

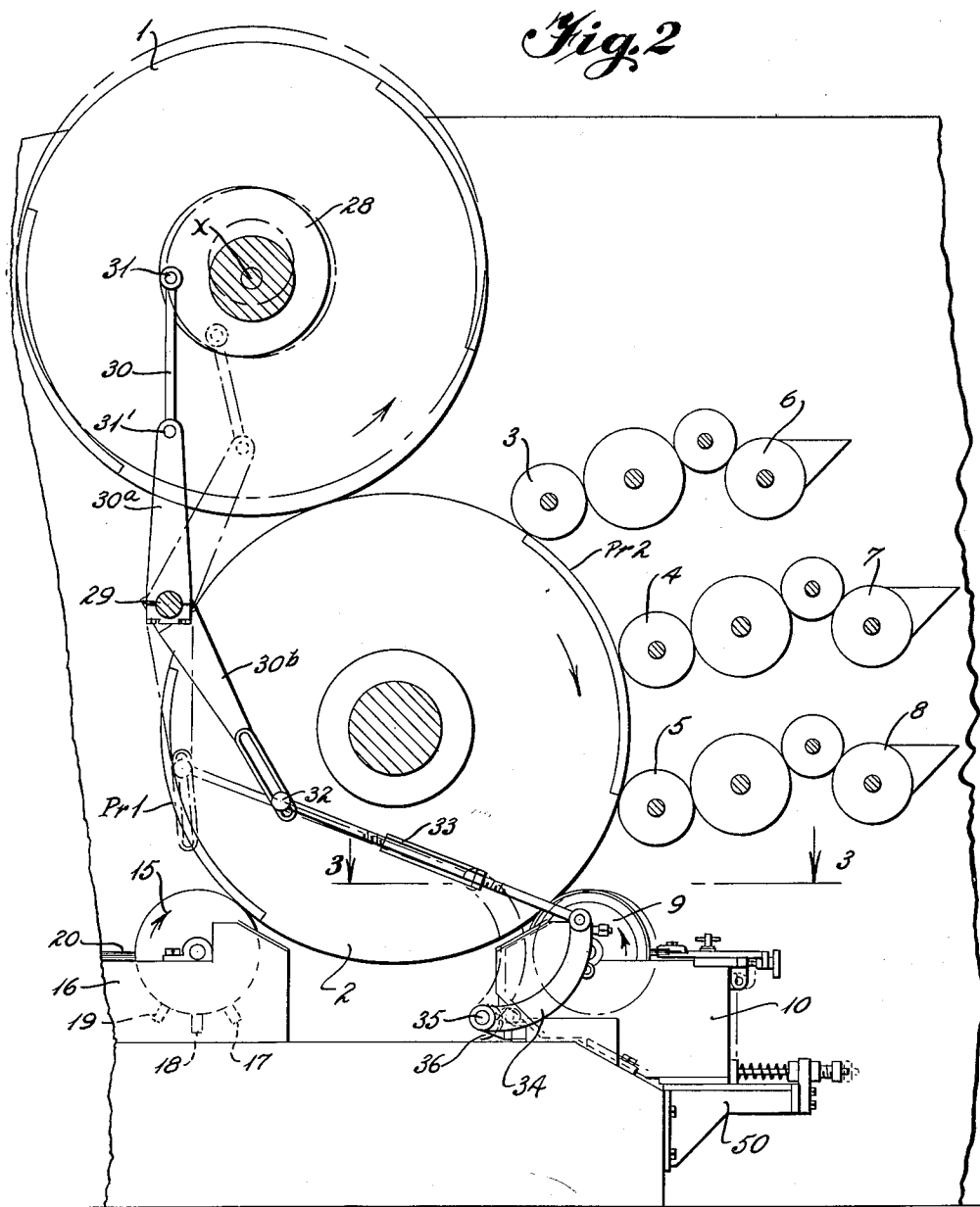
June 13, 1961

G. GIORI

2,987,993

INK REGULATING DEVICE FOR INTAGLIO AND SIMILAR PRINTING MACHINES
Filed Aug. 24, 1956

4 Sheets-Sheet 2



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4 Sheets-Sheet 3

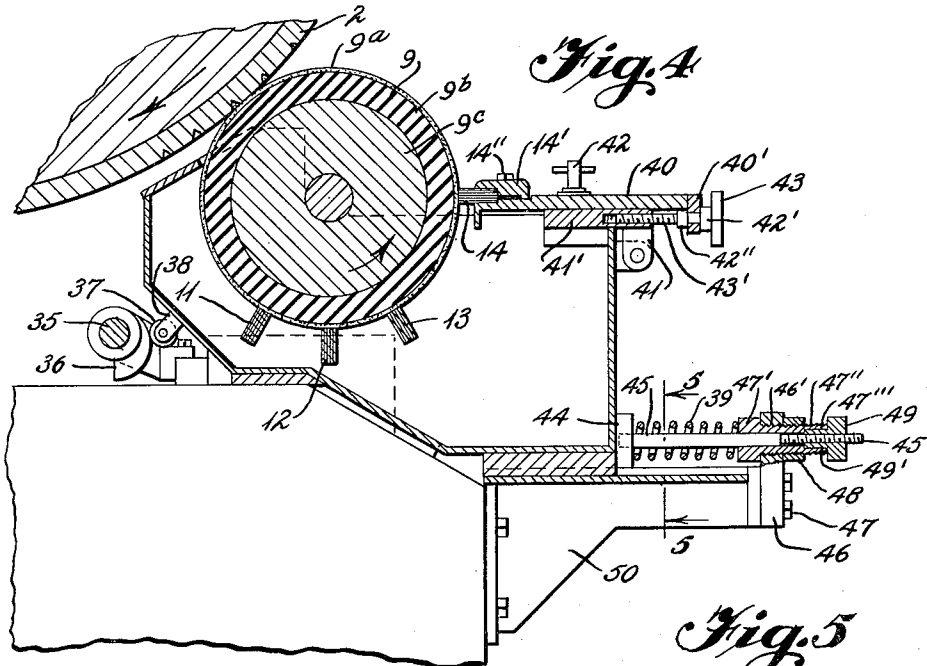


Fig. 5

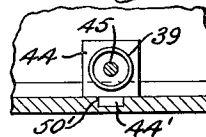
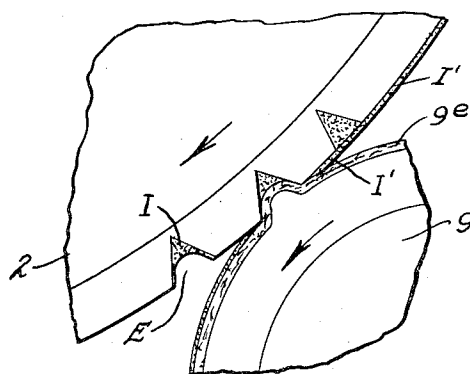
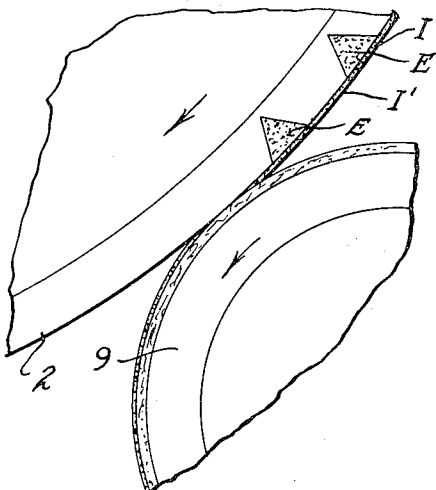


Fig. 7

Fig. 6



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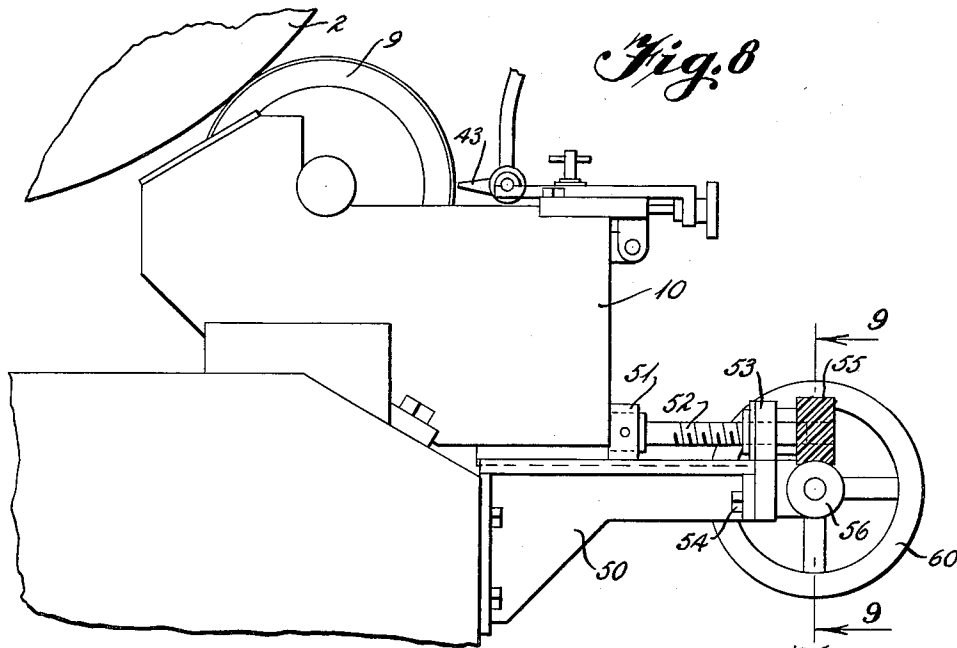


Fig. 8

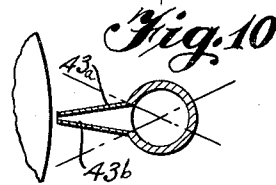
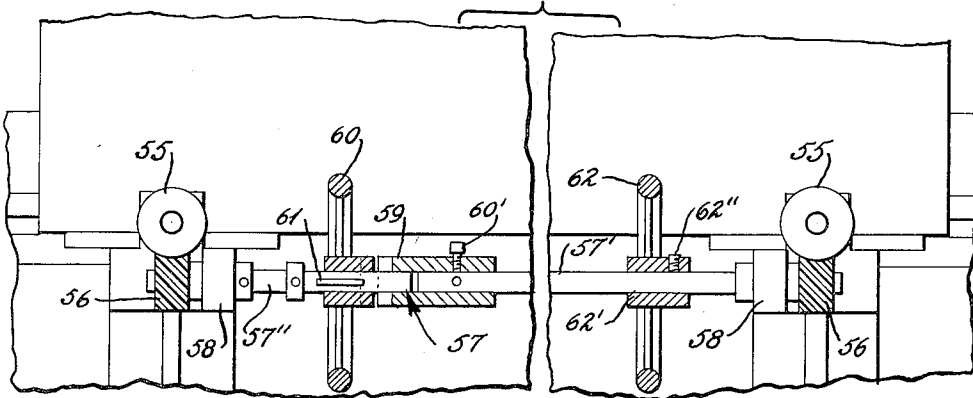


Fig. 10

Fig. 9



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INK REGULATING DEVICE FOR INTAGLIO AND SIMILAR PRINTING MACHINES

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5 Claims. (Cl. 101-155)

My invention is directed to intaglio and similar printing machines and particularly to the improvements in ink regulation in the printing plate.

In a one-color intaglio machine, the printing plate is normally inked-in by one or more rollers in contact with its surface. So-called padding-rollers with an elastic cover distribute and rub the ink on the plate in an axial and a circumferential direction. There is always a relative movement between such padding-roller and plate. After this inking takes place, there is a wiping of the surface of the printing plate by means of elastic wipers covered with layers of cloth or paper. These wipers are driven in a rotating manner by a crank drive or only in an axial movement with no rotary movement against the moving plate. In both of these cases, a relative movement with respect to the plate takes place in axial and in a circumferential direction.

In rotary multicolor intaglio printing presses, the inking is accomplished by pattern rollers. The surface of these rollers is of elastic material and is cut out or milled in a way so that only selected zones or areas corresponding to a predetermined color are inked-in and this is transferred to a plate having engravings to pick up the ink. Inking can be made also by an elastic collection roller which collects the multicolor design and transmits the same in one passage to the engraved plate. Where close delineation of colors is desired padding-rollers or cloth or paper wipers can not be used. Following a known process, a cylinder driven in opposite circumferential direction to a rotating printing plate and also in an axial direction is used for wiping the surface of a printing plate. After having removed the surplus ink from the surface of the plate, the wiping cylinder is cleaned by mechanical or chemical means or by both in a way to be perfectly clean and dry when it again touches the plate to wipe the same. This process permits of perfect cleaning of the surface of the plate but the ink is not rubbed into the engraving, as well as, for example, as when using padding-rollers. In case the printing plate has shallow and fine engravings and very viscous ink, much trouble can occur such as breaks in the fine lines. Such deficiencies are not permissible in high quality precision printing, such as printing of security paper, bank notes, and the like.

My invention uses a cylinder instead of a padding-roller whose relative movements are not possible in multicolor printing. A cylinder, according to my invention, moves circumferentially with the printing plate and its circumference corresponds to the length of one printing plate. In this relationship the same color zones of the cylinder and plate are always in registry and there is no possibility for displacement of colors. In my invention, the cylinder which I term an ink-regulating cylinder is fitted with a special composition covering of elastic material. In operation, the cylinder is slightly pressed against the plate and its special surface covering pushes the ink, previously applied by an inking roller, into the engraved lines and thus filling them in. At the same time the ink is pushed into the engravings, the regulating-cylinder removes some of the ink applied to the plate between engravings. At a further station past which the cylinder surface passes, the ink-regulating cylinder is cleaned by chemical and mechanical means. When this cylinder touches the plate again, it is clean and dry and in a condition to again perform its advantageous steps.

After the plate has been subjected to the action of the

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ink-regulating cylinder according to my invention as explained above, it passes a wiping roller which as known rotates in the opposite direction against the plate to wipe clean the areas between the engravings. While the wiping roller performs its useful function, it is the action of the ink-regulating cylinder according to my invention that makes it possible to obtain a perfect multicolor impression in one passage.

A further object of my invention is to provide an ink-regulating cylinder for intaglio printing machines which is interlocked for movement with the impression cylinder of the press such that release and application of pressure on the impression cylinder releases and applies pressure on my ink-regulating cylinder in a simultaneous operation.

For a more complete understanding of the nature and scope of my invention, reference may be had to the drawings in which:

FIG. 1 is a side elevation illustrative of a printing press having a roller arrangement attached according to my invention;

FIG. 2 is an enlarged end view showing of an ink-regulating roller interconnected with the impression roller so as to be released when the impression roller is released according to my invention;

FIG. 3 is a top plan view along section line 3-3 of FIG. 2 showing the mounting of the ink-regulating roller according to my invention;

FIG. 4 is an enlarged view of the ink-regulating roller and its mounting according to my invention as shown in FIG. 2;

FIG. 5 is a detailed cross sectional view of the biasing spring for the pan in which the ink-regulating roller is mounted;

FIG. 6 is a diagrammatic illustration of the ink-regulating roller moving with a printing plate and about to push ink into an engraving;

FIG. 7 shows the action of the elastic covered ink-regulating roller pushing the ink into the engraving so as to ensure that ink is present for the printing step and at the same time removing some of the ink on the surface of the printing plate between the engravings;

FIG. 8 is a modified form of tank mounting wherein is provided a cross shaft for adjusting the positioning of the tank into pressure and out of pressure engagement with the plate roll 2;

FIG. 9 is a sectional view along line 9-9 of the control mechanism for adjusting the tank 10 and the pressure roll 9; and

FIG. 10 is a detailed enlarged drawing of an air wiper which may be used in place of or along with the wiper 14 as shown in FIG. 4.

Throughout the description like reference numerals refer to similar parts.

An intaglio printing machine for multicolor printing is indicated generally at P and has the usual impression cylinder cooperating with a plate cylinder 2 which is inked by pattern rollers generally indicated at 3, 4, and 5 with various colors of ink through the respective inking systems 6, 7 and 8. These inking rollers and their inking systems are carried in a movable frame which may be moved into and out of engagement with the plate cylinder in a known manner. An ink-regulating cylinder according to my invention is indicated at 9 and it is mounted in a pan 10 mounted for sliding movement in the press P so that the ink-regulating cylinder 9 may be placed in and out of pressure engagement with the plate cylinder 2; which is shown in enlarged manner in FIG. 4. Cleaning brushes 11, 12, and 13 are mounted in pan 10 for applying a cleaning fluid contained therein to the surface of the roll 9. A scraper 14 associated with the pan 10 and the roll 9 serves to remove traces of ink and cleaning fluid and to dry off the surface of the elastic covering on roll 9. It

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will be noted that the roll 9 turns in the same circumferential direction and with the same circumferential speed as the plate roll 2 so that it has a cooperating pressure action to impress any ink such as shown in FIG. 6 and 7 into the engravings and to ensure a uniform deposit of ink in the engravings and to allow uniform printing of security material without any interruption in the printed lines.

A wiping and polishing cylinder is indicated at 15 mounted within its pan 16 and provided with brushes 17, 18, and 19, and wiper 20.

A feeder generally indicated at 23 feeds sheets to two opposite sectors 1a and 1b on impression cylinder 1 so that they register with the printing plates Pr1 and Pr2 mounted on plate cylinder 2 such that printing takes place between the rolls 1 and 2 at N while an endless delivery system indicated at 24 removes the printed sheets from impression roller 1 and deposits them as at 25 on a suitable support.

Reference to FIG. 2 shows the impression roller 1 mounted for translational movement into and out of printing pressure position against plate roller 2. An eccentric 28 serves to move the axis X in a translational manner. A fixed pivot shaft 29 in the form of a shaft fixed to the press P and the frame thereof, serves as a pivot about which there pivots the arms 30a and 30b each fixedly mounted on pivot shaft 29. The broken line position of the arms 30a and 30b is the position for the pressure release position of roll 1. Arm 30a is connected with link 30 by pivot 31'. Link 30 is pivoted to eccentric 28 as at 31 while the lower end of arm 30b is connected as at 32 to an adjustable-in-length arm 33 in turn connected to a crank arm 34 which pivots about a pivot point 35 fixed in the press P. Reference to FIG. 4 shows the pivot point 35 as a shaft having a cam 36 attached thereto which cam 36 rides against a roller 37 connected by a bifurcated bracket 38 to the pan 10 so that rotary movement of the cam 36 will move the pan 10 to the right against the compression springs 39. A duplicate cam arrangement is provided at the other end of pan 10. The full line position for the arms 30a and 30b corresponds to the position of the roll 1 in compression contact with the roll 2 and thus the cam 36 is positioned as shown in FIG. 4 to permit the pan 10 to be moved into proper pressure engagement with plate roll 2 by springs 39.

Reference to FIG. 3 shows the ink-regulating cylinder 9 having a trunnion 37 at each end which is received within a quick detachable bearing assembly 38 permitting expeditious removal and replacement of the cylinder 9 when it is desired to replace the composition covering 9a which fits over a resilient cylinder 9b mounted on the core 9c of solid material as shown in FIG. 4. This elongated cylinder fits within the pan 10 which pan is mounted for sliding movement as shown in FIGURES 2 and 5 on the brackets 50. A quick detachable top plate 40 held on by the screw lugs 42 and the hinge brackets 41 has a vertically depending lug 40' thereon. The lug 40' is apertured to receive a threaded screw rod 43' having spaced shoulders 42'—42'' and a knurled head 43 thereon. This screw rod 43 is threadedly received in a bedplate 41' attached to the hinge 41. As screw rod 43 is rotated it moves the plate 40 in and out towards the cylinder 9. Mounted on the inner end of the plate 40 in a recess is a brush or wiper 14 by means of the clamp 14' and cap screws 14''. Thus, it is very easy to remove the plate 40 when it is found necessary to remove the roll 9. Brushes 11, 12, and 13 extend the full length of the roll 9 and are the means by which the solvent in the tank 10 is applied to the surface of the roll 9 as it moves there past to remove the ink. The scraper 14 serves as a dryer for removing any traces of the solvent and ink. As an alternative construction there may be mounted with the scraper 14 or by itself in some cases an air stripper 43 such as shown in FIGURES 8 and 9. This air stripper 43a may be adjusted and it blows air through nozzles 43b onto the surface of

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roll 9 to further dry same and remove any traces of solvent or cleaning fluid carried by the tank 10. Air stripper 43a may be mounted for adjustment of its angle of attack toward cylinder 9.

In FIGURES 3 and 5 I have shown compression springs 39 which urge the tank 10 towards the plate roll 2. Also in FIG. 4 is shown a block 44 attached to the rear of the tank and at the lower portion thereof to which is attached in a rigid manner a rod 45 that extends through the compression spring 39. Extending upward from the bracket mounting 50 for the tank 10 is a vertical plate 46 which is attached by cap screws 47. This plate 46 is threaded at 46' and receives the threaded collar 47'' having a head 47' against which the spring 39 presses and in turn the head 47' rests against the aperture plate 46 while the threaded portion 47'' extends therethrough and is secured by means of a locknut 48. Thus, the compression on spring 39 may be adjusted by loosening of the locknut 48 and adjusting the position of collar 47. Rod 45 extends through this threaded collar 47 out and beyond and to the rear of the locknut 48 where it is provided with a threaded portion 45' which extends within the threaded collar 47. The rear end of threaded collar 47 has an enlarged recess 47''' formed therein which receives a collar portion 49' on the threaded nut 49 received on screw thread portion 45'. Thus adjustment of the nut 49 on the threaded portion 45' will move the rod 45 to the right and pull the tank 10 to the right whereas loosening of the nut 49 will permit the rod to move to the left under the influence of the compression spring 49. In moving the tank 10 to the right and to the left under the influence of the cam 36 when the impression cylinder 1 is relieved and placed under pressure, the rod 45 freely moves within the collar 47. One of these rods 45 is positioned at each end of the tank 10 and serves as an adjusting or positioning means for the tank 10. To guide the tank 10, the plate 44 has a depending lug 44' thereon which rides within a slot 50' milled in the bracket therebeneath as shown in FIG. 5.

In FIGURES 8 and 9 I have shown a modified form of means for adjusting the position of the cylinder 9 and tank 10'. Mounted on bracket 50 is a lug 51 attached to the tank 10'. Attached to this lug 51 is a threaded rod 52 which extends within an apertured plate 53 attached to the rear end of bracket 50 by means of cap screws 54. Threadedly received on the rear end of the threaded rod 52 is a worm gear 55 which meshes with a gear 56 mounted on a shaft generally indicated at 57 as shown in FIG. 9. There are two of these gears 56, one at each end, and likewise two gears 55. Suitable bearings 58 support the shaft 57 which is split so as to have two sections of shaft 57' and 57''. A collar 59 having a handwheel 60 thereon surrounds the two shaft sections 57' and 57'' and is slidably mounted therealong and connected to shaft 57'' by a keyway and key generally indicated at 61, see FIG. 9. To lock the two shafts together a set screw 60' is provided in the collar 59. Another handwheel 62 mounted on a hub 62' is provided with a set screw 62'' so as to be attached to the shaft section 57'. Rotation of either handwheel 62 or 63 when it is locked by the set screw 60' will turn the shafts 57' and 57'' in unison. To make a separate adjustment for each end of the tank 10, set screw 60' is released and handwheel 60 permits adjustment of the left-hand end of the tank as shown in FIG. 9 while handwheel 62 permits adjustment of the right-hand end.

In FIG. 6 I have shown in an illustrative manner on an enlarged scale plate roll 2 with engravings E therein. These are exaggerated in size, however, the ink deposits are shown at I in the engravings and at I' on the surface of the plate. It will be noted that the ink deposits I do not extend into the bottom of the grooves as they should.

Reference to FIG. 7 shows a further positioning of the plate roll 2 and the engravings E after they have passed contact with the ink-regulating cylinder 9 according to my invention and its elastic surface 9e thereon. The illus-

trations are exaggerated but they do show the action of the elastic surface in pushing the ink I down into the engravings in a uniform manner so that it is fully deposited there and is available at the printing station N where the impression roller under pressure forces the paper into engagement with the engravings and the ink I is picked up and deposited on the paper. This is extremely important in connection with security printing since any imperfections render the printings worthless. There must be no breaks in the lines and the lines must be uniform and of even width and character. This is accomplished by means of the ink-regulating roll 9 which turns in the same direction at the point of contact as the plate roll 2 and at the same circumferential speed. It will be observed in FIGS. 6 and 7 that as the roll 2 approaches the ink-regulating roll 9 there is between the engravings deposits of ink I' which are substantially wiped clean by the action of the surface 9e of ink-regulating roll 9. This ink-regulating roll 9 as shown in FIG. 4 rotates in a counterclockwise manner as there shown and passes the brushes 11, 12, and 13 and the wiper 14 to be fully cleaned and dried before it again is available on a particular surface for use in impressing ink into the engravings on the plates of roll 2 and for removing some of the ink between the engravings. It will be noted that in the illustration shown, plate cylinder 2 as shown in the various drawings rotates clockwise.

I have provided an ink-regulating means which ensures uniform deposits of ink in the engravings so that uninterrupted lines in intaglio and the like printing with a uniform character in keeping with the engraving is maintained. A novel control of the ink-regulating cylinder is also provided so that it operates simultaneously with the impression cylinder. By these means I have provided for greatly improved printing and control of ink in engraved printing plates.

I claim as my invention:

1. In an intaglio and similar printing press having a plate roller with printing plates thereon, an impression cylinder mounted for movement into and out of pressure contact with said plate roller, means mounting the impression cylinder for movement into and out of pressure engagement with the plate roller, and ink applying rolls for applying various colored inks to the printing plates on the printing roller, the improvement comprising an ink-regulating cylinder mounted adjacent the plate roller for pressure contact therewith, said cylinder turning in the same circumferential direction and rate in its contact with said plate whereby ink applied by the ink-applying rolls is forced into the engravings in the printing plate and ink between the engravings is taken off by said ink-regulating cylinder, means mounting said ink-regulating cylinder for movement into and out of pressure engagement with the plate roller, and link means connected with said means mounting the impression cylinder for movement into and out of engagement with the plate roller and the mounting means for said ink-regulating cylinder whereby said impression cylinder and the ink-regulating cylinder simultaneously are brought into and relieved from pressure contact with said plate roller.

2. An ink regulating device for ink applied to the printing plate on the plate roller of a rotary intaglio and similar printing presses comprising an elongated pan for cleaning fluid, means mounting the pan for movement toward and away from the plate roller, an ink regulating roller mounted in said pan for rolling contact with said plate roller and the printing plate thereon, said regulating

roller being driven by circumferential contact with said plate roller and at the same circumferential speed, means in said pan for applying cleaning fluid to said regulating roller and wiper means for drying said regulating roller just before it again contacts said plate roller, said regulating roller having a resilient covering and pressing ink uniformly into engraving grooves on said plate and removing some ink from between said engraving grooves.

3. An ink regulating device according to claim 2 including a base for said means mounting the pan for movement toward and away from the plate roller and wherein said last-named means comprises a threaded shaft attached to each end of said pan and extending perpendicular to the elongated direction of said pan, a threaded nut mounted on each shaft and having an outer drive surface, a drive member contacting the outer drive surface of said nut, shaft means having portions for each nut supported on said base and carrying each of said nuts, said shaft means being adjustably coupled together whereby each drive member attached to its shaft portion may be rotated separately and means for coupling said shaft portions together for rotation together.

4. An ink regulating device according to claim 2 including a base for said means mounting the pan for movement toward and away from the plate roller and wherein said last-named means comprises a threaded shaft attached to each end of said pan and extending perpendicular to the elongated direction thereof, bearing means attached to said base and having an aperture therein through which each threaded shaft extends, spring means on each shaft between the bearing means and the pan urging said pan toward said plate roller, nut means on said shaft for adjusting the position of each threaded shaft in said bearing and in turn adjusting the position of said pan and the biasing of said springs, and cam means on said base and positioned for cooperation with said pan for moving same pan against said spring and away from said plate roller and toward said plate roller.

5. In an intaglio and similar printing press having a plate roller with printing plates thereon, an impression roller and ink applying rolls for applying various colored inks to the printing plate, the improvement comprising an ink-regulating cylinder mounted adjacent the plate roller for pressure contact with the printing plates thereon, said cylinder turning in the same circumferential direction in its contact with said plate whereby ink applied by the ink-applying rolls is forced into the engravings in the printing plate and ink between the engravings is taken off by said ink-regulating cylinder, a cleaning fluid pan within which said ink-regulating cylinder is mounted for contact with cleaning fluid therein, brush means in the pan for contact with the cylinder to apply cleaning fluid in a wiping action to the cylinder, wiper means for drying the surface of the cylinder before it against contacts said printing plate and mounting means for the pan for moving the ink-regulating cylinder into and out of pressure contact with the printing plate on the plate roller.

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UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 2,987,993

June 13, 1961

Gualtiero Giori

It is hereby certified that error appears in the above numbered patent requiring correction and that the said Letters Patent should read as corrected below.

Column 6, line 54, for "against" read -- again --.

Signed and sealed this 31st day of October 1961.

(SEAL)

Attest:

ERNEST W. SWIDER

Attesting Officer

DAVID L. LADD

Commissioner of Patents

USCOMM-DC