part of a blade supporting arm 23 or, as preferred and herein shown, adjustably secured to the arm 23, being adapted to be moved thereon about an arc, having the point of contact of the blade 15 with the cylinder 11 as the center, by means of a cooperating tongue and groove arrangement and T bolts 24. A blade supporting arm 23 is provided at each end of blade 15.

The arms 23 are mounted to swing toward and away from the cylinder 11 and carry with them the blade 15 and its supporting members, the bars 16 and 17 and the member 18, into a position as shown in dotted lines in Figure 3, whereby the cylinder 11 and its associated parts will be conveniently accessible. The arms 23 are rotatably supported upon a shaft 25 which is disposed parallel to and extends from end to end of the cylinder 11, being journaled along its length in bearing brackets 26. The brackets 26 are mounted upon a reciprocable carriage 27, movable transversely with respect to, and toward and away from, the cylinder 11, upon a supporting table 28 by means of a manually operable feed screw 29. The table 28 is preferably mounted for oscillating movement axially with respect to the cylinder 11, upon a frame member or standard 31. Oscillatory movement of the table 28 may be obtained by means of any of the well known types of mechanism, to cause it to slide on ways 32 provided between the same and the frame member 31.

Swinging movement of the blade supporting arms 23 is obtained by their connection with the shaft 25 by means of a rocker arm 33, which is secured to the shaft and rocks therewith, and an adjustable connection between the arms. This adjustable connection herein comprises, a stud 34 and 35 extending from the arms 23 and 33 respectively, which are disposed one above the other therebetween, and an adjusting screw 36 rotatively secured to the stud 35 and threadingly engaging the stud 34. Before the proper and desired pressure and contact has been obtained between the blade 15 and the cylinder 11, the arms 23 and 33 are locked in the blade operative position, as shown in Figures 1 and 3, by means of rotatably mounted disc cams 37, each of which is disposed with its camming face 38 in operable abutment with the face of a lug 39 provided on each of the arms 33.

Desired pressure adjustment of the blade 15, upon the surface of the cylinder 11, may be delicately controlled by the screws 36. By providing one of the above disclosed adjusting connections at each end of blade 15, perfect contact of its edge upon the cylinder 11 along its entire length may be obtained by proper adjustment of the screws 36.

Should occasion require the removal of the blade 15 away from the cylinder 11 to permit accessibility to the same or to the adjacent machine parts, the cams 37 are manipulated to release the arms 33 and permit the blade 15 to be swung away from the cylinder 11 as shown by dotted lines in Figure 3. This is accomplished by mounting each of the cams 37 on one end of a

shaft 41, which is rotatably and axially slidably journaled in a portion 42 of the brackets 26. In this instance the shaft 41 is axially slidable in the brackets 26 by means of a sleeve cam 43 which is secured to the bracket 26, and is provided with an end cam surface 44 adapted to be engaged by a pin 45 protruding radially from the shaft 26.

Rotation of the shaft 41 in one direction, by means of a hand crank 46 will permit the shaft 41 to slide axially under urge of a spring 47, one end of which abuts the portion 42 of the bracket 26 and the other end against a sleeve 48 secured to the shaft 41, to a position as shown in dotted lines in Figure 2. Obviously, rotation in the other direction will force the shaft 41 to move axially into position to dispose the cam 37 in engagement with the lug 39 whereby the blade 15 is locked in operable position to contact the surface of the cylinder 11. The cam 37 and its operating parts, therefore forms the means whereby the mechanism is locked in operable position in respect to the cylinder 11, to insure the proper pressure of the blade 15 thereon, after the same has been adjusted by the screws 36, while permitting swinging movement of the blade away from the cylinder without disturbing such adjustment.

From the above description, it will be obvious that the combined features of this invention provides an improved doctor blade mechanism which is particularly efficient in removing excess ink from the surface of printing cylinders of a printing machine. The provision of an angular adjusting means for the blade 15, in respect to the cylinder 11, permits its proper setting for different diameters of cylinders and to compensate for differences in the flexibility of different doctor blades. The provision of the blade pressure mechanism including the screws 36 permits delicate adjustment of blade contact pressure on the cylinder 11 over its entire length and the provision of the locating, locking and release mechanism, including the cam 37 and its operating mechanism, permits convenient accessibility to the cylinder and other machine parts adjacent thereto without disturbing this delicate adjustment of the blade pressure.

It will be understood that the invention may be embodied in other specific forms without departing from the spirit or essential attributes thereof, and it is therefore desired that the present embodiment be considered in all respects as illustrative and not restrictive, reference being had to the claims rather than to the foregoing description to indicate the scope of the invention.

What I claim is:

1. In combination with a cylinder of a printing machine, a doctor blade mechanism, comprising a flexible doctor blade, a holder for said blade, means to support said blade holder for swinging movement toward and away from said cylinder including, a member connected to the blade holder and an arm pivoted to a stationary part, said member and said arm having cooperating relatively slidable portions, arcuate in form, to adjust said blade angularly with respect to said cylinder, and means to releasably lock said arm to the stationary part.

2. Apparatus for removing surplus ink from a cylinder of a printing machine, comprising a doctor blade, a holder for said blade, means to support said doctor blade holder for swinging movement to dispose said blade into and out of contact with said cylinder, means to positively move said blade holder toward and away from

said cylinder to adjust the pressure of the contact of said blade thereon, and releasable means rotatable to engage said supporting means to lock it in position to hold said blade in cylinder contacting position.

3. In a doctor blade mechanism, a flexible blade, a blade holder, a swingably mounted arm for supporting said blade holder to dispose of said blade in contact with the surface of a cylinder of a printing machine, and cooperating means including an arcuately formed tongue and groove between said arm and said blade holder slidably adjustable arcuately on said arm to vary the angle of contact of said blade upon the surface of the cylinder.

4. In a doctor blade mechanism, a flexible blade, a swingably mounted member for supporting said blade in contact with the surface of a cylinder of a printing machine, cooperating means including an arcuately formed tongue and groove between said member and said blade, adjustable to vary the angle of contact of said blade upon the surface of the cylinder, a rotatable arm to swing said member, and adjustable means connecting said arm to said member and operable to vary the contact pressure of said blade on the surface of said cylinder.

5. In a doctor blade mechanism, a flexible blade, a swingably mounted member for supporting said blade in contact with the surface of a cylinder of a printing machine, and rotatable means to engage said member to locate and lock said member in blade contacting position, said means being axially movable out of engagement with said member to permit swinging movement thereof to remove said blade out of contact with the cylinder.

6. In a doctor blade mechanism, a flexible blade, a swingably mounted member for supporting said blade in contact with the surface of a cylinder of a printing machine, cooperating means between said member and said blade adjustable to vary the angle of contact of said blade upon the surface of the cylinder, and rotatable means to engage said member, to locate and lock the same in blade contacting position, said means being axially slidable, when rotated, to disengage from said member to permit swinging movement thereof to remove said blade out of contact with the cylinder.

7. In a doctor blade mechanism, a flexible blade, a swingably mounted member for supporting said blade in contact with the surface of a cylinder of a printing machine, rockable means to swing said member, adjustable means connecting said rockable means to said member and operable to vary the contact pressure of said blade on the surface of the said cylinder, and rotatable means to engage said rockable means to locate and lock said member in blade contacting position, said rotatable means being axially slidable, when rotated to disengage from said rockable means to permit swinging movement of said member to remove said blade out of contact with the cylinder.

8. In a doctor blade mechanism, a flexible blade, a swingably mounted member for supporting said blade in contact with the surface of a cylinder of a printing machine, cooperating means between said member and said blade adjustable to vary the angle of contact of said blade upon the surface of the cylinder, a rockable arm to swing said member, adjustable means connecting said arm to said member and operable to vary the contact pressure of said blade on the

surface of said cylinder, and rotatable means to engage said member to locate and lock said member in blade contacting position, said rotatable means being axially slidable out of engagement with said member to permit swinging movement thereof to remove said blade out of contact with the cylinder.

9. In a doctor blade mechanism, a flexible blade, an arm for supporting said blade, a rockable shaft upon which said arm is swingably mounted, another arm secured to said shaft and rockable therewith, and connecting means between said arms, said connecting means being adjustable to move one arm rotatably about said shaft relatively to the other arm to adjust the contact pressure of said blade against the surface of a printing cylinder.

10. In a doctor blade mechanism, a flexible blade, a blade holder, an arm for supporting said blade holder, and connecting means between said arm and said blade holder, said connecting means including an arcuately formed tongue connected to said holder, and an arcuately formed groove in said arm to receive said tongue, said tongue being slidably mounted in the groove in said arm to cause relative movement between said blade and said arm and thereby vary the angle of contact of said blade upon the surface of a printing cylinder.

11. In a doctor blade mechanism, a flexible blade, a first arm for supporting said blade, a rockable shaft upon which said arm is swingably mounted, a second arm secured to said shaft and rockable therewith, connecting means between said arms, said connecting means being adjustable to move one arm rotatably about said shaft relatively to the other arm to adjust contact pressure of said blade against the surface of a printing cylinder, and releasable means engaging said second arm to positively locate and lock said arms to dispose said blade in cylinder contacting position.

12. In apparatus for removing ink from a cylinder, a doctor blade having a front edge in contact with said cylinder, a holder for said blade, a supporting member for said holder, and means to adjustably connect said holder to said support including a member connected to said blade holder, and an arcuately formed tongue on one member and an arcuately formed groove in the other member, said tongue and groove being relatively slidable in an arcuate path the center of the arc thereof being substantially upon the periphery of the cylinder.

13. In apparatus for removing ink from a cylinder, a doctor blade having a front edge in contact with said cylinder, a holder for said blade, a carrier for said holder, a swingable arm, and means to adjustably connect said carrier to said arm including relatively slidable cooperating arcuate tongue and arcuate groove between said arm and said carrier, the center of the arc thereof being substantially at the point of contact of said blade with said cylinder.

14. In a printing machine having a cylinder, a doctor blade mechanism including a doctor blade holder, an arm supporting said holder, a standard to which said arm is pivoted, an axially slidable and rotatable member for operative connection with said arm to move and maintain said holder in position adjacent said cylinder, and means to rotate and axially slide said member to disconnect it from said arm to permit swinging of said holder away from said cylinder.

15. In a doctor blade mechanism for a print-

ing machine, a doctor blade holder, a swingably mounted arm for supporting said holder, and a rockable member mounted for axial movement when rocked and adapted to be axially moved to be operatively connected to said arm when rocked in one direction, and to release such connection when rocked in another direction.

16. In a doctor blade mechanism for a printing machine, a doctor blade, a holder for said doctor blade, a swingable arm for slidably supporting said holder, cooperating means between said holder and said arm to guide said holder in its sliding movement on said arm in an arcuate path, and a rockable member mounted for axial sliding movement when rocked and adapted to be axially moved to be operatively connected to said arm when rocked in one direction, and released from such connection when rocked in another direction.

17. In a doctor blade mechanism for a printing

machine, a swingable doctor blade holder, a rockable member, said rockable member being adapted to axially slide when rocked, to be disposed in the path of a part of said holder to swing the same when in one of its axially disposed positions, and to be removed from the path of the part of said holder to allow it to be freely swung when in another of its axially disposed positions.

18. In a doctor blade mechanism for a printing machine, a cylinder, a doctor blade holder mounted for movement toward and away from said cylinder, a rockable member adapted to axially slide when rocked to be disposed in the path of a part of said holder to move it toward said cylinder when the member is in one of its axially disposed positions, and to be removed from the path of the part of said holder to allow it to be moved away from the cylinder when the member is in another of its axially disposed positions.

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