

United States Patent

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Continuation of application Ser. No.
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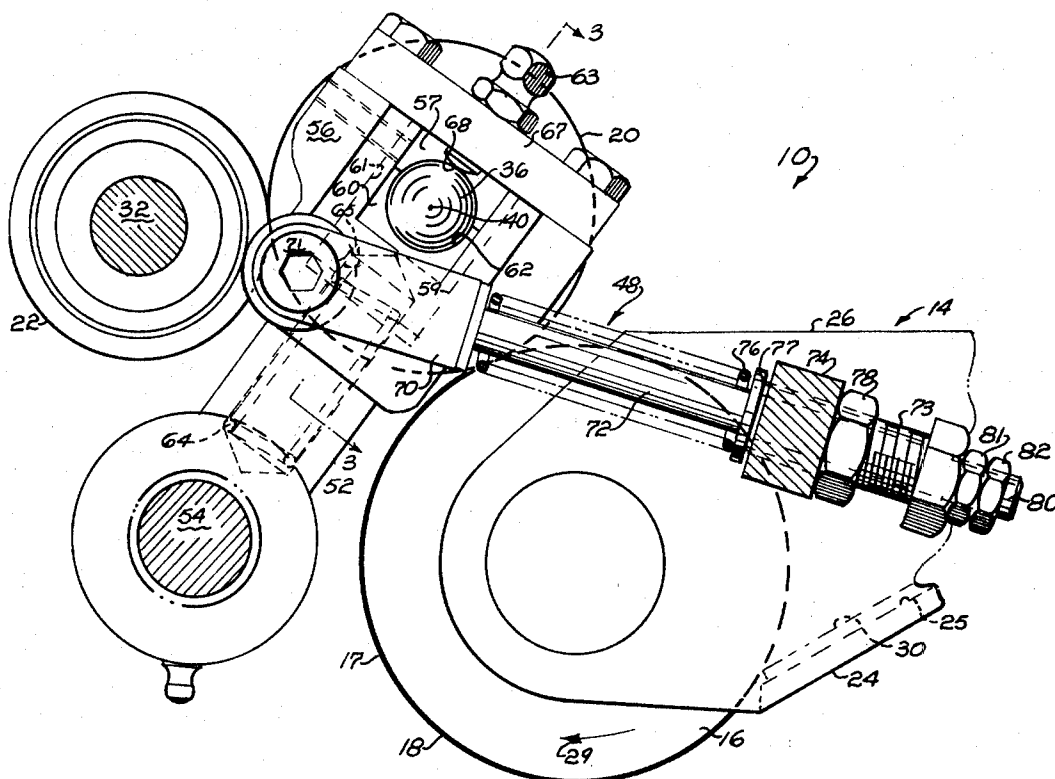
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[54] LIQUID-HANDLING MECHANISM 10 Claims, 7 Drawing Figs.

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118/243
[51] Int. Cl. B41125/16;
B41125/18; B41f31/12
[50] Field of Search. 29/121,
110, 129.5; 118/262, 243, 240; 101/348—351,
148; 308/29, 55, 72

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ABSTRACT: A liquid-handling mechanism in which a ductor roll receives liquid from a fountain roll and transfers it to a distributing or transfer roll. The ductor roll is maintained in peripheral engagement with the distributing roll and has an inner body portion concentric with respect to its axis of rotation and a covering or sleeve which has an outer surface eccentric with respect to the axis of rotation of the ductor roll so that the ductor roll moves toward and from the fountain roll during each revolution thereof. Also, the ductor roll is supported by an adjustable support assembly for the ductor roll which enables the ductor roll to be adjustably positioned laterally toward and from the fountain roll while maintaining a pressure relationship with the transfer roll.



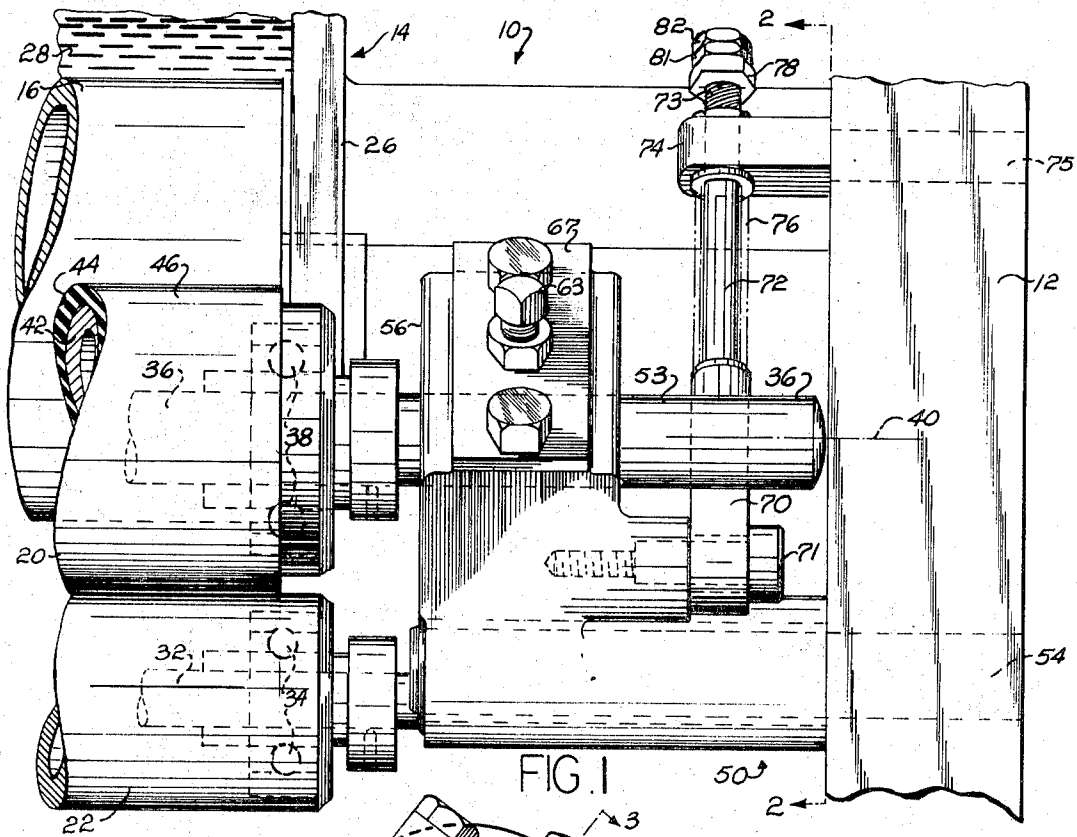


FIG. 1

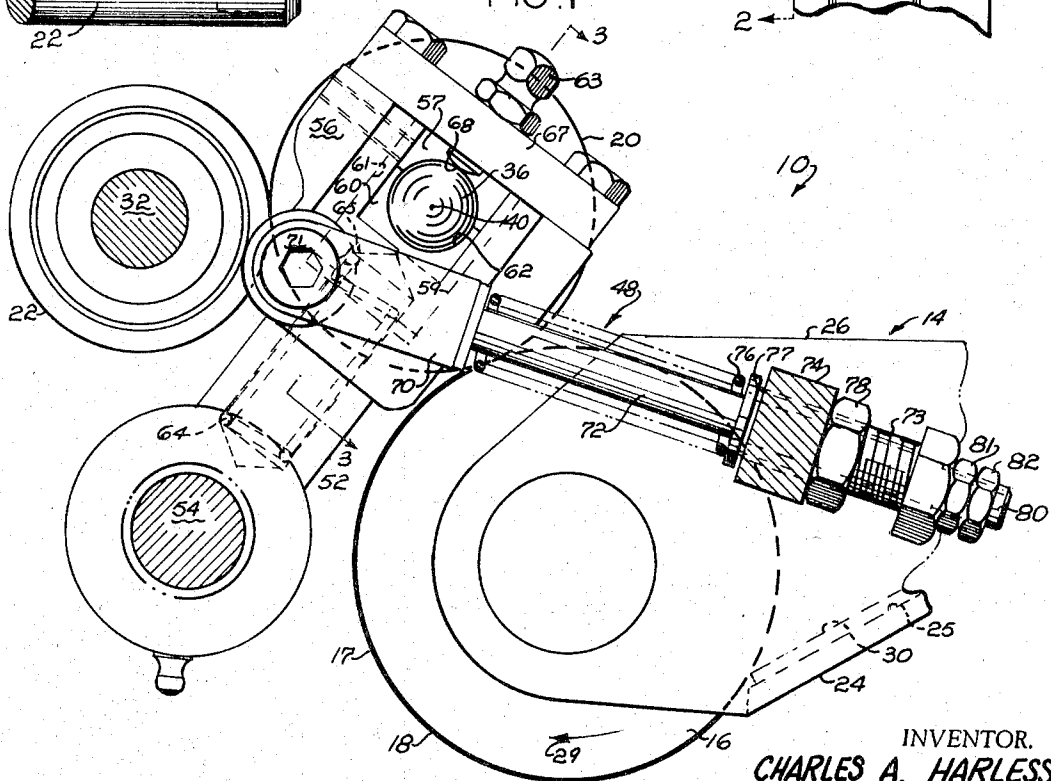


FIG. 2

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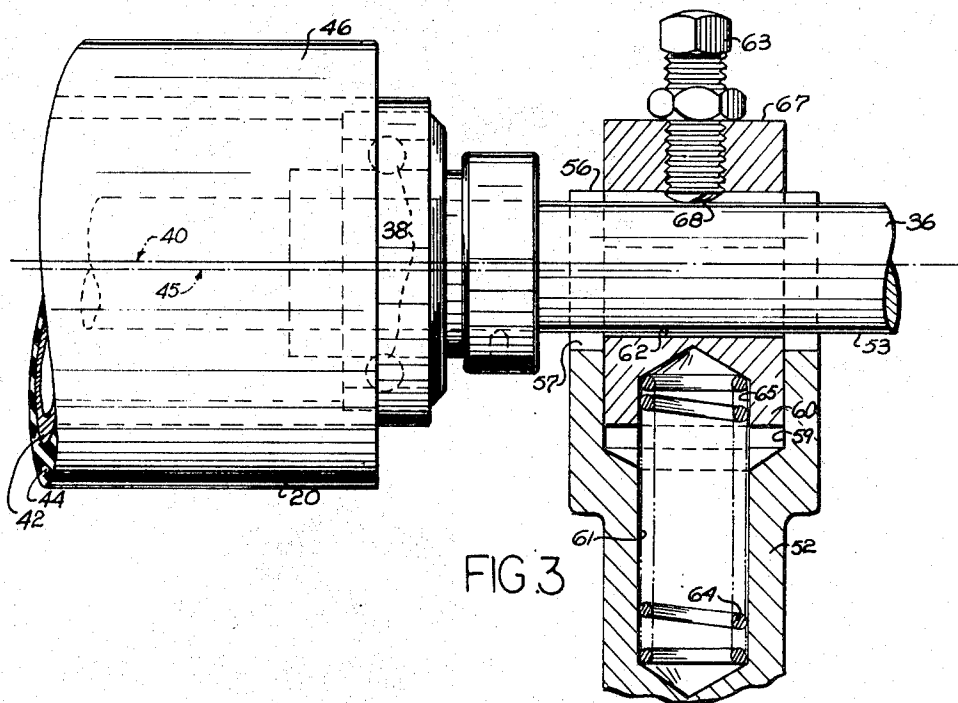


FIG. 3

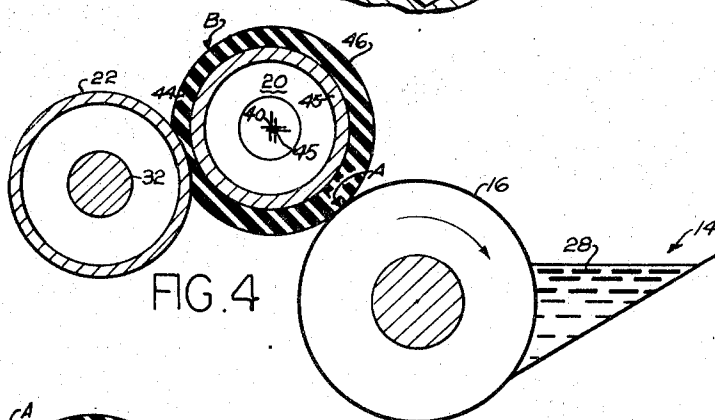


FIG. 4

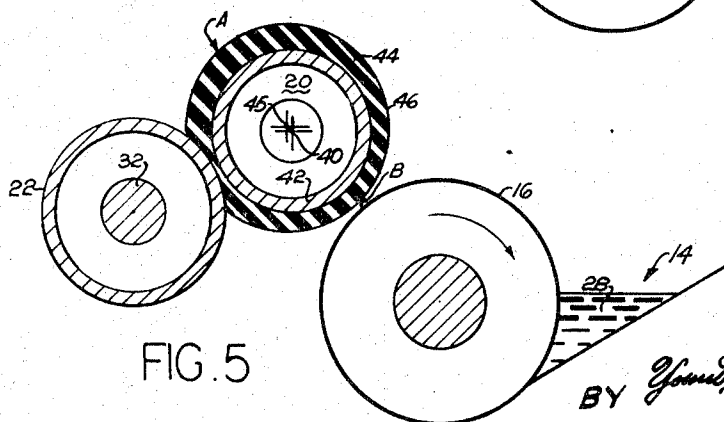
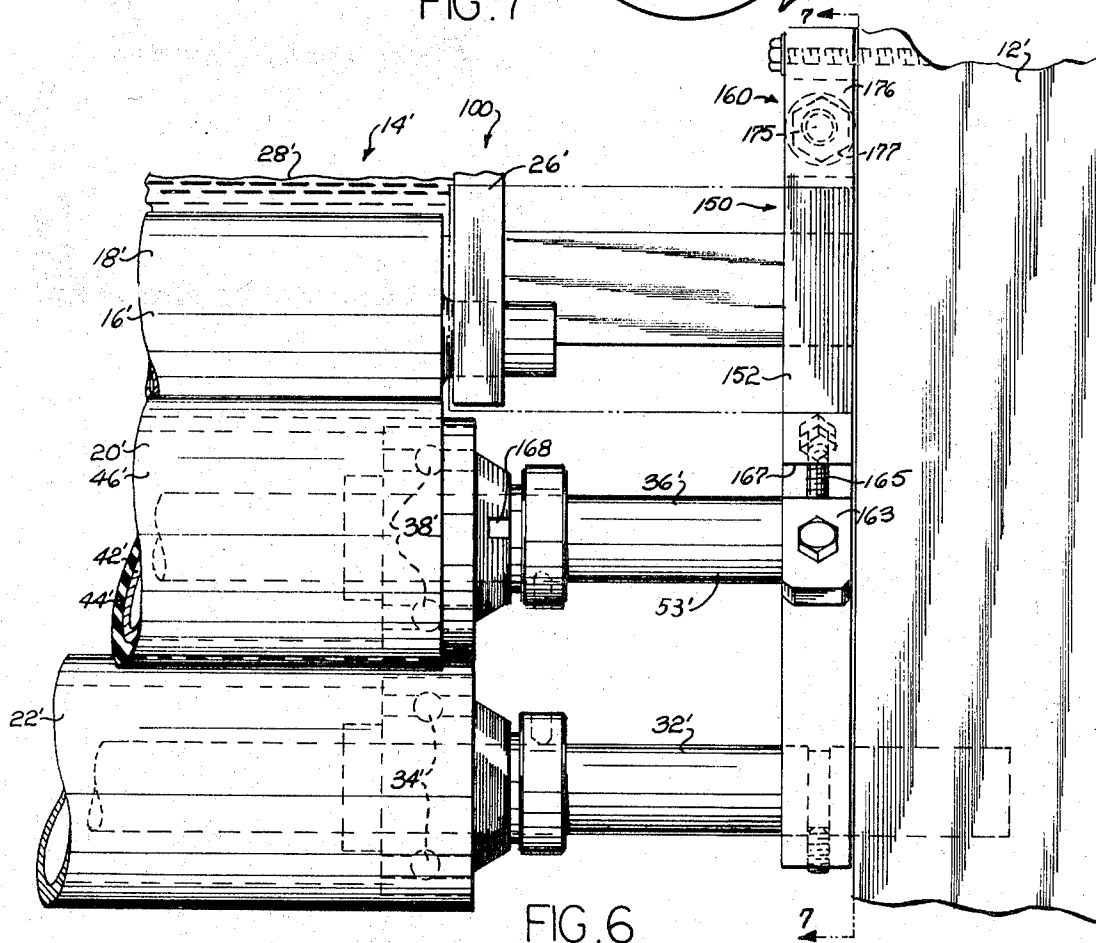
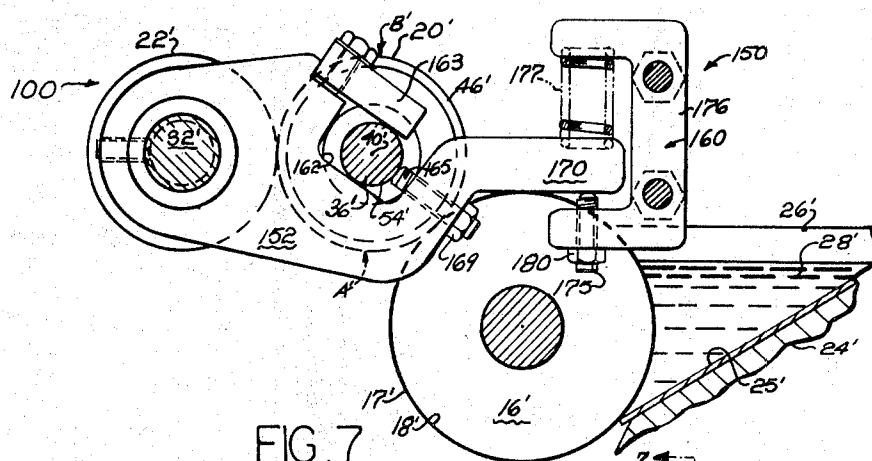


FIG. 5

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LIQUID-HANDLING MECHANISM

This application is a continuation of application Ser. No. 624,801 filed Mar. 21, 1967, now abandoned.

The present invention relates to a liquid-handling mechanism, and in particular relates to an inking or dampening mechanism for use in rotary printing presses.

An object of the present invention is to provide a new and improved liquid-handling mechanism, such as an inking or dampening mechanism for a printing press, having a ductor roll for transferring liquid from a first roll which is adapted to carry liquid thereon to a second or inking roll in contact therewith, and in which the ductor roll has an outer peripheral surface eccentric with respect to its axis of rotation whereby the peripheral surface of the ductor roll during each revolution of the latter moves toward and from the first roll to receive liquid carried by the first roll, and which mechanism is of a simple and economical construction, reliable in operation, and so constructed and arranged that little or no vibration occurs due to the eccentric nature of the ductor roll.

Another object of the present invention is to provide a new and improved liquid-handling mechanism, such as an inking or dampening mechanism for use in a printing press, and in which the parts of the ductor roll, such as the metal parts, are of the relatively high mass and concentric with respect to its axis of rotation and in which the eccentricity of the roll is provided by a relatively low mass outer portion, preferably a sleeve.

A further object of the present invention is to provide a new and improved liquid-handling mechanism of the character described above in which the outer portion of the ductor roll comprises a sleeve of varying radial thickness made from a deformable or resilient material, such as rubber.

A still further object of the present invention is to provide a new and improved liquid-handling mechanism of the character described above in which the ductor roll is biased into engagement with the second or inking roll to provide for continuous and uniform or substantially uniform pressure engagement between the ductor and the second or inking roll during operation of the liquid-handling mechanism.

Yet another object of the present invention is to provide a new and improved liquid-handling mechanism in which a first roll supplies liquid to a second roll receiving the liquid from the first roll and a third roll for receiving liquid from the second roll, and in which the second roll is adjustably supported at its opposite ends by adjustable support assemblies and in a manner such that its pressure relationship with respect to the third roll can be easily and readily adjusted and that its lateral position with respect to the first roll can be readily adjusted without disturbing or substantially disturbing its pressure relationship with respect to the third roll.

A still further object of the present invention is to provide a new and improved liquid-handling mechanism, as defined in the next preceding object, and in which the support assemblies include a biasing means for biasing the second roll into peripheral engagement with the third roll and a swivel support means rotatable about an axis normal to the rotational axis of the second roll to enable the second roll to uniformly engage the third roll axially of the rolls substantially free of binding between the second roll and its supports.

Another object of the present invention is to provide a new and improved ducting mechanism in which the periphery of the ducting roll moves toward and away from a source roll while in engagement with the ink-receiving roll, and which mechanism is less sensitive to changes in dimensions of the ducting roll than prior ducting mechanisms and in which finer control of the ink can be obtained.

The present invention further resides in certain novel constructions and arrangements of parts, and further objects and advantages thereof will be apparent from the following detailed description of an illustrated embodiment of the present invention and in the accompanying drawings forming a part of the present specifications and in which similar reference numerals are employed to designate corresponding parts throughout the several views, and in which:

FIG. 1 is a fragmentary top plan view of an inking mechanism embodying the present invention;

FIG. 2 is a fragmentary sectional view taken approximately along line 2-2 of FIG. 1;

FIG. 3 is a fragmentary sectional view taken approximately along line 3-3 of FIG. 2;

FIG. 4 and 5 are schematic views of the inking mechanism embodying the present invention and showing certain parts thereof in different relative positions;

FIG. 6 is a fragmentary top plan view of another inking mechanism embodying the present invention; and

FIG. 7 is a fragmentary sectional view on a slightly smaller scale taken approximately along line 7-7 of FIG. 6.

Although the liquid-handling mechanisms of the present invention are susceptible for use in or in conjunction with various kinds of apparatuses wherein it is desired to supply a liquid in film form, they are particularly useful as inking or dampening mechanisms for a printing press, and for the purposes of illustration are herein shown and described as inking mechanisms for use in a rotary printing press.

As representing one embodiment of the present invention, FIGS. 1 and 2 of the drawings show an inking mechanism 10. The inking mechanism 10 is adapted to be disposed between and supported by a pair of spaced side frames 12 of the printing press. The inking mechanism 10, in the preferred embodiment, generally comprises an ink fountain 14 having a fountain roll 16 for carrying a film of ink 17 on its outer peripheral surface 18, a ductor roll 20 which picks up ink from the fountain roll 16 and a transfer or distributor 22 for receiving the ink from the ductor roll 20. The ink film on the transfer roll 22 is adapted to be transferred to an inking drum or cylinder of the printing press via a series of intermediate transfer rolls, and in a manner well known to those skilled in the art.

The ink fountain 14 may be of any suitable or conventional construction, and since it does not per se form a part of the present invention it will only be described to the extent necessary for a clear understanding of the operation of the inking mechanism 10. Suffice it to say that the ink fountain 14 is suitably supported by the side frames 12 and comprises a fountain body or support means 24 having a bottom 25 and upwardly extending sides 26 at its opposite ends which rotatably support the opposite ends of the fountain roll 16. The sides 26, bottom 25 and fountain roll 16 define a trough for holding a supply of ink 28, with the ink 28 being in contact with the outer periphery 18 of the fountain roll 16.

The fountain roll 16 is adapted to be rotated in the direction of the arrow 29 while in contact with the ink supply 28. As the fountain roll 16 is rotated in the direction of the arrow 29, its outer peripheral ink-carrying surface 18 picks up or receives the ink 28 to form the ink film 17 thereon. A metering blade 30 extending across the bottom 25 of the ink fountain 14 and which is adjustably positionable toward and from the periphery 18 of the fountain roll 16 is provided to meter the thickness of the ink film 17 formed on the peripheral surface 18 of the fountain roll 16.

The ductor roll 20 picks up ink from the outer peripheral surface 18 of the fountain roll 16 and in turn transfers the ink to the transfer or distributor roll 22. The transfer roll 22 is here shown as a metal cylindrical roll which is rotatably journaled on a stationary shaft 32 by suitable or conventional bearings 34 for rotation about an axis extending parallel to the axis of rotation to the fountain roll 16. The shaft 32 at its opposite ends is fixed to and supported by the side frames 12 of the printing press. The transfer roll 22 is adapted to be rotated in either direction by a suitable or conventional drive means, such as the main drive means of the printing press or by friction from a roll (not shown) to which it supplies the ink. The transfer roll 22, in the preferred embodiment, is in peripheral contact with the ductor roll 20 to rotate the latter. The transfer and ductor rolls are normally rotated at the surface speed of the printing cylinder of the press and the fountain roll 16 at a substantially slower speed. The rate of rotation of the fountain roll 16 is preferably adjustable to supply the amount

of liquid required, and the drive thereto may be intermittent, but is preferably continuous.

The ductor roll 20 is rotatably journaled on a nonrotatable shaft 36 by bearings 38 for rotation about the axis 40 of the bearings, which axis extends generally parallel to the axis of rotation of the fountain roll 16 and the transfer roll 22.

The ductor roll 20 comprises an inner portion 42 concentric with respect to its axis of rotation 40 and an outer portion 44 having a cylindrical peripheral surface 46 which is eccentric with respect to its axis of rotation 40. The inner portion 42 is here shown as comprising a metal cylindrical roller fixed to the outer race of the bearings 38 and the outer portion 44 is here shown as comprising an eccentric sleeve having its inner periphery bonded or otherwise secured to the inner cylindrical roller 42. The outer periphery 46 of the sleeve 44 is circular, as viewed in transverse cross section, and has its longitudinal center axis 45 laterally spaced from the axis of rotation 40 of the inner roll 42 so that the eccentricity of the outer peripheral surface 46 gradually varies between high and low radius points of eccentricity A and B, respectively, located 180° apart. The distance between the axis of rotation 40 of the ductor roll 20 and the central axis 45 of the sleeve 44 is shown in exaggerated form in FIG. 4. The outer periphery 46 of the sleeve thus has peripheral extending surface portions at varying radial distances from the axis of rotation 40 of the ductor roll 20. The sleeve 44 is preferably made from a deformable or resilient material, such as rubber.

The ductor roll 20, in the preferred embodiment, is biased into engagement with the transfer roll 22 by a biasing means 48 so as to be in continuous and uniform or substantially uniform pressure engagement with the transfer roll 22, and in a manner to be hereinafter more fully described. The ductor roll 20 is preferably positioned with respect to the fountain roll 16 so that a varying gap will exist between the outer peripheral surfaces of the ductor roll 20 and the fountain roll 16.

The outer peripheral surface 46 of the ductor roll 20, since it is eccentric with respect to the axis of rotation 40, acts as a cam to move the roll 20 toward and from the outer periphery 18 of the fountain roll 16 to vary the distance or gap between the outer peripheral surfaces between minimum and maximum values, as respectively shown in exaggerated form in FIGS. 4 and 5, during each revolution of the ductor roll 20. The high point of the ductor roll 20 will in the preferred form touch the fountain roll. Since the surface of the roll 20 is resilient, i.e., rubber, neither of the rolls will be damaged by the engagement. This engagement of the rubber ductor roll 20 renders the system sensitive to the precise spacing between the fountain roll and ductor roll. It also enables a thinner film to be used on the fountain roll and thereby provides for finer control of the amount of ink delivered. The ductor roll 20, due to the provision of the biasing means 48, remains in uniform or substantially uniform pressure engagement with the transfer roll 22 during its movement toward and from the outer periphery 18 of the fountain roll 16.

This gradual engagement of the ductor roll 20 with the ink film 17 on the fountain roll 16 between maximum and minimum values and the uniform or substantially uniform pressure engagement between the ductor roll 20 and the ink transfer roll 22 provides an ink transferring operation in which the ink film being transferred to the transfer roll 22 is substantially uniform in thickness. Moreover, due to the construction of the ductor roll 20 and the arrangement of the rolls, the problems of misting or spraying of the ink, even when used in high-speed press operations, are eliminated or substantially eliminated.

The advantage of employing the ductor roll construction described above is that the problems of vibration encountered in an inking mechanism employing an eccentric structure are minimized. By making the heavier high mass parts of the roll concentric with the axis of rotation and by making the sleeve of a material which is lightweight and of low density so that the eccentric portion of the sleeve has a very low mass, vibration,

if any, due to the eccentricity of the sleeve 44 will be very minimal and counterbalancing is not normally required.

In the preferred embodiment, the opposite ends of the ductor roll 20 are each supported by an adjustable support assembly 50. Since the adjustable support assemblies 50 are of an identical construction, only the adjustable support assembly 50 for supporting the right end of the shaft 36, as viewed in FIG. 1, is shown in the drawings and will be described in detail. As best shown in FIG. 2, the support assembly 50 comprises a lever arm 52, which extends upwardly between the shafts for the rolls 16 and 22, for supporting the right end 53 of the shaft 36. The lever arm 52 is pivotally connected at one end to a stationary shaft 54 suitably secured to the side frame 12 of the printing press for movement in opposite directions about the axis of the shaft 54, which axis extends parallel to the axis of the shaft 32 of the transfer roll 22. The lever arm 52 at its other or upper end 56, as best shown in FIG. 2, is bifurcated to provide a transverse slot 57 for receiving the end 53 of the shaft 36 and has a counterbore 59 for receiving a support slide 60 which supports the end 53 of the shaft 36, and a bore 61 extending inwardly from the counterbore 59. The counterbore 59 provides the legs of the bifurcated end 56 with cylindrically curved side surfaces, as indicated by reference numeral 61, and the support slide 60, which has a circular cross section, is slidably and swivelly received within the counterbore 59.

The support slide 60 has a generally semicircular, transverse recess 62 at its upper end, as viewed in FIG. 2, for supporting the end 53 of the shaft 36 and is biased upwardly by a spring 64 in the opening 61 to cause the shaft 36 to engage an adjustable stop 63. The compression spring 64 at its upper end is received in an opening 65 in the bottom of the support slide 60. The spring 64 functions to bias the slide 60 and the shaft 36 in an upward direction along the longitudinal axis of the arm 52 and away from a plane containing the axes of rotation of the rolls 16 and 22, and to maintain the shaft 36 in abutting engagement with the stop 63.

The adjustable stop 63 comprises an adjusting screw threaded into a crossmember 67 secured to and extending between the bifurcated legs at their upper end, as viewed in FIG. 2. The adjusting screw 63 has a curved inner end 68 which engages the shaft 36 with substantially a point contact and against which the shaft 36 abuts when biased upwardly by the compression spring 64.

When the adjusting screws 63 of the support assemblies 50 are rotated, the ductor roll 20 is moved transversely relative to a plane containing the axes of the rolls 16 and 22 to adjust it laterally toward or away from the fountain roll 16 to vary the gap therebetween at the lower portions of the roll.

The biasing means 48 for biasing and maintaining the ductor roll 20 in engagement with the transfer roll 22 comprises a member 70 having one end pivotally connected to the arm 52 by a pivot pin means 71 and the other end threadably connected to one end of a rod 72. The other end of the rod 72 is slidably received in a central through opening in a screw or headed guide bushing 73 threaded into a block 74 which in turn is pivotally connected to the side frame of the printing press 12 by a pivot pin 75. A compression spring 76 encircling the rod 72 and having one end in abutting engagement with the member 70 and the other end in abutting engagement with the end 77 of the bushing 73 remote from its head is provided for biasing the member 70 and rod 72 toward the left and the lever arm 52 in a counterclockwise direction, as viewed in FIG. 2, and hence the ductor roll 20 into engagement with the transfer roll 22. The compressive force exerted by the spring 76 and hence, the value of the pressure engagement between the rolls 20 and 22 can be varied by suitably rotating the screw bushing 73 to change its position relative to the block 74. A locknut 78 carried by the screws 73 and engageable with the block is provided to lock the bushing 73 in its adjusted position relative to the block 74.

The rod 72 at its end 80 remote from the lever 52 is threaded and carries a pair of nuts 81 and 82 with the nut 81

being adapted to abut the head of the screw 73 to limit the movement of the rod 72 toward the left and the lever 52 in a counterclockwise direction, as viewed in FIG. 2.

The nuts 81, 82 can be adjustably positioned relative to the rod 72 so as to enable different diameter rolls to be employed and may also be adjustably positioned to limit the extent of the pressure engagement between the rolls 20 and 22.

From the foregoing, it can be seen that the ductor roll 20 is biased into engagement with the transfer roll 22 by the biasing means 48 and that the biasing force exerted can be varied by adjusting or rotating the screw 73. It can also be seen that the ductor roll 20 can be adjustably positioned laterally toward and from fountain roll 16 by merely rotating the adjusting screws 63 of the support assemblies 50, and that the compression springs 64 thereof will maintain the shaft 36 in engagement with the ends 68 of the screws 63.

An advantage of the above-described support assembly 50 is that the position of the ductor roll 20 relative to the fountain roll 16 can be adjusted without significantly disturbing the pressure relationship between the ductor roll 20 and the transfer roll 22, since the ductor roll 20 will be maintained in engagement with the outer peripheral surface of the transfer roll 22 when the ductor roll 20 is moved toward and from the fountain roll due to the biasing means 48. Another advantage is that adjustment of the ducting roll can be readily made by merely rotating the adjusting screws 63 at the opposite ends of the roll 20.

Also, by providing a point or substantially a point contact between the shaft 36 of the roll 20 and the screws 63 and support slides 60 which are swivelable or rotatably about axes normal to the axes of the support shaft 36 limited lateral movement of the shaft 36 can take place. This eliminates binding between the roll 20 and its supports and enables a uniform pressure engagement axially between the rolls 20 and 22 to be obtained. The described structure also readily accommodated ducting rolls of different diameters and provides for fine adjustment of the ducting roll relative to the fountain roll.

FIGS. 6 and 7 show a modified form of inking mechanism 100. The inking mechanism 100 is of an identical construction to the inking mechanism 10 shown in FIGS. 1 and 2 except that the ductor roll is not biased into engagement with the transfer roll, but rotates about a fixed axis and has a variable pressure engagement therewith, and that the support assemblies for supporting the opposite ends of the ductor roll are of a different construction. The parts of the inking mechanism 100 which are identical to the parts of the inking mechanism 10 will be given the same reference numeral, but with a prime affixed thereto.

The ductor roll 20' of the inking mechanism 100 is positioned with respect to the transfer and fountain rolls 22' and 16' so as to be in continuous pressure engagement with the transfer roll 22' and so that its outer surface moves into and out of engagement with the fountain roll 16'. Preferably just the high part of the roll 20' touches the fountain roll 16'. In operation of the inking mechanism 100 there will be a varying indentation of the roll 20' by the transfer roll 22' since the former is rotating about a fixed axis of rotation.

To enable the gap between the ductor roll 20' and the fountain roll 16' to be varied, the opposite ends of the ductor roll 20' are each supported by an adjustable support assembly 150, and in a manner which enables the ductor roll 20' to be adjustably positioned laterally with respect to both the fountain and transfer rolls 16' and 22'.

Since the adjustable support assemblies 150 for supporting the opposite ends of the shaft 36' are of an identical construction only the adjustable support assembly 150 for supporting the right end 53' of the shaft 36', as viewed in FIG. 6, is shown in the drawings and will be described in detail. The support assembly 150 comprises an arm 152 for positioning the shaft 36'. The arm 152 is pivotally connected at one end to the shaft 32' for movement in opposite directions about the axis of the shaft 32' and at its other end is supported and positioned by a support means 160 carried by the adjacent side frame 12' of

the printing press. The end 54' of the shaft 36' is slidably engaged with the bottom of a rectangularly shaped recess 162 in the arm 152 and is retained within the recess 162 of by a hold-down member 163 bolted or otherwise secured to the top side of the arm 152.

As best shown in FIG. 7, the ductor roll 20' is adjustably positionable laterally toward and from the transfer roll 22' by an adjustment means comprising an adjusting screw 165 threadably engaged with the support arm 152 and having its left end within the recess 162 and in abutting engagement with the adjacent end 53' of the shaft 36'. The shaft 36' is biased or held in engagement with the adjustment screw 165 as a result of the pressure engagement between the ductor roll 20' and the transfer roll 22'.

To enable the ductor roll 20' to be easily adjusted relative to the transfer roll 22' the ductor roll 20' is provided with a notch or marking 168 to indicate the low radius point B' of its outer eccentric peripheral surface 46'. The ductor roll 20' is rotated to dispose the markings 168 between and in alignment with the line between the centers of the shafts 32' and 36' and then the adjusting screw 165 for each of the support means 150 for supporting the opposite ends of the shaft 36' are suitably rotated to move the shaft 36' and hence, the ductor roll 20', relative to the transfer roll 22' until the minimum extent of the desired indentation is obtained. When so positioned a locknut 169 carried by the adjusting screws 165, can be turned until it is in abutting engagement with the arm 152 to lock the adjusting screw 165 in place. The shaft 36' is retained or held fixed in its adjusted position, since vertical displacement is prevented by the holddown member 163 and horizontal displacement is prevented as a result of pressure engagement between the ductor and transfer rolls and the engagement between the shaft 36' and the adjusting screws 165 at the opposite ends thereof.

The support means 160 for supporting and positioning the end 170 of the arm 152 remote from the end pivotally connected to the shaft 32' to enable the ductor roll 20' to be adjustably positioned laterally with respect to the fountain roll 16' comprises an adjusting screw 175 threadably engaged with one leg of a U-shaped bracket 176 for supporting the end 170 of the arm 152 and a compression spring 177 for biasing the arm 152 into engagement with the adjusting screw 175. The spring 177 has one end in abutting engagement with the underside of the upper leg of bracket 176 and the other end in abutting engagement with the upper side of the arm 152 and biases the arm 152 into engagement with the upper end of the vertically extending adjusting screw 175. The bottom side side of the upper leg of the bracket 176 and the top side of the arm 152 are provided with a pair of aligned recesses for providing seats for the opposite ends of the compression spring 177.

From the foregoing, it can be seen that when the adjusting screw 175 is rotated in a clockwise direction, as viewed in FIG. 7, the arm 152 is caused to be pivoted about the axis of the shaft 32' in an upward direction and in opposition to the biasing force of the spring 177 which in turn causes the ductor roll 20' to be moved away from the fountain roll 16'. When the adjusting screw 175 is rotated in the opposite direction, the arm 152 is pivoted about the axis of the shaft 32' in a downward direction by the biasing force of the spring 177 to cause the roll 20' to be moved toward the fountain roll 16'. Since the ductor roll 20' is pivoted about the axis of the shaft 32' when being adjustably positioned with respect to the fountain roll 16', its present position with respect to the transfer roll 22' will remain undisturbed.

The ductor roll 20' can be readily positioned with respect to the fountain roll 16' so as to obtain the desired maximum value, of the gap between their outer peripheries by rotating the roll 20', after it has been preset with respect to the transfer roll 22', to dispose the marking 168 indicating the low radius point of eccentricity B between and in alignment with the line between the centers of the ductor roll 20' and the fountain roll 16', and then by suitably rotating the adjusting screws 175 of each of the support means 160 to obtain the maximum gap

desired therebetween. When the ductor roll has been so positioned with respect to the fountain roll 16', it can be locked in that position by a locknut 180 carried by each of the adjusting screws 175 and which is engageable with the underside of the leg of its respective bracket 176.

From the foregoing, it should be apparent that a very simple adjustable support assembly has been provided for supporting the ductor roll 20' and which can be readily adjusted to enable the ductor roll 20' to be easily and readily adjustably positioned laterally relative to both the transfer roll 22' and the fountain roll 16'. It should also be apparent that the support assembly enables the ductor roll 20' to be laterally positioned relative to the fountain roll 16' without disturbing its preset position relative to the transfer roll 22.

It will, of course, be understood that the ductor rolls of the inking mechanisms 10 and 100 could be positioned relative to the fountain roll so that its outer periphery never touches or engages the outer periphery of the fountain roll and/or that its outer periphery always engages the outer periphery of the fountain roll 16 during each revolution thereof, if desired. It has been found, however, that the mechanism is less sensitive to changes in size in the ducting roll and that thinner ink films and better control can be obtained when the high part of the ducting roll touches the fountain roll.

Although the ductor rolls in the above-described inking mechanisms have outer sleeves 44, 44' of varying radial thickness to provide an outer peripheral surface which is eccentric with respect to the axis of rotation of the ductor rolls, other types of sleeves could be employed. For example, the sleeve could be a circular sleeve having one or more axially extending integrally formed lobes thereon, the lobes preferably having an arcuate outer periphery, or a circular sleeve of uniform radial thickness and wherein one or more axially extending wires are disposed between the metal inner body and the sleeve of the ductor roll to provide lobes at one or more peripherally spaced locations could be employed.

The term liquid as used in the specification and claims is meant to include inks and other materials which are in paste or fluid form.

From the foregoing, it can be seen that the present invention involves three rotatable rolls 16, 20, and 22 with the roll 20 being an eccentric roll and arranged intermediate what may be termed a first roll 22 and an additional roll 16. The roll 20 is supported by support means including support members in the form of arms 52 which are acted upon by biasing means 48 to urge the intermediate roll or eccentric roll 20 into engagement with the roll 22 and support or bearing members 60. The support 60 receives shaft means in the form of a shaft 36 extending axially from the intermediate roll.

From the foregoing, it should be apparent that the hereinbefore enumerated objects and others have been accomplished and that novel liquid-handling mechanisms, especially inking or watering mechanisms for use in printing presses, have been provided.

I claim:

1. A liquid-handling mechanism comprising first and second rotatable rolls, shaft means projecting outwardly from each end of said second roll, and means for supporting said shaft means and for biasing said second roll into engagement with said first roll comprising a first support means engaging one end of said shaft means, a second support means supporting said first support means for swiveling movement about an axis generally normal to the axis of said shaft means, biasing means for biasing said second support means toward said first roll to yieldably urge said second roll into engagement with said first roll, a third roll in liquid-transferring relationship with said second roll, said second roll having an outer peripheral surface which is eccentric with respect to its axis of rotation and which cooperates with the periphery of said first roll on rotation of said second roll to move said second roll toward and away from said third roll, said second roll comprising a metal inner body portion concentric with the axis of rotation of said second roll and a sleeve of resiliently yieldable material cover-

ing said inner body portion to provide said outer peripheral surface on said second roll, said outer peripheral surface of said sleeve including portions spaced at different distances from the axis of rotation of said second roll to provide a ducting action between said second and third rolls.

2. A liquid-handling mechanism comprising first and second rotatable rolls, shaft means projecting outwardly from each end of said second roll, and means for supporting said shaft means and for biasing said second roll into engagement with said first roll comprising a first support means engaging one end of said shaft means, a second support means supporting said first support means for swiveling movement about an axis generally normal to the axis of said shaft means, and biasing means for biasing said second support means toward said first roll to yieldably urge said second roll into engagement with said first roll, wherein said second roll is a ducting roll and comprises a metal inner body portion having a mass which is balanced with respect to the axis of rotation and a sleeve of yieldable resilient material covering said inner body portion to provide an outer peripheral surface of the roll, said sleeve being of low density material as compared to the inner body portion and having a peripheral ducting portion providing an unbalanced mass with respect to the axis of rotation.

3. A liquid-handling mechanism comprising a first rotatable roll and a second rotatable roll cooperating in liquid-transferring relationship, a third rotatable roll cooperating in liquid-transferring relationship with said second rotatable roll, shaft means projecting axially outwardly from each end of said second rotatable roll, and means for supporting said shaft means and for biasing said second rotatable roll into engagement with said first rotatable roll comprising a first support means engaging one end of said shaft means, a second support member supporting said first support member for swiveling movement about an axis generally normal to the axis of said shaft means, and biasing means acting transversely of the axis of swiveling movement for biasing said second support means toward said first roll to yieldably urge said second rotatable roll into engagement with said first rotatable roll, said second roll comprising a cylindrical inner body portion having a mass which is balanced with respect to the axis of rotation and a sleeve of yieldable resilient material covering said inner body portion to provide an outer peripheral surface of said second roll, said outer peripheral surface defining a surface eccentric to the axis of rotation of said second roll, an adjustable stop means disposed on one side of said shaft means opposite to said first support means, and second biasing means operatively connected between said second support means and said first support means to move the latter along its axis and urge said shaft means against said adjustable stop to position said second roll while in engagement with said first roll, said stop means being adjustable to adjust the operating position of said second rotatable roll relative to said rotatable third roll to provide clearance therebetween during each revolution.

4. A liquid-handling mechanism having a rotating ducting roll which runs in substantially continuous engagement with a first roll while the periphery thereof moves in a ducting manner toward and away from another roll, said ducting roll being comprised of an inner metal body portion and an outer covering of resilient material on the outer periphery of said metal body portion and substantially covering the entire outer periphery of said metal body portion, said metal body portion being balanced with respect to the axis of rotation of the ducting roll and said covering of resilient material having outer peripheral portions spaced at different radial distances from the axis of rotation to provide a ducting action on rotation of said ducting roll, said outer covering being a sleeve having an arcuate outer periphery of varying diameter with respect to the axis of rotation of said second roll.

5. A liquid-handling mechanism having a rotating ducting roll which runs in substantially continuous engagement with a first roll while the periphery thereof moves in a ducting manner toward and away from another roll, said ducting roll being comprised of an inner metal body portion and an outer

covering of resilient material on the outer periphery of said metal body portion and substantially covering the entire outer periphery of said metal body portion, said metal body portion being balanced with respect to the axis of rotation of the ducting roll, said resilient material defining the outer periphery of the roll and having outer peripheral portions spaced at different radial distances from the axis of rotation to provide a ducting action, said resilient material being unbalanced with respect to the axis of rotation, and said outer covering comprising a sleeve which is circular and is eccentric with respect to the axis of rotation of said second roll.

6. A liquid-handling mechanism comprising a liquid supply roll, a liquid-receiving roll, an intermediate roll for transferring liquid from said liquid supply roll to said liquid-receiving roll, said intermediate roll having a pair of shaft ends, support arm means supporting each of said shaft ends for pivotal movement about a pivot axis substantially parallel to the axis of rotation of said liquid supply and liquid-receiving rolls, means operatively connected with said support arm means for varying the position of said intermediate roll relative to said liquid supply roll to provide a gap therebetween, biasing means urging said intermediate roll about said pivot axis into engagement with said liquid-receiving roll and maintaining said intermediate roll in engagement with said liquid-receiving roll, said intermediate roll being rotated due to the peripheral contact of said intermediate roll and said liquid receiving roll, and said intermediate roll having eccentric means rotated by said peripheral contact of said intermediate and liquid-receiving roll for effecting pivoting movement of said intermediate roll about said pivot axis against said biasing means, said pivoting movement of said intermediate roll effecting a ducting movement of a portion of the periphery of said intermediate roll into a liquid film on said supply roll to pick up liquid therefrom for transfer thereof to said liquid-receiving roll.

7. A liquid-handling mechanism as defined in claim 6 wherein the axis of said intermediate roll is located above a line intersecting the axes of said liquid supply and said liquid-receiving rolls, and said liquid supply roll comprises a fountain roll cooperating with said liquid supply to pick up liquid therefrom.

8. A liquid-handling mechanism as defined in claim 7 wherein said biasing means comprises an elongated member pivotally connected at one end with said support arm means at a point above said line, and further including support means supporting the opposite end of said member for pivotal movement and for sliding movement, and a compression spring acting between said support means and said support arm means.

9. A liquid-handling mechanism comprising a liquid supply roll, a liquid-receiving roll, an intermediate roll for transferring liquid from said liquid supply roll to said liquid-receiving roll, said intermediate roll having a pair of shaft ends, support arm means supporting each of said shaft ends for pivotal movement about a pivot axis substantially parallel to the axes of rotation of said liquid supply and liquid-receiving rolls, means operatively connected with said support arm means for adjustably shifting said support arm means to vary the position of said intermediate roll relative to said liquid supply roll to provide a gap therebetween, said intermediate roll being rotated due to the peripheral contact of said intermediate roll and said liquid-receiving roll, and said intermediate roll having eccentric means rotated by said peripheral contact of said intermediate and liquid-receiving rolls for effecting a ducting movement of a portion of the periphery of said intermediate roll into a liquid film on said supply roll to pick up liquid therefrom for transfer thereof to said liquid-receiving roll.

10. A liquid-handling mechanism as defined in claim 9 wherein said support arm means comprises a first support member engaging each of said shaft ends, a second support member supporting said first support member and its associated shaft end for movement along a line generally normal to the axis of said shaft end, a stop disposed on said second support member on the side of said shaft end opposite to said first support member, biasing means operatively connected between said second support member and said first support member to urge and move said first support member along said line to urge said shaft end against said stop, and means for adjusting said stop to move said second roll toward or away from said third roll while maintaining engagement with said first roll.

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