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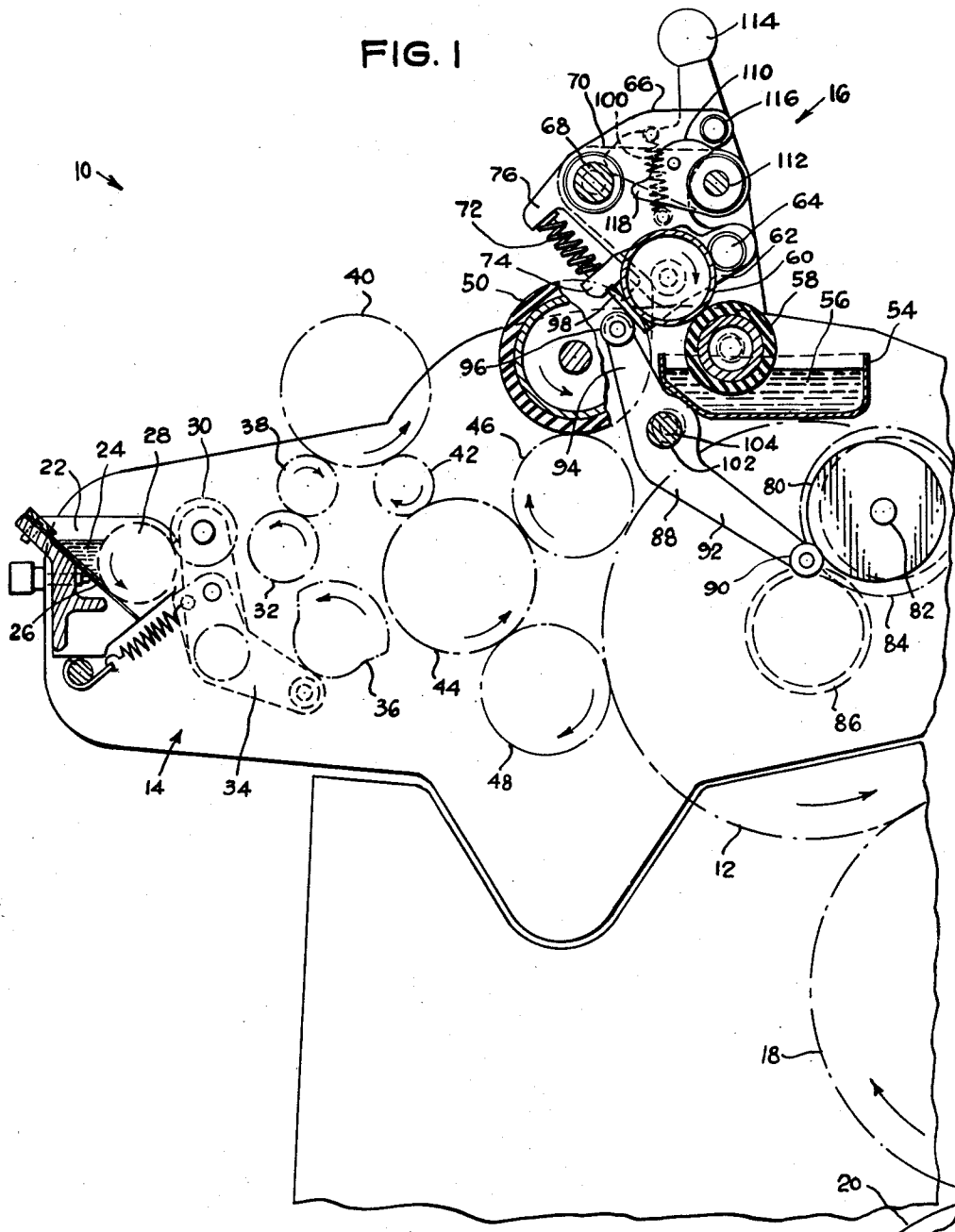
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DAMPENING SYSTEM FOR LITHOGRAPHIC PRINTING PRESSES

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2 Sheets-Sheet 1

FIG. 1



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FIG. 2

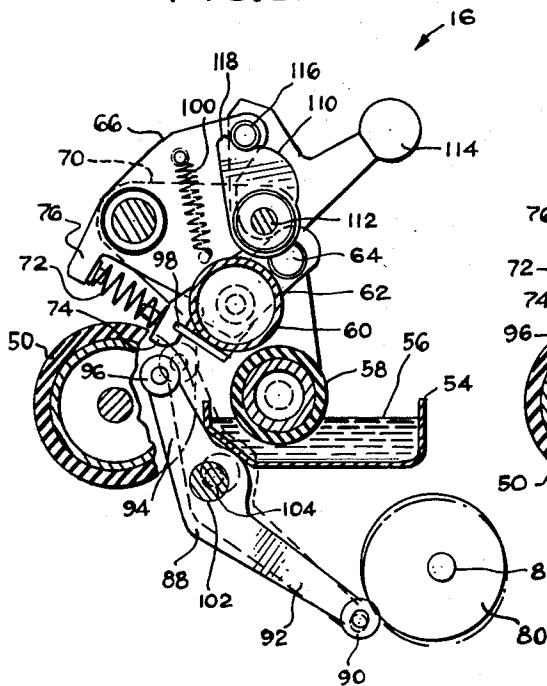


FIG. 3

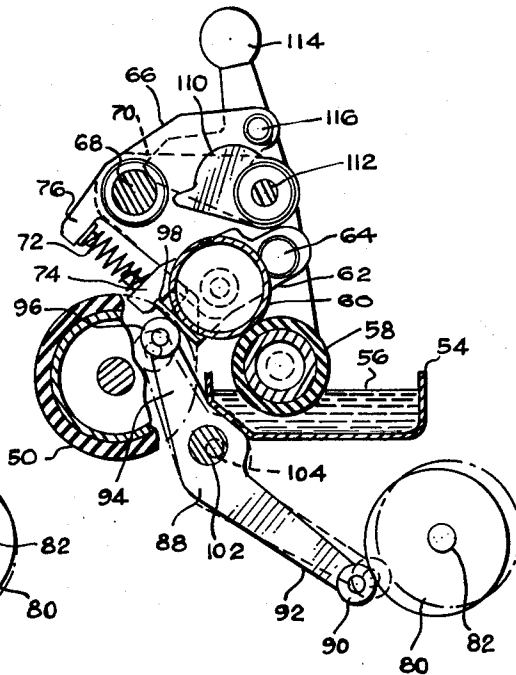
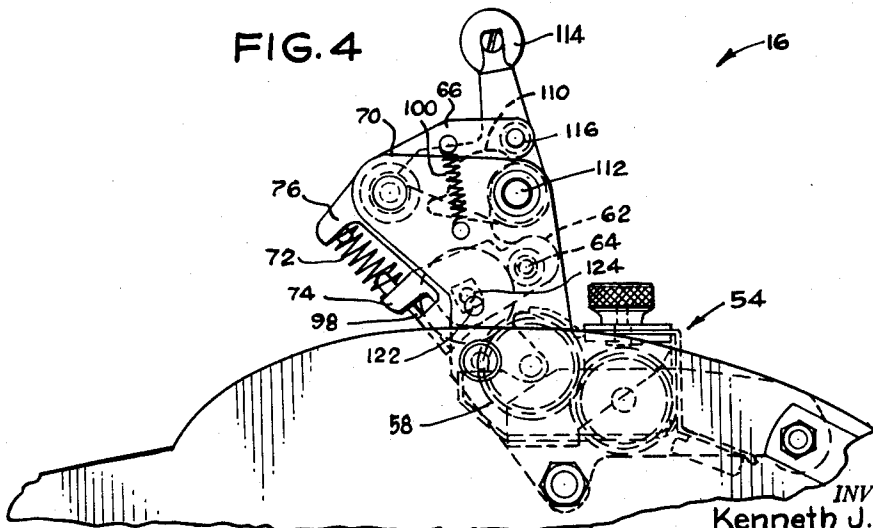


FIG. 4



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DAMPENING SYSTEM FOR LITHOGRAPHIC PRINTING PRESSES

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6 Claims. (Cl. 101—148)

This invention relates to lithographic printing presses or duplicators and pertains particularly to a new and improved dampening system for applying water or other ink repellents to a lithographic printing plate.

One object of the present invention is to provide a new and improved dampening system of the type in which the water or other ink repelling liquid is supplied to the lithographic printing plate by way of the inking system.

A further object is to provide a new and improved dampening system of the foregoing character in which the repellent is supplied to one of the rollers of the inking system by an oscillating ductor roller having a surface which is receptive to the repellent while being non-receptive to the ink, so that the ductor roller is kept free of ink.

It is another object to provide a new and improved dampening system of the foregoing character in which the repellent is supplied to the ductor roller by a fountain roller which is partly immersed in a supply of repellent contained in a repellent fountain, and in which the fountain roller is also kept free of ink by virtue of the ink repellent surface of the ductor roller.

Thus, it is a further object of the present invention to provide a new and improved dampening system of the foregoing character in which the ink is protected from prolonged attack by the repellent in the repellent fountain, so that waterlogging or other breakdown of the ink is prevented.

Another object is to provide a new and improved dampening system of the foregoing character which may employ any desired type of lithographic ink, rather than being restricted to the use of inks which are highly water resistant.

Further objects and advantages of the present invention will appear from the following description, taken with the accompanying drawings in which:

FIG. 1 is a general diagrammatic sectional view showing a lithographic printing press to be described as an illustrative embodiment of the present invention. In this view, the dampening system of the lithographic printing press is adjusted for maximum or continuous feed of repellent to the lithographic printing plate.

FIG. 2 is a sectional view, similar to a portion of FIG. 1, but showing the dampening system in the position in which it is adjusted for zero feed of repellent to the printing plate, and in which the ductor roller is separated from the repellent fountain roller.

FIG. 3 is a sectional view similar to FIG. 2 but showing the dampening system in the position in which it is adjusted for intermittent feed of the repellent to the printing plate.

FIG. 4 is a side elevational view of the dampening system.

It will be seen that FIG. 1 illustrates a lithographic printing press or duplicator 10 having a plate or master cylinder 12 for holding a lithographic printing plate. An inking system 14 is provided to supply ink to the lithographic printing plate on the cylinder 12. Water or other repellent is also supplied to the lithographic printing plate by means of a dampening or repellent system 16. It will be understood by those skilled in the art that the image areas of the printing plate, representing the de-

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sired printed matter, are ink receptive and are supplied with ink by the inking system 14. The non-image areas of the printing plate are receptive to repellent and are supplied with repellent by the dampening system 16. The repellent prevents the ink from adhering to the non-image areas of the printing plate. In this case, the printing press 10 is of the type in which the dampening system 16 is adapted to supply the repellent to the plate cylinder 12 by way of the inking system 14.

As shown, the lithographic printing press 10 is of the three-cylinder offset type. However, the invention is applicable to lithographic printing presses of all types. In addition to the plate cylinder 12, the illustrated machine 10 is equipped with an offset cylinder 18 and an impression cylinder 20. It will be understood by those skilled in the art that the offset cylinder 18 has a surface, generally in the form of a rubber blanket, which is adapted to receive ink from the printing plate on the plate cylinder 12. The ink is applied to the offset cylinder 18 in the form of a reversed or mirror image of the printed matter on the printing plate 12. Paper or other sheets are fed between the offset cylinder 18 and the impression cylinder 20 so that the inked image on the offset cylinder 18 will be transferred to the sheets. The impression cylinder 20 presses the sheets against the offset cylinder 18.

The inking system 14 may be of any conventional or suitable construction. As shown, the inking system comprises an ink fountain 22 adapted to hold a supply of ink 24. It will be seen that the ink fountain 22 comprises a trough which is formed between a thin flexible doctor blade 26 and a fountain roller 28. The ink 24 is in contact with the fountain roller 28. It will be understood that the fountain roller 28 is rotated so that a thin film of ink will be carried past the doctor blade 26 by the fountain roller.

An oscillating ductor roller 30 is employed to carry the ink between the fountain roller 28 and a roller 32. The ductor roller 30 is mounted on a swingable carriage 34 which is oscillated by a cam 36 so that the ductor roller 30 will be moved back and forth between the fountain roller 28 and the roller 32.

From the roller 32 the ink is carried by a train of successively engaging rollers 38, 40, 42, and 44 to a pair of form rollers 46 and 48 which engage the lithographic printing plate on the plate cylinder 12. Some of the rollers 32-44 may be oscillated axially so as to spread the ink in a uniform film on the rollers. An additional ink receptive roller 50 engages the upper form roller 46. All of the rollers 28-50 of the inking system may be made of suitable ink receptive materials, such as rubber of varying degrees of hardness. Those skilled in the art will realize that the rubber rollers of the inking system are normally non-absorbent.

As shown, the dampening or repellent system 16 comprises a repellent fountain or trough 54 adapted to hold a supply of water or other repellent 56. In this case, a fountain roller 58 dips into the fountain 54 and is partly immersed in the repellent 56 contained therein. The fountain roller 58 may be continuously rotated by suitable gears or the like, not shown. Preferably, the fountain roller 58 is rotated at the surface speed of the plate cylinder 12.

A ductor roller 60 is engageable with the fountain roller 58 and is intermittently movable into engagement with the ink roller 50, so as to transfer repellent from the fountain roller 58 to the ink roller 50. Thus, the roller 50 serves not only to spread the ink on the form roller 46, but also to transfer the repellent to the form roller 46. From the form roller 46, the repellent is carried to the form roller 48 by the roller 44. It will be understood that

the form rollers 46 and 48 apply the repellent to the printing plate on the printing cylinder 12.

Means are provided to oscillate the ductor roller 60 so that it will intermittently engage the transfer roller 50. In this case, the ductor roller 60 is mounted on a first carriage 62 which is swingable about pivots 64 carried by a second carriage 66. It will be seen that the second carriage is swingable about a pivot shaft 68 mounted on fixed brackets 70. With this arrangement, the pivot shaft 68 is spaced a considerable distance above the fountain roller 58, so that the bearings for the carriage 66 are removed by a considerable distance from the repellent 56 in the fountain 54. Thus, the bearings can readily be protected from invasion and damage by the repellent, which is usually acidified, and hence tends to have a corrosive action on the bearings.

Springs 72 are provided to bias the ductor roller 60 against the fountain roller 58. In this case, the springs 72 are compressed between lugs 74 and 76 on the first and second carriages 62 and 66. Thus, the first carriage 62 is biased downwardly with respect to the second carriage 66. This biasing action normally holds the ductor roller 60 against the fountain roller 58. The ductor roller 60 is frictionally driven by the fountain roller 58. The surface speed of the ductor roller 60 is preferably the same as that of the roller 50 and thus is the same as that of the printing cylinder 12.

Means are provided to oscillate the second carriage 66 about the pivot 68 so that the ductor roller 60 will be moved intermittently into and out of engagement with the transfer roller 50. In this case, such means comprise an eccentric or cam 80 which is rotatably mounted on a shaft 82. The cam 80 is continuously rotated by means of suitable gears 84 and 86. The gear 84 is connected to the cam 80, while the gear 86 is secured to the plate cylinder 12. The gears 84 and 86 are slightly different in size so that the cam 80 will be driven at a speed differing slightly from the angular or rotary speed of the plate cylinder 12. This arrangement gives the ductor roller 60 a substantially random pattern of operation, relative to the rotation of the plate cylinder 12. Exact coincidence between the oscillatory cycle of the ductor roller 60 and the rotary cycle of the plate cylinder 12 occurs only after long intervals, comprising numerous revolutions of the plate cylinder 12.

The motion of the eccentric or cam 80 is transmitted to the ductor roller carriage 56 by means of a cam follower lever 88 which carries a roller 90 adapted to engage and follow the cam 80. It will be seen that the roller 90 is mounted on a downwardly extending arm 92 of the lever 88. As shown, the lever 88 also has an upwardly extending arm 94 which carries a roller 96, adapted to engage an ear or flange 98 on the ductor roller carriage 66. Under the usual operating conditions, the cam 80 oscillates the lever 88, which in turn oscillates the carriage 66. A spring 100 biases the carriage 66 in a clockwise direction and thus tends to move the ductor roller 60 against the transfer roller 50. The carriage 66 is moved away from the transfer roller 50 by the cam follower 88.

The oscillation of the ductor roller 60 is rendered adjustable by mounting the cam follower lever 88 on a pivot 102 which is eccentrically secured to a shaft 104. Normally, the shaft 104 is stationary, but the shaft may be rotated to change the position of the eccentric pivot 102. When the shaft 104 is rotated, the pivot 102 is moved around a circular orbit. This changes the relationship between the cam follower lever 88 and the carriage 66, so that the extent of movement of the carriage is varied. In this way, the action of the ductor roller 60 may be varied between a condition of continuous engagement with the transfer roller 50, as shown in FIG. 1, to a condition of continuous disengagement between the ductor roller and the transfer roller, as indicated by the broken line position of the lever 88 and the pivot 102, as

shown in FIG. 2. FIG. 3 illustrates the pivot 102 in an intermediate position, in which the pivot 102 is adjusted to a position in which the lever 88 is as far as possible away from the flange 98 on the carriage 66. Under this condition of adjustment, the oscillation of the lever 88 by the cam 80 does not cause any movement of the carriage 66. If the pivot 102 is moved to the position shown in broken lines in FIG. 2, the lever 88 is moved toward the flange 98 to such an extent that the ductor roller 60 is held out of engagement with the transfer roller 50 throughout the range of oscillation of the lever 88.

Means are provided for separating the ductor roller 60 from the fountain roller 58 when the machine is to be shut down. The same means are also effective to separate the ductor roller 60 from the transfer roller 50. In this case, such means comprise a cam 110 which is rotatable about a pivot 112 and is connected to an operating handle or lever 114. In FIG. 1, the cam 110 is shown in its normal position, out of engagement with the carriage 66. As shown to best advantage in FIG. 2, the lever 114 may be swung in a clockwise direction. The resulting clockwise rotation of the cam 110 brings the cam into engagement with a roller or pin 116 on the carriage 66. Thus, the cam 110 is effective to swing the carriage 66 in a counterclockwise direction, to such an extent that the ductor roller 60 is disengaged from both the transfer roller 50 and the fountain roller 58. The carriage 66 is swung to such an extent that it is out of the range of movement of the lever 88. The movement of the cam 110 is limited by an ear or lug 118 which is formed on the cam and is engageable with the roller 116, as shown in FIG. 2.

During the normal operation of the dampening system, the carriage 66 is oscillated by the lever 88 to such an extent that the ductor roller 60 is moved intermittently into and out of engagement with the transfer roller 50. However, the ductor roller 60 is held against the fountain roller 58 by the spring 72, which biases the carriage 62 in a counterclockwise direction relative to the carriage 66. When the carriage 66 is swung to the shut-down position shown in FIG. 2, the range of movement of the carriage 62 is limited, so that the ductor roller 60 is separated from the fountain roller 58. As shown to advantage in FIG. 4, the movement of the carriage 62 is limited by a pair of slots or openings 122 which are formed in the opposite sides of the carriage 66. The carriage 62 is provided with pins or shafts 124, which are received in the slots 122. The movement of the carriage 62 is limited by the engagement of the pins 124 with the lower edges of the slots 122.

In accordance with the present invention, the ductor roller 60 is made with a surface which is fully receptive to the repellent, so that the surface of the ductor roller 60 is always covered with a film of the repellent liquid. The surface of the ductor roller 60 is non-receptive to ink, with the result that the ductor roller and the fountain roller 58 are kept entirely free of ink. The maintenance of a continuous film of repellent on the surface of the ductor roller 60 assists greatly in preventing the ink from adhering to the ductor roller.

It is preferred that the ductor roller 60 be formed with a chromium surface which is sandblasted, etched, buffed or otherwise given a matte finish. The chromium may be in the form of a relatively thin plating, formed by electroplating chromium onto the base metal of the roller. It has been found that the matte finish chromium is particularly receptive to the repellent and non-receptive to the ink. Moreover, the chromium resists the corrosive action of the repellent. Other water receptive metals, such as aluminum or zinc, may be employed for the surface of the ductor rollers 60, but matte finish chromium has been found to be particularly advantageous.

The repellent fountain roller 58 may be made of medium hard rubber or the like. The fountain roller 58 is kept free of ink by the ink repelling action of the ductor roller

60. The ink receptive transfer roller 50 may also be made of medium hard rubber.

With the arrangement of the present dampening system, the ductor roller 60 and the fountain roller 58 are kept free of ink, because of the ink repelling action of the ductor roller 60. In the case of prior systems of this general type, the ductor roller was not ink repelling. In fact, both the ductor roller and the fountain roller were ink receptive, so that both of these rollers were covered with thin films of ink under normal operating conditions. This frequently resulted in a condition in which the ink on the fountain roller was broken down or became waterlogged due to prolonged exposure to the repellent liquid in the repellent fountain. The waterlogged ink was then carried throughout the inking system to such an extent as to spoil the printing qualities of the ink. Because of the possibility of such failure of the ink, due to attack by the repellent solution, it was necessary to use inks which were highly resistant to water. This limitation in the choice of ink increased the difficulty of obtaining the desired results under all printing conditions.

In the case of the present invention, there is no ink on the fountain roller 58 or the ductor roller 60 to be attacked by the water or repellent solution in the repellent fountain. Thus, all difficulties with waterlogging of the ink have been eliminated. The present invention permits the use of all types of commercial lithographic ink. There is no longer any need to select inks which are highly water-resistant. Thus, it is much easier to obtain the desired results under all printing conditions.

When the printing press is started up, it is desirable to moisten the ductor roller 60 with the repellent solution 56 before allowing the ductor roller to engage the ink covered transfer roller 50. The prior moistening of the ductor roller 60 is automatically accomplished if the machine is started up with the ductor roller separated from the transfer roller 50, as shown in FIG. 2. When the throw-out lever 114 is swung counterclockwise, the cam 110 permits the ductor roller 60 to engage the fountain roller 58 before the ductor roller engages the transfer roller 50. This action avoids any possibility that ink might be smeared on the ductor roller 60 before it is moistened with the repellent from the fountain roller 58.

The present invention greatly enhances the advantages of the type of dampening system in which the water or repellent solution is applied to the lithographic printing plate by way of the inking system. By eliminating difficulties with waterlogged ink, the present invention increases the versatility and flexibility of such machines, and makes it possible to obtain improved results under many printing conditions.

Various other modifications, alternative constructions and equivalents may be employed without departing from the true spirit and scope of the invention, as exemplified in the foregoing description and defined in the following claims.

We claim:

1. In a lithographic printing press, the combination comprising a plate cylinder for carrying a lithographic printing plate, an ink fountain, a system of ink rollers for carrying ink from said ink fountain to the printing plate on said plate cylinder, each of said ink rollers having a non-absorbent ink receptive surface, a repellent supply roller, means for supplying repellent to said repellent supply roller, said repellent supply roller being non-absorbent, and a ductor roller engageable with said repellent supply roller and movable intermittently into engagement with one of said ink rollers for supplying repellent to the printing plate by way of said system of ink rollers, said ductor roller having a non-absorbent metal surface which is receptive to the repellent while being entirely non-receptive to the ink so that said ductor roller and said repellent supply roller will be kept entirely free of ink.

2. In a lithographic printing press, the combination comprising a plate cylinder for receiving a lithographic

printing plate, a pair of non-absorbent form rollers engageable with the printing plate on said cylinder, an ink fountain for holding a supply of ink, a system of non-absorbent ink rollers for carrying the ink from said ink fountain to said form rollers, an ink receptive non-absorbent transfer roller engaging one of said form rollers, a repellent fountain for holding a supply of repellent, a non-absorbent rubber repellent roller in said repellent fountain and positioned to be partly immersed in the repellent contained therein, a non-absorbent ductor roller engageable with said fountain roller for receiving repellent therefrom, and means for cyclically moving said ductor roller into and out of engagement with said transfer roller for supplying repellent to the printing plate by way of said transfer roller and form rollers, said ductor roller having a chromium surface with a matte finish so as to be fully receptive to repellent while being entirely non-receptive to the ink, said ductor roller and said fountain roller thereby being kept entirely free of ink.

3. In a lithographic printing press, the combination comprising a plate cylinder for receiving a lithographic printing plate, an ink fountain for holding a supply of ink, a system of ink rollers for carrying the ink from said ink fountain to the printing plate on said cylinder, each of said ink rollers having a non-absorbent ink receptive surface, a repellent supply roller, means for supplying repellent to said repellent supply roller, said repellent supply roller being non-absorbent, a non-absorbent ductor roller engageable with said repellent supply roller, and means for intermittently moving said ductor roller into and out of engagement with one of said ink rollers to supply repellent to the printing plate by way of said system of ink rollers, said ductor roller having a chromium surface with a matte finish so as to be fully receptive to the repellent while being entirely non-receptive to the ink, said ductor roller and said repellent supply roller thereby being kept free of ink.

4. In a lithographic printing press, the combination comprising a plate cylinder for holding a lithographic printing plate, a non-absorbent form roller for engaging the printing plate on said cylinder, an ink fountain, a system of non-absorbent ink rollers for carrying ink from said ink fountain to said form roller, an ink receptive non-absorbent transfer roller engaging said form roller, a repellent fountain, a non-absorbent fountain roller in said repellent fountain, a ductor roller engageable with said fountain roller, and means for cyclically moving said ductor roller into and out of engagement with said transfer roller, said ductor roller having a non-absorbent metal surface which is fully receptive to the repellent while being entirely non-receptive to the ink so as to keep said ductor roller and said ink roller free of ink.

5. In a lithographic printing press, the combination comprising a plate cylinder for holding a lithographic printing plate, an inking system including a plurality of ink rollers for supplying ink to the printing plate on said cylinder, each of said ink rollers having a non-absorbent ink receptive surface, a repellent fountain for holding a supply of repellent, a non-absorbent fountain roller in said fountain, a ductor roller engageable with said fountain roller, and means for intermittently moving said ductor roller into engagement with one of said ink rollers for supplying repellent to the lithographic printing plate by way of said inking system, said ductor roller having a non-absorbent metal surface which is receptive to the repellent while being non-receptive to the ink so as to keep said ductor roller and said fountain roller free of ink.

6. In a lithographic printing press, the combination comprising a plate cylinder for holding a lithographic printing plate, an inking system including a plurality of ink rollers for supplying ink to the printing plate on said cylinder, each of said ink rollers having a non-absorbent ink receptive surface, a repellent fountain for holding a supply of repellent, a non-absorbent rubber fountain roller in said fountain, a non-absorbent ductor roller

engageable with said fountain roller, and means for intermittently moving said ductor roller into engagement with one of said ink rollers for supplying repellent to the lithographic printing plate by way of said inking system, said ductor roller having a chromium surface which is receptive to the repellent while being non-receptive to the ink so as to keep said ductor roller and said fountain roller free of ink.

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