United States Patent

[11] **3,552,311**

[72] Inventor **Nello J. Petri**
1450 Bancroft Ave., San Francisco, Calif. 94124

[21] Appl. No. **744,399**
[22] Filed **July 12, 1968**
[45] Patented **Jan. 5, 1971**

[54] **DAMPENING SYSTEM FOR A LITHOGRAPHIC PRESS**
3 Claims, 11 Drawing Figs.

[52] **U.S. Cl.** **101/148,** 101/350
[51] **Int. Cl.** **B411 25/00**
[50] **Field of Search** 101/147, 148, 348, 349, 350

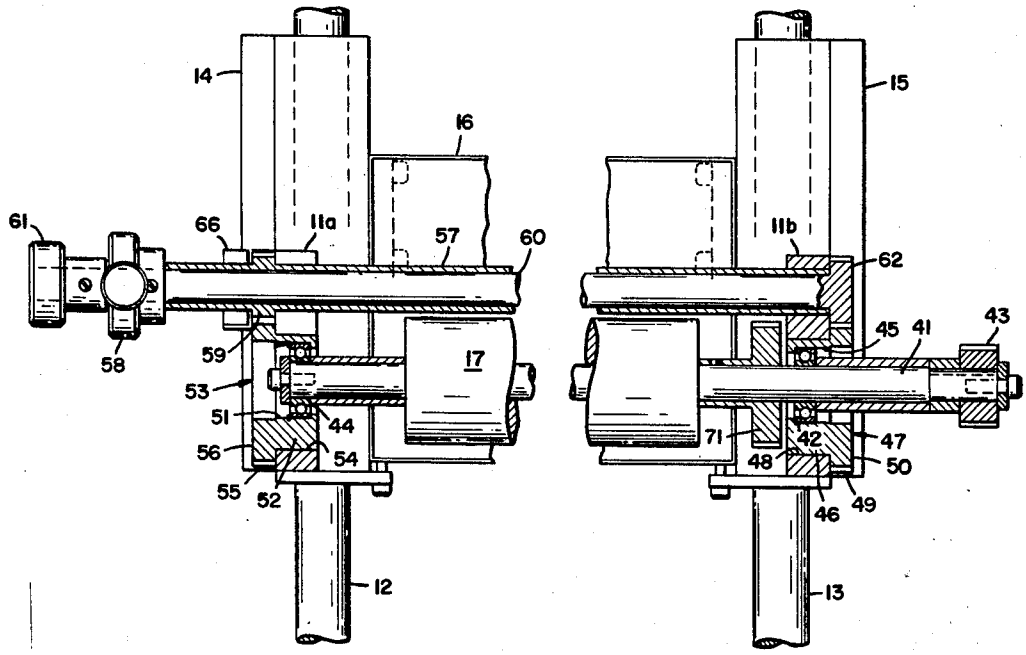
[56] **References Cited**

UNITED STATES PATENTS

1,364,257	1/1921	Dobbertin	101/148
2,162,248	6/1939	Delaplane	101/148
2,750,883	6/1956	Dietrich et al.	101/348
2,762,295	9/1956	Varaga et al.	101/148UX
3,014,421	12/1961	Townsend	101/148X
3,019,727	2/1962	Lake	101/148
3,039,386	6/1962	Trister	101/148X
3,283,707	11/1966	Greubel et al.	101/148
3,343,484	9/1967	Dahlgren	101/148
3,455,238	7/1969	Gambella et al.	101/349X

Primary Examiner—Robert E. Pulfrey
Assistant Examiner—Eugene H. Eickholt
Attorney—Mellin, Moore & Weissenberger

ABSTRACT: A dampening system for a lithographic press in which there is a train of rollers from the dampening fluid pan to the form roller of the press comprising a pan roller, a smooth, resilient-surfaced metering roller and a chrome-surfaced transfer roller. The metering and transfer rollers are mounted in parallelism a fixed distance apart so that the surface pressure therebetween is uniform throughout the length of the rollers. The pan roller is mounted so that the surface pressure against and along the length of the metering roller can be varied to permit the transfer of a proper amount of dampening fluid by the pan roller to the entire length of the metering roller or only to one end thereof.



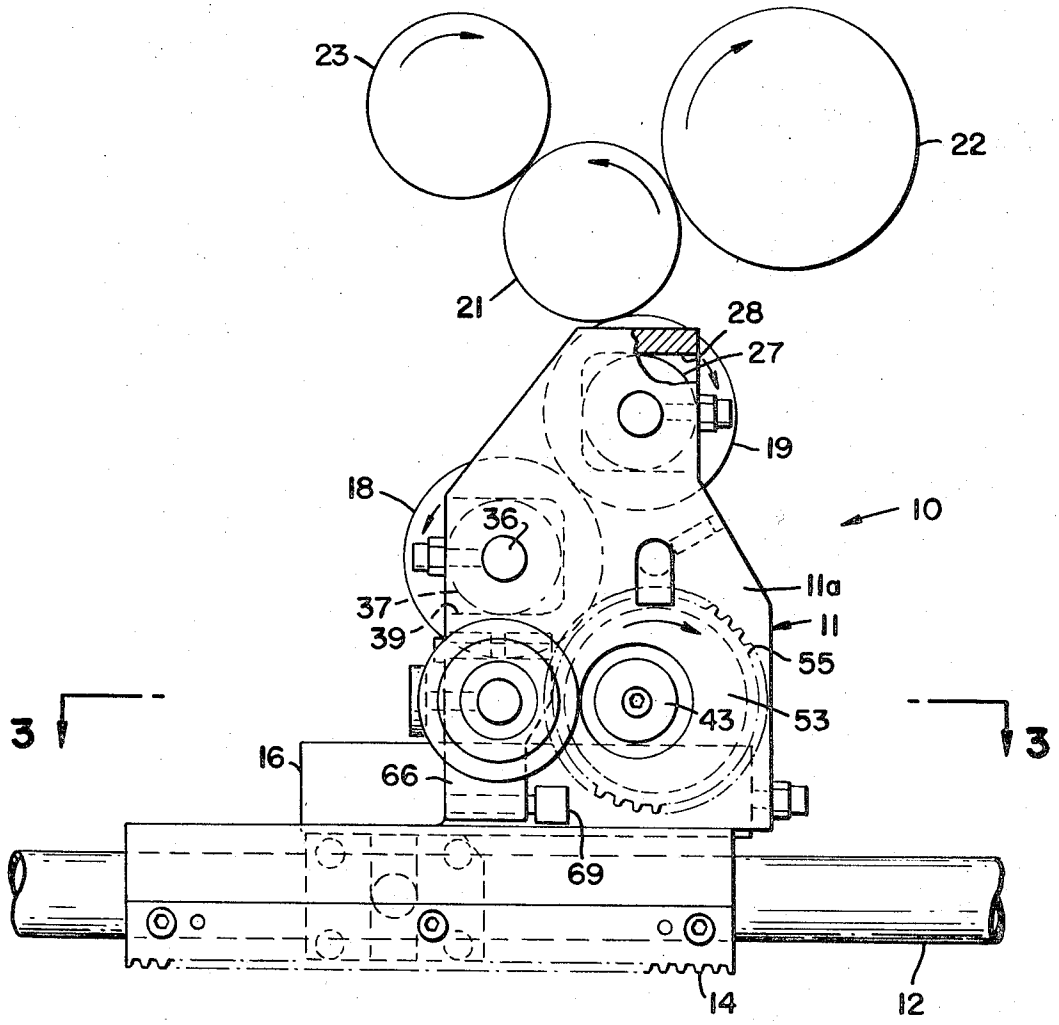


FIG_1

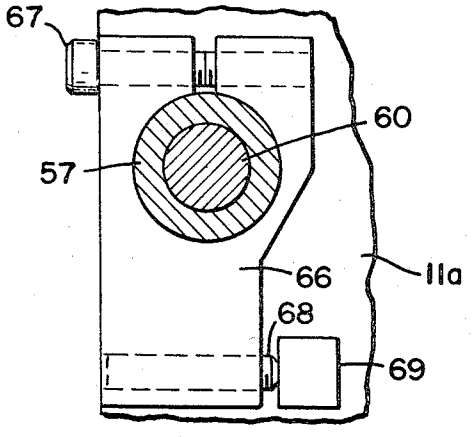


FIG_4

INVENTOR.
NELLO J. PETRI
BY
Mellin, Moore & Weissenberger
ATTORNEYS

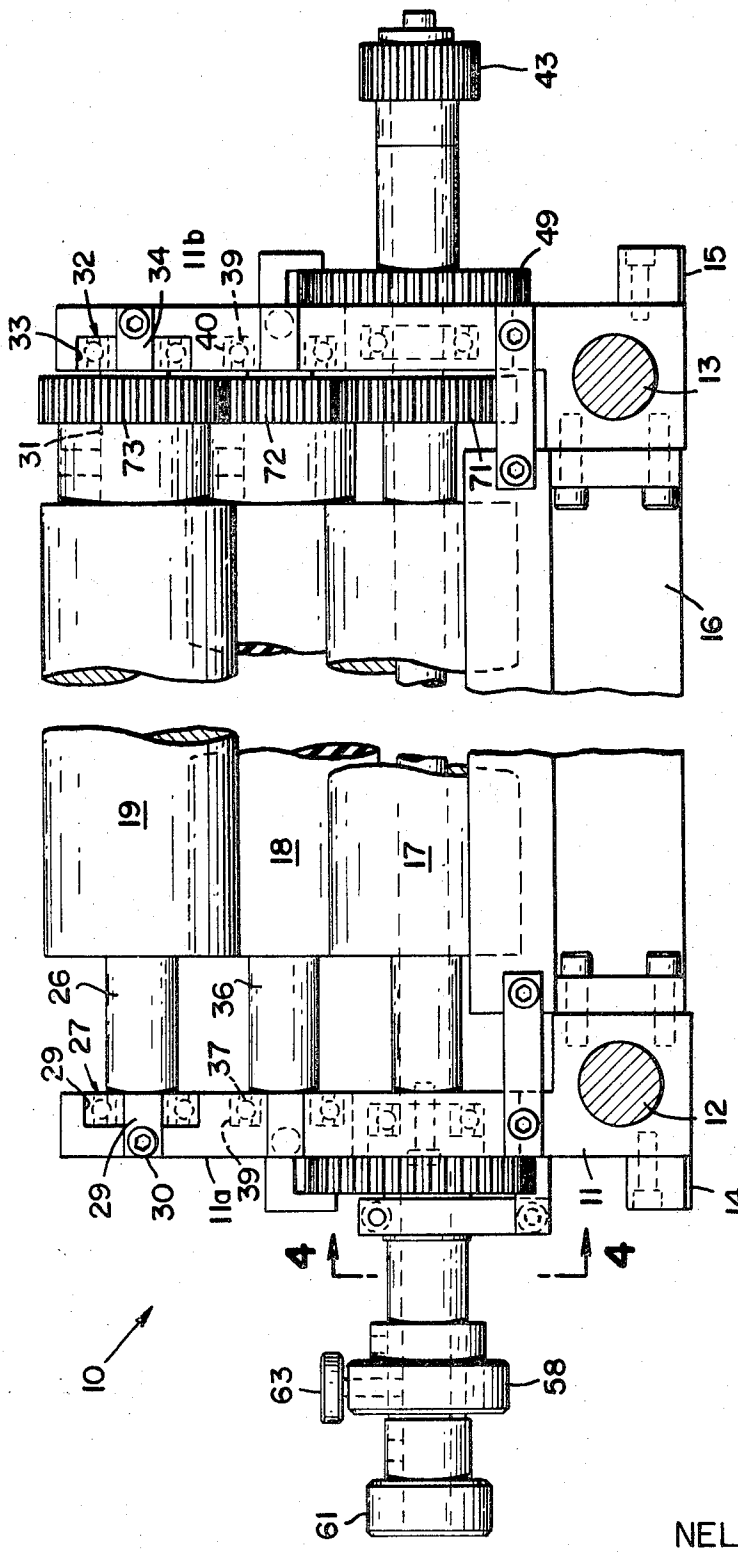


FIG_2

INVENTOR.
NELLO J. PETRI

BY

Mellin, Moore & Weissenberger
ATTORNEYS

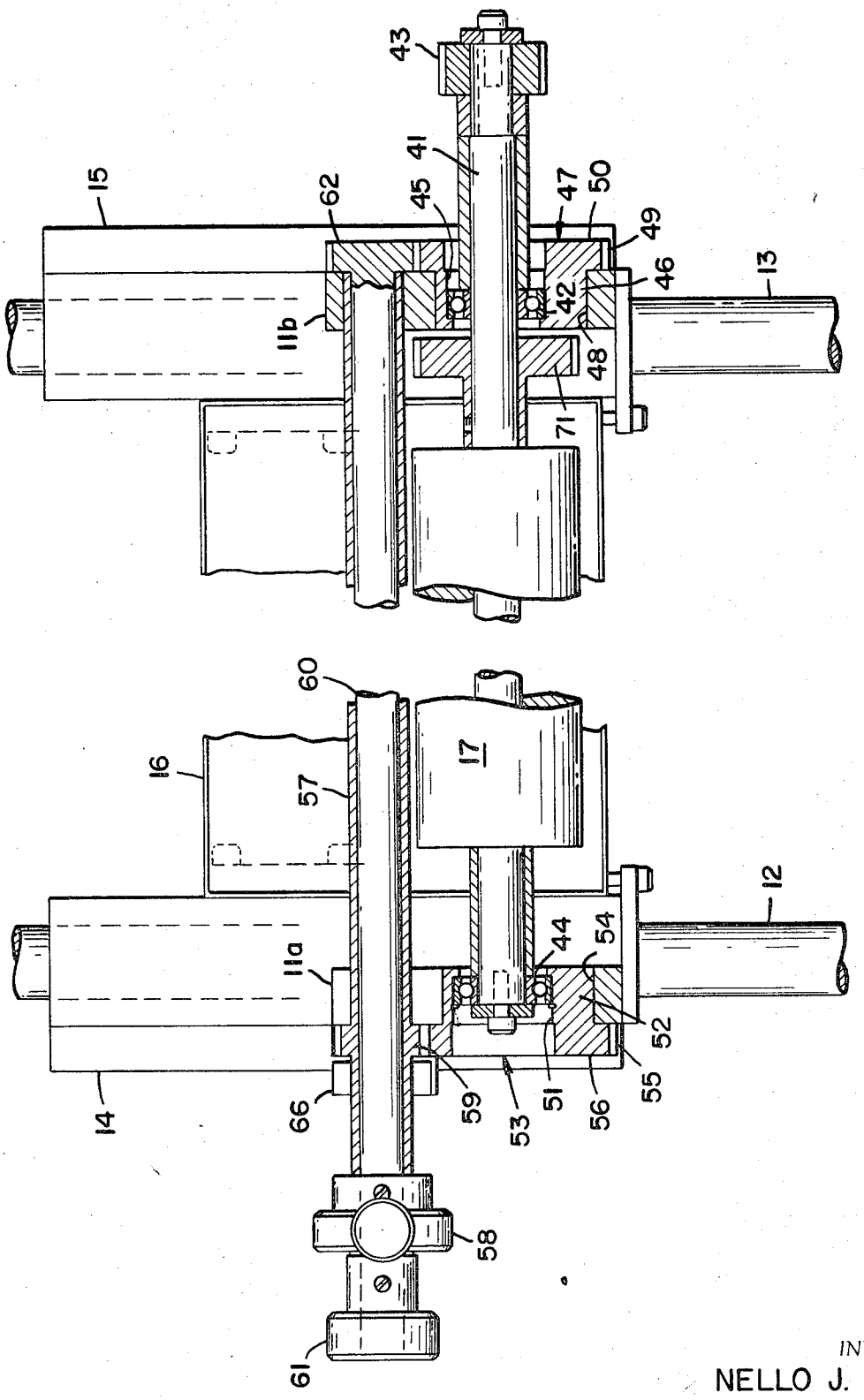


FIG_3

INVENTOR.
NELLO J. PETRI
BY
Mellin, Moore & Weissenberger
ATTORNEYS

FIG_8A

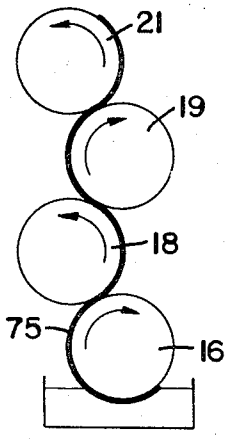


FIG_6A

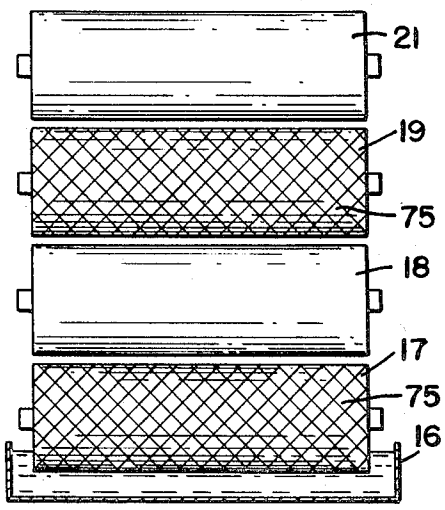


FIG_7A

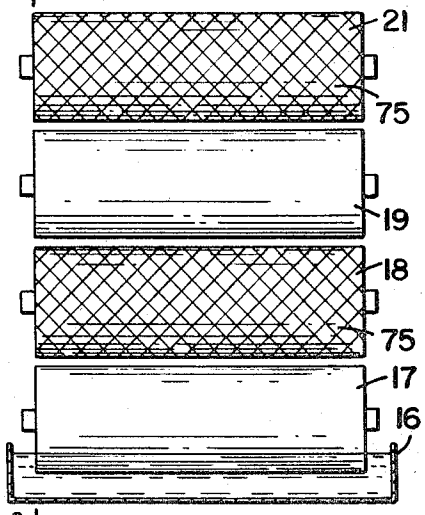


FIG_8B

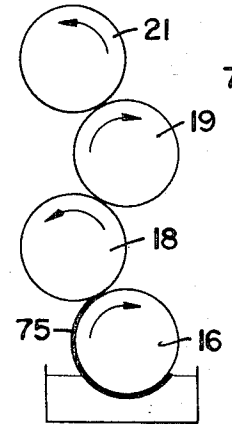


FIG_6B

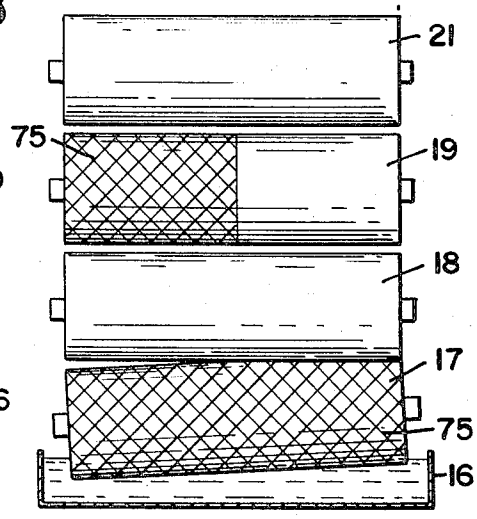
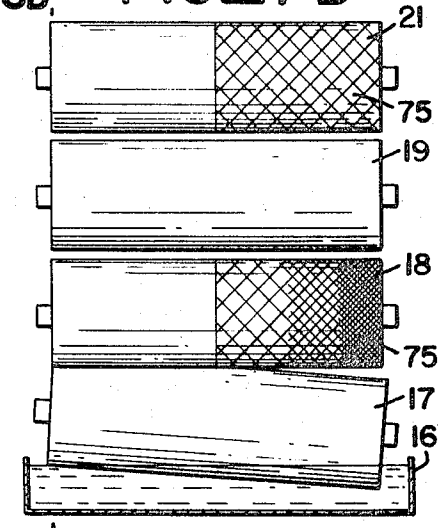


FIG_7B



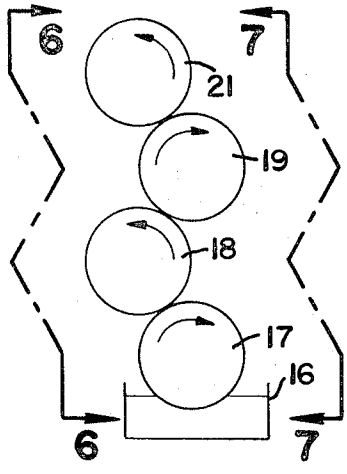


FIG_5

INVENTOR.
NELLO J. PETRI
BY
Mellin, Moore & Weissenberger
ATTORNEYS

DAMPENING SYSTEM FOR A LITHOGRAPHIC PRESS

BACKGROUND OF THE INVENTION

This invention is concerned with lithographic offset printing, and is particularly concerned with improved means for applying dampening fluid to a desired portion of the width of a lithographic offset printing plate.

A lithographic offset printing plate is chemically treated so as to provide a printing area and a nonprinting area—the printing area being ink-receptive and the nonprinting area being hydrophilic, or moisture-receptive. It is necessary to apply a film of moistening fluid (generally a water-alcohol solution) to the surface of the plate, which film is retained by the hydrophilic area but is repelled by the printing area. This enables the printing area to receive ink while the nonprinting area is separated and isolated from the ink by the film of moistening fluid. Thereby, only the image of the printing area is transferred from the lithographic printing plate to the blanket cylinder and from thence onto the paper on which the image is printed.

One of the greatest problems in lithographic offset printing is the application of dampening fluid to the surface of the lithographic plate in uniform and evenly distributed quantities so as to assure uniformly good-quality reproduction of the printed image on the paper.

If too little fluid is applied, the nonprinting areas will not accept enough moisture and will accept some ink, which subsequently will be transferred to the paper. On the other hand, if too much dampening fluid is applied to the plate, it will dilute the ink and cause the printed image to have a washed-out appearance. If the dampening fluid is applied unevenly, so that too little fluid is applied to some portions of the plate and too much is applied to other portions of the plate, the final printed image will have some undesired areas inked and other areas wherein the image is washed out.

One of the methods which have been employed in lithographic offset printing to apply dampening fluid to the lithographic plate is that known as the Dahlgren system, such system being described in considerable detail in the Dahlgren Pat. No. 3,168,037, issued Feb. 2, 1965. In this system there is a water pan in which a rubber-covered metering roller rotates about a horizontal axis to pick up a coating of dampening fluid thereon. A chrome-plated transfer roller rotates in parallelism and in contact with the metering roller so that a film of dampening fluid transfers from the metering roller to the transfer roller. The film of fluid is then transferred from the transfer roller to a form roller of the press and then to the printing plate. A separate train of rollers brings ink to the form roller so that the form roller will apply both ink and dampening fluid to the lithographic plate. In the Dahlgren dampening system the pressure between the metering and transfer rollers will determine the thickness of the film of fluid passing between the rollers and onto the surface of the transfer roller. The amount of fluid passing to the printing plate is adjusted by varying the speed of rotation of the metering and transfer rollers relative to the speed of rotation of the printing plate. An increase in relative speed will supply a greater volume of fluid to the plate, and conversely.

Although the Dahlgren system provides satisfactory results when it is desired to moisten the entire width of the lithographic plate, it has a severe disadvantage for high-speed web feed printing wherein the width of the web is less than the width of the plate. In such circumstances the printing area will be confined to a width of the plate corresponding to the width of the web. If dampening fluid is fed to the plate in the normal manner, such fluid will accumulate on the remainder of the plate since it is not taken up by the narrow web of paper fed through the press. Eventually the water will accumulate on the plate to a point wherein it will run onto the printing width of the plate and will dilute the ink deposited thereon.

In practice, the Dahlgren metering roller will be adjusted in an attempt to block off the transfer of the moistening fluid to the unused end of the lithographic plate. This is accomplished by tilting the axis of the metering roller relative to the axis of the transfer roller so as to squeeze the two rollers together at the ends thereof to starve off the transfer of fluid to the unused end of the plate. However, such tilting necessarily opens up the other ends of the rollers and permits an excessive amount of fluid to pass therethrough and then to the plate. As a result, it often occurs that too much fluid is applied to the edge of the plate which causes dilution of the ink thereat so that the final printed image is washed out along the edge.

In addition, the adjustment of the metering and transfer rollers to permit a desired amount of fluid to pass therebetween for narrow web printing has been found to be a cumbersome procedure and in practice a large number of runs are often required before the proper adjustment has been obtained with the correct amount of dampening fluid being applied to the desired portion of the plate cylinder.

The main object of the present invention is to provide a dampening fluid train of rollers which can be easily and quickly adjusted for supplying the proper amount of fluid evenly to the entire width or a desired portion thereof of a lithographic printing plate.

SUMMARY OF THE INVENTION

The main object of the invention is achieved by the use of a dampening train comprised of three rollers, a pan roller, a metering roller and a transfer roller, which in operation give a double metering control of the dampening fluid passing therethrough.

The metering and transfer rollers are accurately positioned when the dampening system is manufactured so that these rollers are in parallelism with a predetermined pressure therebetween. With a uniform amount of fluid supplied to the metering roller along the length thereof, the rotation of these two rollers will feed a film of fluid therebetween of a substantially uniform thickness along the length thereof, which fluid is then delivered to the printing plate uniformly along the width thereof.

The pan roller rotates in the water pan and is in rolling contact with the metering roller so that as the pan roller rotates it will pick up fluid and transfer it to the metering roller. The pan roller is independently adjustable at each end so that its axis can be made parallel to the metering roller or can be tilted relative thereto.

If it is desired to dampen the entire width of the lithographic plate for full web printing, the pan roller is adjusted so that its axis is parallel to the metering roller The pan roller will then transfer fluid to the entire length of the metering roller uniformly along the length thereof. This uniform layer of fluid on the metering roller will then be passed through to the transfer roller, again uniformly along the length thereof so that the entire width of the printing plate will be uniformly dampened.

If it is desired to dampen only a portion of the width of the plate, for narrow web printing, the axis of the pan roller is tilted relative to the metering roller so as to squeeze one end of the pan roller tightly against the metering roller. This will starve off the transfer of fluid from that end of the pan roller to that end of the metering roller, so that very little fluid is available thereat for transfer to the transfer roller and subsequently to the plate. Even with a tight engagement of the ends of the pan and metering rollers some fluid will be passed therebetween, but this is desirable since the plate should not be allowed to run dry even where it is not in contact with the web. However, the amount of dampening fluid delivered to this unused portion of the plate will not be sufficient to cause problems due to a buildup of dampening fluid on that portion of the plate.

The opposite end of the pan roller will be opened up relative to the corresponding end of the metering roller by the tilting of the pan roller, so that a thicker film of fluid is passed from the pan roller to the metering roller. If this thicker film were permitted to pass to the printing plate, then washouts along

the edge of the plate would occur. However, the thicker film on the end metering roller cannot pass freely between the fixed ends of the metering and transfer rollers. Instead, with an increased amount of fluid on the end of the metering roller it has been found that an additional amount of fluid will be passed through thereat to the transfer roller, but a considerable amount of the thicker film on the end of the metering roller will bead up at the point of contact between the metering and transfer rollers and will run along the line of contact of these rollers before it passes therethrough and onto the transfer roller.

Thus, the metering and transfer rollers will serve to smooth out the excess fluid at the end of the metering roller so that the fluid taken up by the transfer roller and delivered to the web portion of the printing plate will be within the desirable range of dampening fluid on the plate for satisfactory results.

Other objects and advantages of the present invention will become apparent during the course of the following detailed description.

BRIEF DESCRIPTION OF THE DRAWINGS

In the drawings, wherein is illustrated a preferred embodiment of the invention, and wherein like parts are designated by like reference numerals throughout the same.

FIG. 1 is a side elevational view of a dampening system constructed in accordance with the invention.

FIG. 2 is an end elevational view of the system shown in FIG. 1.

FIG. 3 is a sectional view taken on line 3–3 of FIG. 1.

FIG. 4 is a detailed elevational view, partly in section, of the adjustable stop member, taken on line 4–4 of FIG. 2.

FIG. 5 is a diagrammatic view of the pan metering, transfer and form rollers of FIG. 1.

FIG. 6A is an illustrative view of the pan metering, transfer and form rollers, as seen from line 6–6 of FIG. 5, showing the relationship of the rollers when positioned to moisten the entire width of a printing plate and the distribution of dampening fluid on the surfaces of such rollers.

FIG. 7A is a view similar to FIG. 6A, showing the opposite sides of the rollers as viewed from line 7–7 of FIG. 5.

FIG. 8A is an illustrative view of the rollers of FIGS. 7A and 8A as seen from the lines 8A–8A to show the path of fluid transfer from roller to roller.

FIGS. 6B, 7B and 8B are views corresponding to FIGS. 6A, 7A and 8A respectively, showing the relationship of the rollers when positioned to moisten a portion of the width of a printing plate and the distribution of dampening fluid on the surfaces of the rollers.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring now to the drawings, and particularly FIGS. 1—3 thereof, the reference numeral 10 refers generally to the dampening system of the invention which comprises a frame unit 11 having upstanding end portions 11*a* and 11*b*, and mounted for movement along shafts 12 and 13 by means of pinion gears (not shown) which engage the teeth of racks 14 and 15 mounted on the frame 11. The frame 11 has secured thereto a water pan 16 and has journaled therein the pan roller 17, metering roller 18 and transfer roller 19.

The transfer roller tangentially engages form roller 21, which in turn tangentially engages a lithographic printing plate cylinder 22. An ink train of rollers (not shown) supplies ink to the vibrator roller 23 for transfer to the form roller 21 and then to the plate cylinder 22 in a well-known manner. Rollers 21, 22 and 23 are conventionally journaled for rotation by means not shown in the same main frame as that to which shafts 12 and 13 are affixed.

The transfer roller 19 is chrome plated and conventionally formed so as to have a continuous, uninterrupted, hard, smoothly finished hydrophilic surface thereon. The transfer roller 19 is mounted on frame 11 as follows. Shaft stub 26 projecting axially from the transfer roller is inserted into the inner race of a ball bearing unit 27, the outer race of which fits snugly into the pocket 28 formed in frame member 11*a*. Keeper plate 29, fixed by bolt 30 to the frame member 11*a*, maintains ball bearing unit 27 in place in the frame. The other end of the transfer roller 19 is similarly mounted in frame member 11*b* by means of shaft stub 31, ball bearing unit 32 in frame pocket 33 and keeper plate 34.

The metering roller 18 is rubber-covered to provide a smooth, resilient surface thereon, and is mounted in frame members 11*a* and 11*b* in the same manner as described in connection with the transfer roller. Thus the ends of the metering roller shaft 36 are mounted in ball bearings 37 and 38 in turn received within pockets 39 and 40 of frame members 11*a* and 11*b*.

The frame pockets for the transfer and metering rollers thus described are formed in the frame during the manufacture thereof and support the transfer and metering rollers in fixed and parallel relationship to each other. The spacing of the pockets is such that a predetermined pressure is imposed between the engaging surfaces of the transfer and metering rollers to allow the proper amount of fluid to pass therebetween. Since there are no adjustments of these rollers, there is nothing for a press man to alter and thus there is no danger that the desired spacing or positioning of these rollers may be accidentally changed.

The pan roller 17 is also provided with a chrome surface having hydrophilic properties, and is mounted in frame 11, as best shown in FIG. 3. The right end of pan roller shaft 41 extends through ball bearing unit 42 and frame member 11*b* and has a drive gear 43 secured to its end. The left end of the pan roller shaft extends into ball bearing unit 44.

Ball bearing unit 42 is mounted within the eccentrically located bore 45 in the circular hub 46 of eccentric member 47, the hub 46 being mounted in a circular opening 48 in frame member 11*b*. Gear teeth 49 are formed around the circular flange 50 of eccentric member 47 which extends to the right of frame member 11*b*, as seen in FIG. 3.

Similarly, ball bearing unit 44 is mounted within the eccentrically located bore 51 in circular hub 52 of eccentric member 53, the hub being supported in circular opening 54 in frame member 11*a*. Gear teeth 55 are formed around the circular flange 56 of eccentric member 53.

The position of the axis of the pan roller 17 can be adjusted relative to frame 11 by the following mechanism. Hollow shaft 57 is journaled in frame members 11*a* and 11*b* and is provided at one end with a knurled hand knob 58 and a gear member 59 in mesh with the gear teeth 55 of eccentric member 53. Shaft 60 extends through and coaxially to hollow shaft 57 and is provided at one end with a knurled hand knob 61 and at the other with a gear 62 in mesh with the gear teeth 48 on eccentric member 47. The hand knob 58 is provided with a setscrew member 63 so that upon tightening thereof the shafts 57 and 60 will be locked together for unitary rotation.

Assuming that the axis of the pan roller shaft 41 and pan roller 17 is parallel to the metering roller 18, and that the setscrew 63 has been tightened to lock shafts 57 and 60 together, rotation of either knob 58 or 61 will cause eccentric members to rotate equally in frame members 11*a* and 11*b* and move the pan roller towards or away from the metering roller while maintaining the parallel relationship therebetween. Such movement will regulate the pressure between these rollers so as to vary the thickness of the film of fluid that will pass therebetween and be transferred from the pan roller to the metering roller.

If it is desired to move the left end of the pan roller closer to the metering roller (as seen in FIG. 3) and increase the pressure therebetween, the setscrew 63 in knob 58 is loosened so that shafts 57 and 60 may rotate independently of each other. Knob 58 is then rotated in a counterclockwise direction, causing gear 59 to rotate the eccentric member 53 in a clockwise direction, thus moving its eccentrically disposed bore 51 and pan roller shaft 41 towards the metering roller 18. Similarly, rotation of knob 58 in a clockwise direction will move the left

end of the pan roller away from the axis of the metering roller. The right end of the pan roller can also be moved towards or away from the axis of the metering roller in the same manner by rotation of adjustment knob **61**.

At the end of a work shift it is desirable to move the pan roller completely out of engagement with the metering roller, and to again move it back into such engagement at the beginning of the next shift. This may be easily accomplished without loss of adjustment by the following apparatus. A split yoke **66** encircles shaft **57** and is provided with a screw **67** so that the yoke may be locked to shaft **57**. The yoke is also provided with a setscrew **68** which is abuttable against the fixed stop member **69** protruding from the frame member **11***a*.

After the pan roller **17** has been moved to its adjusted position relative to the metering roller **18**, setscrew **63** in knob **58** is tightened to lock the adjustment shafts **57** and **60** together. Yoke member **66** is rotated on shaft **57** so that the setscrew **68** abuts stop member **69** and screw **67** is tightened to lock the yoke onto shaft **57**. Sufficient rotation of either knob **58** or **61** in a clockwise direction will then move both ends of the pan roller away from the metering roller so that these two rollers are physically separated. At the same time yoke **66** will rotate in a clockwise direction with shaft **57**.

When it is desired to reengage the pan and metering rollers, the locked-together shafts **57** and **60** are rotated in a counterclockwise direction, bringing the pan roller back into engagement with the metering roller. Such movement is ended by the reengagement of setscrew **68** with the stop member **69**, so that the pan roller is back in its original position relative to the metering roller.

The right ends of the shafts of the pan, metering and transfer rollers (as seen in FIG. **2**) are each provided with gears **71**, **72** and **73** respectively in meshing engagement. Thus, when a variable drive means (not shown) is coupled to gear **43** on the pan roller shaft, the pan, metering and transfer rollers will be driven in unison.

The operation of the apparatus described above is shown diagrammatically in FIGS. **5—8**. In FIGS. 5A, 7A, 6B and 7B the various rollers are shown as being physically separated for purposes of explanation. However, it is to be understood that in actual operation, these rollers are in contacting pressure engagement with each other.

FIGS. **6A**, **7A** and **8A** illustrate the arrangement of the rollers when it is desired to print from the entire width of the printing plate cylinder **22**. In such case the axes of the metering roller **18** and transfer roller **19** will be in parallelism and spaced apart a predetermined distance so that the proper pressure is imposed therebetween to cause a layer of dampening fluid of uniform thickness to pass through the line of contact therebetween and be transferred to the transfer roller **19**. This layer of fluid is then transferred to the form roller **21** for application to the printing plate cylinder. The axes of the form roller **21** and plate cylinder **22** are also parallel to the axes of the metering roller **18** and transfer roller **19**.

The pan roller **17** is adjusted so that its axis is parallel to the axis of the metering roller **18** and is in such pressure engagement that the amount of dampening fluid **75** (shown in crosshatching on FIGS. **6A** and **7A** and in heavy line on FIG. **8A**) carried by the pan roller surface and passing between the pan and metering rollers for transfer to the metering roller surface is approximately equal to the amount which can pass between the metering and transfer roller surfaces.

As the pan roller **17** rotates it will pick up dampening fluid along the length thereof and carry it up to the metering roller **18** and transfer a film of such fluid completely along the length of the metering roller. Since the axes of the metering and transfer rollers are fixed in parallelism to each other, the film of dampening fluid passing therebetween will be of uniform thickness, and will be transferred to the transfer roller completely along the length thereof. The film **75** of dampening fluid will then be transferred to the form roller **21** completely along the length thereof and then to the plate cylinder **22**.

If it is desired to moisten only a portion of the plate cylinder, the pan roller is adjusted so that one end is squeezed more tightly against the metering roller as shown in FIGS. **6B**, **7B** and **8B**, to squeeze off the fluid which can pass between those ends of the pan and metering rollers.

As shown in FIG. **6B**, the pan roller **17** will again pick up fluid uniformly and completely along its length. However, since its axis is not now parallel to that of the metering roller, the transfer of fluid from the pan to the metering roller will not be uniform. Instead, the transfer of fluid will be substantially starved at the end where the pan and metering rollers are in tight contact, although some fluid will still be passed therebetween, which fluid is necessary to prevent the plate from running dry. The amount of fluid transferred to the metering roller will be in increasing amounts to the other end of the metering roller, as illustrated in general by the variation in crosshatching of the layer **75** in FIG. **7B**.

The amount of fluid transferred to the other end of the metering roller will be in excess of that required. However, as the excess fluid arrives at the transfer roller, the metering action of the metering and transfer rollers will not allow all of the fluid to pass therebetween. Instead, the amount of passed will pile up in the form of a bead and will run along the line of contact of the metering and transfer rollers and will eventually pass through at points spaced from the end of the rollers.

Thus, the amount of fluid transferred to the transfer roller will be substantially uniform along the transfer roller for a length substantially equal to the width of the web passing over the printing plate, as generally indicated in FIG. **6B**.

It is to be understood that the distribution of fluid depicted in FIG. **6B** is for purposes of explanation. In actual practice, it will be found that the fluid transferred to the transfer roller is greater at the left end thereof (as seen in FIG. **6B**) and decreases towards the right, without a sharp cutoff of fluid as illustrated. However, the variations in the amount of fluid on the transfer roller in the crosshatched area are within the range of the amount of fluid needed for proper printing, and the amount of fluid on the unshaded portion of the transfer roller is sufficiently small to prevent the plate from running dry while at the same time preventing detrimental fluid buildup on the nonactive portion of the printing plate.

Although the pan roller **17** has been described as having a hydrophilic chrome surface, a rubber-covered roller may be used instead, if desired, or any other surface may be used which is capable of picking up fluid from the pan and transferring it to the metering roller **18**.

It is to be understood that the form of the invention herein shown and described is to be taken as a preferred embodiment of the same and that various changes may be made in the shape, size and arrangement of parts without departing from the spirit of the invention or the scope of the attached claims.

I claim:

1. In a device for dampening the plate of a lithographic press:

a. a frame;

b. a dampening fluid pan supported on said frame;

c. a pan roller having its ends journaled in said frame, said pan roller having a portion of the periphery of the surface thereof disposed in said pan;

d. a dampening fluid transfer roller having its ends journaled in said frame, said transfer roller having a chromeplated surface;

e. a dampening fluid metering roller having its ends journaled in said frame, said metering roller having a smooth, resilient surface in rotative surface engagement with said pan and transfer rollers;

f. said metering roller and said transfer roller being supported on said frame with the axes of said rollers being parallel and spaced apart a fixed distance so that the surfaces of said rollers are in predetermined pressure engagement with each other; and

g. first and second adjustment means for independently moving the ends of said pan roller towards and away from

the axis of said metering roller to tilt the axis of the pan roller and vary the surface pressure relationship therebetween along the line of contact.

2. In a device as set forth in claim 1, and further including:

h. means releasably locking said first and second adjustment means together for simultaneous movement of the ends of said pan roller towards and away from the axis of said metering roller.

3. In a device as set forth in claim 2, and further including:

i. a first stop member on said frame; and

j. a second stop member releasably connectable to said adjustment means for movement therewith and engageable with said first stop member to arrest movement of said pan roller towards said metering roller.