July 7, 1953 H. E. PEYREBRUNE ET AL 2,644,395

RECIPROCATING DOCTOR BLADE MECHANISM

Filed March 22, 1949 3 Sheets-Sheet 1

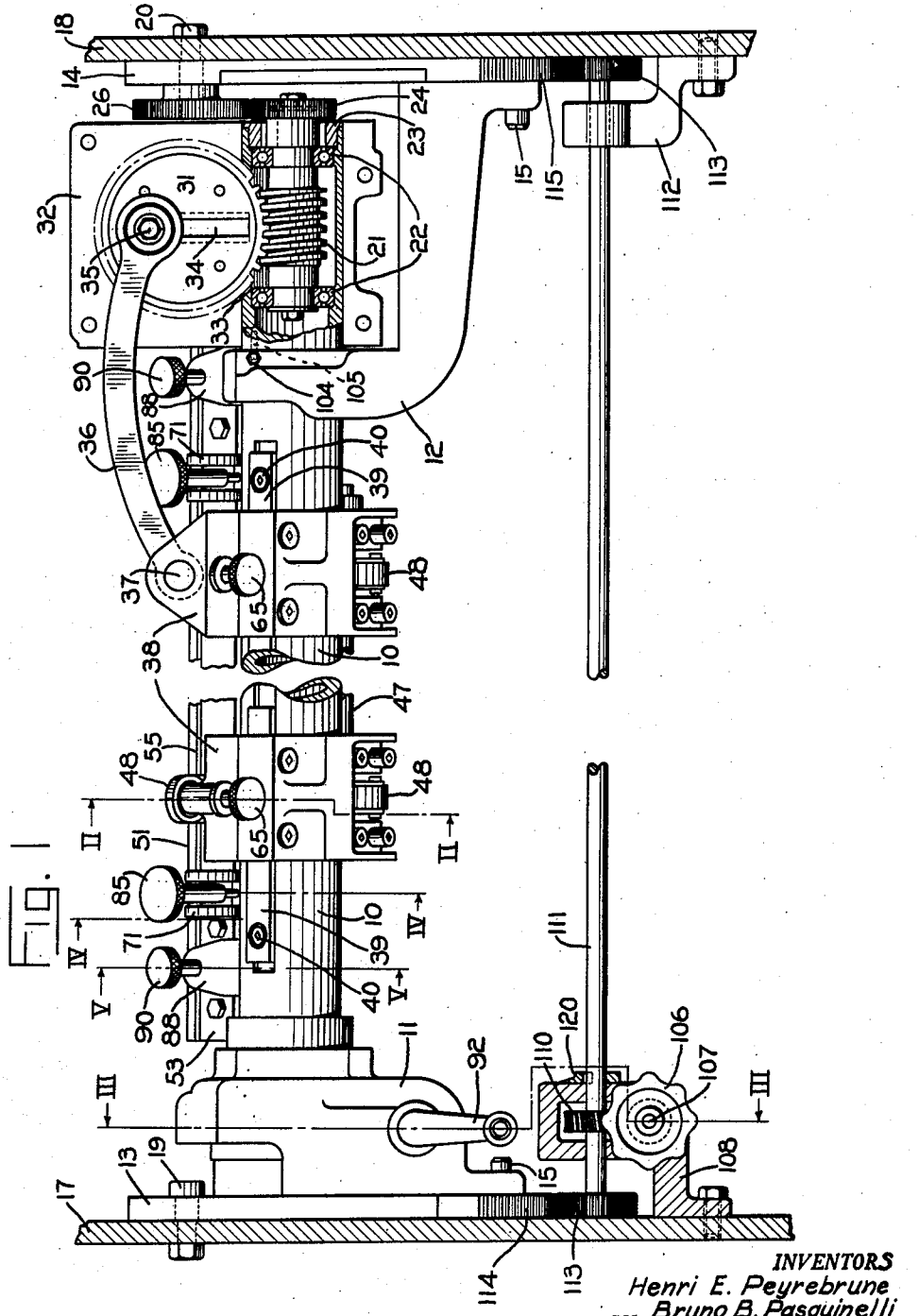


FIG. 1

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RECIPROCATING DOCTOR BLADE MECHANISM

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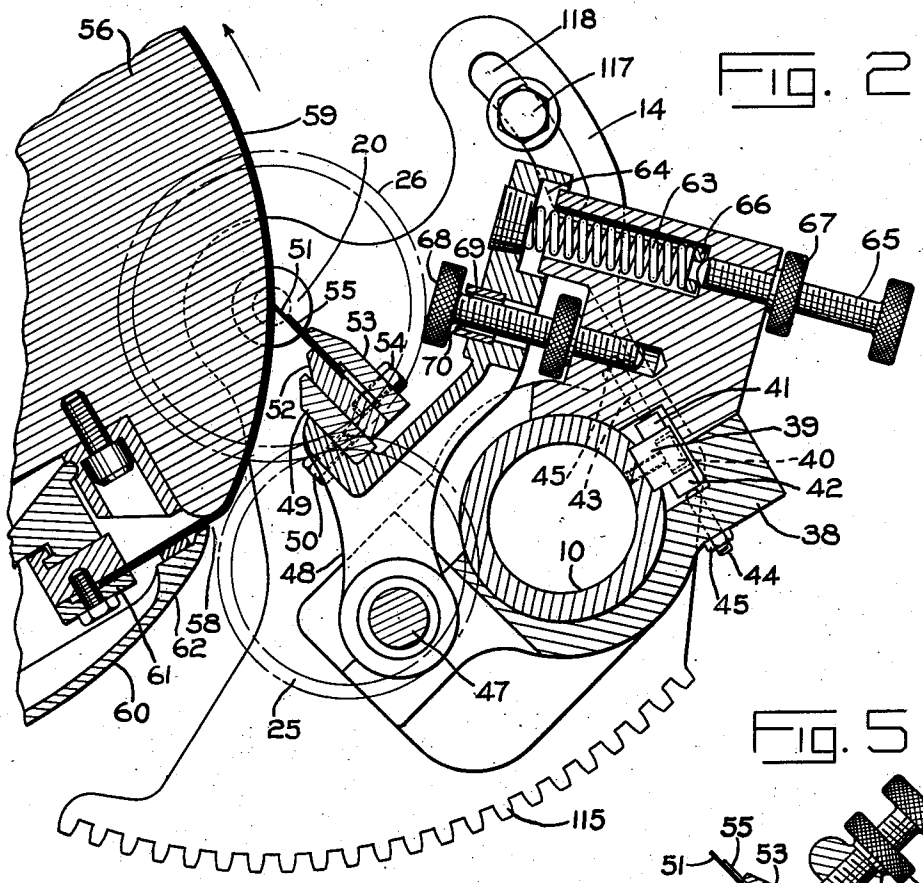


Fig. 2

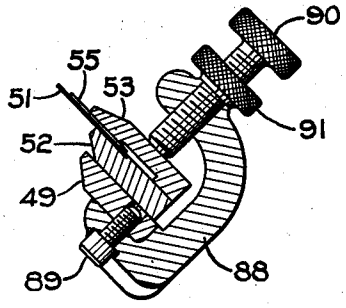


Fig. 5

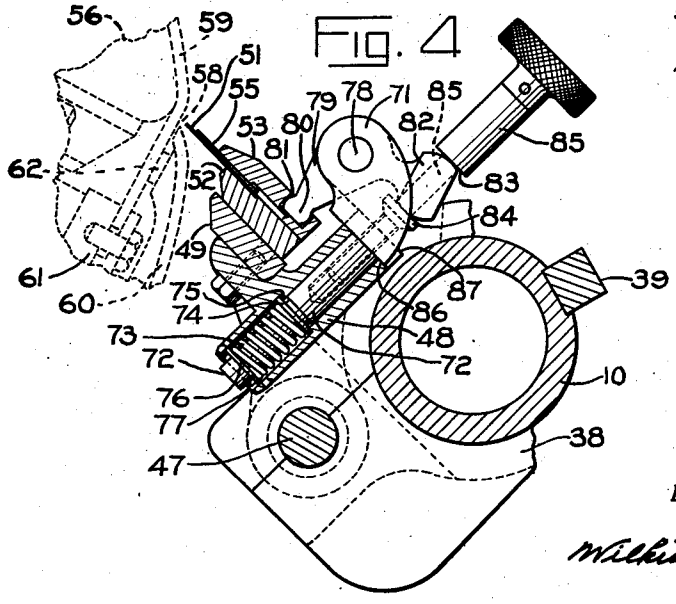


Fig. 4

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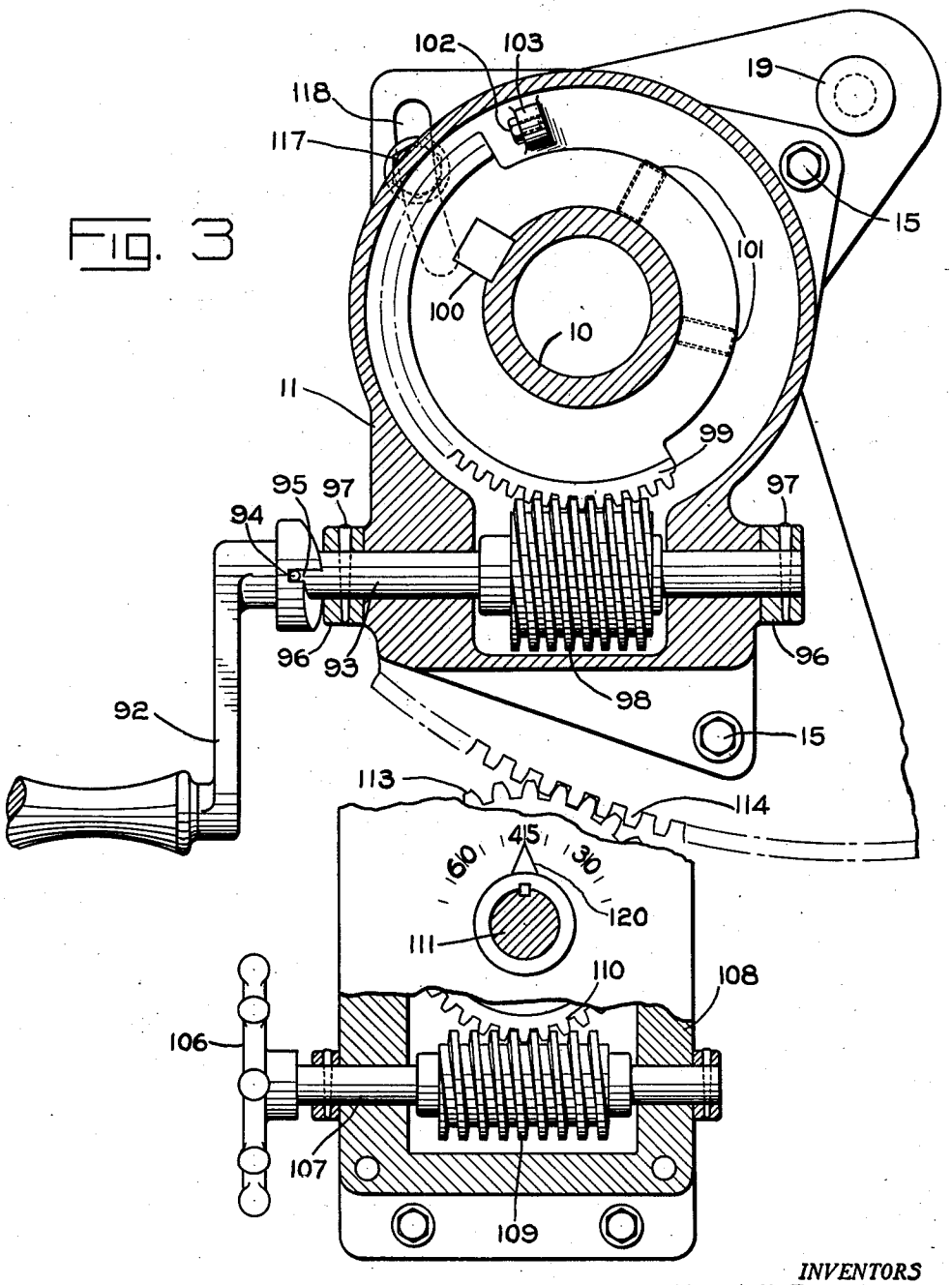
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RECIPROCATING DOCTOR BLADE MECHANISM

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FIG. 3



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UNITED STATES PATENT OFFICE

2,644,395

RECIPROCATING DOCTOR BLADE MECHANISM

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Application March 22, 1949, Serial No. 82,804

5 Claims. (Cl. 101—157)

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This invention pertains to improvements in means whereby excess fluid is removed from surfaces such as gravure plates used in intaglio printing.

More specifically, and as disclosed hereinafter by way of example, the invention relates to a reciprocating doctor blade mechanism which includes many improved and novel features designed to provide for more accurate adjustments and control of the blade in order to accomplish a perfect wiping of the printing plate as well as to permit the use of printing inks of different consistencies.

In the art of gravure printing, the quality as well as the quantity of the work produced depends to a large extent on the adjustability and efficient functioning of the doctor blade and associated mechanism whereby excess ink is removed from the inked-in printing surface.

The improvements which our invention presents are particularly adapted for use in connection with sheet fed printing presses of the class which include a cylinder onto which a flexible printing plate, which carries the subject to be printed, is securely clamped in registered position.

In the operation of intaglio printing presses, it is extremely important that the angular relation of the doctor blade with respect to the surface of the printing plate can be varied within certain given limits and preferably while the press is running. It has been found for example that, depending on the consistency of the inks used, it is essential to correspondingly vary said angular relation in order to attain the best results both as to the quality of printing as well as to the quantity of production.

Means have been suggested heretofore whereby such adjustments can be made, but in the devices known in the art, any changes in the angular relation of the blade also involves a complete readjustment of the blade pressure on the printing plate, as well as a realigning of the blade with relation thereto. Furthermore, such adjustments can be effected only when the press is stopped, which results in a considerable loss in production, besides the fact that they are not positive and must be dependent on a trial and error method in order to ascertain the most efficient setting of the doctor blade.

Printing cylinders which are designed to have applied thereto flexible plates, are provided with a "gap" or recess in their circumference for accommodating the plate securing means, and it has been common practice to apply a cover plate

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over it for the purpose of preventing printing ink from reaching and collecting in such gap.

Along the edges of such plate, where it contacts the printing surface or form on the cylinder, a transverse recess or well presents itself, which fills with ink during the inking-in of the form. In the normal operation of a conventional doctor blade mechanism, either an insufficient amount of ink is scooped from such recesses, or in attempting to remove the necessary volume of ink from the recesses, it is spattered therefrom by the flipping action of the blade with the result that ink reaches the back of the doctor blade and accumulates to such an extent that it will eventually spread over the wiped surface of the form as the blade passes over it. This causes streaks or blotches which will show on the finished prints.

It is desirable therefore to provide means whereby as much ink as possible will be removed from such transverse recesses during every inking-in operation and whereby such spattering of the ink therefrom will be avoided.

With this purpose in view, we have developed an effective means whereby surplus ink will be scooped from the recesses as the doctor blade passes over them and to an extent that said undesirable condition shall be eliminated.

To accomplish this, we have developed mechanism which provides for adjustment to control the extent to which the doctor blade should be permitted to enter into said recesses. The blade must be governed by positive means in order to prevent the blade from entering too far into a recess which otherwise would result in damage to the blade. Associated with this mechanism we have introduced means whereby the tip or edge of the blade is guided into and out of a recess with an easy, non-flipping motion.

The development of our invention also includes the provision of a positive and independent adjustment of the blade angle whereby the required adjustments can be made while the press is in operation.

With these advantages in view, it is one of the primary objects of our invention to provide an improved doctor blade mechanism which comprises a novel means whereby the blade angle can be adjusted independently of the other adjustments, and capable of such adjustments while the press is running, thereby enabling the pressman to observe the wiping efficiency of the blade while such adjustments are being made and to make the necessary changes without stopping the press thereby avoiding any loss in production.

A further object of the invention resides in the provision of mechanism whereby any angular adjustment of the doctor blade is accomplished by pivoting the blade about an axis which is coincident with the active or wiping edge of the blade.

Another object of the invention is the provision of resilient means for adjustably controlling the pressure of the blade on the plate cylinder thereby assuring at all times the desired degree of contact of the doctor blade edge with the printing surface during the wiping of the excess ink from said surface.

A further important object consists in providing adjustable means for positively controlling the movement of the blade as it passes over the transverse recess between the cylinder, i. e. printing plate, and the gap cover plate, to thereby assure removal of the ink from the recess during every inking operation of the printing form.

Coincident with this object, we also conceived means whereby any damage to the doctor blade edge and/or any splashing of the ink is prevented while the ink is being removed from said recess.

Further objects and advantages will become apparent from the description and appended claims when read in conjunction with the accompanying drawings, which illustrate and disclose a preferred embodiment of our invention. Like reference numerals designate the same parts through the several figures of said drawings in which:

Figure 1 is a front elevational view, partly in section, illustrating the general arrangement of the various means whereby the adjustments of the doctor blade can be accomplished;

Figure 2 is a sectional view taken on line II—II of Figure 1, seen from the left and depicting more clearly the novel arrangement devised for resiliently mounting the doctor blade.

Figure 3 is a sectional view taken along line III—III of Figure 1, disclosing the means for positioning the doctor blade for inspection or removal and the mechanism for adjusting the doctor blade;

Figure 4 is a cross section taken along line IV—IV of Figure 1, viewed in the direction of the arrows and showing the means provided for adjusting the blade for parallelism with respect to the plate cylinder as well as to compensate for wear of the blade, also indicating in broken lines, sections of the plate cylinder, printing plate and gap cover in order to show the position of the doctor blade as it passes over said recess, and

Figure 5 represents a sectional view taken along line V—V of Figure 1, illustrating the device used for clamping the doctor blade securely in its adjusted position.

Referring now to these drawings, and more specifically to Figure 1, it will be seen that the improved and novel device comprises a main supporting shaft 10, arranged parallel to the printing cylinder and capable of oscillation or rotary movement in the housings 11 and 12 for manual adjustment of the mechanism mounted thereon, toward and away from the cylinder, into and out of operative position. The housings 11 and 12 are in turn fixed to their respective end plates 13 and 14 by conventional means such as the bolts 15. These end plates are pivotally mounted to the side frames 17 and 18 of the press by means of the pivot pins 19 and 20. The axis of the pivot pins are aligned with the

operating edge of the doctor blade, permitting manual oscillation of the complete assembly about a center in line with the wiping edge of the doctor blade to thereby vary the doctor blade angle with respect to the plate cylinder without necessitating readjustment of the blade pressure or its setting with respect to its position toward or away from the cylinder.

Reciprocating motion is imparted to the doctor blade assembly through the worm 21, inserted in the drive end of the shaft 10 and rotatably journalled therein by means of the bearings 22. This complete assembly is secured in its position within the shaft 10 by the locking sleeve 23, which is threaded into the end of said shaft to bear against the outer bearing 22. A worm drive gear 24 is secured to the projecting end of the worm shaft and meshes with a train of gears comprising the idler gears 25 and 26, indicated by broken lines in Figure 2. Idler gear 26 is mounted for rotation on the pivot pin 29 permitting continuous transmission of power through the gear train to the worm, regardless of any rotation of the shaft 10 or oscillation of the end plates 13 and 14.

Rotation of the worm 21 transmits a relative movement to the worm wheel 31, which is rotatably mounted on the housing 32 and has meshing relation with said worm through a slot 33 provided therefor in the shaft 10. For the purpose of providing adjustment whereby the extent of reciprocation of the doctor blade can be varied, a T-shaped groove 34 is formed in wheel 31 in which the stud 35 is slidably fitted for radial adjustment therein. Obviously, the adjustment of the stud 35 in the groove 34 to thereby vary the radius in which it travels, will directly affect the extent of reciprocation of the arcuate lever or connecting rod 36 pivotally attached thereto. The free end of this lever is pivotally connected by means of the pin 37 to the end of one of a plurality of brackets or arms 38. These arms are spaced apart lengthwise and are slidably mounted for reciprocating movement on the shaft 10 providing support for the doctor blade assembly.

As can be seen more clearly in Figure 2, the series of arms 38 are aligned on the shaft 10 and prevented from any radial movement thereon by means of the key 39 rigidly fixed to the shaft 10 by cap screws 40. The shoes 41 and 42, mounted within the arms 38, are slidably associated with the key 39, and can be adjusted relatively thereto by the screws 43 and 44 for the purpose of aligning the series of arms on the shaft and to eliminate entirely any radial movement of the arms about said shaft. When adjusting the screws 43 and 44, the shoes must be set close enough to the key 39 to remove all play, but not tight enough to prevent free sliding movement of the arms 38 axially on the shaft 10. This adjustment need only be made during the initial installation and at such intervals when it becomes necessary to compensate for any wear that might develop in the shoes. When properly adjusted, the screws 43 and 44 are locked in position by means of the nuts 45.

A second shaft 47 is rigidly mounted in the brackets 38 and extends parallel to the shaft 10 to provide a support for a plurality of levers 48 which are rotatably mounted thereon and operatively associated with their respective brackets 38. The shaft 47 also functions to maintain the brackets 38 in their spaced position relative to each other on the shaft 10. By mounting the levers 48 pivotally on the shaft 47, a rockable

support is provided for the doctor blade supporting bar 49, which is secured to each lever 48 by bolts 50 and on which is positioned the doctor blade 51 clamped securely between the lower plate 52 and upper plate 53 by means of a series of bolts 54. A back up blade 55 is adjustably positioned above the doctor blade 51 and between the plates 52 and 53 for the purpose of varying the tension of the blade 51 on the plate cylinder 56.

As previously stated, one of the important objects of this invention is to provide means which will assure precision control of the doctor blade 51 as it passes over and into the transverse recesses or wells 58, which are formed in the periphery of the plate cylinder along the lines of junction where the flexible plate 59 and a gap cover 60 meet, see Figure 2. For this reason, the edges along said lines of junction are curved to present a camlike contour which leads the tip of the doctor blade into and out of the recesses 58 with a smooth, non-flipping motion, see Figure 4. As shown in Figure 2, the plate 59 is secured to the cylinder by conventional plate clamps 61 which are accommodated within a transverse gap formed in the cylinder 56.

As indicated herein, it is essential to provide some means whereby ink is prevented from reaching or collecting in this gap. To accomplish this, we mount the gap cover 60 over the gap in a manner that its longitudinal edges fit against the end portions of the flexible plate 59. Preferably, a strip 62 of felt or other similar material is applied to provide an effective seal whereby any ink which might seep between the plate and the edges of the gap cover will be prevented from reaching the gap and the plate clamping mechanism.

While the major portion of the gap cover presents a surface having the same radius as the plate cylinder, the edges thereof are curved more sharply inwardly to avoid presenting a sharp edge in the path of the doctor blade which would damage the wiping edge.

Consequently, transverse recesses 58 are formed in the surface of the cylinder and extend along the leading and trailing edges of the gap cover. Obviously, ink will collect in these recesses during each inking of the plate 59 and must be removed in order to prevent it from being thrown free because of the centrifugal force which develops by rotation of the cylinder at high printing speeds.

The mechanism whereby an effective and dependable control of the doctor blade 51 can be accomplished, is illustrated in Figures 1, 2 and 4. It is associated with the arm 38 and lever 48 which latter carries the doctor blade clamping means 49 to 54. Said lever and therewith the blade 51 are resiliently urged toward the plate cylinder 56 by means of a compression spring 63 which is housed within a bore provided in the upper portion of the arm 38. The free end of said spring bears against the bottom of a socket 64 formed in the upper end of the lever 48, thereby urging said lever in an anti-clockwise direction for the purpose of maintaining the doctor blade 51 in contact with the printing plate 59 under constant resilient pressure. This pressure can be readily adjusted by means of the screw 65 adjustably threaded in the arm 38 with its inner end in contact with the washer 66. By adjusting the screw 65, the tension of spring 63 can be increased or decreased until the desired blade

pressure is reached after which the screw is locked in position by means of the nut 67.

Operatively associated with the lever 48 to thereby control the movement of the blade 51 over and within the recess 58 is the adjustable stop screw 68, which is threaded into the arm 38 and inserted through a bore provided in the lever 48 and its associated bushing 69. It is apparent that movement of the blade 51 into the recess 58 is governed by the space between the outer face 70 of the bushing 69 and the head of the stop screw 68. As the blade reaches the recess 58, pressure of the spring 63 urges the lever 48 and thereby the blade 51 in an anti-clockwise direction until said bushing 69 contacts the stop screw 68. Therefore, movement of the blade into the recess is positively controlled and can be adjusted to vary the extent to which the blade is to enter said recess, depending for example on the viscosity of the inks used.

Figure 4 illustrates one position of the blade as it passes over and into said recess. Thereafter, the blade will contact the gap cover 60 and ride over its surface whereby the arm 48 and associated parts will again assume the position indicated in Figure 2. By providing such control, the blade can be readily adjusted to determine the volume of ink to be removed from the recess without damage to the blade, or splashing of the ink.

The doctor blade assembly, including the blades 51, 55 and plates 52, 53, can also be adjusted to position the blade parallel to the axis of the plate cylinder in order to assure a uniform contact of the doctor blade edge with the printing surface of the plate and to compensate for variations in the width of a blade which may be caused by grinding and reconditioning the wiping edge of the blade.

The movement of the blade 51 toward and away from the cylinder 56 is accomplished by a plurality of adjustable means as illustrated more specifically in Figure 4, see also Figure 1, one such means being located adjacent to and rockable with each one of the levers 48. The preferred embodiment comprises a yoke 71, which is formed with a downwardly extending stem 72, and is slidably fitted within a bore provided in a laterally projecting portion of the lever 48. A compression spring 73, embraces the reduced lower end of said stem and has for its purpose to urge the stem downwardly. This spring is confined between a washer 74, which bears against the shoulder 75 formed in said bore, and the washer 76 which is retained in its position on the stem by means of a pin 77.

Rigidly secured to and extending within the bifurcation of the yoke 71 is a pin 78 to which is pivoted a bell-crank lever 79, the spherical end 80 of which projects into a slot 81 provided in the upper plate 53 of the doctor blade assembly. The other arm of the lever 79 is formed with a bifurcated knob 82 which embraces the adjusting screw 85. Said knob presents two spherical surfaces and is closely fitted between flanges 83 and 84 provided on the adjusting screw 85. The latter is threaded into the upper end of the stem 72.

It will be seen therefore that by turning the operating knob of the adjusting screw in the clockwise direction the bellcrank lever 79 will be rocked in the same direction about the pin 78 and thereby move the doctor blade 51 toward the cylinder 56. Likewise, when said knob is

turned in the counterclockwise direction, the blade will be drawn away from the cylinder.

As indicated in Figure 1, a number of like controlling devices are arranged at intevals along the entire width of the doctor blade, so that a very accurate adjustment of it with respect to the printing plate is made possible.

If for the purpose of reconditioning or replacing the blade 51, it is required to remove a doctor blade assembly, the screw 85 is pulled upwardly against the pressure of spring 73 until the spherical end 80 of the bell crank lever 79 is withdrawn from the slot 81 and the edge 86 of the yoke 71 is raised to a position clear of the seat 87 provided on the lever 48. The operator then turns the yoke to a small degree about the axis of stem 72 until the edge 86 rests on the seat 97 and the assembly is free to be removed. Upon replacing the assembly, the yoke 71 is turned back until the edge 86 is clear of the seat 87, thereby allowing the spring 73 to urge the yoke downwardly into its operative position as shown in Figure 4.

At the start of a printing run, and before the press is accelerated to a high speed, it is desirable to determine how uniformly the ink is being transferred to the printing plate and to ascertain whether or not a sufficient amount is being deposited thereon. To make this observation, the doctor blade must be temporarily withdrawn from its operative position. This can easily be done by grasping one or several of the adjusting screws 85 and pulling in a direction perpendicular to the longitudinal axis of said screws and away from the plate cylinder. This action moves the levers 48 and thereby the doctor blade assembly in a clockwise direction against the pressure of the springs 63, see Figure 2, and away from the plate cylinder a limited distance until lever 48 contacts the arms 38. With the assembly in this position, the pressman can readily observe the uniformity of the film of ink on the plate cylinder. If desired, a separate handle or lever could of course be installed for the purpose of moving the assembly to make this observation.

After a blade has been adjusted and set in its operative position with respect to the plate cylinder, it is secured against any unintended movement by means of a series of U-shaped clamps as shown in Figure 5. The U-shaped support 88 is preferably secured to the doctor blade supporting bar 49 by bolts 89, with the clamping screw 90 in position to be tightened on the blade assembly. After the screw 90 is tightened to thereby rigidly secure the blade assembly in its adjusted position it is locked by means of the nut 91.

A further adjustment whereby the blade assembly is moved to a position where it is more readily accessible for inspection or replacement, is accomplished by the mechanism illustrated in Figure 3, wherein the hand crank 92 is shown mounted on the shaft 93 with the pin 94 engaged in the slot 95. The shaft 93 is rotatably journalled in the housing 11 and prevented from axial movement therein by means of the collars 96 fixed to said shaft with pins 97. A worm 98 is secured to shaft 93 and meshes with segment 99 which is rigidly mounted on the shaft 10 by means of the key 100 and the set screws 101. Consequently, any rotation of the worm 98 by means of the crank 92 will impart a corresponding rotary motion to the shaft 10, thereby moving the doctor blade assembly about the axis of said shaft, into and out of its operative position.

Stops are provided to insure an accurate resetting of the assembly into a predetermined position after inspection or replacement of the blade and to eliminate any play in the assembly due to manufacturing tolerances, etc. In Figure 3, such a stop is illustrated as comprising the stud 102 adjustably threaded into the boss 103 formed integral with the housing 11. The stop for the opposite end of the shaft is shown in Figure 1 wherein the stud 104 is adjustably threaded into the housing 12 thereby providing an abutment for the pin 105. This pin is indicated by dotted lines since it is actually installed in a cover plate ordinarily mounted on the housing 32, which plate however, is not shown for the purpose of more clearly illustrating the reciprocating drive mechanism. As was previously explained, the housing 32 is rigidly mounted on shaft 10 and, of course, rocks therewith.

The purpose of having stops located at each end of the mechanism is to provide means whereby the assembly can be set rigidly in its operative position thereby eliminating any possible vibration in the mechanism when the press is in operation. The positioning of said stops is such that the pin 105 contacts stud 104 immediately before the segment 99 contacts stop 102. In this manner a minimum stress is set up in the supporting shaft 10 thereby maintaining a definite, predetermined positioning of all those operative parts of the assembly which are mounted on said shaft. After the initial setting of the stops 102 and 104 is made, no further adjustments thereof should be necessary.

Another desirable feature which has been incorporated in this structure is the provision of means whereby the angle of the doctor blade can be varied with respect to the plate cylinder at any time regardless of whether the press is stopped or in operation and without requiring readjustment of any of the above described devices. This is accomplished with mechanism illustrated by way of example in Figures 1 and 3. It includes the handwheel 106, fixed to shaft 107 which is journalled for rotation in the housing 108. Said housing is in turn secured to the press side frame 17, see Figure 1. The worm 109 fixed on shaft 107 and arranged within said housing, meshes with the worm wheel 110 which in turn is secured to the shaft 111 mounted for rotation at each side of the press in the housing 108 and bracket 112 respectively and extends parallel with the shaft 10. Secured to each end of the shaft 111 are the spur gears 113 which mesh with segments 114 and 115 which are integral with the end plates 13 and 14 respectively.

Therefore, any movement of the handwheel 106 will be transmitted to said plates 13 and 14 causing them to rock on the pivot pins 19 and 20 and about a center in axial alignment with i. e., coincident to the operating edge of the doctor blade. This permits the blade angle to be varied while the press is in operation, enabling the pressman to observe the results and arrive at the most efficient setting in a minimum of time. When the desired position is reached, the end plates 13 and 14 and thereby the complete assembly are locked against any unintended movement by tightening the bolts 117, see Figures 2 and 3, which are slidably inserted through arcuate slots 118 provided in said plates and are threaded into the press side frames.

As illustrated in Figure 3, an indicator 120,

rigidly secured to the shaft 111, registers on indicia, provided on the housing 108, the degrees of the angle which the doctor blade assumes with relation to the printing surface on the cylinder 56 at all times. This greatly facilitates the setting of the blade to a predetermined angle either when the press is stopped or when it is running.

While we have herein disclosed by way of example, a preferred embodiment of our invention, it will be understood that modifications in design and manner of operation may be made without departing from the principle of the invention and the scope of the claims appended hereto.

We claim:

1. In a reciprocating doctor blade mechanism of the class wherein the blade is adjustable angularly about an axis coincident with the operative edge of the blade, the combination comprising a supporting shaft, a series of brackets slidably mounted on said shaft and providing support for said blade, a key fixed in said shaft, and means in said brackets associated with said key for adjusting each individual bracket circumferentially on said shaft to bring them into alignment, said means also serving to eliminate play in said mechanism while permitting free axial sliding movement of said brackets.

2. In an intaglio printing press of the class having a reciprocating doctor blade for removing excess ink from a printing form, mechanism for actuating the doctor blade, including a supporting shaft, a plurality of bracket members mounted on said shaft for reciprocating movement axially thereon, a secondary shaft carried by said brackets, a series of arms pivotally mounted on said secondary shaft for supporting the doctor blade, mechanism having operation to rock said supporting shaft and therewith the doctor blade bodily about an axis coincident with the wiping edge of the blade to thereby vary the angle of said blade with respect to the printing form, resilient spring means interposed between the brackets and said arms for urging said arms and thereby the doctor blade into contact with the printing form, adjustable screw means carried by said brackets for engagement with said spring means and operable to vary the tension of the spring means on said arms, and adjustable stop means comprising a screw member having its threaded end inserted through an opening in said arm and engaged in said brackets for limiting the extent of movement imparted to said arms by said spring means.

3. In an intaglio printing press of the class having a reciprocating doctor blade for removing excess ink from a printing form, mechanism for actuating the doctor blade, including a supporting shaft and housings for journalling said shaft, a plurality of brackets mounted on said supporting shaft for reciprocating movement axially thereon, adjustable means associated with said brackets and with said shaft for aligning said brackets on said shaft, a secondary shaft carried by said brackets, a plurality of arms pivotally mounted on said secondary shaft for supporting the doctor blade, resilient means interposed between the brackets and the free ends of said arms for urging the arms and thereby the doctor blade toward the printing form, adjustable stop means carried by said brackets for limiting the movement of said arms toward the printing form, mechanism associated with said housings and operable to rock said housings and therewith the doctor blade assembly bodily about an axis coincident with the wiping edge of the doctor blade to thereby vary the angular relation of the blade with respect to the printing form, and means including a worm and a worm segment operative to rotate said supporting shaft in said housing whereby to rock said brackets and therewith the secondary shaft, said arms and the doctor blade bodily about the axis of the supporting shaft to an inoperative position in which the blade is spaced from the printing form.

4. In an intaglio printing press, the combination of a form cylinder having a recessed longitudinal gap in its periphery, a cover plate arranged to bridge said gap, the junction of the cover plate with the edges of said gap forming longitudinal depressions in the periphery of said cylinder, a reciprocating doctor blade having an operative position in contact with the printing surface on said form cylinder for removing excess ink therefrom, said doctor blade being adjustable about an axis coincident with its wiping edge to thereby vary its angular relation with respect to said surface, supporting means for the doctor blade including a main shaft, a plurality of brackets fixed to said shaft for reciprocating movement axially thereon, a secondary shaft carried by said brackets, a plurality of arms pivotally mounted on the secondary shaft for supporting the doctor blade for rocking movement independently of said main shaft, resilient means interposed between the brackets and said arms for urging said arms and thereby the doctor blade into its operative position in contact with the printing form, and adjustable screw means threaded in said brackets and having coaction with said arms to limit the free movement of said blade toward the form cylinder as said depressions pass under said blade.

5. In an intaglio printing press, the combination comprising a cylinder having a recessed longitudinal gap in its periphery, a printing form carried by said cylinder, a cover plate arranged to bridge said gap, the contiguous edges of said cover plate and said gap forming longitudinal depressions in the periphery of said cylinder, a reciprocating doctor blade for removing excess ink from the surface of said printing form, mechanism for actuating the doctor blade including a supporting shaft and housings for rotatably journalling said shaft, said housings being mounted for movement about a pivot axis coincident with the wiping edge of the doctor blade, a series of doctor blade supporting arms pivotally mounted on said shaft for independent movement toward and away from the printing form about an axis eccentric with respect to the axis of said shaft, adjustable stop means supported on said shaft for coaction with said arms whereby to positively limit the movement of said arms and thereby the doctor blade toward said cylinder as said depressions pass beneath said blade, means for rocking said housings and therewith the supporting shaft and said arms about the pivot axis of said housings to thereby vary the angular relation of said blade with respect to the printing form, additional means having operation to rotate the supporting shaft in said housings to thereby move said blade about the axis of said shaft into operative and inoperative positions with relation to the printing form, and means including an adjustable stop member on each one of said housings adapted to coact with an associated abutment at each end of said shaft whereby to assure stopping of said blade at a predetermined setting when it is returned to its operative position from its inoperative position, the

positioning of said stops being such that one stop is engaged by its associated abutment before the other whereby final movement of said shaft will set up a stress therein to eliminate all play in the mechanism.

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