United States Patent [19]

Klingler

[11] **3,924,531**

[45] **Dec. 9, 1975**

[54] **SPRAY DAMPENER FOR ROTARY PRESS**

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[22] Filed: **Nov. 29, 1973**

[21] Appl. No.: **420,249**

[30] **Foreign Application Priority Data**

Nov. 29, 1972 Germany 2258321

[52] **U.S. Cl.** **101/147**; 101/366

[51] **Int. Cl.**[2] **B41L 25/06**

[58] **Field of Search** ..... 101/142, 148, 155, 167, 101/132.5, 365, 366; 239/590.3, 596, 601, DIG. 1

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Attorney, Agent, or Firm—Flynn & Frishauf

[57] **ABSTRACT**

To permit adjustment of the spray of a fountain system with respect to rollers on which wetting liquid is to be sprayed, the housing in which the fountain system is retained is movable with respect to the roller, towards or away therefrom, or transversely with respect thereto, so that the fountain, controlling the liquid direction in the press is movable and permits exact adjustment without adjustment requirements being placed on the roller to be wetted.

15 Claims, 11 Drawing Figures

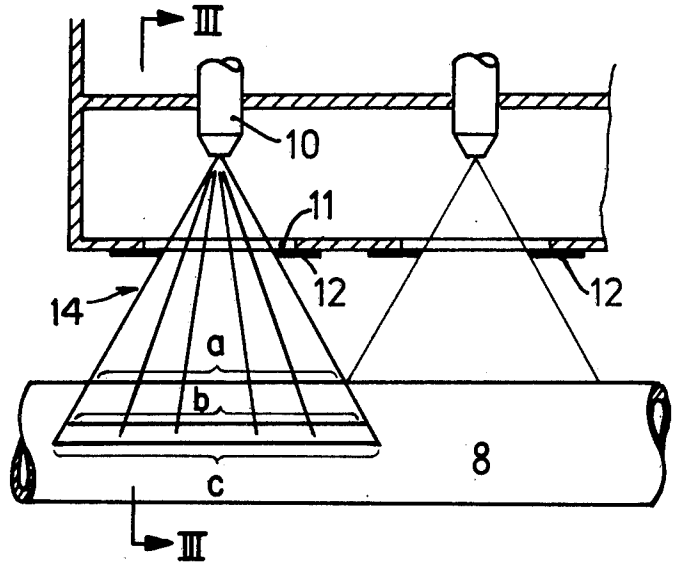


Fig.1

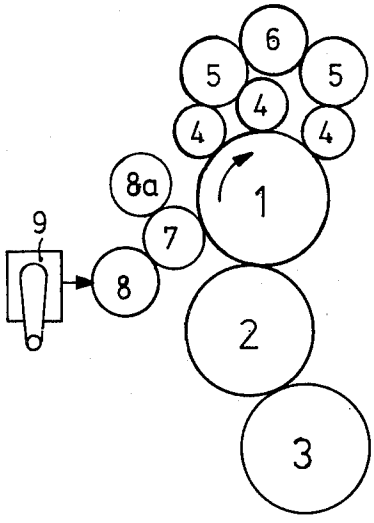


Fig 2

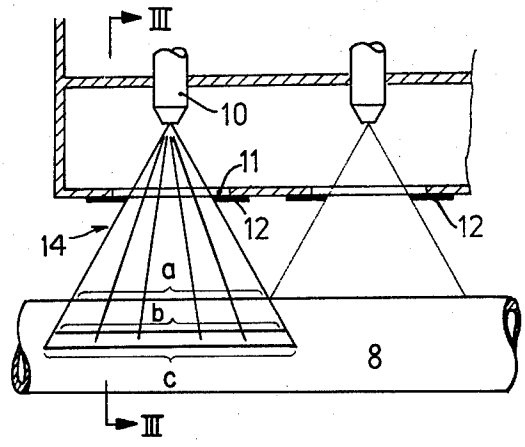


Fig.3

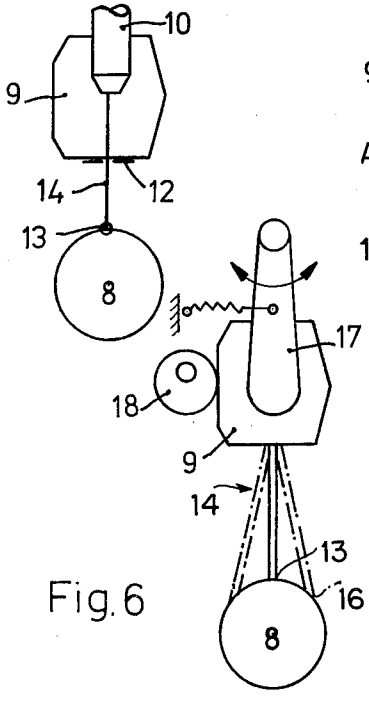


Fig. 4

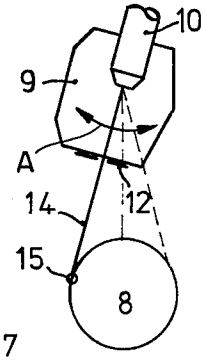
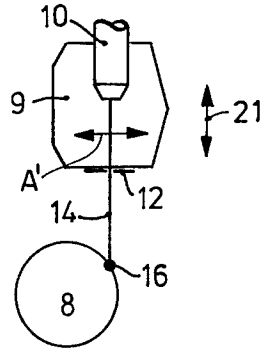


Fig. 5



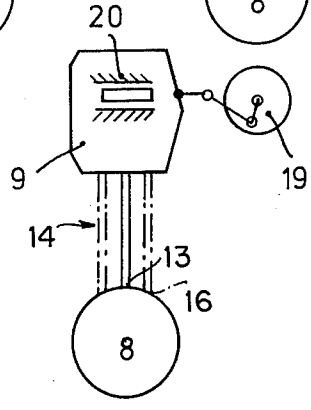


Fig.6

Fig.7

Fig.9

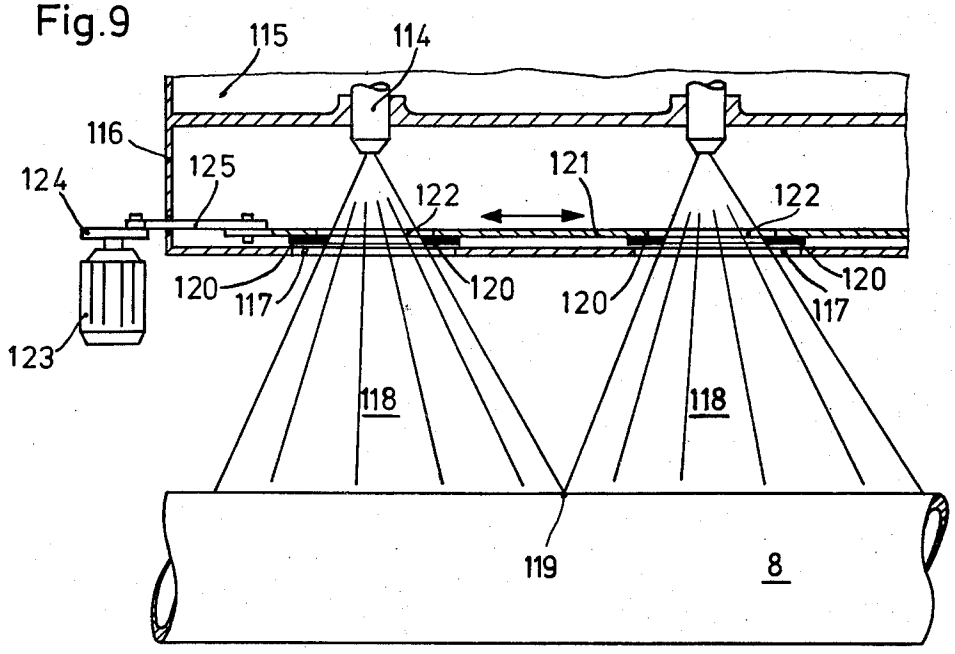
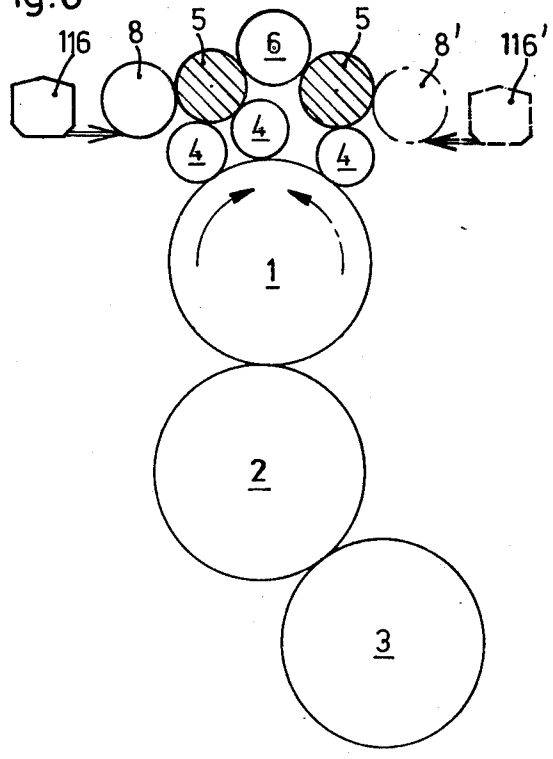

115
114
116
125
124
121
122
122
120
117
120
120
117
120
123
118
118
119
8

Fig.8


116
8
5
6
5
8'
116'
4
4
4
1
2
3

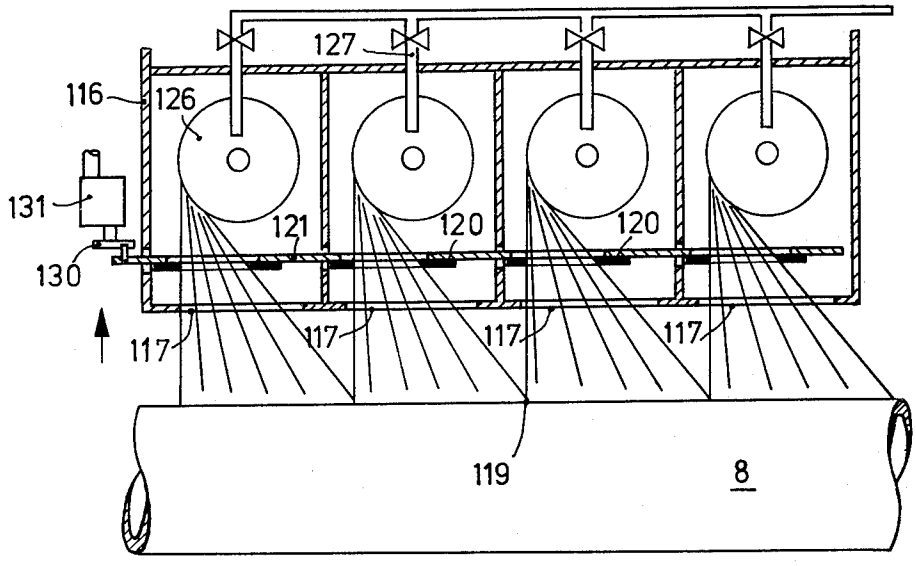

127
116
126
131
130
121
120
120
117
117
117
117
119
8

Fig.10

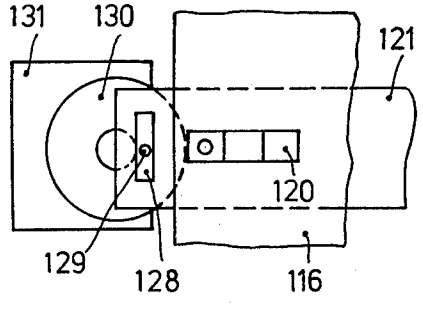

131
130
121
120
129
128
116

Fig.11

SPRAY DAMPENER FOR ROTARY PRESS

The present invention relates to a fountain system to wet printing plates of rotary printing presses, in which wetting liquid is sprayed on a roller, and more particularly to a system in which a plurality of spray nozzles associated with a roller of the wetting, or the inking train are located in a housing, the extent of spray of the spray nozzles being adjustable by sliders adjusting the spray width from the nozzles.

Uniform wetting of the printing plates continues to introduce difficulties. This is true for transfer wetting systems as well as for so-called spray wetting systems, in which the wetting liquid, typically water, is sprayed under substantial pressure in finely atomized form by means of nozzles, or slingers also referred to as flingers or throwers on a wetting liquid. The spray itself may also be introduced with the assistance of compressed air and may be mixed with air. Upon spraying, spray positions (which may be nozzles, or slingers) are usually located adjacent each other; the actual spray cone, that is, the direction of the liquid being sprayed is difficult to control, and it is difficult to so adjust the spray cone, or spray strip that there will be no overlap between adjacent cones or, what is worse, to leave a zone which is not reached by the spray liquid at all. Toning will result which results in eventual stripe formation at printing, thus resulting in reject printing by the press.

It has previously been proposed to render the wetting of the rollers more uniform by utilizing changeable distribution rollers, friction distribution elements, or moveable nozzles. Such systems have the disadvantage that the power requirement for the drive therefor is substantial and, if the direction of rotation of the machine changes, additional difficulties are introduced when such systems are used with rotary presses in which rotation can be reversed.

It is an object of the present invention to provide a system in which spray wetting fountains are so arranged that the spray cones, or the strips being sprayed by the spray system can be controlled simply, so that zones of overlap, or missed wetting can be avoided, independently of presence or absence of a separate spray distribution roller or of introducing the spray directly into, or towards the ink train.

SUBJECT MATTER OF THE PRESENT INVENTION

Briefly, a plurality of spray means are located in a housing and the impingement line of spray on the respective roller is varied; these spray means may be nozzles, or slingers or thrower disks, the housing being formed with openings through which the spray from the spray means may pass. In accordance with a feature of the invention, the spray distribution from the spray means can be controlled, for example by sliders, diaphragm-like openings or the like, so that the angle of cone, or strip of spray derived from the fountain itself can be adjusted. The liquid-directing means, formed by the housing, the spray elements and the spray angle control means are, in accordance with another feature of the invention, secured in the press to be movable with respect to the roller which is to be wetted; this may a roller of a separate wetting system, or of the inking train itself.

The entire housing, together with the spray elements therein may be movable with respect to the roller, or

the spray control means, such as a diaphragm, or the like, may be movable with respect to the roller to be wetted. Movement may be towards or away from the roller, in a plane transverse to the axis thereof, or rockable so that the spray is directed to different zones on the circumference of the roller, from a fixed point, so that, due to the divergence of the spray path as the line of spray impact from the spray means on the roller changes, different spray patterns will result.

The area to be sprayed thus can be changed readily; if the spray control means, for example a diaphragm, is rythmically moved, overlap in spray pattern from adjacent spray elements (nozzles or slingers) can thus be spread over a substantial distance, and lack of wetting liquid at any zone of the roller being wetted is avoided. If, for example, there should be a decrease in the spray zone from any one of the spray means, so that a non-wetted strip would result, moving the entire spray means will compensate for this lack, and cause wetting throughout the width of the roller to be wetted. In any event, the wetting film being applied will be essentially uniform and provide good printing results.

If the housing is moved, sliders may be located therein in front of the openings in the housing through which the spray passes, the sliders accurately controlling spray emanating from the spray elements within the housing, to compensate for any possible inaccuracies in manufacture of the fountain system, and the housing for the fountain, and to permit accurate adjustment of the spray pattern, so that the roller to be wetted will be properly sprayed without overlap of spray on the one hand, and without omitting spraying of any region, on the other.

The invention will be described by way of example with reference to the accompanying drawings, wherein:

FIG. **1** is a highly schematic representation, in side view, of a printing system;

FIG. **2** is a highly schematic top view, partly in section, of a fountain system;

FIG. **3** is a section along line III—III of FIG. **2**;

FIGS. **4** and **5** are sectional views taken along lines III—III, showing the effect of change in position of the spray element, or the housing;

FIGS. **6** and **7** are highly schematic side views showing drive systems to effect the change in spray pattern as illustrated in FIGS. **4** and **5**;

FIG. **8** is a highly schematic side view of a different embodiment of a printing system;

FIG. **9** is a top view, partly in section, of a different embodiment of the fountain system, and to an enlarged scale (with respect to FIG. **1**);

FIG. **10** is a schematic top view of a slinger-type spray system; and

FIG. **11** illustrates a drive for a diaphragm control, derived from the machine drive, in fragmentary, schematic representation, and to an enlarged scale.

The rotary offset printing press, schematically illustrated in FIG. **1**, has the well-known plate cylinder **1**, the rubber cylinder **2**, and the impression or printing cylinder **3**. Three ink transfer rollers **4**, forming part of the ink train, are in contact with plate cylinder **1**. Ink is transmitted over two transfer cylinders **5**, to which ink is supplied by means of an ink roller **6**. Ink roller **6**, in turn, is supplied with ink from an intermittently contacting inking roller, or any other ink supply system, well known in the art.

The wetting system includes a wetting supply roller **7**, a wetting distribution roller **8**, and a wetting storage

roller 8*a*. Other forms of wetting supply roller arrangements may be used; for example, the wetting roller **8** may be contacting one of the ink distribution rollers **5**, that is, in contact with the right, or the left ink distribution roller **5** depending on the direction of rotation of the plate cylinder **1**.

Wetting liquid is applied to the wetting roller **8** by means of a spray system, located in a housing **9**. A plurality of nozzles **10** (FIGS. **2**; **3–5**) are located in housing **9**, spaced from each other. Other spray or liquid application means may be used, for example slinger or thrower disks **126** (FIG. **10**). Housing **9** (FIG. **1**) is formed with openings **11** at the side facing the wetting roller **8**. The cross section of the openings **11** can changed by changing the position of diaphragm-like closing members, for example longitudinally movable sliders **12**. The sliders, or diaphragm arrangements, are provided in order to compensate for manufacturing errors, tolerances, and the like, and can be individually adjusted to prevent overlap of liquid being applied to the liquid application roller **8** or to avoid nonwetted rings on the roller **8**. The roller **8** is usually so constructed that it is subject to translatory movement, in axial direction, besides rotation thereof. Such construction is cumbersome and expensive, particularly in printing systems in which the wetting arrangement can be disassembled and reassembled at different locations to provide application of wetting liquid to different rollers, for example located at another side of the printing roller, which is desirable in case the direction of rotation of the roller **1** changes and is reversed with respect to the arrow.

In accordance with the present invention, the roller **8** need not be supplied with translatory, as well as rotary movement; rather, housing **9** is so constructed that it can move with respect to the axis of roller **8**, either by swinging movement (FIG. **4**) or lateral shift (FIG. **5**). In the normal position of housing **9**, the liquid is sprayed, from nozzles **10** in a triangular sheet-formed spray, arranged to impinge on the surface of roller **8** at a surface position **13** (FIG. **3**). The liquid being sprayed thereon in accordance with a sheet-like spread stream **14** (FIG. **3**), when impinging exactly perpendicularly on the surface, would impinge axially on the roller **8** along the range indicated at a in FIG. **2**. Upon moving the liquid spray-directing means, for example nozzles **10**, from the position illustrated in FIG. **3** (perpendicular impingement of spray) to that illustrated in FIG. **4**, where the spray impinges at least partly tangentially on roller **8** the spray **14** would impinge along the surface region **15** of the roller **8**, and will cover a wider range, indicated at range c in FIG. **2**. Thus, with respect to axial coverage, the range being covered by the spray device has essentially the same effect — with respect to the roller **8** — as if the roller were moving in axial direction. The nozzle **10** and the housing **9** can swing or rock in the direction indicated by the bowed arrow A of FIG. **4**; a similar effect can be obtained by moving the nozzle **10** and the housing **9** in a lateral direction, as indicated by the transverse arrow A′ in FIG. **5**, or moving the housing back and forth, that is towards and away from the roller **8** in the direction of the arrow **21**.

Moving the housing transversely, as shown by the transverse arrow A′ in FIG. **5**, changes the line of impingement of the stream **14**, for example to the position **16** of FIG. **5**. Lateral movement of the housing can extend over a range corresponding approximately to the diameter of the roller **8**, so that the spray stream **14** impinges on the roller **8** approximately at a tangential point, corresponding, for example to point **15** (FIG. **4**). This, then, permits lateral spread of the spray stream **14** to the extent indicated by line c in FIG. **2**, as shown the range of the spray-directing element, that is (in FIGS. **3–5**) nozzle **10**, is the least distance in FIG. **3**, a most the distance c in FIG. **4**, and an intermediate distance b in FIG. **5**, corresponding to effective distances of nozzle **10** from the impingement point: least in FIG. **3**, most in FIG. **4** and intermediate in FIG. **5**.

Movement can be imparted to the housing in various ways, all of them simple to construct and simple to arrange in any operating machine. Thus, the housing **9** can be rocked backwardly and forwardly by supporting the housing **9** on pendant links **17** (FIG. **6**), and rocked about the pivot point of the link **17** by means of an eccentric disk **18**; a spring holds the housing **9** in engagement with excenter **18**. The excenter **18**, itself, can be driven by a separate motor, or by a shaft connected to the machine drive. The housing itself weighs little and only a small drive motor, or little drive power is necessary therefor; the housing itself can be suspended in low friction bearings, and the entire connection of the housing **9** to the machine can readily be so arranged that it can be moved to respective sides of the machine depending upon the direction of rotation of the cylinders thereof. Upon change of direction of rotation, therefore, it is a simple matter to change the position of a single spray fountain system.

To-and-fro movement of the housing **9** can likewise be accomplished by a simple mechanism, illustrated in FIG. **7**, in which a crankshaft drive **19** moves housing **9**, guided between a pair of fixed slide ways schematically indicated at **20**. Upon rotation of the central shaft of crankshaft arrangement **19**, housing **20** will be reciprocated. FIG. **7** shows movement in accordance with arrow A′ of FIG. **5**, that is transversely to the axis of roller **8**, and the stream spray, in a triangular outline (looked at from above in FIG. **2**) will change between the two chain-dotted spray stream schematically indicated in FIG. **7**.

The printing system of FIG. **8** is essentially similar to that of FIG. **1**, and like parts have been given like reference numerals and will not be explained again. Contrary to the system of FIG. **1**, however, the wetting liquid is applied directly to the ink train. All embodiments explained in connection with FIGS. **2**, **3** and **4**, **5** are suitable for the system of FIG. **8**. A plurality of spray-directing elements, located in spaced distance from each other in the form of nozzles, slingers or the like, provide a finely atomized wetting liquid spray, under pressure, or by means of compressed air. The spray nozzles **114** are preferably connected to a common nozzle holder **115** which is located within a housing wall **116** (FIG. **9**) which is so arranged that excess spray liquid can be caught therein, and re-cycled. The housing is formed with a plurality of openings **117** through which sprays **118** extend, the lateral extent of which is limited by sliders or diaphragm opening limit elements. Normally, the spray nozzles **114** and the angle of spray projection are so adjusted that the outer adjacent spray streams of the spray **118** just touch each other, as indicated, for example, at point **119**, FIG. **9**. This is a desired arrangement which, however, in actual operation can be achieved only with great difficulty. There are a number of factors which undesirably affect the spray distribution, for example inaccuracies in manufacture of the nozzles, the housing, and their

openings; differences in the nozzle construction, which result in differences in the spray cones, or spray triangles being ejected from the nozzles **114**; differences in pressure of liquid being supplied, and the like. It has been tried to provide accurate adjustments to the spray pattern, by locating movable sliders in front of the opening **117**, which are then individually adjusted for each spray pattern. Such accurate adjustment of sliders is timeconsuming and if there are variations in pressure, of the liquid or compressed air, if used, then even accurate adjustment of sliders **120** will not provide for a proper distribution of wetting liquid.

Accurate application of wetting liquid to the roller **8** can be obtained, in accordance with the invention, by associating a diaphragm or opening control element **121** with the openings **117**, and moving this diaphragm or control element **121** in the reciprocating direction indicated by the double arrow in FIG. **9**. This element **121** may be a strip of metal, plastic, or the like, formed with openings **122** therein, and extending over the entire length of the housing. The openings **122** are placed along the extended axes of the nozzles **114**; the individual opening adjustment elements **120** can be adjusted with respect to the openings **117**, as well as with respect to the opening **122** as it is reciprocated by a crankshaft drive **124**, driven by a rotating motor **123**. The diaphragm element **121**, of thin sheet metal, such as sheet steel, plastic, or the like, can be very lightweight, so that the weight of the entire arrangement is low and the drive can be powered by a small inexpensive motor. The reciprocating motion is over a distance small with respect to the lateral (or axial) extend of the sheet of spray at the impingement line on the roller. A link **129** connects the diaphragm element **121** to the excenter disk **124**. Reciprocating movement of element **121** changes the extent of the individual wetting zones continuously with respect to the wetting roller **8**. Accumulation of wetting liquid, or lack of wetting liquid in any specific zone is thus effectively avoided since the entire spray pattern of the wetting liquid changes the lateral impingement pattern and distribution by the range of reciprocating movement of the diaphragm element **121**. Formation of stripes in the printed matter is thus prevented.

The slider adjustment elements **120** are preferably secured to the diaphragm element **121**; this also permits fine adjustment in order to compensate for inaccuracies in manufacture, and tolerances of the openings **122** in the diaphragm element **121**. Adjustment can thus be made in such a manner that, looked at in plan view, the spray pattern is approximately triangular and the spray patterns of adjacent nozzles just touch each other, as seen in FIG. **9**, at point **119**, that is, do not overlap or leave un-sprayed gaps, which may result in stripe formation.

The arrangement of FIGS. **8** and **9** has the advantage that the entire housing **116**, together with motor **123** and the associated excenter and link, both of which are light, can be moved to a different location within the machine, as indicated in chain-dotted lines in FIG. **8**. Thus, the housing **116** and the spray nozzles therein, all of which are of light weight, can readily be located as shown at **116'**, without any additional changes in the machine drive, or in the roller drive being necessary. The roller **8**, if desired, may also be moved to the position indicated at **8'**, a position which is usually provided for by the machine construction and which does not require any extensive relocation, or resetting of drive gears. The direction of rotation of the cylinder **1** is indicated by the solid arrow, that is clockwise, for the solid line position of roller **8** and housing **116**, and is indicated in chain-dotted form, counter-clockwise, for position of the roller indicated in chain-dotted lines, at **8'** and the housing at **116'**. No further alteration of the machine drive of the roller **8**, which is in frictional engagement with other rollers and usually of heavy material, is necessary.

FIG. **10** illustrates a plurality of slinger throwers, or disks **126**, of somewhat conical top configuration, and rotating at high speed, and throwing wetting liquid on roller **8**. The wetting liquid is applied to the slingers **126** over lines **127**, controlled by valves, as well known. Housing **116** is formed with openings **117** and so arranged that wetting spray can be ejected from the slinger disks **126** on the roller **8**. That remaining wetting liquid which is not ejected is collected in the bottom of the housing, and re-cycled by a pump for reintroduction into the ducts **127**. The reciprocating diaphragm element **121**, on which transversely adjustable sliders **120** are located, is operated from a gear drive **131**, driven from a rotating element of the machine, and driving a disk **130** which has a notch or hole formed therein in which a pin engages which is slidable in a suitable cross groove to carry slider element **121** backwards and forwards in a reciprocating motion. Rather than gear **131** coupled to the machine drive, a separate motor **123** and a link drive mechanism **124**, **125** (FIG. **9**) may be used.

Various changes and modifications may be made within the scope of the inventive concept and features described in connection with any one of the embodiments may be used suitably with any of the other embodiments.

I claim:

1. In a rotary printing press, a foutain system for uniformly applying wetting liquid to the printing plates comprising means directing wetting liquid on a roller of the printing press, including

a housing (**9**);

a plurality of spray means (**10**) to spray wetting liquid, located in the housing, each spray means providing a divergent stream of wetting liquid in sheet form directed towards the roller to be wetted and impinging thereon along an impingement line, the housing being formed with openings (**16**) through which the sheet of spray from the spray means may pass,

said spray means being secured in the press in axially fixed position with respect to the roller axis and movable in a plane transverse with respect to said axis to change the impingement line of the spray on the roller and hence the axial coverage of the sheet of spray on the roller from any one spray means.

2. Press according to claim **1**, wherein the spray means comprises nozzles (**10**).

3. Press according to claim **1**, wherein the spray means is swingably movable with respect to the axis of the roller (**8**) to be wetted.

4. Press according to claim **1**, wherein the spray means is movable towards and away from the axis of the roller (**8**) to be wetted.

5. Press according to claim **1**, wherein the spray means are secured in the housing and the said housing (**9**) is movably secured in the press to rock the housing and hence the spray means in said plane.

6. Press according to claim 1, further comprising reciprocating operating means (19, 20) reciprocating the spray means with respect to the roller (8) to be wetted over a distance small with respect to the lateral extent of the sheet of spray upon impingement of the roller.

7. In a rotary printing press, a fountain system for uniformly applying wetting liquid to the printing plate comprising means directing wetting liquid on the roller of the printing press including

a housing (9);

a plurality of spray means (114, 126) to spray wetting liquid, located in the housing in axially fixed position with respect to the roller, each spray means providing a divergent spray (118) of wetting liquid in sheet form directed towards the roller to be wetted and impinging thereon along an impingement line, the housing being formed with openings through which the sheet of spray from the spray means may pass;

and a movable reciprocating diaphragm slider (121) formed with openings (122) therein, the diaphragm slider reciprocating in a direction parallel to the axis of the roller to be wetted to change the impingement line of the spray on the roller passing through the openings in the housing, and hence the axial coverage of the sheet of spray on the roller from any one spray means.

8. Press according to claim 7, further comprising adjustment slider means (120) secured to the diaphragm slider (121) to fine-adjust the spray pattern from the spray means (114, 126) passing through the diaphragm openings (122) in the diaphragm slider (121).

9. Press according to claim 7, further comprising electric motor drive means (123) and means connecting the motor to the diaphragm and changing rotation of said drive means to reciprocation of said diaphragm.

10. Press according to claim 7, wherein the diaphragm slider extends over the entire length of the roller (8) to be wetted.

11. Press according to claim 7, comprising means coupled to a rotating drive element of the printing press and providing a reciprocating output, the reciprocating output of said means being coupled to the diaphragm slider to move the slider in reciprocating motion.

12. Press according to claim 7, wherein the liquid directing means including said housing comprise lightweight material and are removably located in the press, to permit ready re-location of said wetting liquid directing means in the press and accomodate different directions of rotation of the press.

13. Press according to claim 7, wherein the wetting liquid directing means including said diaphragm are removably located in the press.

14. Press according to claim 7, wherein the spray means comprises nozzles.

15. Press according to claim 7, wherein the spray means comprises throwers (126).

* * * * *