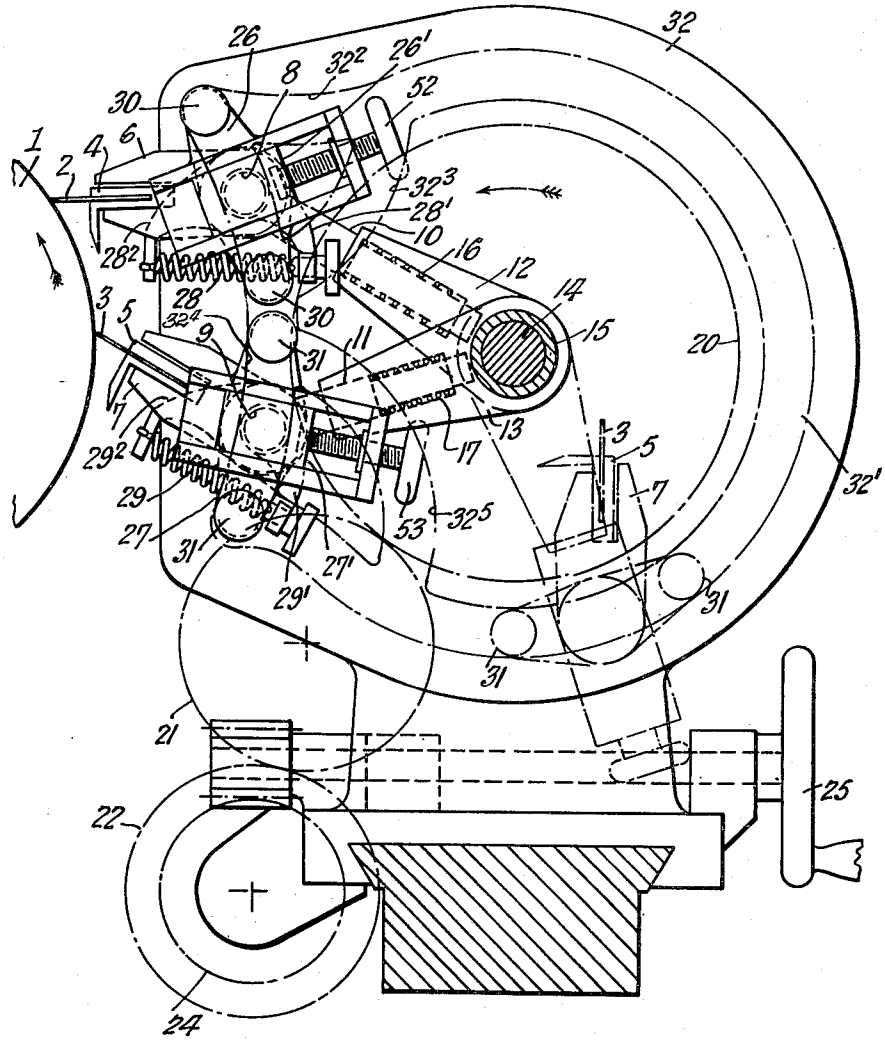
Feb. 16, 1937. F. G. LOUGEE 2,070,667

DOCTOR BLADE MECHANISM FOR INTAGLIO PRINTING MACHINES

Filed Dec. 19, 1934 6 Sheets-Sheet 1

Fig. 1.



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DOCTOR BLADE MECHANISM FOR INTAGLIO PRINTING MACHINES

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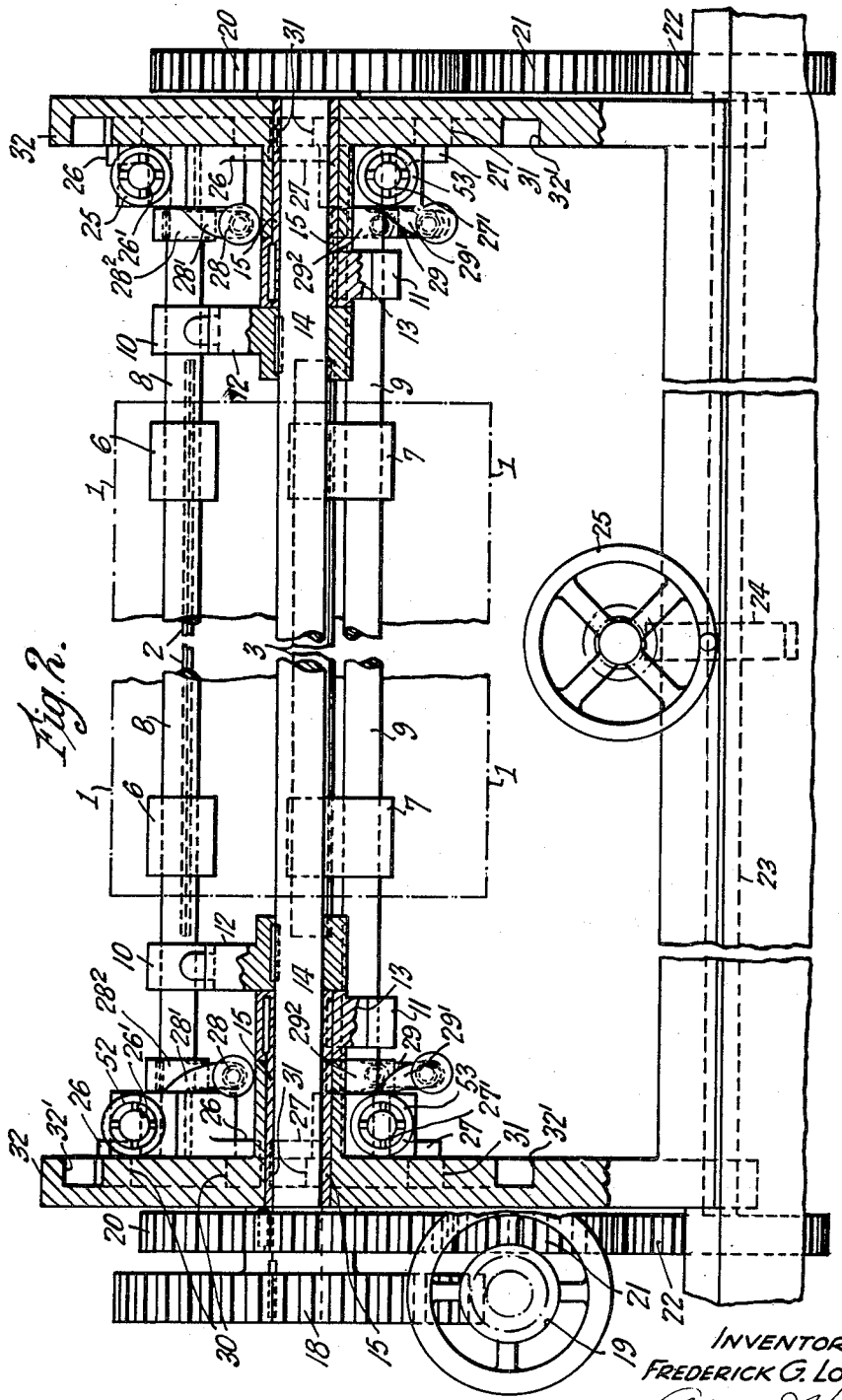


Fig. 2.

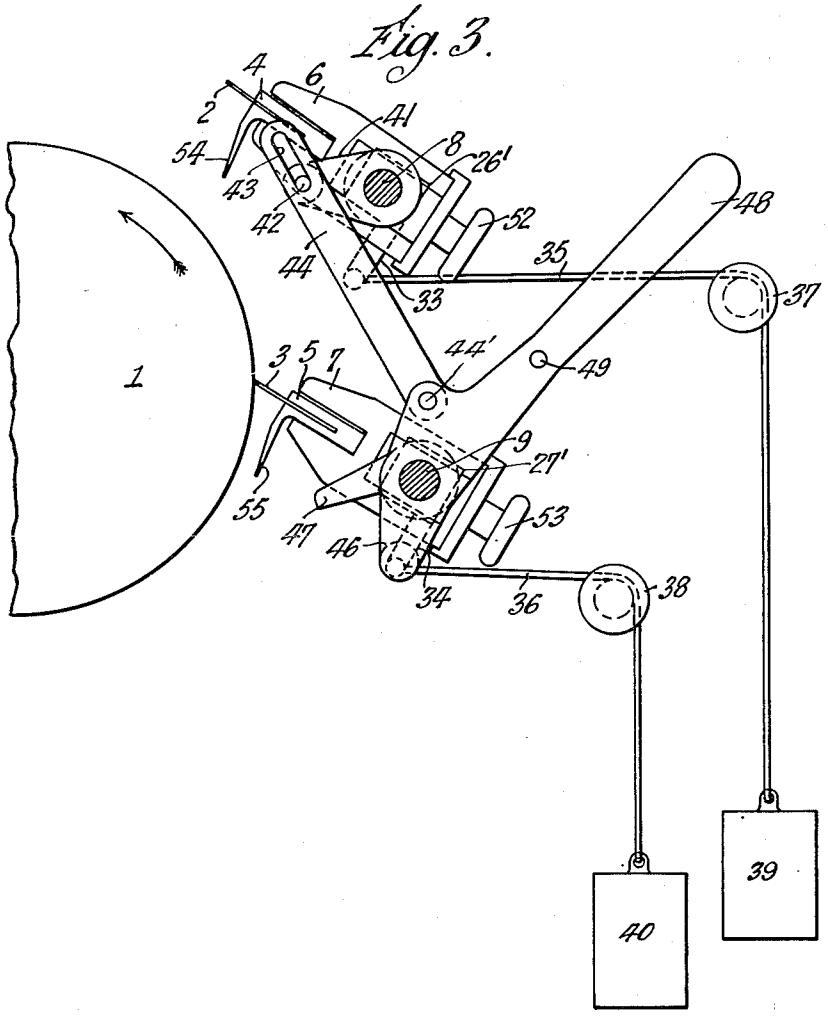
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DOCTOR BLADE MECHANISM FOR INTAGLIO PRINTING MACHINES

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Fig. 3.



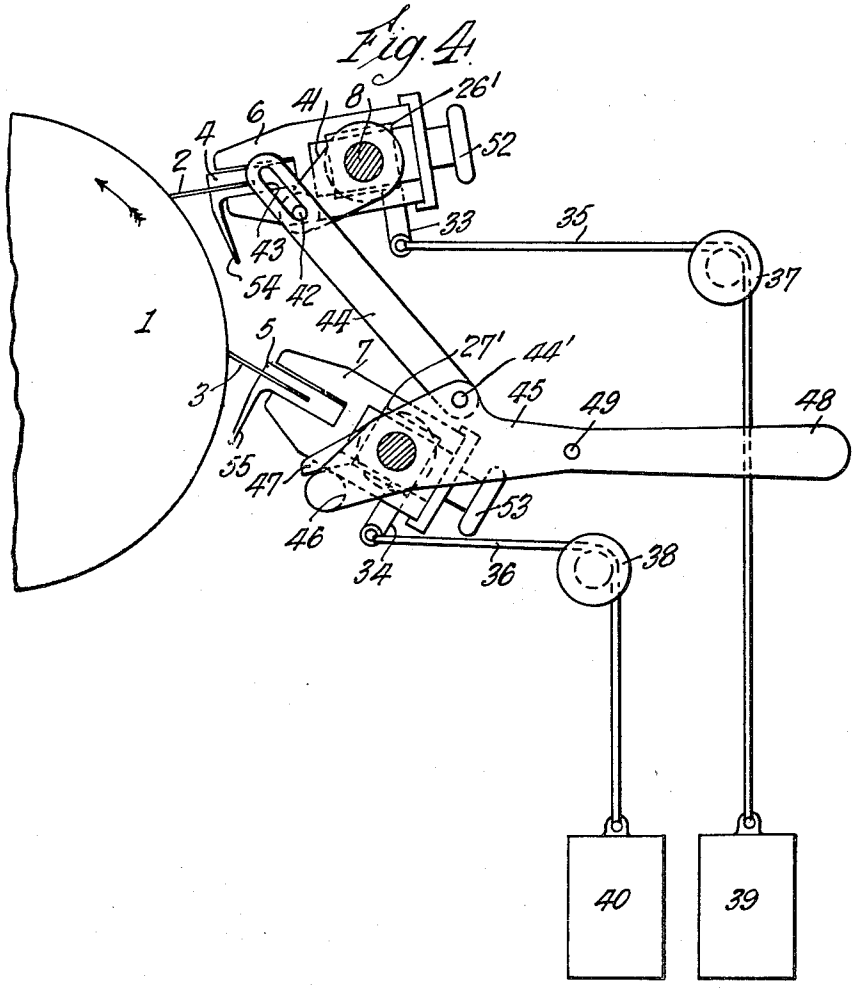
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DOCTOR BLADE MECHANISM FOR INTAGLIO PRINTING MACHINES

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Fig. 4.



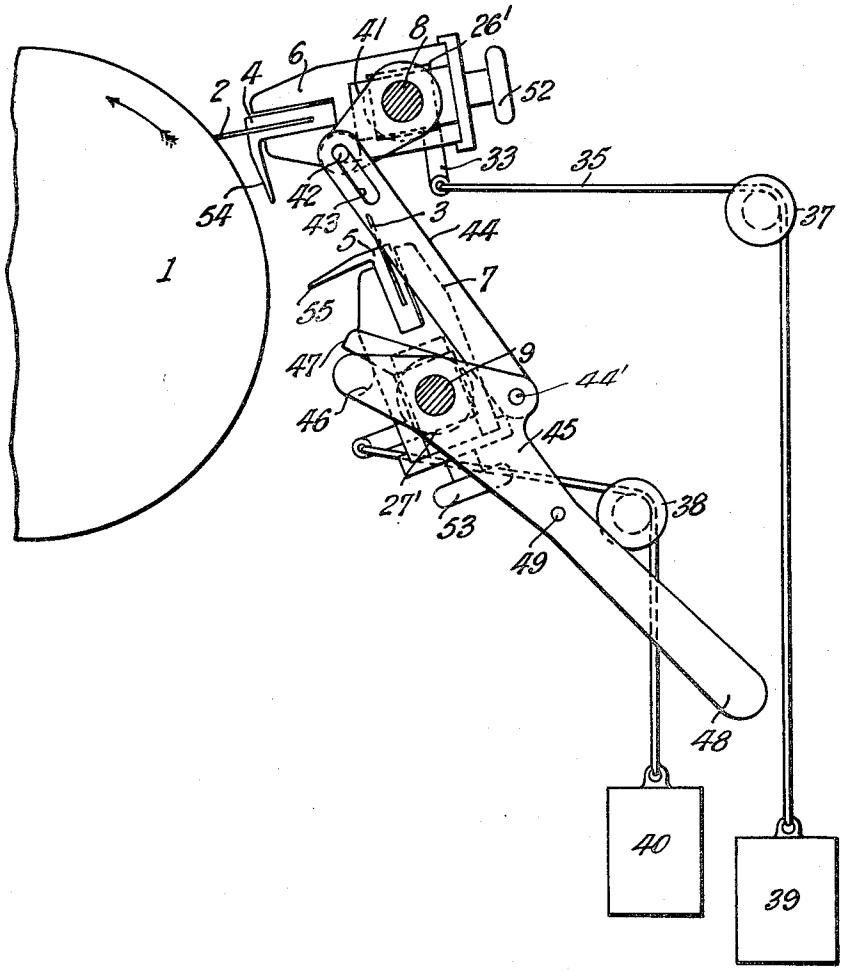
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DOCTOR BLADE MECHANISM FOR INTAGLIO PRINTING MACHINES

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Fig. 5.



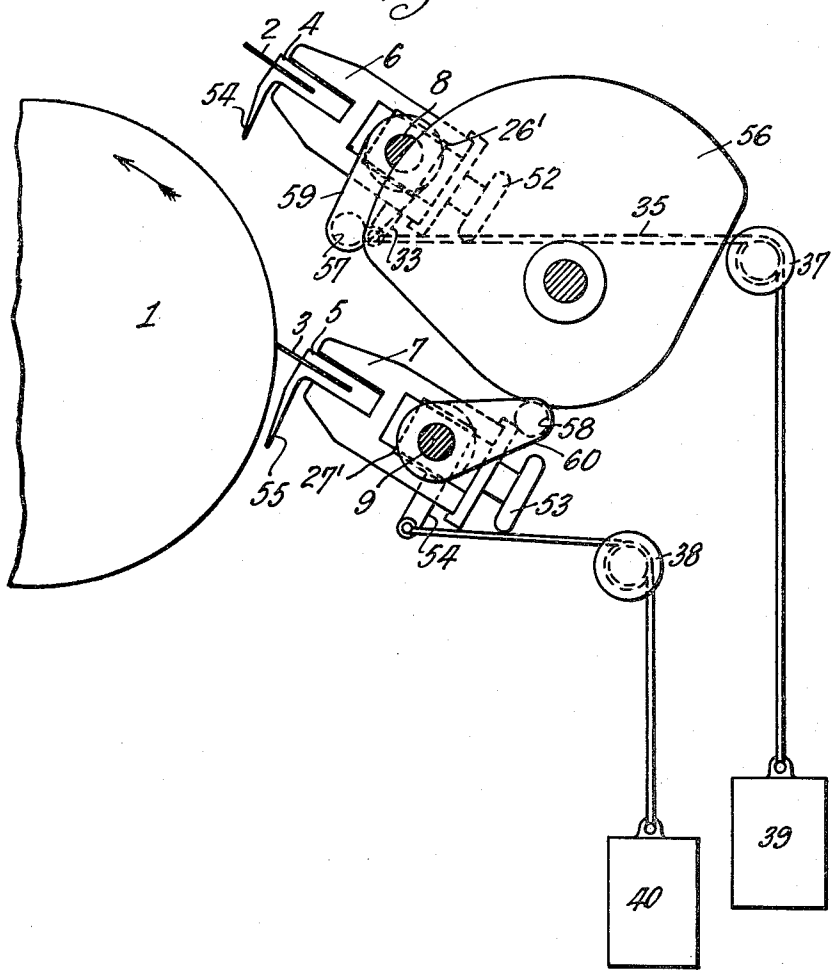
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DOCTOR BLADE MECHANISM FOR INTAGLIO PRINTING MACHINES

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Fig. 6.



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UNITED STATES PATENT OFFICE

2,070,667

DOCTOR BLADE MECHANISM FOR INTAGLIO PRINTING MACHINES

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Application December 19, 1934, Serial No. 758,156
In Great Britain December 20, 1933

17 Claims. (Cl. 101—157)

This invention relates to improvements in doctor blade mechanism for intaglio printing machines, the doctor blade operating to remove ink from the surface of an etched plate carried by a plate cylinder.

In such mechanism as hitherto commonly employed if a doctor blade has become inefficient due for example to damage by grit or other matter, it has been necessary to stop the machine to remove the blade and replace it by another.

The main object of the present invention is to provide an arrangement in which the necessity for stopping the machine to change a doctor blade is avoided.

According to the present invention there are provided two doctor blade carriers and devices for moving each carrier to present a doctor blade to the same predetermined operative zone with respect to a plate on a printing cylinder whereby either carrier can be held in operative position and the other in reserve position.

Preferably the devices are arranged to allow both carriers to be in the operative zone at the same time, whereby a blade carried by one carrier can be maintained in operative position while the reserve blade carried by the other carrier is moved to the operative zone, thus enabling a plate on the printing cylinder to be subjected to the action of a doctor blade even while changing over from one blade to the other. It is preferred so to interconnect the devices that when the carrier for the operative blade is operated to move into and out of use or reserve position the carrier for the reserve blade is automatically moved into operative position. It is also preferred to arrange the devices so that the timing of the reserve blade relatively to the operative blade is such that no part of the plate shall pass without being subjected to the action of a blade and this can be effected by arranging that the carrier for the reserve blade moves into operative position as or just before the carrier for the other blade commences to move to its out of use position. If desired, however, a quick acting mechanism could be employed.

The invention is illustrated in the accompanying drawings in which Figures 1 and 2 illustrate one form of construction, Figure 2 being a sectional view at right angles to Figure 1 and to a smaller scale, Figures 3, 4, and 5 a view of a modification showing the parts in different positions, and Figure 6 a view of a still further modification.

In the arrangement shown in Figures 1 and 2, 1 indicates a plate cylinder and 2, 3 two doctor blades carried respectively by carriers 4, 5 carried by supports 6, 7 on shafts 8, 9. The shafts 8, 9 are mounted to move independently and are respectively carried in arms 10, 11 slidably mounted in arms 12, 13 of which the arms 12 are secured to a shaft 14 and the arms 13 to sleeves 15 mounted to rotate on the shaft 14, the arms 10, 11 being biased by springs 16, 17 to move radially outwards from the arms 12, 13. The shaft 14 is provided with a worm wheel 18 in mesh with a worm on an operating shaft 19 so that when the operating shaft is turned the shaft 14 is also turned and the arms 12 on the shaft moved. Each of the sleeves is provided with a gear wheel 20 in mesh with an intermediate gear wheel 21 in mesh with a gear wheel 22. The gear wheels 22 are at opposite ends of a shaft 23 having an intermediate worm wheel 24 in mesh with a worm fast with an operating handwheel 25. By rotating the handwheel 25 the two sleeves 15 are rotated equally and the arms 13 on the sleeves moved to an equal extent.

The shafts 8, 9 carried by the arms 10, 11 have rotatably mounted thereon blocks 26^1, 27^1 which carry trolley members 26, 27 which are biased by springs 28, 29 interposed between arms 28^1, 29^1 on the blocks and arms 28^2, 29^2 secured to the shafts 8, 9. The trolley members are provided with rollers 30, 31 which enter cam tracks formed in stationary end members 32, the tracks comprising parts 32^1, 32^2, 32^3, 32^4 and 32^5, as indicated in dot and peck lines in Figure 1. It will be seen that by turning the handwheel on the shaft 19 in a constant direction, the corresponding trolleys 26 are caused to sweep through the cam track which in turn causes, through the springs 28, 29, the shaft 8 to rock about its own axis, the shaft also turning about the axis of the shaft 14, so that the blade 2 is caused to travel in a closed looped path and is additionally given a movement about the axis of the shaft 8. By turning the handwheel 25 the trolleys 27 for the blade 3 will be similarly operated. This movement is utilized to cause the doctor blades 2, 3 to be applied to and removed from the plate on the plate cylinder 1. Thus, suppose the lower blade 3 to be in operative position and it is desired to change the blade, and assume that the other blade 2 is in the reserve position shown in dot and peck lines in Figure 1. The handwheel on the shaft 19 corresponding to the reserve blade 2 would first be operated to move the arms 10 carrying the reserve blade in an anti-clockwise direction and the trolleys 26 would sweep idly through the part 32^1 of the cams until the part 32^2 is reached, whereupon the springs 28 acting

on these trolleys 26 will cause one of the rollers on the trolleys to enter the part 32^2 and the other roller to enter the part 32^3: this compels the trolleys to rock in a clockwise direction to bring the reserve doctor blade into contact with the plate on the cylinder 1, the parts now being in the position shown in Figure 1. The handwheel 25 for the lower doctor blade 3 is now operated and the first part of the resulting movement of the arms 11 causes one of the rollers on the corresponding trolleys 27 to move through the part 32^5 of the cam track, thus moving the lower doctor blade in a clockwise direction away from the printing plate. Continued movement of this handwheel now brings the blade 3 to the reserve position shown in dot and peck lines in Figure 1, the trolleys 27 sweeping idly along the part 32^1 of the cam tracks. Finally, the handwheel on the shaft 19 is again operated to move the now operative doctor blade 2 into the normal running position occupied by the lower doctor blade shown in Figure 1, the parts 32^4 of the cam tracks causing the doctor blades to rock slightly in a clockwise direction so as to cause the blade to assume the normal or running inclination shown.

It will be seen that the doctor blades are movable into operative position in a direction from above the operative blade. Thus any difficulty due to an upper operative blade depositing ink on a reserve blade moving into position below the operative blade is obviated.

Referring now to Figures 3–5, the shafts 8, 9 to which the blocks 26^1, 27^1 are in this arrangement directly connected, are stationary and the blocks have arms 33, 34 to which are respectively connected cables 35, 36 which pass around pulleys 37, 38 and have at their lower ends weights 39, 40, the weights tending to rock the shafts 8, 9 and hence the doctor blades 2, 3 in an anticlockwise direction. The shaft 8 is also provided with an arm 41 having at its outer end a pin 42 extending into a slot 43 formed in one end of a link 44 the other end of which is pivotally connected to one end of a lever 45 by a pivot pin 44'. This lever is mounted intermediate its ends to rock upon the shaft 9 and this lever is provided with a pin or roller 46 adapted to engage an arm 47 secured to the shaft 9. The lever 45 is also extended to provide an operating handle 48 having an aperture 49 to receive any convenient locking device (not shown) to hold the handle in either of two extreme positions.

The arrangement is such that assuming that the lower blade is in operative position as is shown in Figure 3, the pin 42 on the arm 41 is held by the weight 39 against the lower end of the slot 43 in the link 44 and as the lever 45 to which the link 44 is connected is locked in position by the handle, it follows that the upper blade is prevented from moving under the influence of the weight 39 into operative position by the reaction of the link. It is also to be observed that the roller 46 is clear of the arm 71. If now it be desired to change over the blades the handle 48 is moved in a clockwise direction, whereby the link 44 is lowered and the pin 42 following this movement of the link 44 by reason of the weight 39 allows the upper shaft 8 to rock to cause the upper blade 2 to be applied to the plate on the cylinder 1. The arrangement of the pin or roller 46 on the lever 45 is such that during the time taken to move the blade 2 into contact with the plate on the cylinder 1, the pin or roller 46 moves idly towards the arm 47 secured to the shaft 9 and thus contact between the lower blade and the plate is unaffected during this period, the parts now being in the position shown in Figure 4. Continued movement of the handle, however, now causes the pin or roller 46 to engage the arm 47 whereby the shaft 9 of the blade 3 is moved against the action of its weight 40 to carrry the blade away from the plate, the parts finally being in the position shown in Figure 5.

In the converse operation, i. e. when it is desired to move the lower blade 3 into operative position it follows that this blade 3 will be applied to the plate on the cylinder 1 before the upper blade 2 commences to move away from the plate; thus it is ensured that no part of the plate at any time is allowed to pass without having been subjected to the action of a blade.

It will be seen that the pin and slot connection 42, 43 between the upper blade and the operating lever 45 and the arm and pin or roller connection 47, 46 between the lower blade and the operating lever 45, enable the blades when moved to their inoperative position to be swung over with respect to the lever 45 to provide for easy access to the blades.

In the modification shown in Figure 6 the lever and link operating mechanism is replaced by a cam 56 engaged by rollers 57, 58 carried by arms 59, 60 secured to the respective shafts 8, 9 the contour of the cam being such that when it is turned the reserve blade is applied to the plate on the cylinder before the running blade is moved by the cam out of contact with the plate.

In order to effect a transverse adjustment of the doctor blades, the trolley members 26, 27 in the arrangement shown in Figures 1 and 2 and the supports 6 and 7 in the arrangements shown in Figures 3–6 are slidably mounted on the blocks 26^1, 27^1 which are secured to the shafts 8, 9 and the trolley members 26, 27 or the supports 6, 7 are provided with operating hand wheels 52, 53, whereby the trolleys and the supports and their respective blocks 26^1, 27^1 and hence the respective shafts 8, 9 can be moved transversely with respect to each other. Preferably also the carriers 4, 5 for the doctor blades are provided with downward extensions 54, 55 terminating preferably in a knife edge so as to screen the mechanism from ink deposited on the blades and to promote the flow of deposited ink from the blades.

It will be understood that in all the constructions illustrated, provision would be made for reciprocating the doctor blades axially of the cylinder 1 as is usually the case, for instance, by slidably supporting the same upon a dovetail formed support as shown in section in Figure 1.

What I claim is:—

1. The combination of a printing cylinder for receiving an etched printing plate, two doctor blades, a carrier for each blade and devices operating to cause the carriers to be moved through a closed looped path extending from a reserve position to an operative zone and back to reserve position, the operative zone extending through a substantial part of the looped path so that both carriers can lie within the operative zone at the same time.

2. The combination of a printing cylinder for receiving an etched printing plate, two doctor blades, a carrier for each blade and devices operating to cause the carriers to have two components of movement, one component being in a closed looped path extending from a reserve position to an operative zone and back to re-

serve position, the operative zone extending through a substantial part of the looped path so that both carriers can lie within the operative zone at the same time and the other component varying the inclination of the blades in the operative zone.

3. An arrangement as claimed in claim 2 and in which each carrier is pivotally carried by an arm which can be completely rotated and in which each carrier is controlled by a cam track which causes the carrier to rock on the arm as the arm is caused to rotate, the movement of the carrier due to the movement of the arm and to the cam track causing the carrier both to move in the closed looped path and also to assume the final desired inclination.

4. The combination of a printing cylinder for receiving an etched printing plate, two doctor blades, a pivoted carrier for each blade, means to swing each carrier from an inoperative position to an operative position in which a doctor blade is presented to the plate, a single operating element for actuating said swinging means and means so interconnecting the swinging means and the element that operation of the element causes one carrier to swing into its operative position before the other carrier is removed from the operative zone.

5. An arrangement as claimed in claim 4 and in which the two carriers are biased to one extreme position and the interconnecting means include lost motion devices so arranged that when the operating element is actuated to swing the carrier for the operative blade to reserve position, the lost motion for this carrier has first to be taken up, the other carrier being swung into operative position while the lost motion is taken up.

6. An arrangement as claimed in claim 4 and in which the two carriers are mounted to oscillate about fixed axes and are biased to one extreme position and in which the operating element is in the form of an arm which is mounted to oscillate about a fixed axis, while the interconnecting means include lost motion devices formed by abutments associated with the arms and with the carriers, the arrangement being such that when the arm is actuated to swing the carrier for the operative blade to reserve position the lost motion for this carrier has first to be taken up, the other carrier being swung into operative position while the lost motion of the other carrier is being taken up.

7. An arrangement as claimed in claim 4 and in which the two carriers are mounted to oscillate about fixed axes and are biased to one extreme position and in which the operating element is in the form of an arm which is mounted to oscillate about an axis coincident with the axis of one carrier and is connected to the other carrier through a link, the arm having a projection forming one abutment arranged to engage a projection on the first carrier, while the link is formed with a slot receiving a projection fast with the other carrier.

8. An arrangement as claimed in claim 7 and in which the carriers are mounted to oscillate about fixed axes and are biased to one extreme position and in which the interconnecting means includes a cam engaged by followers on the carriers and operable by the single operating element.

9. The combination of a cylinder for a printing machine, a plurality of doctor blades, each of said blades being pivotally mounted for movement toward said cylinder when swung about the pivot in one direction and for movement away from said cylinder when swung about its pivot in the opposite direction, and means operably associated with said blades to cause actuation of said blades to swing one blade about its pivot in one direction toward said cylinder and to swing the other blade about its pivot in an opposite direction away from said cylinder.

10. The combination of a cylinder for a printing machine, a plurality of doctor blades, a holder for each blade, means to pivotally support each holder, means to urge each of said holders for swinging movement about its pivot in one direction, and means operably connected to each of said holders to resist the action of said urging means and swing one of said holders about its pivot in a direction opposite the direction it is urged by said urging means and to permit swinging movement of the other of said holders by said urging means.

11. In a printing machine, a cylinder, a plurality of doctor blades for engaging said cylinder, a holder for each blade, a pivotal support for each holder, means to move each of said holders radially with respect to its pivotal support, and means operably associated with said supports to rock one of said supports about its pivot in one direction, to move a blade out of engagement with said cylinder, and to cause the other of said supports to rock about its pivot in the other direction to move another blade into engagement with said cylinder.

12. In a printing machine, a cylinder, a plurality of doctor blades for engaging said cylinder, a holder for each blade, a pivotal support for each holder, means to move each of said holders radially with respect to its pivotal support, and means operably associated with said supports to rock one of said supports about its pivot in one direction to move a blade out of engagement with said cylinder and to cause the other of said supports to rock about its pivot in the other direction to move another blade into engagement with said cylinder, said last mentioned means automatically operating to cause both of said blades to be in engagement with said cylinder during an interval in its operation.

13. In a printing machine, a cylinder, a plurality of doctor blades for engaging said cylinder, a holder for each blade, a pivotal support for each holder, means to move each of said holders radially with respect to its pivotal support, means to urge each of said holders in rocking movement about its pivotal support in a direction to cause the blade held thereby to engage said cylinder, and means operably associated with said holders to resist said urging means and rock one of said holders about its pivotal support in a direction to cause the blade held thereby to move away from said cylinder and to permit rocking movement of the other of said holders about its pivotal support to cause engagement of the blade held thereby with said cylinder.

14. In a printing machine, a cylinder, a plurality of doctor blades for engaging said cylinder, a holder for each blade, a pivotal support for each holder, means to move each of said holders radially with respect to its pivotal support, means to urge each of said holders in rocking movement about its pivotal support in a direction to cause the blade held thereby to engage said cylinder, and means operably associated with said holders to resist said urging means and rock one of said holders about its pivotal support

in a direction to cause the blade held thereby to move away from said cylinder and to permit rocking movement of the other of said holders about its pivotal support to cause engagement of the blade held thereby with said cylinder, said last mentioned means automatically operating to cause both of said blades to be in engagement with said cylinder during an interval in its operation.

15. In combination with a printing cylinder, a plurality of pivotally-supported doctor blades each swingingly movable to and from scraping engagement with the printing cylinder periphery, and means for moving the doctor blades so that a reserve blade is moved into scraping engagement with the printing cylinder periphery before the removal of an operating blade from scraping engagement with the printing cylinder periphery.

16. In combination with a printing cylinder, a plurality of pivotally supported doctor blades each swingingly movable to and from scraping engagement with the printing cylinder periphery, and means having elements common to all the doctor blades for moving the doctor blades so that a reserve blade is moved into scraping engagement with the printing cylinder periphery before the removal of an operating blade from scraping engagement with the printing cylinder periphery.

17. In combination with a printing cylinder, two pivotally-supported doctor blades, each doctor blade being mounted for swinging movement to and from scraping engagement with the printing cylinder periphery, and means having elements common to the doctor blades for moving one of the blades into and away from scraping engagement with the cylinder periphery in interrelated relationship with the other blade.

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