United States Patent [19]

Wildeman

[11] **3,926,116**

[45] **Dec. 16, 1975**

[54] **DAMPENING APPARATUS FOR OFFSET PRINTING PRESS**

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[22] Filed: **July 1, 1974**

[21] Appl. No.: **484,704**

[52] **U.S. Cl.** **101/148;** 101/352

[51] **Int. Cl.²** **B41F 7/26;** B41F 31/30

[58] **Field of Search** 101/147, 148, 352, 349, 101/350, 351

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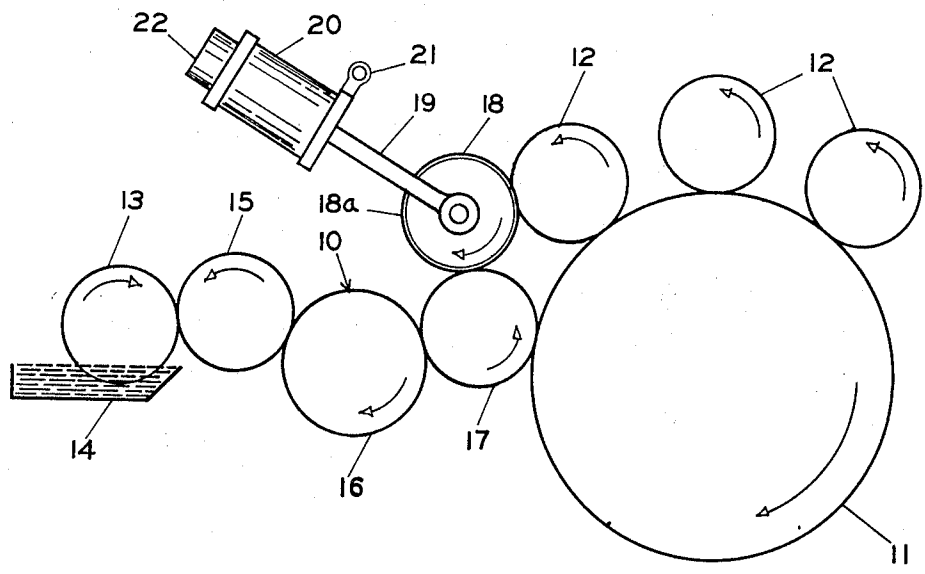
[57] **ABSTRACT**

An improved dampening apparatus for an offset printing press of the type having inking rollers and a dampener roller or rollers in rolling contact with a plate cylinder. Pneumatic cylinders advance a separator roller into rolling contact with the dampener roller and an adjacent ink roller when the press is printing. The surface of the separator roller is composed of a material having a high affinity for ink which will cause ink to be removed from the dampener roller and placed on the ink roller. The separator roller is withdrawn from contact with the dampener roller when the press ceases printing to prevent the flowage of ink onto the dampening system rollers.

8 Claims, 3 Drawing Figures



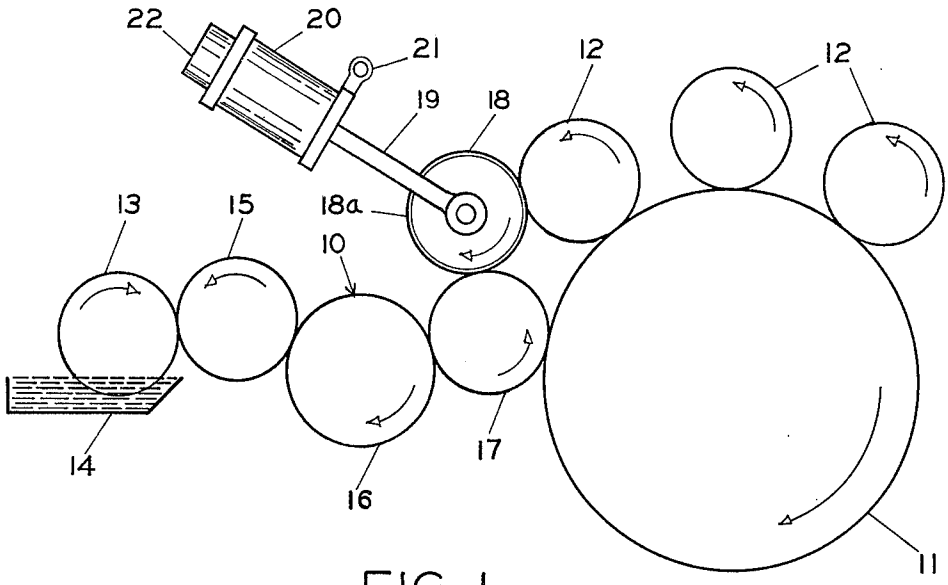


FIG. 1

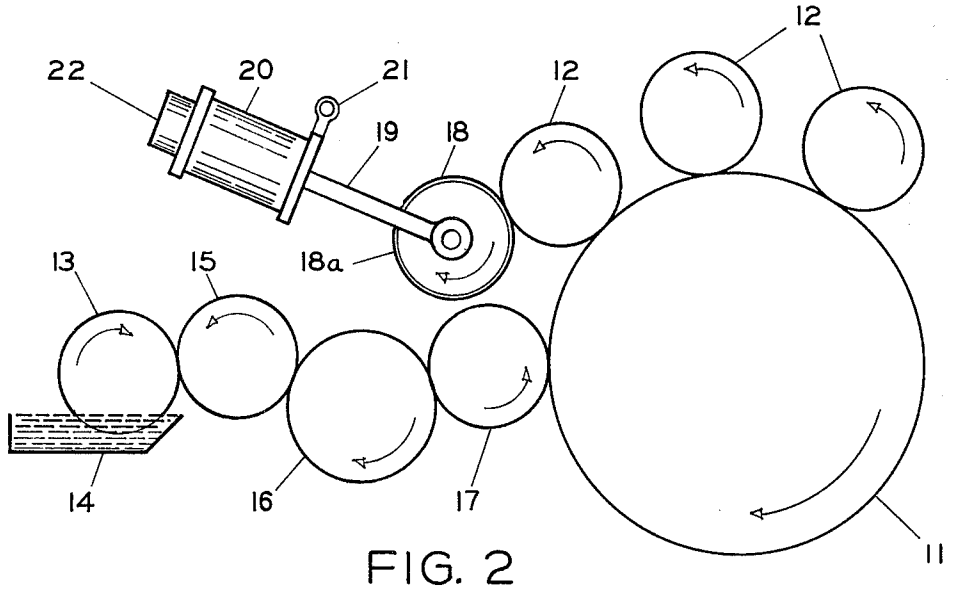


FIG. 2

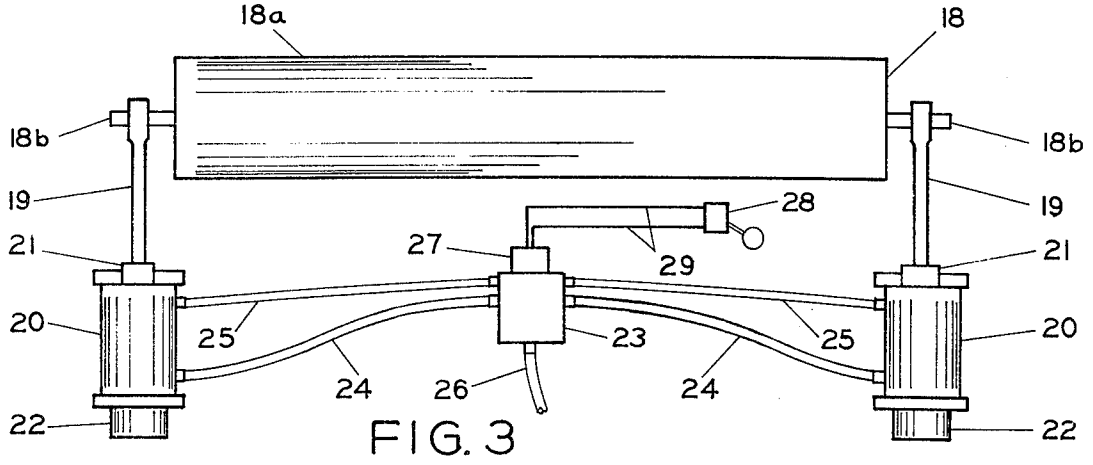


FIG. 3

DAMPENING APPARATUS FOR OFFSET PRINTING PRESS

BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention relates to improvements in dampening systems, and more particularly to dampening methods and apparatus for off-set printing presses.

2. Description of the Prior Art

Conventional dampening systems for offset printing presses commonly utilize four revolving rollers in combination with a revolving plate cylinder which carries the printing plate. The first roller is independently driven, and normally revolves at a slower speed than the three remaining rollers and the plate cylinder, which are normally in rolling contact and revolve at the speed of the printing press. The first roller, or "pan roller", is in contact with a supply of water or other suitable dampening liquid. The dampening liquid is transferred from the pan roller to the other rollers of the dampening system, including a form dampener roller which is in rolling contact with the plate cylinder, thus supplying the plate cylinder with dampening liquid.

Ink is supplied to the plate cylinder by an ink distributing system which has one or more ink form rollers in contact with the plate cylinder. During press operation, ink is picked up on the portions of the surface of the plate cylinder that have an affinity for ink, and dampening liquid is picked up on the portions of the plate cylinder surface that have an affinity for dampening liquid. (As used herein, the term "affinity for ink" means the property of a surface which permits that surface to be wetted by lithographic printing ink and to maintain said ink on its surface and reject dampening liquid therefrom when the surface is in rolling contact with a surface which is wetted by dampening liquid. The term "affinity for water" or "affinity for dampening liquid" as used herein means the property of a surface which permits that surface to be wetted by water or other dampening liquid and to maintain such water on its surface and reject ink therefrom when the surface is in rolling contact with a surface which is wetted by ink.) The ink is then transferred from the surface of the plate cylinder to a blanket cylinder in rolling contact therewith. When the press is printing the plate is in rolling contact with a cylinder that is covered with a blanket that has a rubber-like surface. During each revolution, the plate cylinder is wetted with dampening solution by the form dampener roller, inked by the ink form rollers, and makes its print on the blanket, which in turn makes its print on material that passes between the blanket cylinder and an impression cylinder therebelow.

The plate cylinder does not deposit all of its ink film on the blanket cylinder. Approximately 50% of the ink remains on the plate cylinder. Some of this remaining ink, in the form of free ink particles, will be picked up by the first object which they encounter, the form dampener roller. After a free ink particle has moved to the form dampener roller it can do one of three things. It may return to the plate cylinder as the roller revolves, it may migrate farther back into the dampening system, or it may remain on the form dampener roller. Ink particles tend to attract each other, and in time sufficient ink will accumulate on the form dampener roller to completely cover it with ink and cause skidding of

the roller. When this happens the form dampener roller is no longer doing an adequate job of dampening the plate cylinder, with the result that streaks and dirty spots appear on the final printed sheets.

In the conventional dampening system for offset printing presses the form dampener roller is generally constructed of a steel core covered with some type of rubber or plastic material. Usually, the form dampener roller is itself covered with some surface material such as textile or parchment paper which has a high affinity for water but repels ink when the surface is dampened. In use, these covering materials tend to shred, wrinkle, become dirty easily and otherwise wear out. Accordingly, frequent replacement of the covering material and close attention to the printing operation are required.

It is possible to operate the form dampener roller "bare-back" with no surface covering material, but the rubber or plastic surface of the roller will normally accept ink as readily as water, thus allowing the roller to quickly become contaminated with ink and begin to skid. This problem is common to all presses printing by the offset lithographing method. Although operation without a final covering on the form dampener roller has been and is being used on many presses, such operation is time consuming and requires a high degree of skill on the part of the pressman since numerous changes of procedure and adjustments of the ink and dampening solutions are necessary.

Other, nonconventional dampening systems have been developed to avoid the problems associated with conventional dampening system rollers. Generally, these other systems place the dampening liquid directly on the ink rollers. However, this approach necessitates using an expensive alcohol-water solution for the dampening liquid and doctoring of the inks to make them compatible with the alcohol in the dampening liquid. The relatively high cost of the alcohol dampening liquid has a significant effect on the cost of operating a press.

SUMMARY OF THE INVENTION

I have invented a novel improved dampening apparatus for offset printing presses which allows the use of an uncovered form dampener roller without the need for special dampening solutions, special inks, or special methods of driving the form dampener roller. My invention allows the printing press to be run at maximum production for longer periods than is presently possible, and requires less skill and attention on the part of the pressman.

My dampening apparatus employs a movable separator roller which is disposed between the form dampener roller of a conventional dampening system and an adjacent ink form roller. When the press is printing, the separator roller is advanced into revolvable contact with both the form dampener roller and the ink form roller. The surface of the separator roller has a high affinity for ink in the presence of ink and dampening liquid, and draws ink off of the form dampener roller and deposits this ink on the ink form roller. Ink is thus removed from the dampening apparatus, which results in proper dampening of the plate cylinder without requiring the use of a special covering for the form dampener roller.

The separator roller is preferably engaged or disengaged with the form dampener roller by means of double-acting pneumatic piston-cylinder units which are

responsive to operation of the press. The separator roller is advanced into engagement with the form dampener roller when the press is printing, and is retracted from such engagement when the press stops printing to thereby prevent migration of ink across the separator roller to the rest of the dampening apparatus when the press is stopped. The separator roller and the one ink form roller maintain continuous engagement whether the press is printing or not.

Further objects, features and advantages of my invention will be apparent from the following detailed description taken in conjunction with the accompanying drawings showing a preferred embodiment of an improved dampening apparatus exemplifying the principles of my invention.

BRIEF DESCRIPTION OF THE DRAWINGS

In the drawings:

FIG. 1 schematically illustrates my dampening apparatus in combination with the upper plate cylinder and ink form rollers of an offset printing press, shown in printing position.

FIG. 2 schematically illustrates my dampening apparatus in combination with the upper plate cylinder and ink form rollers of an offset printing press, shown in their positions when the press is not printing.

FIG. 3 is a top view of the separator roller and pneumatic control portion of my dampening apparatus.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring now more particularly to the drawings, wherein like numerals refer to like parts throughout the several views, a preferred embodiment of my improved dampening apparatus for offset presses is shown generally at **10** in FIG. **1** in operating position to transfer dampening liquid to an upper plate cylinder **11** of an off-set printing press. Ink is provided to the upper plate cylinder **11** by ink form rollers **12** which are in rolling contact with the plate cylinder. The ink form rollers **12** form a portion of an ink supply system, and are provided with ink by the remainder of the ink supply system (not shown in the drawings) which may be of any usual design. Offset printing presses are often built to print simultaneously on both sides of a web or sheet of material, and would thus utilize both an upper and lower plate cylinder. My invention will be illustrated and described herein only with reference to an upper plate cylinder arrangement, but it will be apparent that my invention will also be utilized in cooperation with the lower plate cylinder of a press.

My improved dampening apparatus **10** includes a water fountain or pan roller **13** disposed and mounted in the frame (not shown) of a press in parallel revolvable relation with the plate cylinder **11.** The fountain roller **13** extends into and receives dampening liquid on its surface from a water fountain pan **14.** The dampening apparatus **10** also includes a first transfer roller **15,** an intermediate roller **16,** and a form dampener roller **17,** all mounted in the frame of a press in parallel revolvable relation with the plate cylinder **11.** Dampening liquid is transferred from the fountain roller **13** to the first transfer roller **15,** thence to the intermediate roller **16,** and thence to the form dampener roller **17.** The surfaces of the aforesaid rollers should be adapted to readily accept water or some other dampening liquid and repel grease to provide for efficient transfer of the dampening liquid to the plate cylinder **11.** The fountain roller **13** and the intermediate roller **16** preferably have chrome plated surfaces, while the first transfer roller **15** preferably has a resilient outer surface. The form dampener roller **17,** which preferably has a resilient surface such as a rubber or plastic covering over a steel core, is in rolling contact with the plate cylinder **11** to provide dampening liquid thereto. The fountain roller **13,** fountain pan **14,** first transfer roller **15,** intermediate roller **16,** and form dampener roller **17** comprise a conventional dampening system for offset presses. However, my invention can be used with variations of the conventional dampening system such as, for example, the use of two form dampener rollers.

As shown in FIGS. **1** and **2,** the form dampener roller **17** is disposed adjacent to one of the ink form rollers **12.** Interposed parallel to and between the form dampener roller **17** and the one ink form roller **12** adjacent thereto in my improved dampening apparatus is a novel separator roller **18.** During the printing operation or print mode of the press, the separator roller **18** is in rolling contact with both the form dampener roller **17** and the one ink form **12,** as shown in FIG. **1.** The body of the separator roller **18** is preferably rotatably mounted on a non-rotating roller shaft **18***b*, which is itself loosely attached at either end thereof to piston rod members **19.** As best shown in FIG. **3,** the rod members **19** extend from two pneumatic cylinder-piston units **20** which advance or retract the rod members in response to air under pressure supplied to the units. The loose attachment between the rod members **19** and the roller shaft **18***b* allows the separator roller **18** to wedge into engagement wih the form dampener roller and the one ink form roller **12.** The pneumatic cylinder units **20** are pivotally attached by hangers **21** to the frame of the press and may have counterweights **22** attached thereto or be spring biased (not shown) to substantially offset the weight of the separator roller **18** carried on the ends of the rod members **19.** The weight of the pneumatic cylinder units **20** and the illustrated counterweights **22** is sufficient to overbalance the weight of the roller **18.** Thus, when the cylinder units **20** retract the roller **18,** it will tend to rise away from contact with the form dampener roller **17,** as shown in FIG. **2.** Contact between the separator roller **18** and the one ink form roller **12** will be constantly maintained.

The pneumatic cylinder units **20** are selectively supplied with controlled air under pressure from a pneumatic valve **23** through pneumatic control lines **24** for advancing the separator roller **18,** or through control lines **25** for retracting the separator roller. The valve **23** is supplied with air by a supply line **26** and is operated by an electrically actuated solenoid **27.** A switch **28** is closed preferably when the press is placed in the print mode, thus supplying an electrical signal from a standard source of electrical power (not shown) to the solenoid **27** through conductors **29,** and causing the valve **23** to supply air through the control lines **24** to the pneumatic cylinder units **20** and thereby advance the separator roller **18** into engagement with the form dampener roller **17.** When the press is taken out of the print mode, the switch **28** is preferably opened whereby the solenoid **27** operates the valve **23** to supply air under pressure through the control lines **25** to the pneumatic cylinder units **20** to thereby retract the separator roller. Thus the separator roller will preferably be in contact with the form dampener roller **17** only when the printing press is in its print mode. As described, the switch **28** may, for example, be the switch or relay

operated by the actuator (frequently termed the "print" or "fast" actuator) engaged by the operator to place the press in its print mode, so that the operation of the solenoid **27** and pneumatic cylinder units **20** will be responsive to the operation of the press.

As described above, the uncovered or "bareback" form dampener roller **17** will in a conventional system tend to attract and accumulate ink particles, eventually causing a degradation of its ability to dampen the plate roller **11.** The function of the separator roller **18** is to remove ink from the form dampener roller and send this ink back into the ink supply system. To accomplish this purpose, the separator roller **18** should be covered with a material **18***a* that has a high affinity for ink. The reason for this can be illustrated with reference to FIG. **1,** wherein the separator roller **18** is in rolling contact with both the form dampener roller **17** and one adjacent ink form roller **12** during the printing operation. Since the inked surface **18***a* of the separator roller has a higher affinity for ink than does the moistened surface of the form dampener roller **17** the separator roller will pick the loose ink particles off the surface of the form dampener roller. These ink particles will become entrained in the ink on the separator roller surface and will be carried up to the point where the separator roller and the ink form roller **12** are in contact. The ink will then tend to be maintained in equal quantity on the contacting surfaces of the separator roller and the ink form roller.

An examination of the accompanying drawings might appear to indicate that engagement of an "ink" roller such as the separator roller **18** on the form dampener roller **17** would cause ink to be transferred to the dampener system, rather than to remove loose ink particles therefrom. However, I have found that the ink and fluid balances between the separator roller **18** and the ink form roller **12** and form dampener roller **17** are respectively the same as between the plate cylinder **11** and the ink form roller **12** and form dampener roller **17.** That is, the separator roller **18** maintains the same ink balance with the ink form roller **12** as does the inked portion of the plate cylinder. Likewise, the form dampener roller **17** will always have enough dampening liquid on its surface to repel ink from the separator roller **18** in the same manner that it repels ink from the ink portions of the plate cylinder **11.** Conversely, the separator roller **18** will always have enough ink on its surface to reject the dampening liquid presented to it by the form dampener roller **17,** and to attract and accept the individual ink particles which are entrained in the dampening liquid on the form dampener roller **17.** I have found that the entrained ink particles will be readily attracted to the ink on the separator roller **12** in strong preference to the dampening liquid on the form dampener roller **17.**

The material that I have found most suitable for the surface covering **18***a* of the separator roller is polytetrafluoroethylene resin such as that manufactured by the du Pont corporation under the trademark "Teflon". In an environment where both lithographic printing ink and dampening liquid are present, the Teflon will not accept any dampening liquid on the surface, but instead will immediately become wetted with the ink. Accordingly, the Teflon surface **18***a* of my separator roller **18** will be wetted with ink from the ink form roller **12** with which it is in rolling contact at all times, and will reject the dampening liquid presented by the form dampener roller **17** when it is brought into rolling contact therewith. However, I have found that the free ink particles which have been entrained in the dampening liquid on the plate cylinder **11** and have been picked up therefrom with the dampening liquid by the form dampener roller **17** will be attracted to the ink on the separator roller Teflon surface **18***a.* Accordingly, the loose ink particles will migrate from the dampening liquid on the form dampener roller **17** to the ink on the separator roller Teflon surface **18***a* and thereby keep the form dampener roller surface substantially free of ink.

The Teflon covering can be readily heat shrunk onto a metal roller body, preferably an aluminum roller body since it is desirable to minimize the weight of the separator roller. A light weight separator roller is desirable as it allows small cylinder units **20** to be used and reduces mounting requirements.

Other surface materials which will accept ink and reject water in the presence of both include ebonite hard rubber, or a copper plating, over a steel roller body. However, the steel roller body results in a heavier roller, requiring heavier mountings and cylinder units.

To prevent the dampening apparatus **10** from becoming loaded with ink when the press is not printing, the separator roller **18** is retracted from the dampener roller **17** by the pneumatic cylinder units **20** as described above. While so retracted, the separator roller **18** is maintained in contact with the one ink form roller **12** because of the counterbalance provided around the hangers **21** by the cylinder units **20** and their associated counterweights **22.** The separator roller **18** is preferably advanced back into its running position when the press begins operating or returns to its printing mode. It is important that the form dampener roller have a moisture or dampening liquid film over its entire surface before it is engaged by the separator roller to prevent ink from depositing on the form dampener roller. If the form dampener roller is dry when engaged by the separator roller, the form dampener roller will take on ink and transfer it back to the other dampening rollers which would also be dry.

It has been found that too much pressure at the separator roller—form dampener roller contact point, or "nip", inhibits the ability of the form dampener roller to carry moisture, and too much pressure applied at the separator roller—ink form roller contact point causes milling of the ink with consequent absorption of water by the ink. The air pressure supplied by the valve **23** to the pneumatic cylinder units **20** is therefore preferably adjusted to avoid those problems and provide satisfactory operation.

While my improved dampening apparatus has been described with reference to an upper plate cylinder, it has previously been indicated that my invention can be employed with equal success with a lower plate cylinder. The only basic modification required would be to change the balance of the separator roller **18** around the hanger **21** so that the separator roller would maintain constant contact with the ink form roller which would now be below it.

It is understood that my invention is not confined to the particular construction and arrangement of parts herein illustrated and described, but embraces all such modified forms thereof as may come within the scope of the following claims.

I claim:

1. An improved offset printing press of the type having a plate cylinder, an ink supply system including at

least one ink form roller which is adapted to deposit ink on said plate cylinder by making rolling contact therewith, and a dampening system including a form dampener roller disposed adjacent to one ink form roller and which is adapted to deposit dampening liquid on the plate cylinder by making rolling contact therewith, wherein the improvement comprises:

a. a revolvable separator roller interposed between said form dampener roller and said one adjacent ink form roller;

b. said separator roller having a surface consisting of a material that has an affinity for ink; and

c. means for maintaining said separator roller in contact with said one ink form roller whereby said surface of said separator roller is wetted with ink, for advancing said separator roller into rolling contact with said form dampener roller when said press is printing and said form dampener roller surface has a film of dampening liquid thereon, and for retracting said separator roller from contact with said form dampener roller when said press is not printing.

2. The improved offset printing press specified in claim **1** wherein said surface material of said separator roller consists of a polytetrafluoroethylene resin covering.

3. The improved offset printing press specified in claim **2** wherein said separator roller has a metal body portion and said polytetrafluoroethylene resin covering is heat shrunk onto said separator roller body portion.

4. The improved offset printing press specified in claim **1** wherein said means includes pneumatic cylinder-piston units operably attached to the ends of said separator roller, a solenoid operated pneumatic valve adapted to receive air under pressure and to supply controlled air under pressure through air lines to said cylinder-piston units to advance said separator roller when said press is printing and to retract said separator roller when said press has stopped printing.

5. Dampening apparatus for an offset printing press having a revolvable plate cylinder and at least one ink form roller which is adapted to deposit ink on said plate cylinder by making rolling contact therewith, said apparatus comprising:

a. a revolvable fountain roller disposed in substantially parallel relation to said plate cylinder, said fountain roller being adapted to receive dampening liquid on the surface thereof;

b. at least one revolvable dampening liquid transfer roller interposed between said fountain roller and said plate cylinder in substantially parallel, successive rolling contact, including a form dampener roller disposed adjacent to one of said ink form rollers and which is adapted to deposit dampening liquid on the plate cylinder by making rolling contact therewith;

c. a revolvable separator roller in rolling contact with said one adjacent ink form roller;

d. said separator roller having a surface consisting of a material that has an affinity for ink; and

e. at least one pneumatic cylinder-piston unit operably attached to said separator roller to advance said separator roller into additional rolling contact with said form dampener roller and to retract said separator roller from contact with said form dampener roller, and

f. means for supplying air under pressure to said cylinder-piston units to advance said separator roller when the press is printing and the form dampener roller surface has a film of dampening liquid thereon, and to retract said separator roller when the press has stopped printing.

6. The dampening apparatus specified in claim **5** wherein said surface material of said separator roller consists of a polytetrafluoroethylene resin covering.

7. The dampening apparatus specified in claim **6** wherein said separator roller has a metal body portion and said polytetrafluoroethylene resin covering is heat shrunk onto said separator roller body portion.

8. The dampening apparatus specified in claim **5** wherein said means includes a solenoid operated pneumatic valve adapted to receive air under pressure and to supply controlled air under pressure through air lines to said cylinder-piston units to advance said separator roller when said press is printing and to retract said separator roller when said press has stopped printing.

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