April 29, 1958 R. W. FERGUSON 2,832,286

APPARATUS FOR REMOVING INK FROM A PRINTING PLATE

Filed April 2, 1954 6 Sheets-Sheet 1

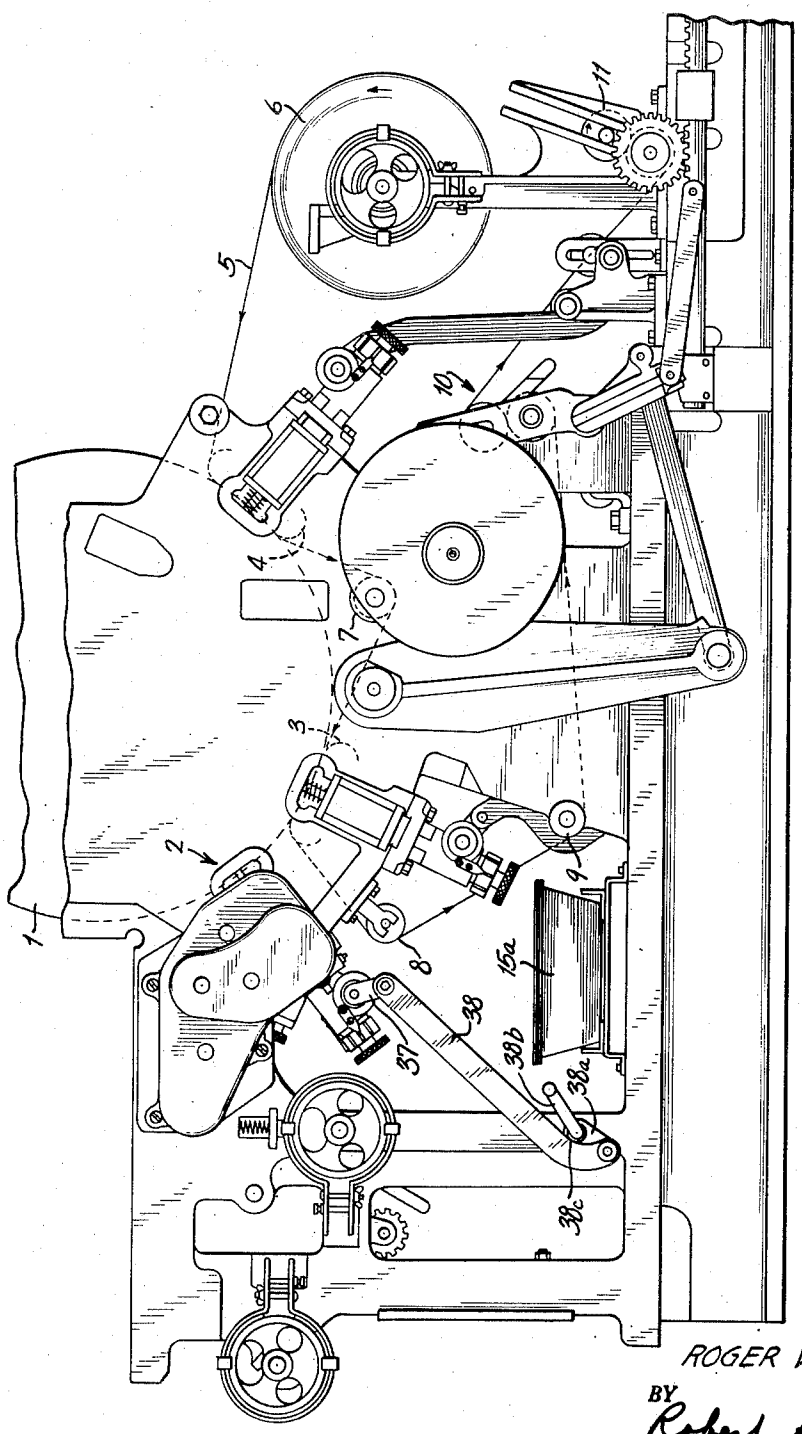


Fig. 1

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APPARATUS FOR REMOVING INK FROM A PRINTING PLATE

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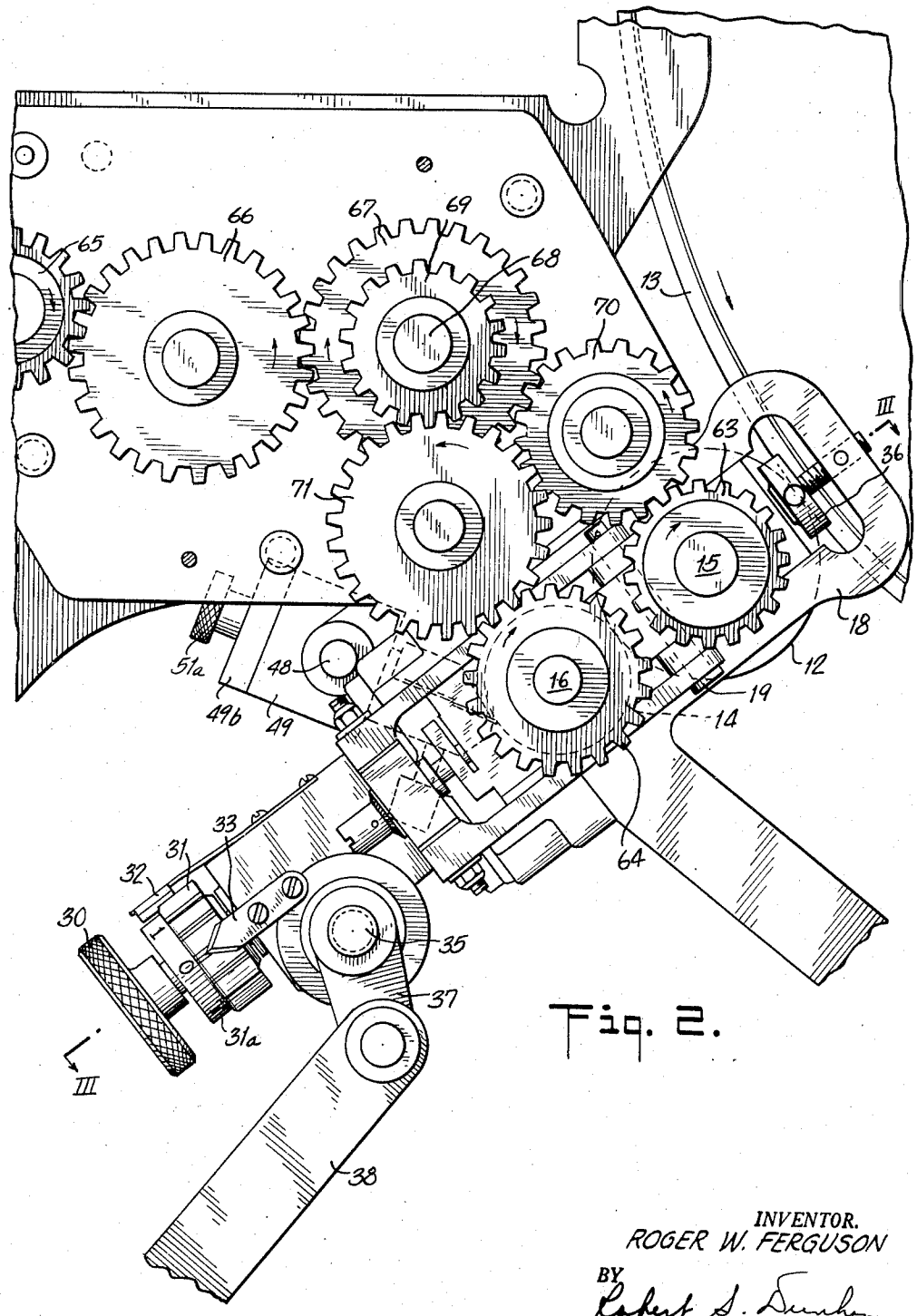


Fig. 2.

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Fig. 4.

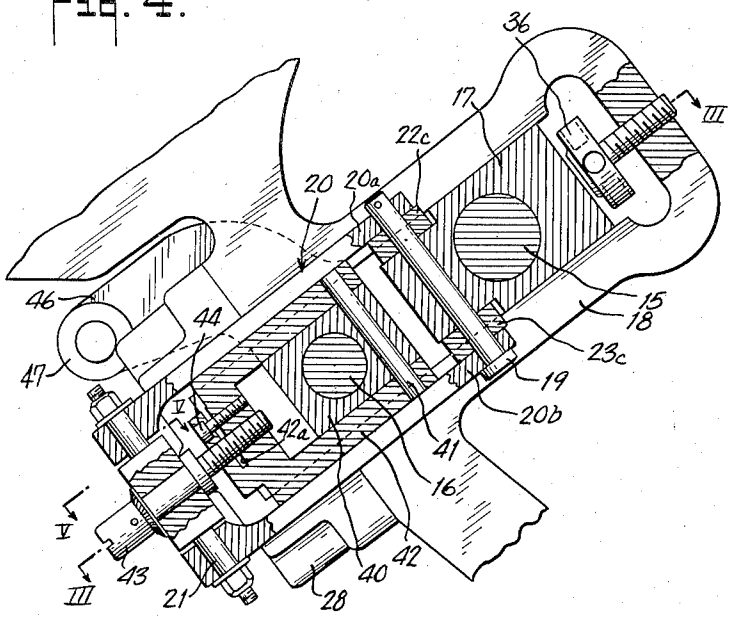


Fig. 7.

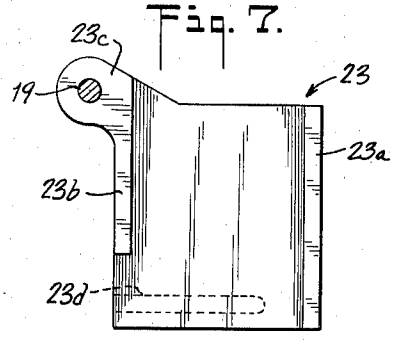
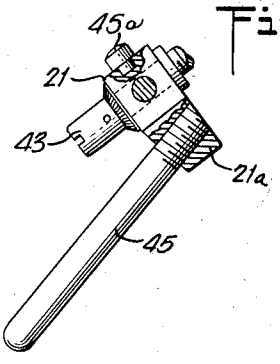


Fig. 5.



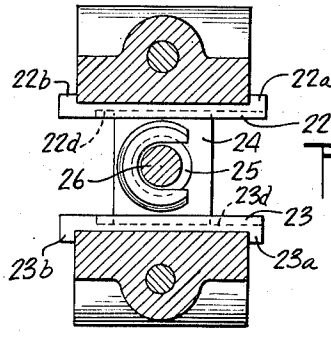


Fig. 8.

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APPARATUS FOR REMOVING INK FROM A PRINTING PLATE

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Fig. 3.

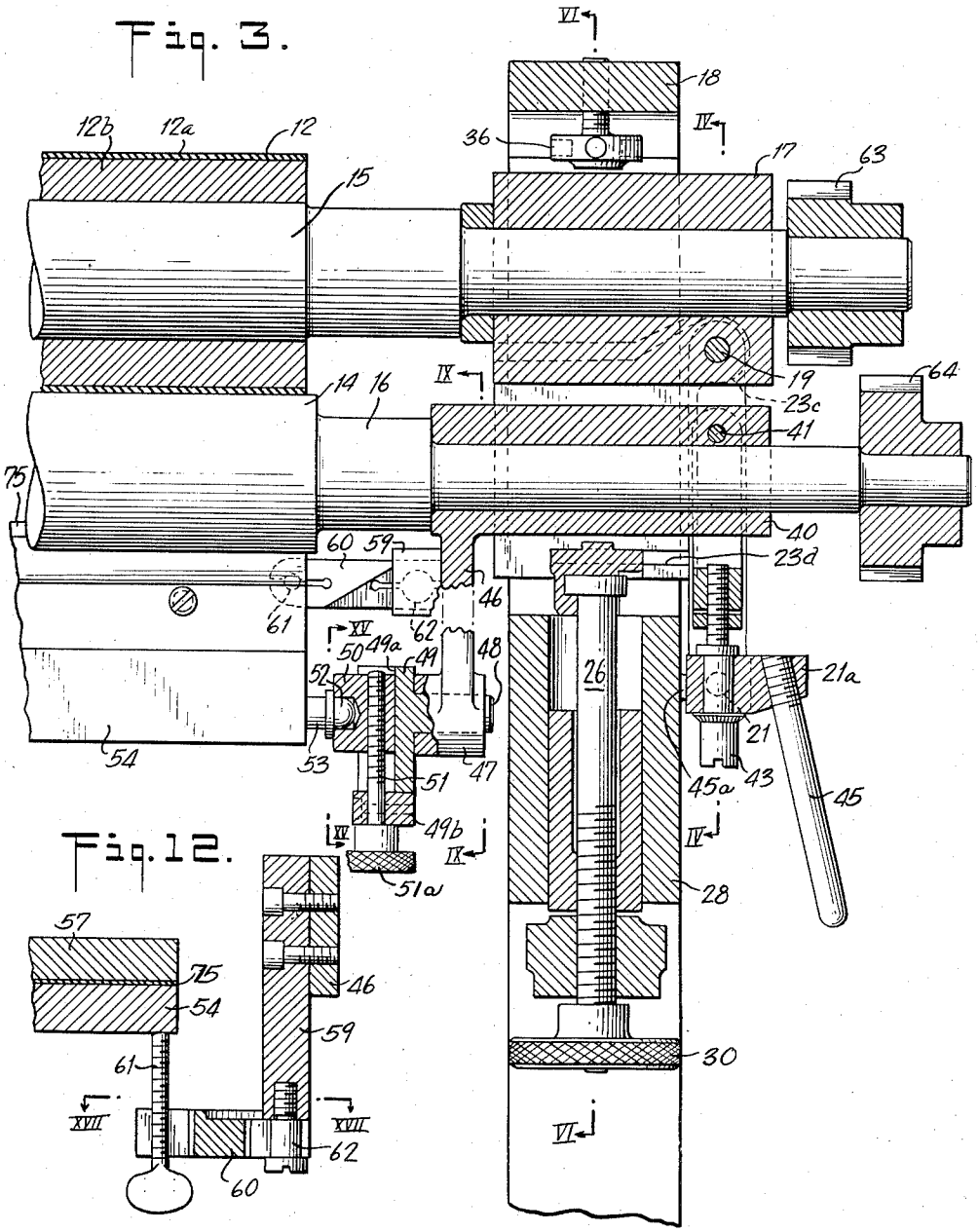


Fig. 12.

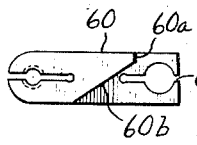


Fig. 13.

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APPARATUS FOR REMOVING INK FROM A PRINTING PLATE

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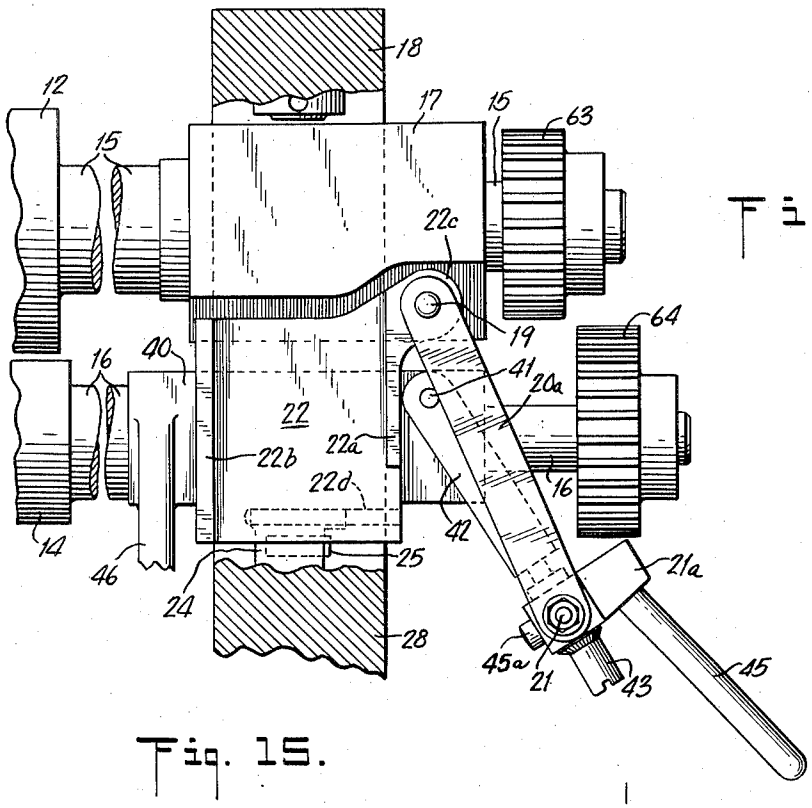


Fig. 14.

Fig. 15.

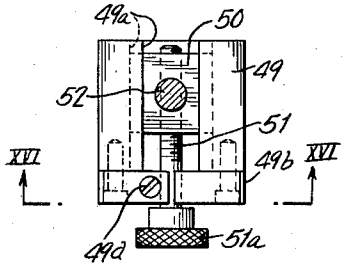


Fig. 16.

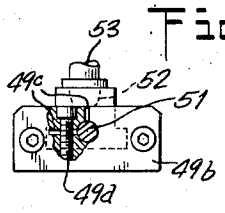
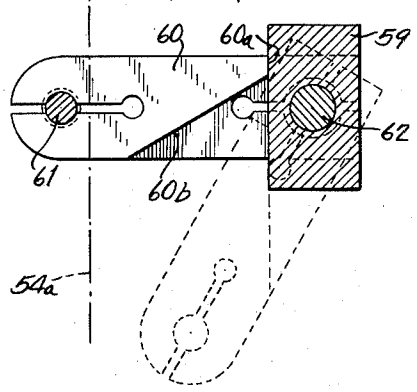


Fig. 17.



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APPARATUS FOR REMOVING INK FROM A PRINTING PLATE

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Fig. 11.

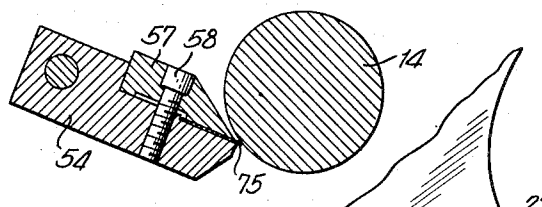
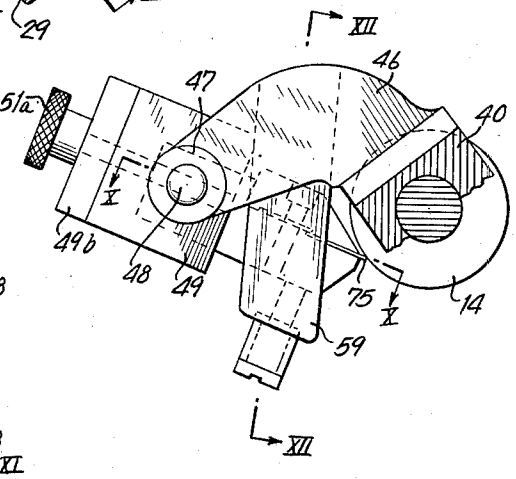


Fig. 8.

Fig. 9.



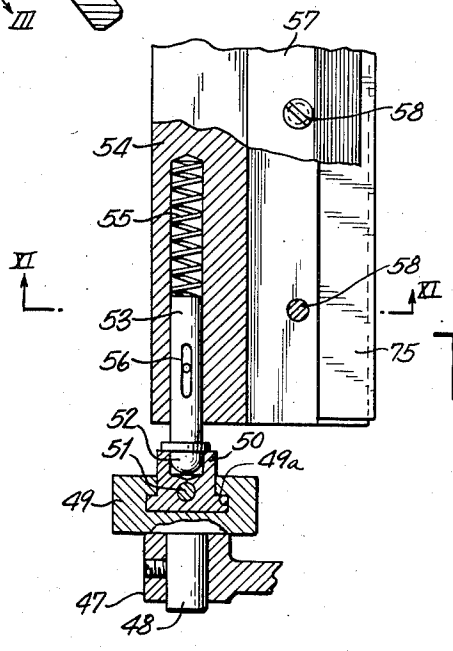


Fig. 10.

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United States Patent Office 2,832,286
Patented Apr. 29, 1958

2,832,286

APPARATUS FOR REMOVING INK FROM A PRINTING PLATE

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Application April 2, 1954, Serial No. 420,625

12 Claims. (Cl. 101—155)

This invention relates to apparatus for removing ink from a printing plate. More specifically, it relates to apparatus mounted on a printing press for removing ink from the raised portions of an engraved intaglio printing plate after each inking and before each printing impression. The particular apparatus illustrated is intended for use on a rotary cylinder press, and in connection with engraved steel plates, and certain features of the invention are of especial utility in connection with such apparatus and plates.

Printing plates such as those used in steel engraving work, when mounted on a press, depart from true cylindrical surface on the average about five to ten thousandths of an inch. Exceptional plates may have departures as great as twenty thousandths of an inch.

It has been a conventional practice in connection with such plates to remove the ink by rubbing the raised portions of the plate first with a burlap strip, which removes most of the ink and then with a strip of crepe paper, which removes the remainder of the ink. That practice, while effective, is wasteful of material, particularly burlap, which is expensive, and which cannot be economically cleaned and re-used.

It has been proposed to utilize, in place of the burlap strip, a doctor blade or scraper running against the surface of the plate and removing most of the ink. Since such blades tend to scrape and groove the plate, it has also been proposed to use a roller running against the plate to take up the ink therefrom, and a doctor blade running against the roller to scrape the ink off it.

The doctor blade mechanisms of the prior art have not been completely satisfactory, because of the difficulty in maintaining a good cleaning contact between the blade or roller and the plate without wearing or scratching the plate. Specifically, difficulty has been encountered in adjusting the positions of the blade and roller to maintain good cleaning conditions. It is desirable from time to time to clean the blade and roller, especially when changing from one color ink to another. Difficulty has also been encountered with the prior art structures in connection with this cleaning operation, particularly in that a thorough cleaning requires that the blade and roller be removed from their operating positions. If so removed, a new setting of the adjusting mechanism is required when the blade and roller are returned to their operating positions.

An object of the present invention is to provide improved apparatus for cleaning ink from a printing plate.

Another object of the invention is to provide an improved doctor blade apparatus for removing excess ink from the raised portions of an intaglio printing plate.

A further object is to provide improved ink removing apparatus including a yieldable-surfaced roller which runs against the printing plate to remove ink therefrom, a hard surfaced roller which runs against the yieldable-surfaced roller to remove ink therefrom, and a doctor blade which

scrapes the surface of the hard surfaced roller to remove the ink therefrom.

A further object of the invention is to provide an improved roller structure for removing ink from an intaglio printing plate.

Another object is to provide, in apparatus of the type described, improved mechanism for adjusting the positions of the various rollers and of the doctor blade.

Another object of the invention is to provide improved mechanism for quickly releasing the rollers and doctor blade from their operating positions to positions wherein they are accessible for cleaning. A further object is to provide such a quick release mechanism which may be operated without disturbing the adjusted setting of the rollers and blade.

Another object of the invention is to provide an improved quick release mechanism so that the doctor blade may be quickly removed for replacement.

The foregoing and other objects of the invention are attained, in the apparatus described herein, by providing a rubber surfaced roller which runs against the printing plate, and a steel roller which runs against the rubber surfaced roller and a doctor blade in scraping engagement with the steel roller.

After passing the rubber roller, the printing plate is rubbed clean by a crepe paper strip running over two successive spaced pads contoured to conform with the printing plate.

The rubber roller is driven in the same direction as the printing plate, but at a slower linear speed, a speed of 50% to 90% of the plate speed being preferred. The steel roller is driven in the opposite direction to the rubber roller and at a slower speed, a speed of from 25% to 75% of the rubber roller speed being preferred.

The rubber roller is constructed with a sponge rubber core and an outer sheath of tougher, more wear resistant material. The sponge rubber core permits the outer sheath to move toward and away from the printing plate to accommodate variations in the plate contour.

The rubber roller is mounted on a shaft journaled in a bearing block which is adjustable toward and away from the printing plate. Means is provided for moving the block quickly toward and away from the plate to permit cleaning of the rubber roller. This quick moving mechanism operates without changing the adjusted position of the block with respect to the plate, i. e., so that the rubber roller may be moved away from the plate, cleaned and moved back again without disturbing its adjusted position.

The chromium plated steel roller running in contact with the rubber roller is mounted on a shaft journaled in a second bearing block and the second bearing block is mounted on the first block through a suitable mechanism so that the two blocks move together during adjustment or movement of the first block. This mechanism includes means for adjusting the relative positions of the two blocks, and a linkage operable to release the second block quickly to a cleaning position wherein the two rollers are separated without disturbing the adjustment. An extension on the second block serves as a mount for the doctor blade and includes means for adjusting the doctor blade angularly and linearly with respect to the steel roller. A quick release mechanism is also provided for the doctor blade so that it may be separated from the steel roller for cleaning without disturbing the latter adjustments.

The steel and rubber rollers are driven at fixed speeds through suitable gearing. The adjustment mechanism for both rollers is so constructed that during adjustment the points of contacts of the gears travel along the pitch circles of the gears, thereby avoiding introduction of lost motion and slack in the gear train.

Other objects and advantages of the invention will become apparent from a consideration of the following specification and claims, taken together with the accompanying drawings.

In the drawings:

Fig. 1 is an elevational view, taken from the feeder side, of a cylinder press equipped with ink removing apparatus constructed in accordance with the invention;

Fig. 2 is a fragmentary elevational view of the doctor blade mechanism in the ink removing apparatus of Fig. 1, certain covering parts in Fig. 1 having been removed to illustrate the gear train in detail;

Fig. 3 is a fragmentary sectional view taken on the line III—III of Fig. 2, looking in the direction of the arrows;

Fig. 4 is a fragmentary sectional view taken on the line IV—IV of Fig. 3, looking in the direction or the arrows;

Fig. 5 is a sectional view taken along the line V—V of Fig. 4, looking in the direction of the arrows, with certain parts broken away;

Fig. 6 is a sectional view taken partly in elevation and partly in section along the line VI—VI of Fig. 3, looking in the direction of the arrows, with some parts broken away and others omitted;

Fig. 7 is a fragmentary view taken along the line VII—VII of Fig. 6, looking in the direction of the arrows, and illustrating a detail of the mechanism;

Fig. 8 is a sectional view taken along the line VIII—VIII of Fig. 6, looking in the direction of the arrows;

Fig. 9 is a fragmentary view taken along the line IX—IX of Fig. 3, looking in the direction of the arrows;

Fig. 10 is a fragmentary view taken along the line X—X of Fig. 9;

Fig. 11 is a sectional view taken along the line XI—XI of Fig. 10;

Fig. 12 is a sectional view taken along the line XII—XII of Fig. 9;

Fig. 13 is a plan view of one part of the mechanism appearing in Fig. 12;

Fig. 14 is a fragmentary view, similar to a portion of Fig. 3, illustrating certain of the parts in a different position;

Fig. 15 is a fragmentary sectional view, taken on the line XV—XV of Fig. 3;

Fig. 16 is a sectional view, taken generally on the line XVI—XVI of Fig. 15, with certain parts broken away, and

Fig. 17 is a sectional view taken on the line XVII—XVII of Fig. 12.

Printing from engraved intaglio plates is accomplished by forming the plates with shallow recesses below the plate surface. These recesses have the contours of the letters or other material to be printed. Ink is applied over the surface of the plate, commonly by means of an inking roller, and is spread nearly uniformly over both the recessed portions of the plate and the raised portions between the recesses. Before an impression can be made from the inked plate, the ink must be removed from the raised portions of the plate, so that when the paper or other surface to be printed is brought into contact with the plate, only the ink from the recessed portions of the plate will print on the paper. The present invention is concerned with apparatus for removing the ink from the high level portions of the plate, after the plate has been inked and before the printing impression is made.

In the printing press illustrated in Fig. 1, a plate is fastened on the periphery of the cylinder **1**. As the cylinder **1** rotates counterclockwise, the plate is carried past an inking mechanism, located near the top of the cylinder and not shown in the drawing, and then downwardly past a de-inking mechanism with which the present invention is particularly concerned. Thereafter, by mechanism not shown, a sheet of paper to be printed is moved into contact with the inked plate to print the material from the plate on the paper.

The de-inking mechanism of the present invention comprises a doctor blade apparatus generally indicated at **2**, and a pair of shoes **3** and **4**. A strip of crepe paper **5** runs from a supply roll **6** over the shoe **4**, thence over an idle roller **7**, over the shoe **3** and thence over guide rollers **8** and **9** and a slack take-up mechanism **10** to a take-up roll **11**. The shoes **3** and **4** are contoured to conform with the cylindrical contour of the printing plate as it is fastened on the cylinder **1**.

The printing plate has most of its surplus ink removed by the doctor blade apparatus **2**, and any ink that may remain is removed by the paper strip **5** in cooperation with the shoes **3** and **4**. Note that the paper strip **5** moves in the opposite direction to the plate, and that it moves first over the shoe **4** which is the last shoe passed by the plate. Consequently, the paper strip **1** in its fresh condition is moved into contact with the plate when the latter is most nearly clean, so that the cleaning operation is quite complete when the plate leaves the shoe **4**.

The doctor blade apparatus **2** is illustrated in detail in Figs. 2 to 13. It includes a rubber roller **12** which runs in contact with the surface of the printing plate **13**, a steel roller **14** which runs in contact with the surface of the rubber roller **12** and a doctor blade **75** which scrapes the surface of the steel roller **14**. Ink removed by the doctor blade drops into a pan **15***a* (Fig. 1).

While the roller **12** is referred to hereinafter for convenience of identification as the rubber roller, and the roller **14** is similarly referred to as the steel roller, it should be understood that the invention in its broader aspects is not limited to the use of these specific materials.

As best seen in Fig. 3, the rubber roller **12** comprises a relatively hard outer shell **12***a*, which may be formed, for example, of a hard wear-resistant rubber such as 70 shore Buna N. Within the shell **12***a* is a core **12***b* of softer rubber, such as 10 shore natural cushion rubber, of annular cross-section. The core **12***b* is mounted on a shaft **15**. The roller **14** is preferably of chromium plated steel, and is mounted on a shaft **16**.

Rubber roller supporting and adjusting mechanism

The shaft **15** is journaled in a bearing block **17** slidably mounted for movement toward and away from the path of plate **13** in a guide **18** which forms a part of the frame of the press.

The mechanism illustrated in Figs. 2 to 13 is for one side only of the press. It should be understood that this mechanism, except for the gear train which drives the rollers, is duplicated on the opposite side of the press. In order to simplify the drawings and description, for the most part, the supports and adjusting mechanisms for one end only of the rollers **12** and **14** and doctor blade **75** are shown and described. Where there is a difference in the structures at the opposite sides of the press, that difference is specifically mentioned.

A pivot pin **19** is journaled in the block **17**. A yoke **20** is rotatably mounted on the pin **19** (Fig. 4). The yoke **20** comprises an upper yoke arm **20***a*, a lower yoke arm **20***b* and a pivot pin **21** journaled in and extending between the ends of the yoke arms **20***a* and **20***b*.

The pivot pin **19** also extends through upper and lower shoes **22** and **23**, the shoe **23** being illustrated in detail in Fig. 7. The shoe **23** rides on one side of the guide **18**, and is provided at its opposite sides with flanges **23***a* and **23***b* which engage the sides of the guide **18**. At one end, the shoe **23** is provided with an extension **23***c* which is apertured to receive the pivot pin **19**. Near its opposite end from the extension **23***c*, the shoe **23** is provided with a laterally extending groove **23***d*. The shoe **22** is similar in form but of the opposite hand to the shoe **23**, as best seen in Fig. 6. The extensions **23***c* and **22***c* are retained between the upper and lower yoke arms **20***a* and **20***b* and suitable recesses formed on the bearing block **17**. The shoe **22** slides on the upper side of the guide frame **18** just as the shoe **23** slides on the lower side.

Between the lower ends of the shoes 22 and 23 is received a screw socket 24, having flanges 24a and 24b (Fig. 6) which fit into grooves 22d and 23d. The socket 24 is provided with a central recess to receive the head 25 of an adjusting screw 26. The screw 26 is threaded into a sleeve 27 mounted for endwise sliding movement in a cap 28 which is attached to the frame 18 by means of machine screws 29, and which encloses the adjusting screw 26 and its cooperating parts. The adjusting screw 26 extends through and beyond the sleeve 27 and on its outer end carries a knob 30 and an index member 31 having peripheral notches (Fig. 2) which cooperate with a spring finger 32 mounted on the outside of cap 28 to hold the screw 26 against angular movement. An index finger 33 is also mounted on the cap 28 and cooperates with a scale 31a formed on the index member 31 to indicate the angular setting of the adjusting screw 26.

The sleeve 27 is keyed or otherwise held against rotation within the cap 28, and is provided along one side with a rack 27a which cooperates with a pinion 34 integral with a shaft 35. The rack 27a terminates in a flat 27b, which limits the travel of the sleeve toward the printing plate when it engages the pinion 34.

The mechanism just described serves to adjust the position of the rubber roller 12 with respect to the path of motion of the printing plate 13. This adjustment is accomplished by lifting the spring finger 32 out of the notch on the index member 31 and rotating the knob 30 to advance the screw 26 with respect to the sleeve 27, which is normally held stationary by its engagement with pinion 34. Advancing the screw 26 moves the socket 24, shoes 22 and 23 and bearing block 17 toward or away from the path of movement of the printing plate, thereby adjusting shaft 15 and roller 12 in the same manner.

A stop member 36 is threaded into the end of frame 18 to serve as a maximum limit of the adjustment of roller 12 toward the printing plate.

The steel roller 14 and the doctor blade 75 are mounted on the bearing block 17 as described in detail below, and move with it toward and away from the printing plate as it is adjusted.

When it is desired to separate the roller 12 from the printing plate in order to clean it, or for other purposes, the shaft 35 is rotated, as by means of crank arm 37, link 38, crank arm 38a, and hand crank 38b (Fig. 1) in a counterclockwise direction as viewed in Figs. 2 and 6, thereby driving sleeve 27 outwardly away from the printing plate and carrying in the same direction the screw 26 and through its connecting parts the bearing block 17. The shaft 38c, on which crank arm 38a and hand crank 38b are fixed, extends across the press and actuates similar mechanism on the opposite side, so that both ends of roller 12 are moved together toward or away from the printing plate. When it is desired to restore the roller 12 to its operating position, the shaft 35 is returned to its normal angular position wherein pinion 34 engages flat 27b, and the restoration is accomplished. Note that this movement of the rubber roller 12 for cleaning purposes is accomplished without disturbing the setting of the adjusting knob 30 and index member 31, so that when the cleaning is completed, the roller 12 may be returned rapidly to its adjusted operating position.

Steel roller supporting and adjusting mechanism

The steel roller 14 is mounted for adjustment relative to the rubber roller 12 so as to vary the contact pressure between the two rollers. Provision is also made for quickly separating the two rollers by a substantial distance to allow for rapid cleaning, without disturbing the setting of the adjusting mechanism.

The shaft 16 which carries the steel roller 14 is journaled in a bearing block 40. The bearing block 40 extends between the shoes 22 and 23 and carries at its outer end a pivot pin 41 which extends parallel to the pivot pins 19 and 21. A yoke 42 (Fig. 4) is rotatably mounted at its ends on the pivot pin 41. An adjusting screw 43 is journaled in the central part of the pivot pin 21 and is threaded into the bight of the yoke 42. The body of yoke 42 is slotted, as illustrated at 42a, and a locking screw 44 is provided to clamp the sides of slot 42a and thereby hold the adjusting screw 43 against rotation. It may be seen that by rotating the screw 43, the yoke 42 is advanced or retracted with respect to pivot pin 21. The yoke 42 is fixed with respect to the shaft 16 of steel roller 14, and pin 21 is fixed with respect to the shaft 15 of rubber roller 12, insofar as movement of those shafts toward and away from the printing plate are concerned. It may therefore be seen that adjustment of screw 43 varies the contact pressure between the rubber roller 12 and the steel roller 14.

The central portion of the pivot pin 21 is provided with a wing 21a (Fig. 5). A handle 45 is threaded into the wing 21a.

The handle 45 may be used to operate an overcenter linkage, which includes the yoke 42 and screw 43 as one link, and the yoke 20 comprising upper and lower yoke arms 20a and 20b as the other link. In the normal operating position of the rollers 12 and 14, the parts are in the positions shown in Fig. 3. In this position a stop button 45a mounted on the inside of the pivot pin 21 bears against the cap 28. The dimensions of the parts are such that the center of pivot pin 21 is then somewhat to the left of a line drawn through the centers of pins 19 and 41. By virtue of this arrangement, the parts tend to remain in the positions shown, since a substantial force must be applied to squeeze the rollers 12 and 14 together slightly, to move pin 21 across the line of centers. By moving the handle 45 to the right as it appears in Fig. 3, the linkage is moved over center, and the shaft 15 is moved away from shaft 16. The parts may then be moved to a position, such as shown in Fig. 14. In this position the rollers 12 and 14 are separated to permit rapid cleaning. When the cleaning operation is over, the parts may be restored to their previous positions by actuating the handle 45 in the opposite direction. Note that operation of handle 45 does not disturb the setting of the adjusting screw 43. This roller separating mechanism may also be conveniently used to separate the rollers during a relatively long period of inactivity of the apparatus, e. g., overnight to prevent development of flats on the rubber roller.

Doctor blade support and adjusting mechanism

Bearing block 40 carries on its inner end a wing 46, which terminates in a hub 47 (Figs. 3 and 10). The hub 47 is apertured to receive a shaft 48 carrying a guide block 49 having formed therein a slideway 49a to receive a socket 50 which travels on an adjusting screw 51 journaled in an end plate 49b fastened on the guide block 49, and rotatable by means of a knob 51a. End plate 49b is slotted, as at 49c, adjacent the screw 51, and a screw 49d is provided to force the sides of slot 49c toward one another, and thereby clamp the screw 51 against movement. The socket 50 is recessed to receive a semi-ball 52 formed on the end of a rod 53 received in a recess in a doctor blade supporting bar 54. A spring 55 (Fig. 10) is received in the recess in back of the rod 53 and biases it outwardly. A pin 56 is fixed in the bar 54 and extends through a slot in the rod 53 so as to limit the movement of the rod 53 inwardly and outwardly of its recess. The mechanism at the other end of bar 54, on the opposite side of the press, may be similarly formed or the rod 53 at that end may be fixed in the bar.

Adjustment of knob 51a shifts the doctor blade 75 toward and away from the roller 14, and so controls the force with which the blade engages the roller.

The doctor blade 75 rests on a flat surface accurately located on the bar 54, and is clamped against that flat surface by a clamp member 57 attached to the bar 54 by means of machine screws 58.

When it is desired to remove the supporting bar 54, for

example, to replace the blade, it is only necessary to move the bar **54** toward the socket **50**, downwardly as the bar **54** appears in Fig. 10. This movement of bar **54** carries the ball **52** at the opposite end of the bar out of its socket **50** so that the whole assembly may be taken out for inspection or replacement of the blade **75** (see Fig. 11).

There is attached to the wing **46** of the bearing block **40** a downwardly depending plate **59** (Figs. 12 and 17). On the lower end of the plate **59** is pivotally mounted an arm **60** carrying at its end an adjusting screw **61**. The arm **60** may be rotated between the active position shown in Fig. 12, and in full lines in Fig. 17, wherein the screw **61** is underneath and abuts against the under side of bar **54**, and a retracted position shown in dotted lines in Fig. 17, wherein the screw **61** is moved out of the path of downward movement of the bar **54**. The path of movement of the edge of bar **54** is indicated by the dotted line **54***a* in Fig. 17. The arm **60** is provided with abutment surfaces **60***a* and **60***b* which engage the side of the plate **59** to limit the movement of arm **60** respectively at its active and retracted positions. The arm **60** is attached to the plate **59** by means of a pin **62** which is threaded into plate **59** and is provided with a screw slotted head on its outer end. The arm **60** is slotted, as shown at **60***c* in Fig. 13. The slot extends inwardly from the end of arm **60** which receives the pin **62**. The aperture for pin **62** is made slightly smaller than the pin so that the sides of the slot yieldably and frictionally engage the pin. Consequently the arm **60** is frictionally retained in either its active or retracted positions.

The setting of screw **61** determines the angle between the bar **54** and the surface of the steel roller **14**, thereby determining the pressure with which the spring steel blade **75** is forced against the surface of the roller **14**.

When the arm **60** is in its retracted position, the bar **54** and the doctor blade **75** may be swung downwardly, away from roller **14**, for the purpose of cleaning the blade, or the bar **54** and blade **75** may be removed completely, as described above, for replacement of the blade.

It should be observed that the movement of the arm **60** between its operating and its retracted positions does not disturb the setting of the screw **61**, not does it disturb the setting of screw **51**.

Roller driving mechanism

The shaft **15** carries on its outer end a gear **63**, and shaft **16** carries on its outer end a gear **64**. The gears **63** and **64** are driven by a gear train best seen in Fig. 2. This gear train includes a driving gear **65**, meshing with a gear **66** which in turn drives a gear **67**. Gear **67** is fixed on the same shaft **68** with a gear **69**. Gear **67** also meshes with a gear **70** which drives the gear **63** on the shaft **15** of roller **12**. Gear **69** meshes with a gear **71** which drives the gear **64** on the shaft **16** of roller **14**. The gears are driven from the same prime mover which drives the cylinder **1** of the press. It is important, for good operation of the doctor blade mechanism, that the rubber roller **12** move in the same direction as the printing plate **13**, but at a slower speed. The linear speed of the roller **12** at its point of contact with the plate should be from 50 to 90% of the plate speed. The steel roller **14** at its point of contact with the rubber roller **12** moves in the opposite direction to the rubber roller and at a linear speed equal to 25 to 27% of the rubber roller speed.

Best results have been secured by driving the rubber roller at a linear surface speed of 76.6% of the plate surface speed and by driving the steel roller at a linear surface speed of 35.6% of the rubber roller surface speed.

While I have shown and described a preferred embodiment of my invention, other modifications thereof will readily occur to those skilled in the art and I therefore intend my invention to be limited only by the appended claims.

I claim:

1. Apparatus for removing ink from a printing plate, comprising a first roller having a surface of yieldable material running in contact with said plate to remove therefrom a substantial proportion of the ink thereon, non-rotating bearing means for said roller, means for adjusting said non-rotating bearing means through a first predetermined range of positions toward and away from the path of movement of the plate to vary the contact pressure between the roller and the plate, a second roller having a surface of hard material running in contact with said yieldable-surfaced roller and effective to remove therefrom a substantial proportion of the ink thereon, second non-rotating bearing means for said hard surfaced roller, means fixed to the non-rotating bearing means for the first roller for movement therewith and supporting the second non-rotating bearing means for the second roller, means in said supporting means for adjusting the non-rotating bearing means for the second roller through a second predetermined range of positions toward and away from the first roller to vary the contact pressure between the rollers without disturbing the contact pressure between the first roller and the plate, and means in said supporting means for moving the non-rotating bearing means for said second roller from said second range of positions to a position substantially outside said range without disturbing the setting of either of said adjusting means.

2. Apparatus for removing the ink from a printing plate, as defined in claim 1, including driving means for each of said rollers comprising, for each roller, a shaft supporting the roller, a driven gear fixed on the shaft, and a driving gear mounted for rotation about a stationary axis and mating with the driven gear, the non-rotating bearing means for each roller supporting the respective shafts; each said adjusting means being effective to move its associated bearing means and shaft along a path such that the point of contact between its associated gears moves substantially along the pitch line of the driving gear.

3. In ink transferring apparatus, first and second rollers running together to transfer ink from one to the other, first and second parallel shafts, each supporting one of said rollers, first and second bearing means for said shafts, each said bearing means comprising a non-rotating bearing member, a first yoke pivoted on one of said bearing members for rotation about a pivot axis perpendicular to the plane defined by the axes of said shafts and spanning the other bearing member, a pivot pin extending through said first yoke at the end thereof remote from said one bearing member, and parallel to said pivot axis, a second yoke pivoted on the other of said bearing members for rotation about a second pivot axis parallel to the pivot axis of the first yoke, said second yoke extending from said second pivot axis toward the pivot pin, a screw member journaled in said pivot pin and threaded in said second yoke and effective upon rotation to shift said second yoke with respect to said first yoke and thereby to shift one of said bearing members with respect to the other along a straight path and to adjust the contact pressure between said rollers, said pivot pin being shiftable about the pivot axis of the first yoke between a first position wherein said yokes lie in substantially the same plane and the rollers are in contact, and a second position wherein the yokes lie in different planes and the rollers are separated, and means for shifting said pivot pin and thereby shifting said one bearing member along said straight path to move said rollers in and out of contact without disturbing the position of said screw member.

4. Ink transferring apparatus as defined in claim 3, in which said first and second positions of the pivot pin are located on opposite sides of the line of centers of said axes, so that the pressure between said rollers is

increased as the pivot pin passes said line of centers, and said pivot pin is held locked in its first position by the over-center action of said yokes.

5. Ink removing apparatus, comprising a roller from which ink is to be removed, a rotatable shaft supporting said roller, a doctor blade for scraping engagement with said roller to remove ink therefrom, bearing means for said roller supporting shaft comprising a non-rotating bearing member, clamp means for supporting said doctor blade, pivot means mounted on said bearing member for supporting said clamp means for rotation about an axis parallel to the axis of said roller, a swingable arm mounted on said bearing member and rotatable between an active position in the path of rotatation of said clamp means and a retracted position spaced from said path, means for locking said arm in either of its positions, and a stop member adjustably mounted on said arm and effective when said arm is in its active position to limit the angular movement of said clamp means and thereby to establish the angular position of the doctor blade with respect to the roller.

6. Ink removing apparatus as defined in claim 5, including means in said pivot means for adjusting the position of said pivot axis toward and away from said roller.

7. Ink transferring apparatus, comprising two cylindrical members having ink receiving surfaces, bearing means supporting said members for rotation about parallel axes with said surfaces in contact to transfer ink between the surfaces, means for adjusting the bearing means for one of said members through a limited range of positions toward and away from the axis of the other member to vary the contact pressure between the members, common driving means for rotating said members at predetermined relative speeds, said driving means comprising, a driven gear fixed to said one member for rotation therewith, a driving gear connected to said other member for concurrent rotation therewith and mounted for rotation about a stationary axis parallel to the axes of said members and laterally offset from the plane containing the axes of said members by an amount substantially equal to the sum of the radii of the pitch circles of the driving and driven gears, said driving gear thereby meshing with said driven gear, said adjusting means being effective to move said one member and said driven gear so as to shift the axis thereof along said plane, so that, for said limited range of positions, the point of contact between the gears moves substantially along the pitch line of the driving gear and substantially no lost motion is introduced between the gears by the adjustment.

8. Ink transferring apparatus as defined in claim 7, in which one of said cylindrical members is a printing plate and the other is a roller having a surface of yieldable material adapted upon contact with said plate to remove therefrom a substantial proportion of the ink thereon.

9. Ink transferring apparatus as defined in claim 7, in which one of said cylindrical members is a roller having a surface of yieldable material and the other is a roller having a surface of hard material and adapted upon contact with said yieldable-surfaced roller to remove therefrom a substantial proportion of the ink thereon.

10. Apparatus for removing ink from a printing plate comprising a roller having a surface of yieldable material running in contact with said plate to remove therefrom a substantial proportion of the ink thereon, means to adjust the roller through a first predetermined range of positions toward and away from the plate to vary the contact pressure between the plate and the roller, means for moving the roller between said range of positions where it engages the plate and a retracted position spaced from said range without disturbing the setting of said contact pressure adjusting means, a roller having a surface of hard material running in contact with said yieldable surfaced roller and effective to remove therefrom a substantial proportion of the ink thereon, means to adjust the hard surfaced roller through a second predetermined range of positions toward and away from the yieldable surfaced roller to vary the contact pressure between the rollers, means for moving the hard surfaced roller between said second range of positions where it engages the yieldable surfaced roller and a retracted position spaced from said second range without disturbing the setting of the hard surfaced roller adjusting means and without moving the yieldable surfaced roller, and means for removing ink from the surface of the hard surfaced roller.

11. Apparatus as defined in claim 10 for removing ink from a printing plate in which the means to adjust the contact pressure between the plate and the roller does not affect the contact pressure between the yieldable surfaced and hard surfaced rollers, and in which the means to adjust the contact pressures between the rollers does not affect the contact pressure between the plate and the yieldable surfaced roller.

12. Apparatus for removing ink from a printing plate, comprising a first roller having a surface of yieldable material running in contact with said plate to remove therefrom a substantial proportion of the ink thereon, non-rotating bearing means for said roller, means for adjusting said non-rotating bearing means through a first predetermined range of positions toward and away from the path of movement of the plate to vary the contact pressure between the roller and the plate, a second roller having a surface of hard material running in contact with said yieldable surfaced roller and effective to remove therefrom a substantial proportion of the ink thereon, second non-rotating bearing means for said hard surfaced roller, means fixed to the non-rotating bearing means for the first roller for movement therewith and supporting the second non-rotating bearing means for the second roller, means in said supporting means for adjusting the non-rotating bearing means for the second roller through a second predetermined range of positions toward and away from the first roller to vary the contact pressure between the rollers without disturbing the contact pressure between the first roller and the plate, and means in said supporting means for moving the non-rotating bearing means for said first roller from said first range of positions to a position substantially outside said range without disturbing the setting of either of said adjusting means.

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