July 29, 1952 W. G. MULLEN 2,604,848

DAMPENING APPARATUS AND METHOD FOR LITHOGRAPHIC PRINTING

Filed April 3, 1948 4 Sheets-Sheet 1

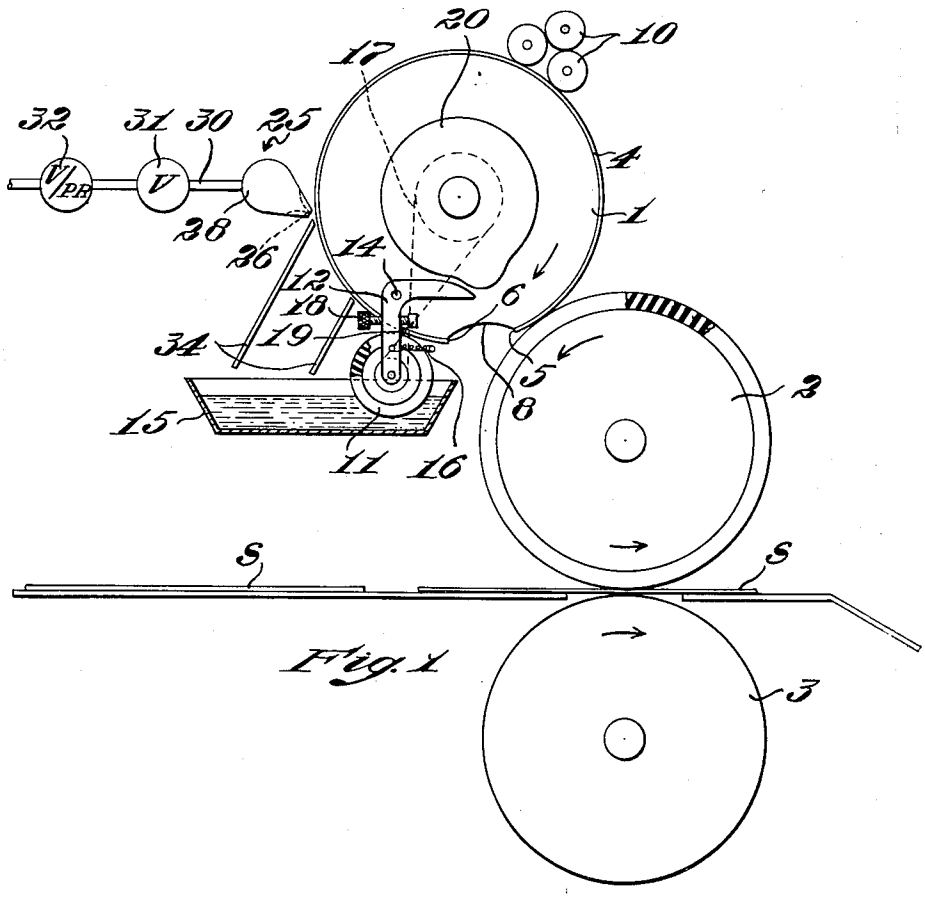


Fig. 1

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DAMPENING APPARATUS AND METHOD FOR LITHOGRAPHIC PRINTING

Filed April 3, 1948 4 Sheets-Sheet 2

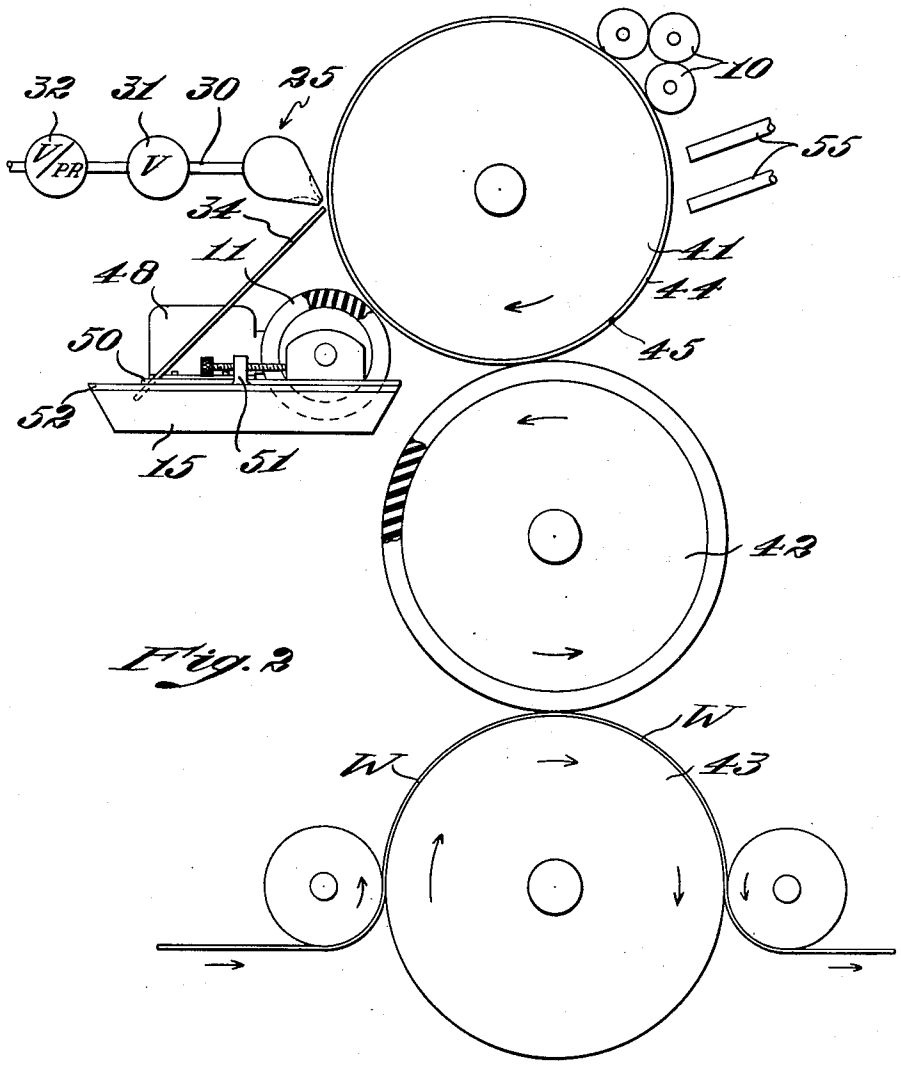


Fig. 2

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DAMPENING APPARATUS AND METHOD FOR LITHOGRAPHIC PRINTING

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Filed April 3, 1948

4 Sheets-Sheet 3

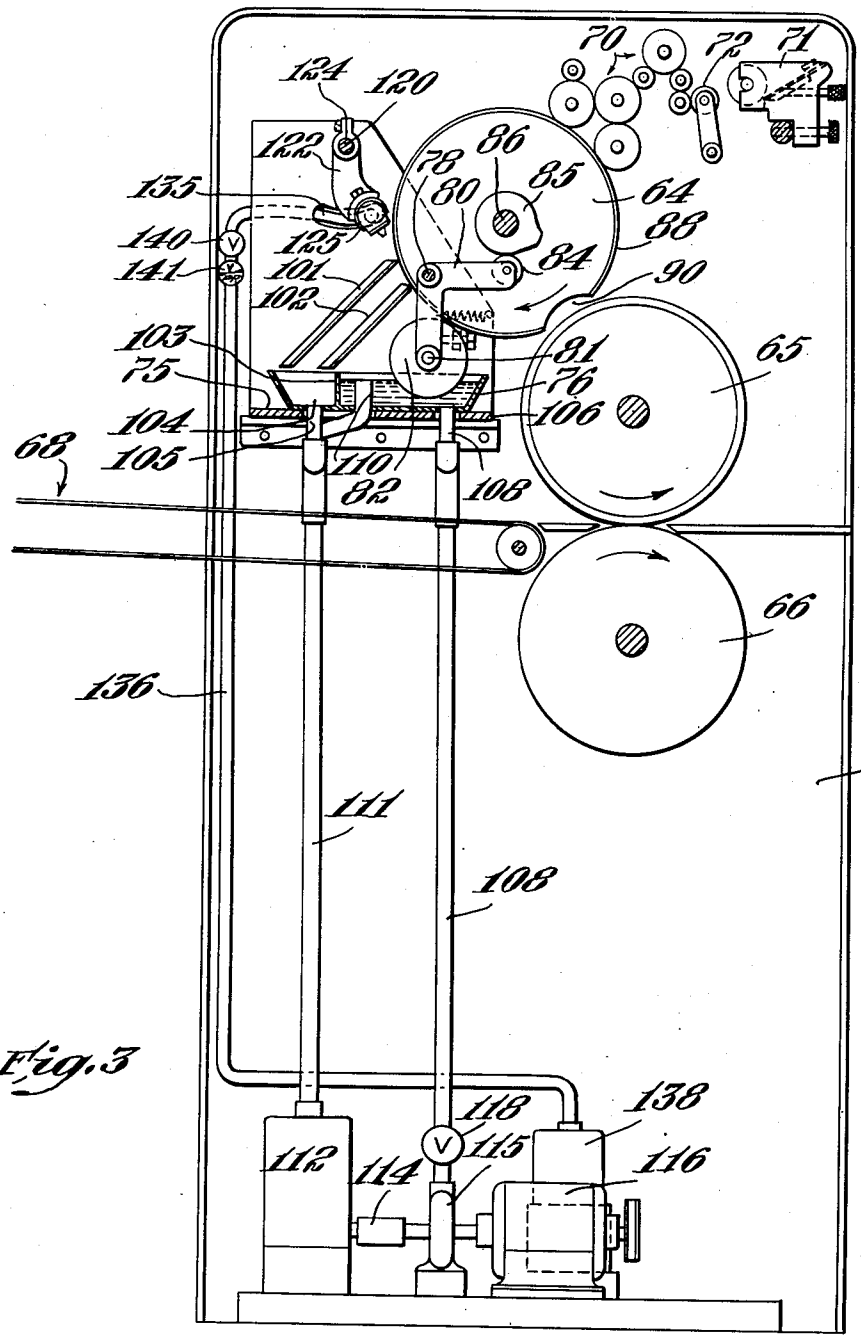


Fig. 3

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DAMPENING APPARATUS AND METHOD FOR LITHOGRAPHIC PRINTING

Filed April 3, 1948 4 Sheets-Sheet 4

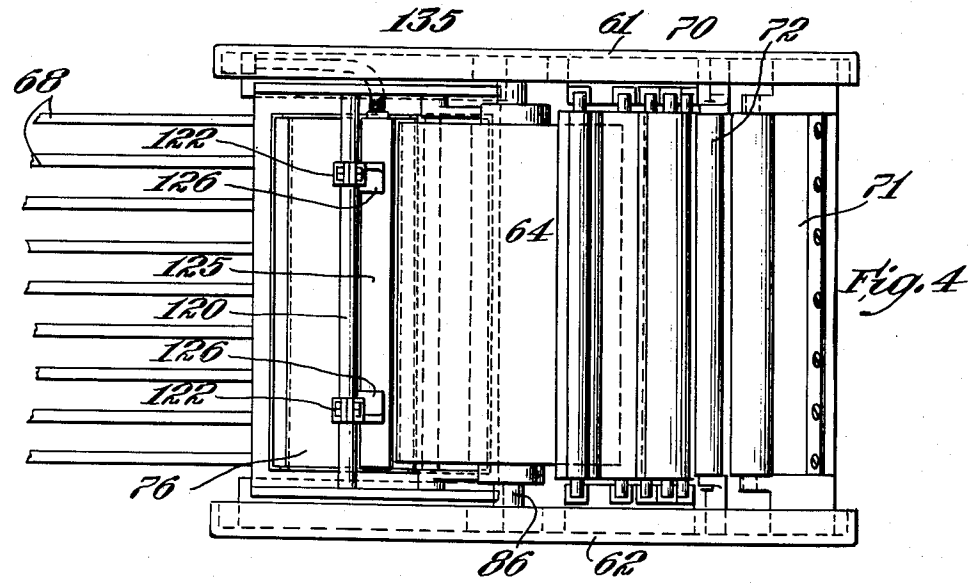


Fig. 4

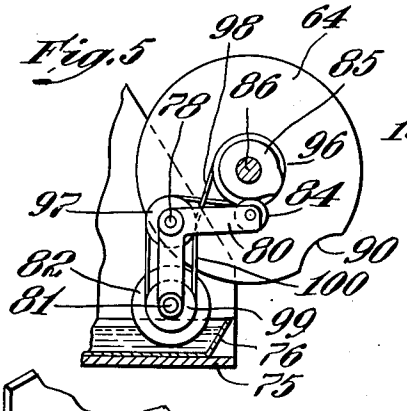


Fig. 5

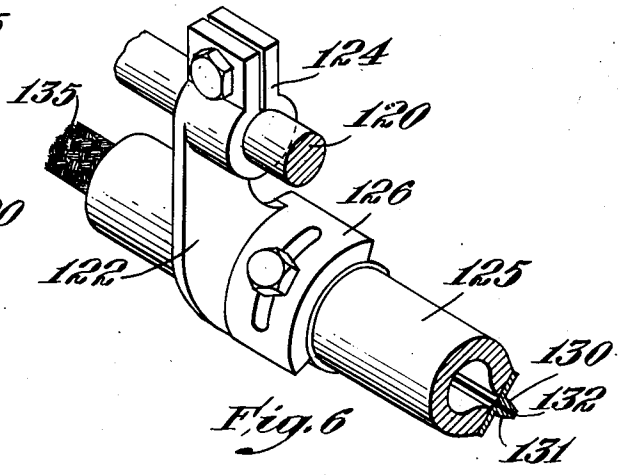


Fig. 6

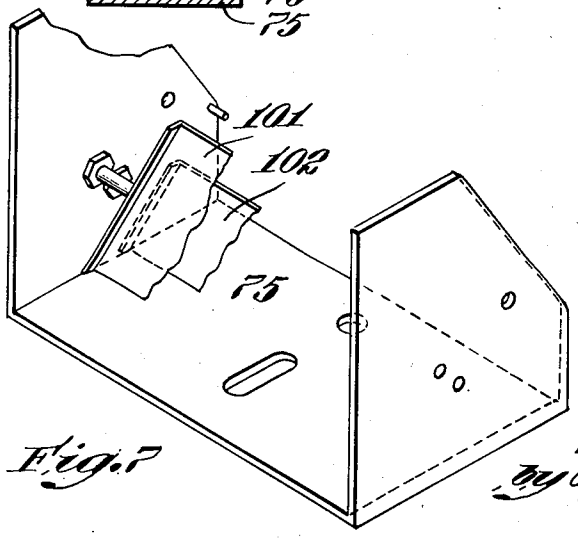


Fig. 7

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Patented July 29, 1952

2,604,848

UNITED STATES PATENT OFFICE

2,604,848

DAMPENING APPARATUS AND METHOD FOR LITHOGRAPHIC PRINTING

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Application April 3, 1948, Serial No. 18,815

13 Claims. (Cl. 101—147)

1

This invention relates to a method of and machine for lithographic printing.

All forms of lithographic printing embody the use of a printing plate having ink-receptive areas and water-receptive, ink-repellent, non-printing areas, and it is well recognized that in order to produce satisfactory printing the non-printing areas must be maintained sufficiently moist to repel the ink applied to the printing plate. Accordingly, it is necessary to apply at least periodically an aqueous liquid or solution (hereinafter referred to as water) to the surface of the printing plate, and to this end it is the usual practice to employ a so-called Molleton roller which comprises an absorptive fabric surface having a direct contact with the printing plate so as to apply to its surface a film of water.

It is well known that if an excess amount of water is applied and permitted to remain on the printing plate it has a tendency to interfere with the ink-receptivity of the printing areas and emulsifying with the printing ink, consequently producing a "gray" and indistinct print. On the other hand, if insufficient water is applied to maintain the non-printing areas ink-repellent, they become fouled with ink and consequently produce a dirty or smudgy print, necessitating cleaning the printing plate which is an irksome, time-consuming procedure greatly interfering with production. Due to the absorbent character of the surface of the roller, it is practically impossible not only accurately to control the amount of water applied to the printing plate, but also the evenness of the water film, and the ink-repellent character of the printing areas are relied on solely to eliminate moisture from these parts.

Moreover, since the Molleton or wetting roller comes in direct contact with the printing plate, it not only tends to pick up ink and thus become dirty, requiring frequent cleaning and periodic replacement of its absorbent covering, but also causes an appreciable wear on the surface of the printing plate which ultimately impairs both the printing and non-printing areas, thus reducing the life of the plate. When it is desired to change from one color to another, it is necessary, in order to avoid contamination, to change the Molleton roller and in some cases the water-transfer rolls associated therewith. Such a procedure is time-consuming, requiring the usual trial runs during which the necessary readjustments must be made.

Another difficulty encountered in offset presses embodying a conventional dampening system when printing or coated papers is the tendency of the coating material or other chemicals contained therein to work or be carried back by way of the wet transfer blanket onto the printing plate and into the dampening solution. Since

2

most coated papers are more or less alkaline, the presence of a small amount of such coating material tends not only to upset the pH of the dampening solution, but also to provide, in effect, an emulsifying agent which promotes emulsification of the ink and dampening solution.

A further difficulty attributable to a wet transfer blanket is the dimensional changes of distortion of the sheet being printed, resulting from moisture transferred to its surface from the blanket, particularly in registration work.

Although numerous attempts have heretofore been made to avoid the above-mentioned disadvantages, so far as I am aware all such attempts have failed to provide a reliable and efficient method of accurately controlling the amount of water applied to the printing plate, and hence the dampening system of all lithographic printing machines still remains an outstanding problem.

The principal objects of the present invention are to provide an efficient and reliable method of and machine for dampening the printing plate of a lithographic printing machine, which are not subject to the aforementioned difficulties and disadvantages; to provide a dampening system which may be attached or applied to conventional presses, both the offset and direct type and to both sheet and web presses; and to provide a dampening system with associated controls which is relatively inexpensive to manufacture, install and operate.

Further objects will be apparent from a consideration of the following description and the accompanying drawings, wherein:

Fig. 1 is a schematic view of an offset press equipped with a dampening system embodying the present invention;

Fig. 2 is a schematic view of a web offset press embodying my dampening system;

Fig. 3 is a vertical sectional elevation of a sheet press having a dampening system similar to that illustrated in Fig. 1;

Fig. 4 is a top plan view of the press shown in Fig. 3;

Fig. 5 is a view of the end of the water roll and associated plate cylinder opposite that shown in Fig. 3;

Fig. 6 is an enlarged sectional isometric view showing the manner in which the air nozzle is adjustably mounted; and

Fig. 7 is an isometric view of the supporting bracket for the dampening system.

In accordance with the present invention there is applied to the surface of a lithographic printing plate having the usual ink-receptive printing areas and water-receptive non-printing areas a continuous film of water or moistening solution in excess of that required for proper moistening of the non-printing areas, after which a rela-

tively high velocity jet of air or other gas is directed against the moistened surface of the printing plate at an angle effective to remove substantially all water from the printing areas and simultaneously reduce the thickness of the film of water in the non-printing areas to a minimum required for repelling ink therefrom. A greasy lithographic ink may then be applied to the printing plate in the usual manner and the ink film thus applied may then be transferred either to the offset blanket or directly to the sheet to be printed. The lithographic plate or surface may be of stone, metal, a hydrophilic colloid or any other material having lithographic properties, and the continuous film of water is preferably applied by a roller maintained in closely spaced relation to the surface of the plate or other means which does not come in actual contact with the printing plate. The air jet should be in the form of an elongate blade extending across the plate, or at least the area which has been wet, and directed at such an angle as is effective cleanly to brush off all water from the printing areas and simultaneously sweep back the excess water from the non-printing areas. The effectiveness of the air jet may be varied by adjusting the distance of the nozzle and/or its angular position relative to the printing plate and/or by varying the air pressure for a given setting of the air nozzle. In any event the velocity and angle of the jet should be such as to hold or brush back the excess moisture from the non-printing areas and sweep away all water from the printing areas, without causing abrasion or impairment of the surface of the plate. Since the velocity and position of the air jet are subject to precise adjustment, an accurate control of the moisture remaining on the non-printing areas may be secured.

If desired, after inking the moistened plate, but before transfer of the ink film, a jet of hot air may be directed against the plate so as to evaporate a substantial portion of the water remaining in the non-printing areas, thus partially drying out the non-printing areas so that no appreciable moisture is transferred to the surface of the sheet to be printed.

An illustrative application of my improved dampening system to an offset press is schematically shown in Fig. 1, wherein the numerals 1, 2 and 3 designate the plate cylinder, blanket cylinder and impression cylinder, respectively. The blanket cylinder 2 is preferably offset, relative to vertical line through the axis of the cylinder 1, so as to provide space for the dampening system, and except as hereinafter noted, all parts of the press are of conventional design and construction.

The cylinder 1 carries the usual lithographic printing plate 4 which may be of metal, parchment, gelatin, casein or other colloid-coated fibrous material or the like, the plate 4 extending about the cylinder 1 with its ends 5 and 6 secured in spaced relation to each other in conventional manner. Between the ends 5 and 6 the cylinder 1 is formed with a depression extending the entire length of the cylinder into which is fitted a shallow scoop 8 of generally arcuate cross-section. The usual inking rolls 10 are provided at the top of the cylinder to transfer ink from a reservoir (not shown) to the face of the printing plate 4.

At the underside of the cylinder 1 is a water transfer roll 11 which is preferably rubber covered and disposed in approximately tangential relation to the printing plate 4. Each end of this roll is rotatably supported in a bearing carried by the depending arm of a bell crank 12 pivoted at 14 to the frame of the press so that the roll 11 dips into a trough 15 which carries water or moistening solution, the construction and arrangement of parts being such that the roll 11 may be moved toward and away from the cylinder 1 and printing plate 4. A tension spring 16 connected with the depending arm of bell crank 12 urges the roll 11 toward the plate cylinder 1, and an adjusting screw 18 carried by the depending arm and engageable with a lug 19 carried by the frame limits the inward movement of the roll so that any desired degree of adjustment of the water roll relative to the printing plate 4 may be obtained. The roll 11 is preferably driven at approximately the same peripheral speed as the printing plate 4 and may be independently driven in any suitable manner, or, as here shown, may be connected with the plate cylinder by a loose fitting crossed belt or chain 17 which permits the roll 11 to be swung toward and away from the plate cylinder sufficiently to move the roll to and from operative position.

Although the water roll may be brought and maintained in direct contact with the printing plate 4, for the reasons above pointed out it is preferable to maintain a spacing between the roll 11 and surface of the printing plate of the order of a few thousandths of an inch so that water picked up by the roll 11 will span the gap and thus be transferred to the printing plate in the form of a continuous film somewhat in excess of the amount required for proper moistening of the plate. A gap or spacing of approximately 0.003 inch has been found quite satisfactory in that such a spacing is less than the thickness of the film or water layer picked up by the roll 11 and there is little danger of the roll coming in direct contact with the plate 4 when properly attached to the cylinder 1.

The upper arm of each bell crank is associated with a cam 20 carried by the shaft supporting the cylinder 1, the cam 20 being designed to swing the bell crank clockwise, thereby swinging roll 11 away from the cylinder 1, when the trailing end of the printing plate 4 and the scoop 8 travel past the line of application of the water, thus arresting temporarily the application of water, but allowing the roll 11 to swing back to operative position under the influence of spring 16 when the leading end 5 of the plate reaches the line of application of the water, thus resuming normal operation.

At a level preferably slightly below the horizontal plane passing through the axis of the cylinder 1 is an elongate air nozzle 25 directed at a downwardly inclined angle so as to deliver a blade-like jet of relatively high velocity air against the surface of the printing plate 4 which, as above explained, is effective to brush back excess moisture from the non-printing areas and sweep away all water from the printing areas. The nozzle 25 extends across the surface of the printing plate 4 and is formed with an elongate slit 26 leading from the plenum chamber 28 which is connected with a suitable compressed air supply by a line 30 provided with a control valve 31 and pressure-regulating valve 32. The size of the nozzle 25, dimensions of the slot 26, operating pressure and other such factors will vary in accordance with the size and speed of the press. For example, in an offset press using conventional plates, a nozzle having a delivery slot approximately 0.01 inch wide and spaced from the surface of the printing plate 4 a distance of 0.012 to 0.015 inch, gave satisfactory results with an operating pressure in sup-

ply line 30 of between one and one-half and five pounds gage when operating at a plate speed of 100 to 250 feet per minute. When operating at higher speeds a greater pressure is usually required for a given setting of the nozzle.

Interposed between the roll 11 and the nozzle 25 is a pair of downwardly inclined baffles 34 spaced apart a distance slightly greater than the width of scoop 8 and so arranged that as the scoop approaches the nozzle 25, the excess water brushed back by the air jet runs into the scoop and is then blown out by the action of the air jet, the baffles being effective not only to prevent the water from being scattered but also to conduct it back to the trough 15, or elsewhere as desired.

In operation the roll 11 picks up from trough 15 and applies to the plate 4 a continuous film of water, and the jet issuing from the nozzle 25 brushes the water from the printing areas and simultaneously reduces the film of water on the non-printing areas to a minimum. The inking rolls 10 then apply a film of ink which is received by the printing areas only, and this film is transferred to the surface of the blanket cylinder 2 and then to the sheet S being fed in conventional manner between the blanket and impression cylinders.

Substantially the same dampening system may be applied to a web press, as schematically illustrated in Fig. 2, wherein the numerals 41, 42 and 43 designate, respectively, the plate, blanket and impression cylinders, and between the latter two is fed in conventional manner a sheet or web W to be printed. In this embodiment the printing plate 44 is wrapped almost completely around the cylinder 41 and its ends are brought as closely together as possible and sealed mechanically or by a covering of wax or the like water-repellent material 45 which prevents moisture from working under the plate.

The water roll 11 is driven by a small back-gear motor 48 mounted on a plate 50 carried by the frame of the press, and the plate 50 is adjustably mounted, as indicated at 51, on guideways 52 so that the roll 11 dips into trough 15, the parts being adjusted to maintain a gap between the surface of plate 44 and roll 11, as in the previously described embodiment. A nozzle 25 and associated controls and inking rolls 10 are provided as in the previously described embodiment, and between the nozzle 25 and roll 11 is a single baffle 34 effective to conduct back to the trough 15, or elsewhere, accumulations of water brushed back by the jet issuing from nozzle 25.

In this installation the water roll 11 is at all times in operative position, and as it is desirous of minimizing if not eliminating moisture carried by the plate 44 at the time of actual printing, one or more drying nozzles 55 may be positioned posteriorly of the inking rolls 10 so as to direct one or more jets of air against the printing plate, thereby evaporating at least a substantial portion of the water in the non-printing areas by the time the ink film is transferred to the blanket cylinder 42.

The embodiment shown in Figs. 3 to 7 illustrates the manner in which the dampening system may be built into or applied to a conventional sheet press having the usual upright frame members or sides 61 and 62 between which are supported the plate cylinder 64 and associated transfer cylinder 65 and impression cylinder 66 which are offset relative to the plate cylinder 64. These cylinders are driven in conventional manner and the usual feeding mechanism 68 carries the sheets

to be printed between the cylinders 65 and 66, it being understood that any of the well-known feeding mechanisms may be employed. The usual inking mechanism, comprising a series of contiguous rolls 70 associated with an ink reservoir 71 through a pivotally mounted transfer roll 72, is mounted between the frames 61 and 62 and except for the dampening system presently to be described, the general design, construction and mode of operation of the press is substantially identical to those of conventional sheet presses such as a Multilith.

The dampening system, in principle, is substantially the same as that shown in Fig. 1 and comprises an elongate U-shaped supporting bracket 75 (Fig. 7) which is secured to the frames 61 and 62 so that its horizontal shelf is below the plate cylinder 64 and in approximate alignment with the axis of the blanket cylinder 65, as shown in Fig. 3. The bracket 75 supports a trough 76 which contains the dampening solution and the side members of the bracket 75 carry aligned stub shafts 78, each of which supports a bell crank 80. The lower arm of each bell crank carries a bearing in which one end of the shaft 81 of the water roll 82 is rotatably mounted and the other end of each bell crank carries a follower 84 engageable with a cam 85 fixed to the shaft 86 supporting the plate cylinder 64, the construction and arrangement of parts being such that the bell cranks normally support the roll so that it dips into the trough 76. The plate cylinder 64 is provided with the usual anchoring means for holding the opposite ends of the printing plate 88 and between the anchoring means the surface of the cylinder is recessed to receive the scoop 90 as in the embodiment of Fig. 1.

The design of the parts is such that the cams 85 rotate the bell cranks clockwise (Fig. 3) to swing the water roll 82 away from the plate cylinder when the scoop 90 approaches the line of application of the dampening solution and then permits the water roll to be restored to normal operating position (Fig. 3) when the scoop passes the line of application. Springs 91 connected at one end to each of the vertical arms of the bell cranks and at their opposite end to a lug 92 carried by the bracket 75 urge the arms inwardly toward the plate cylinder and adjusting screws 94 are carried by the depending arms of the bell cranks and are engageable with lugs 95 carried by the bracket 75 to limit the inward movement of the water roll 82 so that it is normally maintained approximately 0.003 inch from the surface of the printing plate 88 carried by the cylinder 64.

The roll 82 is driven at approximately the same peripheral speed as that of the printing plate 88 and to this end a sheave 96 (Fig. 5) is secured to the shaft 86 and this sheave drives a double-groove sheave 97 carried by one of the stub shafts 78 through a cross belt or chain 98. The sheave 97 drives a sheave 99 secured to the shaft 81 through a belt or chain 100. With this construction and arrangement, the water roll may be swung toward and away from the plate cylinder and still be continuously driven regardless of its position relative to the plate cylinder.

A pair of spaced baffles 101 and 102 are adjustably supported by the bracket 75 so as to return excess dampening solution to the rear section of the trough 75 which, as shown in Fig. 3, is provided with a partition 103 dividing its interior into front and rear sections. The

rear section is provided with a discharge opening 104 through which dampening solution flows into a discharge pipe 105 and the front section is provided with an inlet opening 106 connected with a supply pipe 108 and an opening through which projects an overflow pipe 110 which maintains a predetermined level of dampening solution within the front section of the trough. The overflow pipe 110 is connected with a return pipe 111 which leads to the reservoir 112 at the bottom part of the press between the frames 61 and 62. The discharge pipe 105 may be connected to the return pipe 111 as shown in Fig. 3, if it be desired to recover excess dampening solution, but if such excess solution is not to be re-used, then the discharge pipe may be suitably connected with a drain so that it will not be recirculated through the system.

The lower part of the reservoir 112 is connected to a cartridge filter or the like 114 which in turn is connected to the inlet of a small centrifugal pump 115 driven by a motor 116. The discharge port of the pump 115 is connected to supply pipe 108 which has a regulating valve 118 adapted to control the rate of flow of the dampening solution to trough 75. With the arrangement herein shown, excess dampening solution is conducted by the baffles 101, 102 to the rear section of the trough and the excess solution pumped into the front section, together with the excess dampening solution removed from the printing plate, is returned to the reservoir, drawn through filter 114 and the filtered solution is pumped back into the front section of the trough 75.

The upper ends of the vertical sides of bracket 75 support a fixed shaft 120 on which is mounted a pair of spaced depending arms 122, the upper ends of which are formed with split sockets 124 (Fig. 6) permitting the arms to be swung in one direction or another and secured in any desired position of adjustment. The lower ends of the arms 122 support an elongate air nozzle 125 by means of a connection 126 which permits the nozzle to be rotated through an angle of about 90° relative to the arms 122. The nozzle 125 comprises a tubular member having a section of its wall cut away to form a longitudinally extending slot, and a pair of spaced lips 130, 131 (Fig. 6) are adjustably secured at the cut-away face so as to define a discharge opening or slot 132 extending the length of the body portion of the nozzle. The width of the discharge opening 132 may be varied, but as above noted it is preferably of the order of 0.01 inch so as to discharge a blade-like relatively high velocity jet against the surface of the plate 88.

One end of the nozzle 125 is connected by a flexible tube 135 with an air supply line 136 leading to a source of compressed air such as a compressor 138 positioned at the lower end of the press and operated by the motor 116. The line 136 includes a shut-off valve 140 and a pressure regulating valve 141 by means of which the desired operating pressure may be controlled.

With this construction and arrangement the nozzle 125 is mounted in parallel relation to the water roll 82 and cylinder 64 and may be swung toward and away from the cylinder and rotated relative to the supporting arms 122 to vary the angle of the air jet. As above noted, a spacing of the order of 0.012 inch between the outer ends of the lips 130, 131 and the face of the printing plate 88, when operating at a pressure within the nozzle of approximately 3 lbs. gage, has given satisfactory results for press speeds of about 100 ft. per minute, but for greater speeds an increased operating pressure is used and in any case the jet angle and spacing may be varied to attain the most efficient operation.

It will be noted that in each of the embodiments herein shown the water roll, although maintained in an operative out-of-contact relation with the printing plate, is effective to transfer a continuous film of water to the surface of the printing plate in excess of that required for proper moistening of the non-printing areas, and that the air jet is effective to remove all moisture from the printing areas and reduce the moisture in the non-printing areas to a minimum necessary to insure ink repellency.

Since the water-repellent character of the printing areas is not relied on solely for eliminating water or dampening solution, as in conventional dampening systems, the danger of the printing ink and water emulsifying is minimized, if not overcome, and hence there is little or no likelihood of producing "grey" or indistinct prints.

Since the water roll does not come in actual contact with the printing plate, there is no danger of fouling or contamination either of the roll or the dampening solution; nor is there any wear on or injury to the surface of the printing plate. Hence, a change of colors in the ink may be made without changing the dampening system or making the usual time-consuming adjustments.

It will also be noted that the amount of moisture remaining in the non-printing areas can be accurately controlled by adjusting the water roll and/or the air nozzle by a few simple manipulations and hence the press may be efficiently operated at different speeds and with various types of lithographic printing plates.

It will be further noted that since the possibility of contamination of the dampening solution is virtually eliminated, an accurate pH control may be readily maintained, and where, as shown in Fig. 2, an evaporation air jet is used, the transfer of ink is from a relatively dry printing plate to the blanket and hence the difficulties attributable to ink transfer from a moist plate are minimized. Consequently a wide range of coated papers may be used with little danger of the coating material or other chemicals in the coated paper being carried back into the moistening trough by way of a wet transfer blanket. Moreover, by maintaining the transfer blanket relatively dry, distortion of the paper in registration work is minimized, if not prevented.

In addition to securing an improved quality of printing, my new dampening system not only permits the use of metallic lithographic plates having a finer grain than would otherwise be possible, thereby increasing the sharpness of the print, but also the use of finer screens without encountering the corresponding difficulties usually involved in the use of such screens.

While I have shown and described one desirable embodiment of the invention, it is to be understood that this disclosure is for the purpose of illustration and that various changes and modifications, as well as the substitution of equivalent elements for those elements shown and described, may be made without departing from the spirit and scope of the invention as set forth in the appended claims.

I claim:

1. The method of lithographic printing which comprises moistening a printing plate having

ink-receptive printing areas and water-receptive, non-printing areas with a water roller out of contact with the plate and spaced therefrom by an amount to apply an excess of water to the surface of the plate, directing a jet in the form of a continuous blade of air across the printing plate at an angle effective to remove substantially all water from said printing areas and removing excess from the non-printing areas of the plate, contacting the surface of the plate with an ink transfer roll whereby ink transfers from the roll to the ink receptive areas of the plate and is repelled by the wetted areas, and transferring the ink applied to said ink receptive areas to a sheet to be printed.

2. The method of lithographic printing which comprises moistening a printing plate having ink-receptive printing areas and water-receptive, non-printing areas with a water roller out of contact with the plate and spaced therefrom by an amount to apply an excess of water to the surface of the plate, directing an air jet extending continuously across and coextensive with the surface of the plate against said printing plate at an angle effective to remove substantially all water from said printing areas and simultaneously removing excess from the non-printing areas, applying a greasy ink to said ink-receptive areas, directing a stream of air against said printing plate to evaporate a substantial portion of the water remaining in said non-printing areas, and transferring the ink applied to said ink-receptive areas to a sheet to be printed.

3. A printing machine comprising a support movable in a fixed path and adapted to hold a printing plate having ink-receptive printing areas and water-receptive, non-printing areas, a water roller out of contact with the plate and spaced therefrom by an amount to apply an excess of water to the surface of the plate in excess of that required for proper moistening an air doctor extending across the plate in spaced relation therewith for directing a continuous blade of air transversely across the surface of the printing plate and at an angle effective to remove substantially all water from the printing areas and the excess from the non-printing areas of the printing plate, and means for applying a film of ink to the ink-receptive areas of the printing plate.

4. A printing machine comprising a support movable in a fixed path and adapted to hold a printing plate having ink-receptive printing areas and water-receptive, non-printing areas, a water roller out of contact with the plate and spaced therefrom by an amount to apply an excess of water to the surface of the plate in excess of that required for proper moistening an air doctor extending across the plate in spaced relation therewith for directing a continuous blade of air transversely across the surface of the printing plate and at an angle effective to remove substantially all water from the printing areas and the excess from the non-printing areas of the printing plate, means for applying a film of ink to the ink-receptive areas of the printing plate, and means for directing a stream of air against the inked printing plate to remove a substantial portion of the water carried by the non-printing areas.

5. A printing machine comprising a rotatable cylinder for holding a printing plate having ink-receptive printing areas and water-receptive, non-printing areas, inking means for transferring a film of ink to the printing areas of the printing plate, a water roller coextensive with the plate and out of contact therewith and spaced therefrom by an amount to apply an excess of water to the surface of the plate, and an air knife operative on the plate between said inking means and water-supplying means for directing a jet of air continuously across the surface of the printing plate at an angle effective to remove substantially all water from the printing areas of the printing plate and the excess from the non-printing areas of the printing plate.

6. In a printing machine having a rotatable cylinder for holding a printing plate having ink receptive printing areas and water receptive non-printing areas, an inking roll arranged to contact the surface of the printing plate for transfer of ink to the printing areas, a water roll coextensive with and normally positioned out of contact with the plate and spaced therefrom by an amount to transfer a film of water in excess of that required for proper moistening to the surface of the plate on the cylinder, and an air doctor coextensive with the cylinder for directing a continuous air blade at an angle onto the surface of the cylinder between the water roll and the inking roll to remove water from the printing areas of the plate and the excess of water from the non-printing areas of the printing plate.

7. A printing machine comprising a cylinder rotatable about a horizontal axis and having means for holding a printing plate having ink-receptive printing areas and water-receptive, non-printing areas, an inking roll arranged above the horizontal plane passing through said axis and operative to transfer a film of ink to the printing areas, a water trough disposed below said horizontal plane and in spaced parallel relation to said cylinder, a water roll out of contact with the plate and spaced therefrom by an amount to apply excess water to the surface of the plate, an air nozzle interposed between said inking roll and said water roll for directing a continuous air knife extending across the surface of the plate between the water roll and the inking roll in a direction to displace water from the printing areas of the plate and to displace excess water from the non-printing areas of the plate, and a baffle for conducting the water removed from the printing plate away from said cylinder.

8. A printing machine as set forth in claim 6, which includes mechanism for supporting said water roll to move toward and away from said cylinder, and cam means associated with said cylinder for operating said mechanism periodically to move said water roll away from said cylinder to interrupt the application of water thereto.

9. A printing machine as set forth in claim 6, which includes mechanism for supporting said water roll to move toward and away from said cylinder, and cam means associated with said cylinder for operating said mechanism as the trailing edge of the printing plate approaches said water roll to move said water roll away from said cylinder thereby to interrupt the application of water and then to move said water roll back to operative position when the leading edge of the printing plate reaches said water roll.

10. A printing machine as set forth in claim 6, which includes means posteriorly of the inking means for directing a stream of air against the printing plate so as to evaporate a substantial portion of the water remaining in the non-printing areas.

11. A printing machine comprising a rotatable cylinder for holding a printing plate having ink-receptive printing areas and water-receptive, non-printing areas, the surface of said cylinder between the positions of the leading and trailing edges of the printing plate being recessed to provide a scoop, an inking roll arranged to contact the surface of the printing plate so as to transfer a film of ink to the printing areas, a water roll arranged to apply a film of water to the surface of the printing plate, and an air nozzle interposed between said inking roll and said water roll for directing an air jet against the surface of the printing plate at an angle effective to remove substantially all water from the printing areas of the printing plate and simultaneously reduce to a minimum the thickness of the film of water in the non-printing areas of the printing plate, the excess water thus removed being forced into said scoop as it approaches said nozzle.

12. A printing machine comprising a rotatable cylinder for holding a printing plate having ink-receptive printing areas and water-receptive, non-printing areas, the surface of said cylinder between the positions of the leading and trailing edges of the printing plate being recessed to provide a scoop, an inking roll arranged to contact the surface of the printing plate so as to transfer a film of ink to the printing areas, a water roll arranged to apply a film of water to the surface of the printing plate, an air nozzle interposed between said inking roll and said water roll for directing an air jet against the surface of the printing plate at an angle effective to remove substantially all water from the printing areas of the printing plate and simultaneously reduce to a minimum the thickness of the film of water in the non-printing areas of the printing plate, the excess water thus removed being forced into said scoop as it approaches said nozzle, and means for conducting water from said scoop.

13. A printing machine comprising a rotatable cylinder for holding a printing plate having ink-receptive printing areas and water-receptive, non-printing areas, the surface of said cylinder between the positions of the leading and trailing edges of the printing plate being recessed to provide a scoop, an inking roll arranged to contact the surface of the printing plate so as to transfer a film of ink to the printing areas, a water roll arranged to apply a film of water to the surface of the printing plate, an air nozzle interposed between said inking roll and said water roll for directing an air jet against the surface of the printing plate at an angle effective to remove substantially all water from the printing areas of the printing plate and simultaneously reduce to a minimum the thickness of the film of water in the non-printing areas of the printing plate, the excess water thus removed being forced into said scoop as it approaches said nozzle, and baffle means disposed adjacent to said nozzle and extending into close proximity to the surface of said cylinder for deflecting water blown from said scoop by said jet away from the surface of the printing plate.

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REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
643,372	Cornwall	Feb. 13, 1900
1,216,150	Mark	Feb. 13, 1917
1,335,025	Pitkin	Mar. 30, 1920
1,958,593	Schultz	May 15, 1934
2,002,815	Harrold	May 28, 1935
2,139,628	Terry	Dec. 6, 1938
2,252,345	Johnson	Aug. 12, 1941
2,335,954	Neal	Dec. 7, 1943
2,358,284	Davidson et al.	Sept. 12, 1944
2,395,151	Sodomka	Feb. 19, 1946