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Abler

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[54] **INK RECOVERY MEANS FOR PRINTING PRESS**

[75] Inventor: **Norman C. Abler,** Menomonee Falls, Wis.

[73] Assignee: **Faustel, Inc.,** Butler, Wis.

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[52] **U.S. Cl.** **101/350,** 101/157, 101/169, 101/364

[51] **Int. Cl.** **B41f 31/04,** B41f 31/20

[58] **Field of Search** 101/157, 169, 350, 101/363, 364, 366, 340, 344, 347, 355, 356, 153–155; 220/8; 211/153

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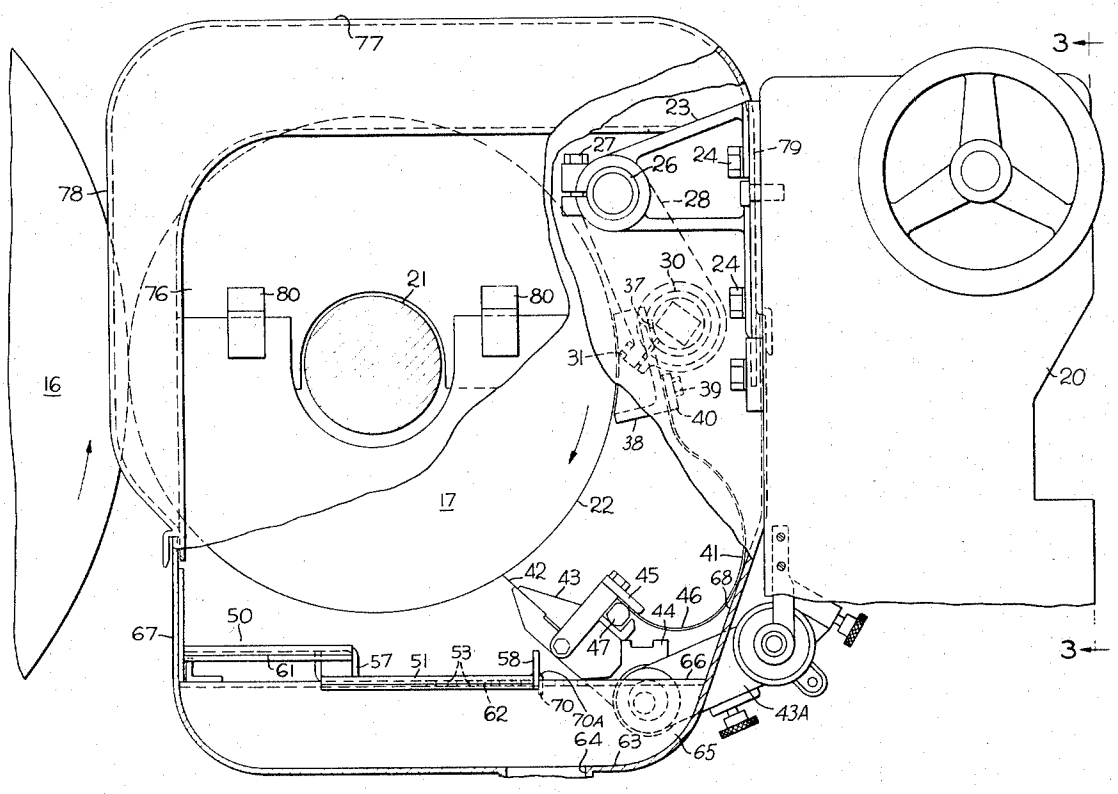
Primary Examiner—Edgar S. Burr
Assistant Examiner—William Pieprz
Attorney—James E. Nilles

[57] **ABSTRACT**

A printing press comprises an adjustable ink applicator assembly for applying ink to a roll and an adjustable doctor blade assembly, including a doctor blade, located below the ink applicator assembly for removing excess ink from the roll. Excess ink recovery means are provided by an adjustable curtain connected between the two assemblies to catch run off ink. The excess ink recovery means also comprise ink tray means below the roll and ink drain housings at the ends of the roll. The ink tray means comprises a stationary tray and an overlapping movable tray which is adjacent or engageable with the adjustable doctor blade assembly. Each ink drain housing comprises a bottom portion having a drain and four upstanding side walls. The inner side wall supports the trays. Runoff ink enters the housings from the ends of the curtain and from the ink tray means.

5 Claims, 5 Drawing Figures



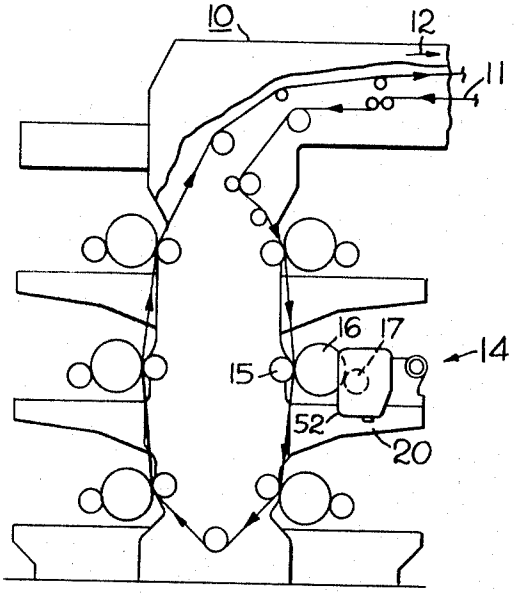

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FIG. 1

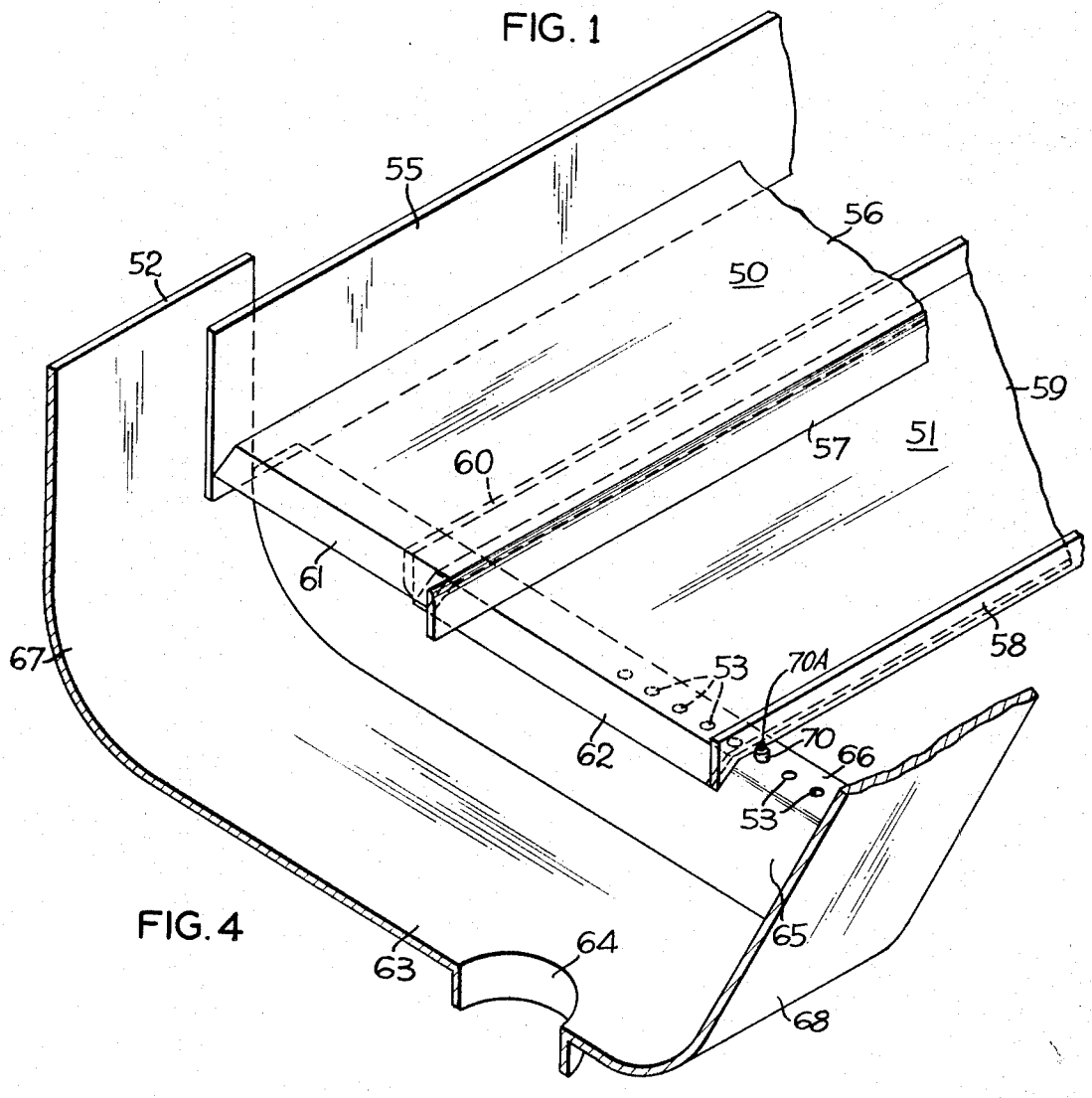
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FIG. 4

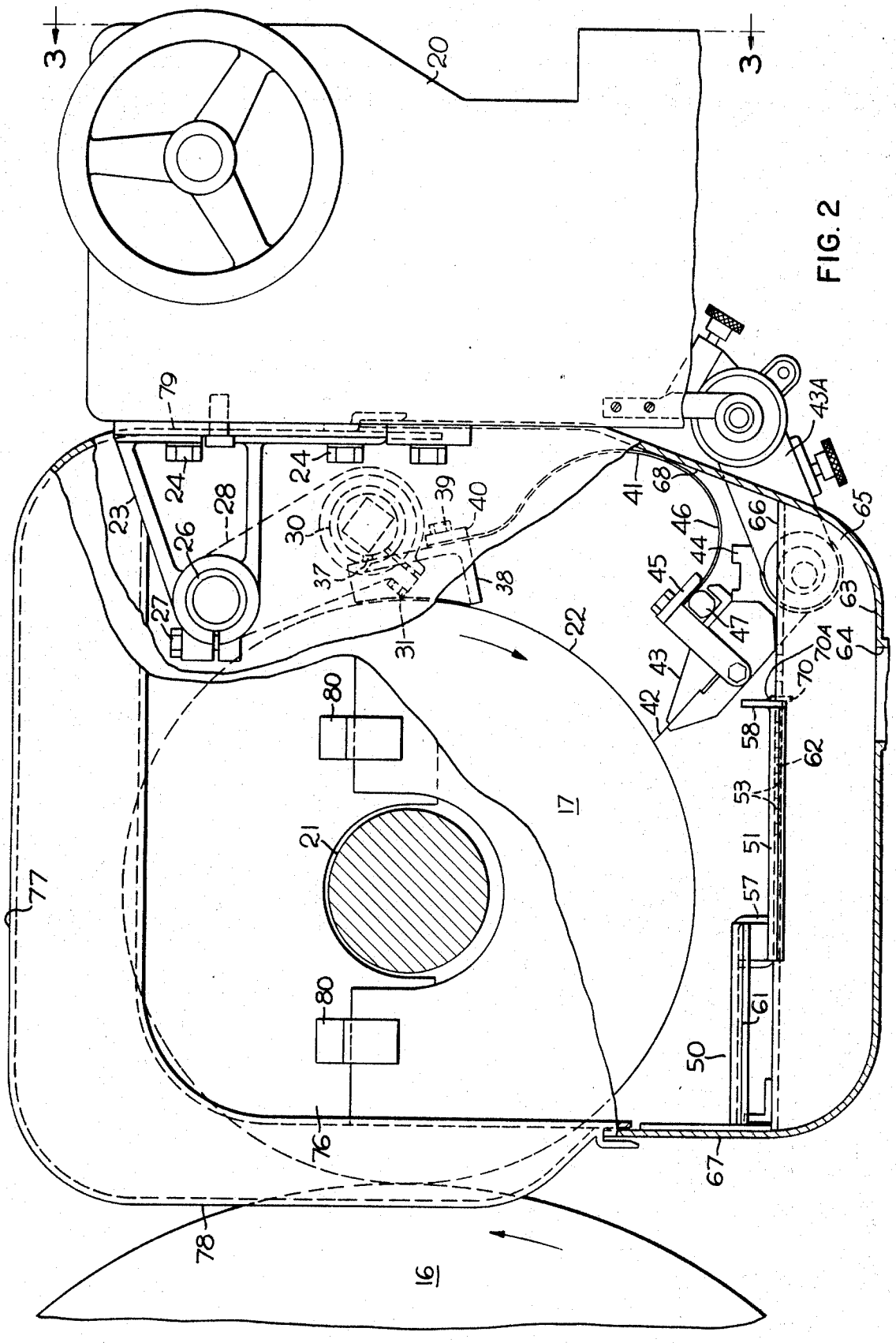
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FIG. 2

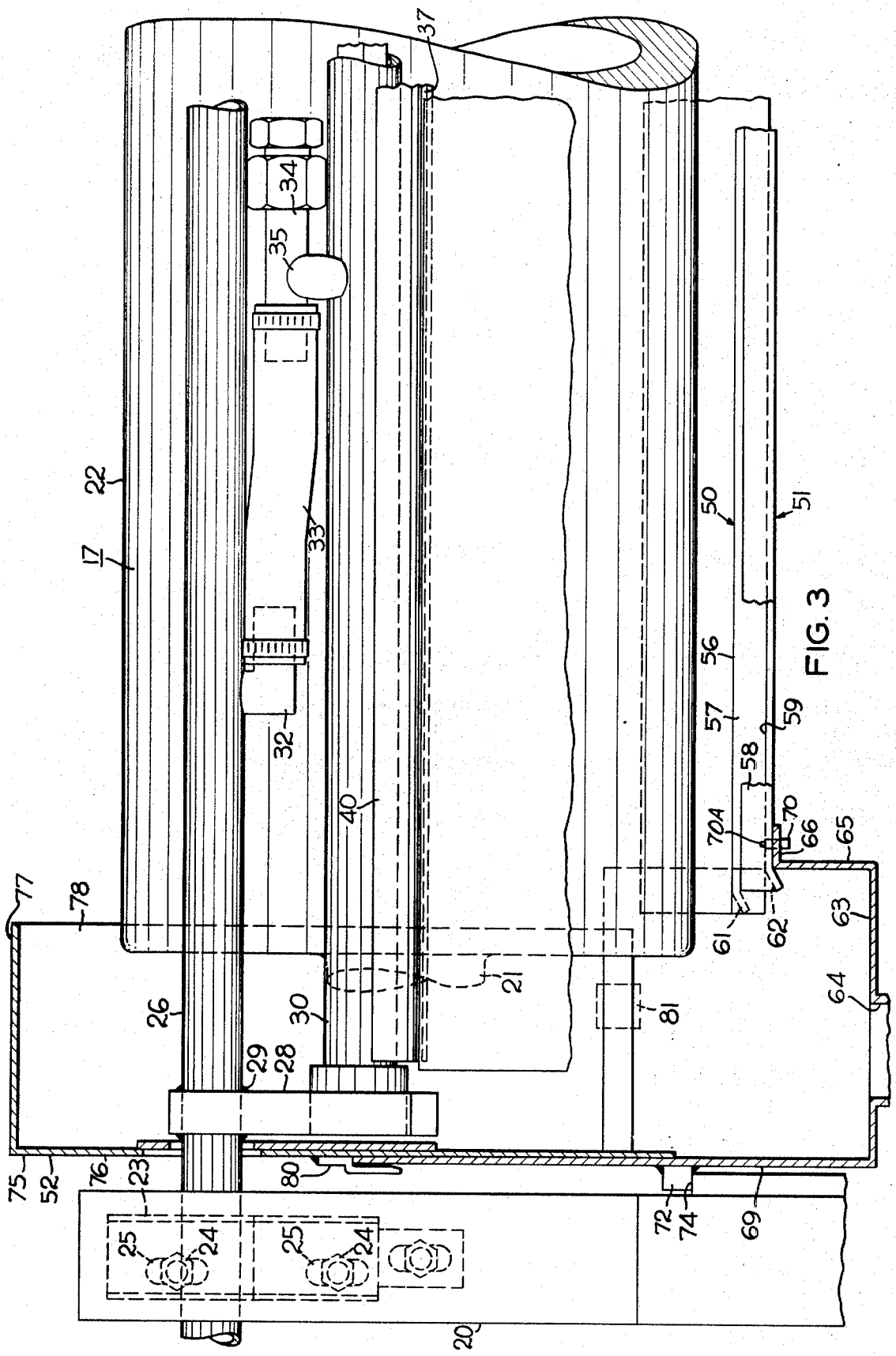
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FIG. 3

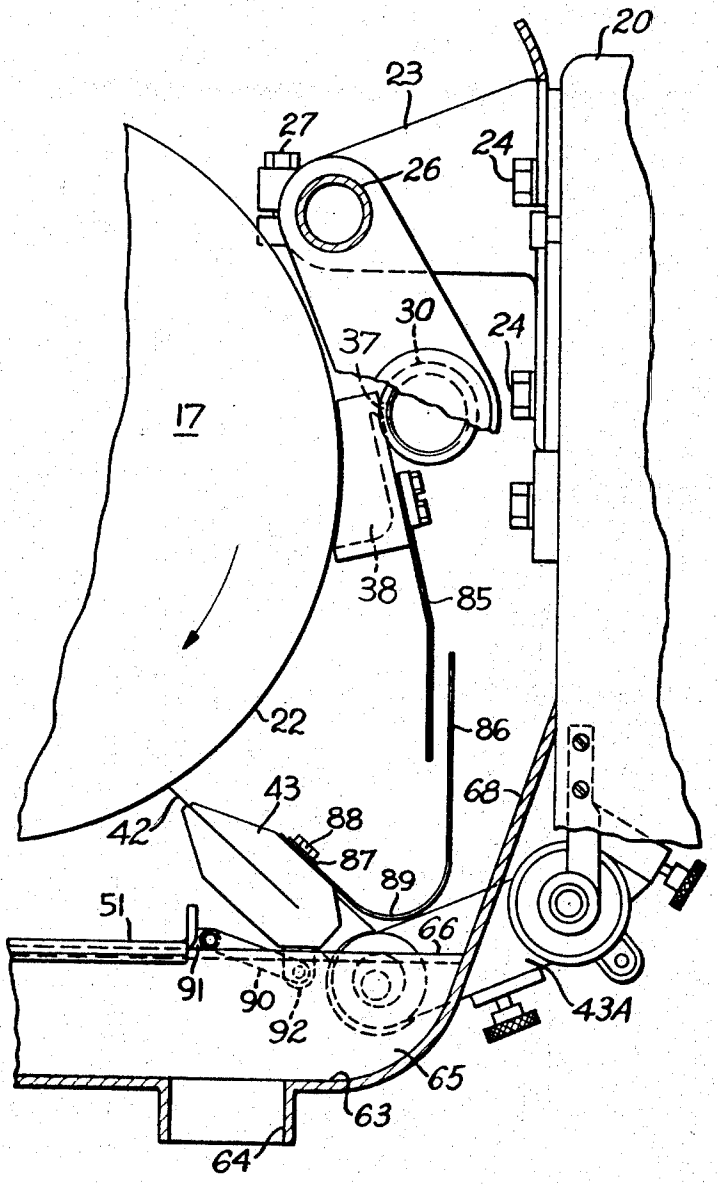
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FIG. 5

INK RECOVERY MEANS FOR PRINTING PRESS

BACKGROUND OF THE INVENTION

1. Field of Use

This invention relates generally to ink fountains for web printing presses, and particularly, to excess ink recovery means therein.

2. Description of the Prior Art

Web printing presses, such as offset or direct rotogravure and flexomatic type presses, employ an engraved or etched roll to which ink is applied by an ink applicator assembly and from which excess ink is removed by a doctor blade assembly, including a doctor blade. Excess ink recovery means, usually in the form of a simple trough, is disposed below the roll, the ink applicator assembly and the doctor blade assembly to catch excess ink for delivery through a drain, back to the ink applicator means. Usually, the press is designed so that rolls of differing diameters can be used and, therefore, the ink applicator assembly and doctor blade assembly are adjustably movable to accommodate different sized rolls. Typically, in the prior art, it was the practice to provide an ink recovery trough large enough to accommodate the largest sized roll used and to accommodate the ink applicator and doctor blade assemblies in their fully extended positions. In all such presses, space for components is at a premium, but especially in presses where the web moves vertically and where the ink fountains are vertically arranged and wherein an adjustable doctor blade assembly is located below an adjustable ink applicator assembly and in close or even interfering relationship with the ink recovery means.

SUMMARY OF THE PRESENT INVENTION

In accordance with the present invention there is provided a web printing press having a downside engraved or etched roll mounted for rotation on the press frame and to which ink is applied and from which excess ink is removed and recovered.

The roll is provided with an adjustably movable ink applicator assembly and with an adjustable movable doctor blade assembly, including a doctor blade for engagement with the roll, located therebelow. Excess ink recovery means are provided and comprise an adjustable curtain, an ink tray means, and an ink drain housing at least at one end of the roll. The curtain is located between the two assemblies to confine ink flow and permits adjusting movement of either or both assemblies. A portion of the curtain forms an open-ended trough. The ink tray means comprises two relatively movable overlapping ink trays, one stationary and the other movable and adjacent the adjustably movable doctor blade assembly. The ink drain housing, which is mounted on the press frame, comprises a bottom portion with a drain therein, upstanding walls, and a removable cover. One end of the ink tray means and one end of the trough formed by the curtain extend into the ink drain housing. The inner wall of the housing affords mechanical support for the ink tray means. Excess ink removed by the doctor blade is supplied to the ink drain housing by the curtain and ink tray means and is drained therefrom and recirculated to the ink applicator means.

In one embodiment of the invention the adjustable curtain takes the form of a single piece flexible member made of tempered stainless steel sheet metal, plastic or the like. In another embodiment, the adjustable curtain

is formed of two overlapping members of rigid sheet metal or plastic. Also, in both embodiments of the invention, means are provided to limit travel or movement of the movable ink tray. In one embodiment such means comprise a projection, such as a pin, on the movable ink tray which engages one of a plurality of positioning holes on a flange on the inner wall of the ink drain housing. Furthermore, in another embodiment of the invention, the movable ink tray is attached to and adjustably movable with the doctor blade assembly and this also provides a means to limit travel of the movable ink tray.

Excess ink recovery means in accordance with the present invention are especially well-adapted for use in presses where the web moves vertically and wherein the roll being inked has the ink applicator assembly above the doctor blade assembly but are not so limited in use. Furthermore, the ink recovery means are well adapted for use in presses of the aforesaid character where either the doctor blade assembly, the ink applicator assembly or both are relatively movable for adjustment with respect to the roll or each other. The ink recovery means ensure that excess runoff ink is closely confined to where it cannot be slung or leaked to other portions of the press or to the web being printed. The ink recovery means also enable a very compact and versatile arrangement of press components. Other advantages will hereinafter appear.

DRAWINGS

FIG. 1 is a side elevational view in schematic form of a flexographic type printing press with a web to be printed therein;

FIG. 2 is an enlarged end view partly in section of one engraved roll and the ink fountain therefor of the press shown in FIG. 1;

FIG. 3 is a side view, partly in section, of one end of the roll and ink fountain taken on line 3—3 of FIG. 2;

FIG. 4 is a perspective view of one end of the ink tray means and ink drain housing shown in FIGS. 1, 2 and 3, with portions of the housing broken away to show interior details, and

FIG. 5 is a view, similar to FIG. 2, showing one end of an alternate form of ink curtain and showing the ink tray means attached to the doctor blade assembly.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring to FIG. 1, the numeral 10 designates a printing press, such as an offset gravure or flexographic press, in accordance with the invention and having a web 11 to be printed therein which is movable in the direction of the arrows 12. In FIG. 1, the right side of press 10 is the downside and the left side is the upside. Press 10 is shown as having six printing stations, three downside and three upside. Downside printing station 14, which is typical of the two other downside stations (and of the three upside stations with certain modifications) is hereinafter described in detail. Station 14 comprises a steel backup roll 15 in contact with the rear side of web 11, a printing roll 16 preferably formed of rubber or the like for transfering an ink image to the front side of the web; and an engraved or etched metal roll 17 which transfers the ink to printing roll 16. The rolls 15, 16 and 17 are mounted on a support frame 20 of press 10 for rotation in the direction of the arrows shown thereon in FIGS. 1 and 2. The rolls are under-

stood to be driven by suitable conventional drive means not shown.

FIGS. 2, 3 and 4 show the structural features at one end of station 14 and the following description deals only with that one end. However, it is to be understood that the other end of station 14 is similarly constructed.

As FIGS. 2 and 3 show, roll 17 comprises a shaft 21 which adapts it for rotation on press frame 20. The surface 22 of roll 17 is suitably etched to provide ink cells thereon. Roll 17 rotates clockwise with respect to FIGS. 1 and 2.

As FIGS. 2 and 3 show, an adjustable ink applicator means or assembly is provided to apply ink to the ink cells on the surface 22 of roll 17 and comprise a support bracket 23 which is rigidly secured to frame 20 by bolts 24 which extend through slots 25 in the bracket and permit vertical adjustment. Bracket 23 supports a hollow shaft or tube 26 through which a supply of ink flows. Ink supply tube 26 is rotatably adjustable with respect to the bracket by means of a bolt 27 when the latter is loosened. An extension arm 28 is rigidly secured to tube 26, as by welding at 29, and affords support for the end of a hollow ink feed tube 30. Ink feed tube 30 is rotatably adjustable with respect to arm 28 by means of a bolt 31 when the latter is loosened. Ink is transferred from ink supply tube 26 to ink feed tube 30 by means of an outlet pipe 32 on supply tube 26 which connects to a flexible hose 33, which, in turn connects to a rigid tube 34. Rigid tube 34 is connected to ink feed tube 30 by an inlet pipe 35 therein which also mechanically supports tube 35. Ink feed tube 30 is provided on its front side, i.e., that side facing roll 17 with a slot 37 through which ink is supplied to the surface 22 of roll 17. An ink guide trough 38 is provided on tube 30 below slot 37 to assist in proper application of ink to roll 17. Guide trough 38 comprises an L-shaped portion which defines a trough or well in which a supply of ink from slot 37 builds up. Its purpose is to prevent entrainment of air bubbles in the ink film applied to surface 22 of roll 17 which would otherwise tend to occur if ink were applied directly from slot 37 over a conventional lip to the rapidly moving surface of the roll. Guide trough 38 is provided on its rearside with elongated clamping means 40, including bolts 39, by means of which the top edge of an ink curtain means 41 is rigidly secured thereto, including bolts 39. Ink curtain 41, which is part of the excess ink recovery means, takes the form of a flexible sheet of metal, such as tempered stainless steel, or plastic. The bottom edge of ink curtain 41 is rigidly secured to the doctor blade assembly hereinafter described.

As FIGS. 2 and 3 further show, an adjustable doctor blade means or assembly is provided to remove excess ink from the surface 22 of roll 17 and comprises an elongated thin doctor blade 42 which is rigidly but releasably clamped between the jaws of a doctor blade clamp 43. Clamp 43 is rigidly mounted on a clamp holder 44 which is adjustably mounted on frame 20 of press 10 by mounting means 43A. It is to be understood that clamp holder 44 is mounted so that it can be universally moved upwardly and downwardly and to the right and left of the position in which it is shown in FIG. 2 so as to locate blade 42 at various peripheral positions and angles with respect to roll 17. The bottom edge of ink curtain 41 is rigidly but releasably secured by entrapment between a clamping lip 45 and an elongated rod 47. Curtain 41 assumes a curved or bowed shape which defines an open-ended trough 46 behind clamp 43. Excess ink is scraped or wiped from roll 17 by doctor blade 42 and eventually an accumulation of ink tends to back up into trough 46 formed by curtain 41.

Referring to FIGS. 1, 2, 3 and 4, the excess ink recovery means further include an ink tray means, comprising two relatively movable ink trays 50 and 51, and a pair of ink drain housings 52, only one of which is shown in the drawings. Tray 50 is stationary and has a side portion 55, a bottom portion 56, and a downwardly depending portion 57.

Tray 51 is adjustably movable to accommodate different positions of the doctor blade assembly and has a side portion 58, a bottom portion 59, and an upwardly extending portion 60. The trays 50 and 51 are arranged so that the bottom portions 56 and 59, respectively, thereof are in overlapping relationship with each other. The downwardly depending portion 57 of tray 50 is above the bottom portion 59 of the other tray 51 and with the upwardly extending portion 60 of tray 51 is below the bottom portion 56 of tray 50.

Clamp 43 of the doctor blade assembly is adjustably movable with respect to roll 17 and the upwardly extending side portion 58 of tray 51 is located below and closely adjacent clamp 43. The ends 61 and 62 of the trays 50 and 51, respectively, slope downwardly to facilitate ink runoff.

The ink trays 50 and 51 are supported at each end by the ink drain housings 52. Ink drain housing 52 comprises a bottom or lower portion 63 having a drain hole 64 therein and an upwardly extending inside or inner wall portion 65 having a flange 66 which supports the trays 50 and 51. Ink drain housing 52 also comprises upwardly extending walls 67 and 68 and an outside wall 69. Ink drain housing 52 is supported on frame 20 of press 10 by a bracket or projection 72 which is welded to outside wall 69 and rests on a shoulder 74 on frame 20.

Means are provided to limit movement of adjustably movable tray 51 with respect to tray 50 and comprise a positioning or stop pin 70 secured as by welding at 70A to the side portion 58 of the tray 51 and extends past the bottom of tray 51. Pin 70 is adapted to engage any one of a series of positioning holes 53 in a flange 66 at the top edge of upwardly extending wall portion 65 of ink drain housing 52.

Ink drain housing 52 further comprises a removable top cover 75 which comprises an outside wall 76, a top wall 77 and walls 78 and 79. Outside wall 76 of cover 75 is provided with clips 80 which are adapted to engage the top edge of outside wall 69 and wall 78 of cover 75 is provided with a lip 81 which is adapted to engage the top edge of wall 67 of ink drain housing 52. The clips enable cover 75 to be supported on the lower section of drain housing 52.

The embodiment of the invention shown in FIGS. 2, 3 and 4 operates as follows. The ink applicator and doctor blade assemblies are properly positioned with respect to roll 17. Movable tray 51 is also moved to proper position, as shown in FIG. 2, with respect to clamp 43, i.e., under and adjacent the clamp. During press operation, excess ink applied to surface 22 of roll 17 is removed by doctor blade 42 and gradually backs up in trough 46 of curtain 41 from whence it flows into the ink drain housings 52 at the opposite ends of roll 17. Any ink draining into the trays 50 and 51 acciden-

tally or during a roll or blade change also flows off the ends thereof into the ink drain housings **52.** Ink is drained from the housings **52** through drain **64** and is ultimately returned to the ink supply for the ink applicator assembly.

While it is preferable to use two ink drain housings **52,** it is within the scope of the present invention that only one such housing be used and that the trays **50** and **51** and the trough portion **46** of curtain **41** be slanted or sloped in the direction of the single housing used.

Referring to FIG. **5,** there is shown a portion of another embodiment of the invention wherein the adjustable ink curtain means is formed of two overlapping separate ink curtain members or components **85** and **86** which, for example, may be formed of rigid sheet metal or plastic. The top edge of member **85** is secured to the rear of the ink applicator assembly in the same manner as curtain **41** hereinbefore described. The lower edge of member **86** is secured to the top of doctor blade clamps **43** by a lip **87** and suitable bolts **88.** Member **86** is shaped to provide a trough **89** for receiving ink. It is to be understood that the members **85** and **86** are dimensioned so as to overlap in all operating positions of the ink applicator and doctor blade assemblies as the applicator and blade are moved relative to each other.

FIG. **5** also shows that movable ink tray **51** is not provided with a positioning pin **70,** but instead, is pivotably connected to clamp **43** so as to be in proper relationship with respect thereto and adjustably movable therewith. The means provided to accomplish this comprise links, such as link **90,** which are pivotably attached to brackets, such as bracket **91,** on tray **51** and which are also pivotably attached to brackets, such as bracket **92,** on clamp **43.** Preferably, two links **90** are provided, one at each end of the elongated clamp **43** and the elongated tray **51.** The links **90** maintain tray **51** stationary when clamp **43** is stationary. The links **90** permit some relative adjusting movement of doctor blade clamp **43** with respect to tray **51** so that proper tray position is not disturbed. However, extensive adjusting movement of clamp **43** is accompanied by appropriate corresponding movement or positioning of tray **51.**

It is to be understood that, aside from the differences described hereinbefore, the embodiment shown in FIG. **5** operates in substantially the same manner as that shown in FIGS. **2, 3** and **4.** Furthermore, the embodiment shown in FIG. **5** may be used with one or both ink drain housings **52.**

I claim:

1. In a printing press:

a supporting frame;

a roll mounted for rotation on said frame;

an ink applicator assembly adjacent said roll for applying ink to the surface of said roll;

means for adjusting the position of said ink applicator assembly with respect to said roll;

a doctor blade assembly mounted on said frame adjacent said roll and including a doctor blade engageable with the surface of said roll and located below said ink applicator assembly for wiping excess ink from said roll;

means for adjusting the position of the doctor blade assembly with respect to said roll;

curtain means connected to and between said ink applicator assembly and said doctor blade assembly, said curtain means defining an open-ended trough for collecting excess ink wiped from the surface of said roll by said doctor blade, said curtain means being movable in response to movement of said ink applicator assembly relative to said doctor blade assembly to accommodate different positions of said assemblies;

ink tray means below said roll and below a portion of said doctor blade assembly, said ink tray means being movable to afford clearance for said doctor blade assembly when the latter is moved to various operating positions, said ink tray means comprising a pair of trays which are relatively movable with respect to each other, one of said trays having an upwardly extending side portion, a bottom portion, and a downwardly depending portion, the other of said trays having an upwardly extending side portion, a bottom portion, and an upwardly extending portion, said trays being arranged so that the bottom portions thereof are in overlapping relationship with the downwardly depending portion of said one tray above the bottom portion of the other tray and with the upwardly depending portion of the other tray below the bottom portion of said one tray;

an ink drain housing mounted on said frame at least at one end of said roll and having a bottom portion below said ink tray means for receiving run-off ink from said ink tray means and from an open end of said trough defined by said curtain means, said bottom portion having a drain hole therein, said ink drain housing affording support for said ink tray means;

and tray positioning means connecting said ink tray means to a relatively stationary portion of said press for maintaining said ink tray means in a predetermined position with respect to said doctor blade assembly.

2. A printing press according to claim **1** wherein said bottom portion of said ink drain housing comprises an upwardly extending wall portion for supporting said ink tray means, said wall portion being a relatively stationary portion of said press and being provided with at least one pin-engaging hole therein, and wherein said tray positioning means comprises a pin on the movable one of said trays for engagement with said pin-engaging hole.

3. A printing press according to claim **1** wherein said bottom portion of said ink drain housing comprises an upwardly extending wall portion for supporting said ink tray means, and wherein said tray positioning means comprises a link connected to said doctor blade assembly, the latter being a relatively stationary portion of said press when in a desired predetermined position with respect to said roll.

4. A printing press according to claim **2** wherein said curtain means comprises a flexible curtain.

5. A printing press according to claim **3** wherein said curtain means comprises two overlapping components relatively movable with respect to each other, one attached to said ink applicator assembly and the other attached to said doctor blade assembly.

* * * * *