Dec. 29, 1936. L. H. MORSE 2,065,535

PLANOGRAPHIC PRINTING MACHINE

Filed Nov. 6, 1933 3 Sheets-Sheet 1

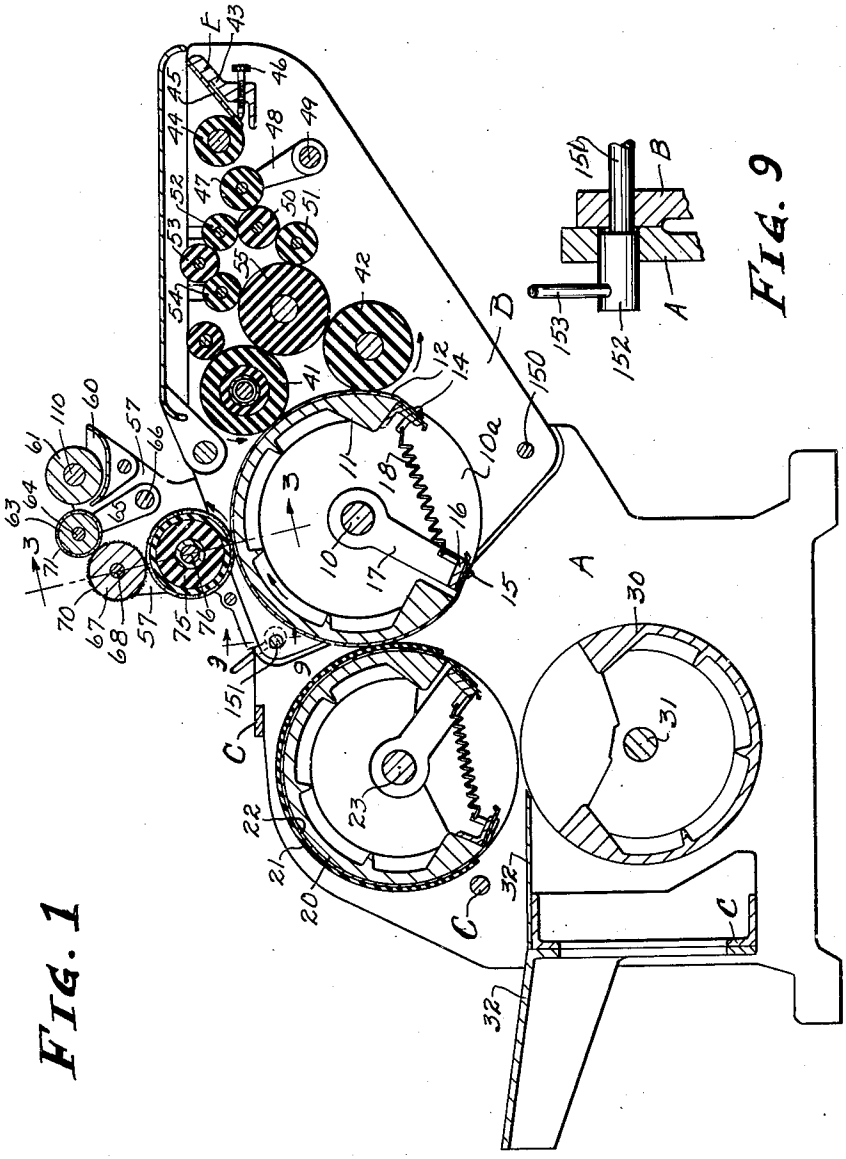

FIG. 1

FIG. 9

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FIG. 2

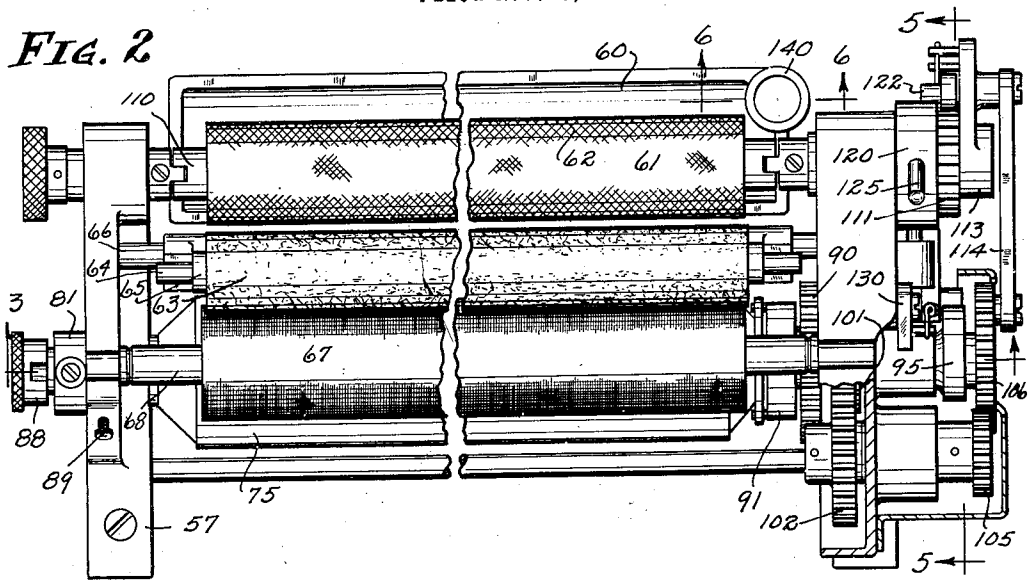

FIG. 3

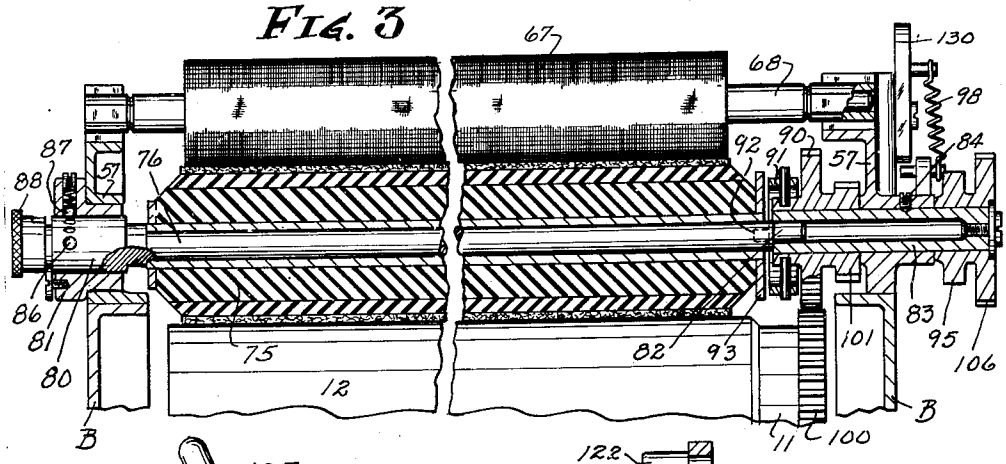

FIG. 7

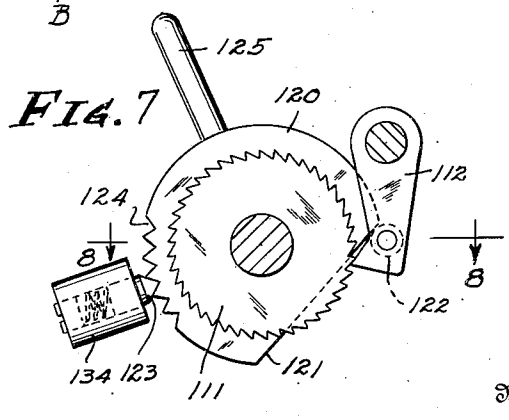

FIG. 8

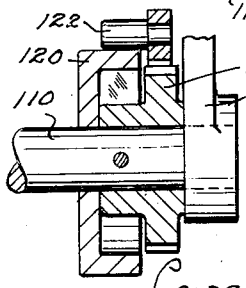

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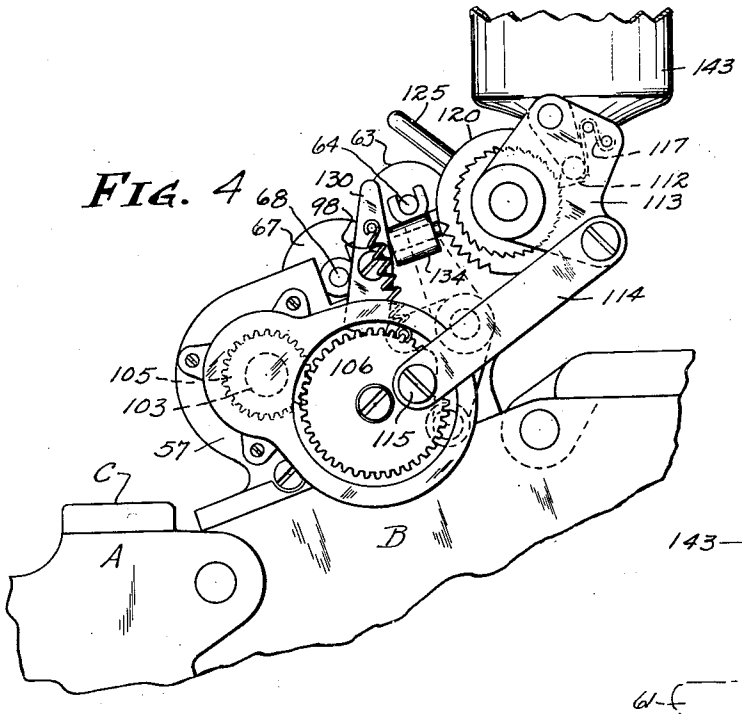
FIG. 4



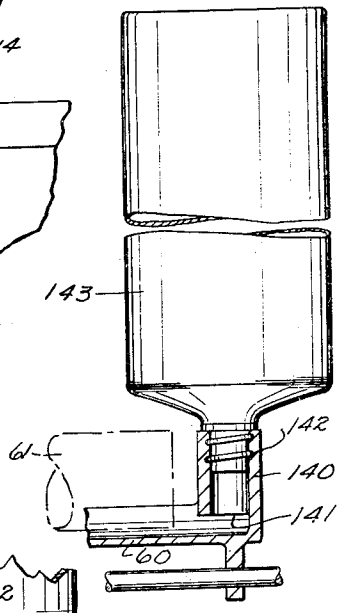
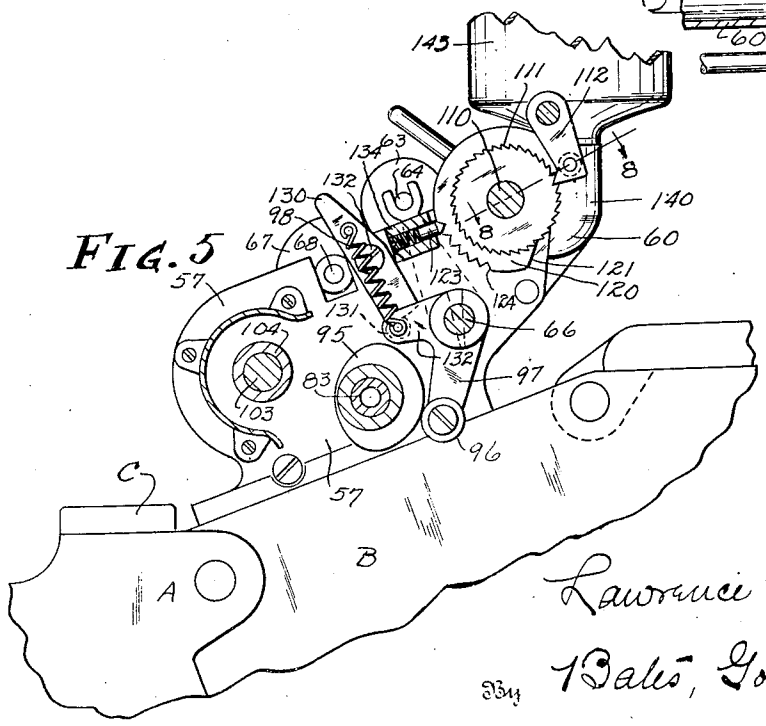


FIG. 6

FIG. 5



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Patented Dec. 29, 1936

2,065,535

UNITED STATES PATENT OFFICE

2,065,535

PLANOGRAPHIC PRINTING MACHINE

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Application November 6, 1933, Serial No. 696,808

6 Claims. (Cl. 101—148)

This invention relates to an improvement for planographic printing machines, and is especially concerned with a repellant applicator for rotary planographic printing presses.

One of the objects of the invention is to provide a simple, automatic mechanism for readily supplying the proper quantity of repellant to the printing plate, according to the rotation of the latter.

A further object is to provide a construction and arrangement of rolls for delivering a suitable chemical solution to a rotating printing plate of the lithographic type, to form a moist coating on the plate as a substitute for the water application in ordinary lithography.

Other features of my invention will hereinafter be more fully set forth in connection with the following description, which refers to a preferred embodiment of the invention, shown in the drawings, wherein the invention is incorporated in a printing machine suitable for lithographic printing. The essential features of the invention will be set forth in the claims.

Referring now to the drawings, Fig. 1 is a centrally located vertical section through a planographic printing press having my improved repellant applicator incorporated therein; Fig. 2 is a top view of my applicator; Fig. 3 is a vertical transverse section as indicated by the lines 3—3 on Figs. 1 and 2; Fig. 4 is a side elevation of my repellant applicator looking from the right-hand side of Fig. 2; Figs. 5 and 6 are fragmentary sectional views, as indicated by the correspondingly numbered lines on Fig. 2; Fig. 7 is an enlarged detail of the driving mechanism for a fountain roll; Fig. 8 is a sectional detail, the plane of the section being indicated by the line 8—8 on Figs. 5 and 7; Fig. 9 is a sectional detail as indicated by the line 9—9 on Fig. 1.

Referring again to the drawings, and especially to Fig. 1, I illustrate one form of planographic printing machine to which my improved repellant applicator is readily adapted. Such printing machine comprises in general a pair of main frame plates A, spaced apart by suitable transverse frame members C. A pair of supplemental frame plates B, are secured to the respective main frame members A as will be hereinafter more fully described, and support certain parts of an inking mechanism, as will be hereinafter more fully described.

Journalled in the frame plates B is a pattern roll shaft 10, on which a suitable pattern roll 11 is drivingly secured. This roll carries on its periphery a planographic printing surface, having the image to be printed reproduced thereon in the usual manner. As shown, the printing surface is provided by a removable plate 12, the end portions of which are held within a gap 10a in the pattern roll.

The plate 12 comprises a comparatively thin, flexible, metallic member, one end of which is provided with suitable perforations (not shown), but through which lugs 14 carried by the roll 11 project. The plate 12 is then wrapped about the periphery of the roll and suitable openings (not shown) at the other end thereof embrace lugs 15 carried by a retaining plate 16. The retaining plate is supported by arms 17, which extend into the gap 10a of the roll 11, and rotatably embrace the shaft 10. Suitable springs 18 are interposed between the arms 17 and the roll 11 to draw the plate 12 tightly into contact with the periphery of the roll, and to maintain it taut during the printing operation.

The pattern roll is inked by an inking mechanism to be hereinafter more fully described, and the inked image of the plate 12 transferred to the surface of a transfer or offset roll 20, which lies forwardly (to the left, Fig. 1) of the pattern roll 11. As shown in Fig. 1, the offset roll 20 comprises a cylindrical roll similar to the pattern roll, and is drivingly mounted on a shaft 23, which is journalled in suitable bearings in the main frame A. A blanket 21 composed of rubber or other suitable ink-transferring material is secured to a carrier plate 22, which is mounted on the periphery of the roll 20 in the same manner as the pattern plate 12 is mounted on the pattern roll 11, heretofore described in detail.

The ink pattern or image which is transferred to the offset roll 20 from the pattern roll 12 is then impressed or transferred to the material to be printed, by such offset roll. As shown in Fig. 1, a suitable platen roll 30 is drivingly mounted on a shaft 31, which is journalled in the frame plate A, beneath the offset roll 20. The material to be printed is fed over the surface of a suitable guide table 32 to the bite of the offset roll 20 and the platen roll 30, and thereby receives its impression from the offset roll.

The ink supply is carried in a suitable reservoir or ink fountain E, and is fed to the pattern plate 12 by a pair of spaced form rolls 41 and 42, which lie to the rear of the pattern roll 11, as shown in Fig. 1. As shown in Fig. 1, the ink fountain E is mounted between and secured to the supplemental frame members B. The fountain comprises the usual fountain frame 43, in which is rotatably mounted a rubber-covered

fountain roll 44. A suitable flexible fountain plate 45 is secured to the fountain frame, and its lower edge is adjustably maintained against the fountain roll 44 by a series of adjusting screws, one of which is shown in Fig. 1 at 46.

The ink is removed from the fountain E by the fountain roll 44 and transferred to the form rolls 41 and 42 by suitable ductor roll and a series of transfer and distributor rolls. The ductor roll preferably comprises a rubber-covered roll and is rotatably mounted between the upper ends of a pair of rock arms 48, which are secured to a rock shaft 49. The shaft 49 is oscillated in any well-known manner, so that the roll 47 moves alternately into contact with the fountain roll 44 and the transfer roll 50, the latter being rotatably journalled in the frame plates B. The transfer roll 50 in turn contacts with a pair of transfer rolls 51 and 52. The roll 52 transfers ink to a transfer roll 54, through the medium of a roll 53. The rolls 51 and 54 contact with a distributor roll 55, which, in turn, distributes ink to the two form rolls 41 and 42.

The pattern roll, the offset roll and the platen roll 30, as well as certain of the rolls of the ink fountain, may be driven in any well-known manner. Suffice it to say that they are driven in synchronism, and that a suitable gear 100 (Fig. 3) is secured to the pattern roll 11 to drive the ink repellant applicator, hereinafter to be described in detail.

My invention includes an ink repellant applicator, generally indicated at 60, and which is mounted between a pair of frame plates 57, which are secured to the frame plates B, heretofore mentioned. As shown in Figs. 1, 5 and 6, a quantity of ink-repellant, which is a chemical solution, is carried in a suitable fountain trough 60, the repellant in the fountain being automatically replenished from time to time, as will hereinafter be more fully described.

Suitable mechanism is provided to transfer the repellant from the fountain roll 61 to the plate 12 in a manner capable of fine adjustment, so that repellants which are required in small amounts with much accuracy may readily be used. Such repellants are generally chemical solutions, usually more viscous than water, but the chemical characteristics thereof forming no part of the present invention.

Mounted with its lower edge in the trough is a fountain roll 61. The fountain roll 61 is preferably a metallic roll—brass, for instance,—having a knurled or otherwise roughened surface, generally indicated in Fig. 2, at 62. This roughened surface enables the roll, consequent upon its rotation, to pick up a quantity of repellant from the fountain and carry it upwardly along its surface, so that it may be transferred to a suitable ductor roll 63. The knurled or roughened surface of the metallic roll 61, being devoid of capillary absorption, acts mechanically to raise a small quantity of liquid into position where the ductor may engage it, without danger of supplying an excess. As hereafter described, this roll 61 is intermittently given a step-by-step rotation, and thus has short periods of rest, enabling surplus liquid to drain from it.

The ductor roll 63 is covered with a felt or other liquid absorbent material and is rotatably mounted on a shaft 64, journalled in the upper end of a pair of arms 65 mounted on a suitable rock shaft 66, which, in turn, is journalled in the frame plate 57, and is oscillated to cause the ductor roll 63 to alternately move into contact with the fountain roll 61 and a suitable distributor roll 67. The distributor roll 67 is carried by a suitable shaft 68, which is journalled in the frame plates 57. The roll 67 transfers the repellant to a form roll 75, which is rotatably mounted on a suitable shaft 76, carried by the frame plates 57, as will be hereinafter more fully described.

The form roll 75 preferably comprises a rubber roll and is covered with a layer of felt or other moisture absorbing and retaining material such as molletin and serves to apply a thin coating of moisture to the pattern 12.

In lithographic printing it has been found that the repellant form roll collected ink which remained on the plate or pattern after the transfer to the offset roll of the main body of ink. The accumulation of such ink on the form roll of the repellant applicator has in the past required either frequent changing of the form roll or the addition of mechanism to clean the roll. The latter prolonged the period of time a form roll could be used without removal for a thorough cleaning.

I have found that I may entirely overcome the above named disadvantage,—namely, the transfer of ink from the plate to the repellant form roll—by providing suitable transfer and form roll surface coverings. As shown, and heretofore mentioned, the form roll 75 is covered with a moisture absorbent felt, such as molletin, while the transfer roll 67 is a metallic roll and is covered with a comparatively thin covering of fabric material such as duck, or other woven fabric of a substantially regular grain and with little or no fibrous nap, in contrast with the grainless fibrous material comprising the covering of the form roll.

The action of these covered rolls 75 and 67 and the pattern 12 is such that the ink does not accumulate on the form roll 75 unless an oversupply is fed to the pattern by the inking mechanism. Hence, this construction eliminates for all practical purposes the accumulation of ink on the repellant form roll. In actual use, the form roll 75 appears to receive a small amount of ink from the pattern 12. However, this ink upon contact with the contrasting fabric of the transfer roll 67 appears to be broken up and is subsequently restored to the pattern 12 when such ink again contacts with the pattern. It is as if the ink has a greater affinity for the pattern than for the repellant-saturated form roll which has been re-supplied with repellant between the time of the removal of the ink from the pattern and the replacement thereof.

As shown in Figs. 2, 3, 4 and 5 the fountain roll 61 and the form roll 75 of my repellant applicator are positively driven. The form roll 75 is, as heretofore mentioned, rotatably journalled on a shaft 76, one end of which has a portion 80, which is journalled in an eccentric bushing 81. The other end has an eccentric stub 82, which is journalled in a bushing 83, which is secured to the frame plate 57 by a suitable retaining screw 54. Thus, by rotating the shaft by means of a knob 88, the shaft may be adjusted to move bodily to or from the printing plate 12, thereby regulating and adjusting the pressure between the roll 75 and the printing pattern or plate 12.

As shown in Fig. 3, the left-hand end 80 of the shaft 76 is provided with a series of notches or recesses 86, which coact with a spring-pressed plunger or ball 87, so that the shaft may be readily positioned to any one of a number of predetermined positions, thereby enabling the

pressure to be regulated. This arrangement also retains the shaft in the desired position. The bushing 81, which is eccentrically mounted in the frame, may be given a partial rotation to raise or lower the left-hand end of the shaft 76, and thereby permit the operator to align the roll 75 accurately with the printing plate 12, so as to enable the entire length of the roll to contact with the plate with even pressure. A suitable screw 89 (Fig. 2) secures the bushing in place, once it is adjusted.

The roll 75 is driven from the pattern roll 11 by the medium of the gear 100, heretofore mentioned. As shown in Fig. 3, the gear 100 meshes with a gear 90 of a composite gear member, which is journalled on the bushing 83, and which is drivingly connected through the medium of an Oldham coupling 91, the inter-engaging portions of which have sufficient lost motion to permit the roll 75 to be driven, under frictional influence with the pattern 12, at a slightly greater speed than the positive drive of the gear. The roll 75 will be positively driven across the gap in the pattern roll to secure a fresh supply of repellant at all times, but when in engagement with the plate, will have a true rolling action thereon, preventing any differences in peripheral speed between the two. The coupling also provides for non-alignment of the axis of the roll and the axis of its driving gear.

The ductor roll shaft 66 is oscillated by a cam 95, which is rotatably mounted on the bushing 83, heretofore described, and coacts with a roller 96, carried by one arm of a bell crank 97, rigidly secured to the ductor roll shaft 66. A suitable spring 98 interposed between the other arm of the bell crank 97 and a relative stationary part of the mechanism maintains the roller 96 in contact with the periphery of the cam 95.

The cam 95 is driven from the gear 100 heretofore mentioned. As shown, the gear 100 meshes with the gear 90, and a gear member 101 integral with or drivingly secured to the gear 90 meshes with a gear 102, which is rigidly secured to a stub shaft 103, journalled in a suitable bushing 104, carried by the frame members 57. A suitable gear 105 is rigidly secured to the stub shaft 103, and meshes with a gear 106, which is drivingly secured to or integral with the cam member 95, thereby rotating the cam member.

The fountain roll 61 is intermittently given a partial rotation by the gear 106. As shown, at Figs. 1, 4, 5 and 7, the fountain roll 61 is rigidly secured to a shaft 110, journalled in the frame members 57. Secured to the outer end of the shaft 110 is a ratchet 111, which is intermittently advanced by a pawl 112 carried by a plate 113, which is rotatably mounted on the shaft 110. A suitable link 114 is connected at one end to the plate 113, and at the other end to a pin 115 eccentrically carried by the gear 106. In this manner the pawl is intermittently driven to advance the ratchet a number of teeth at a time. A suitable spring 117 (Fig. 4) serves to maintain the pawl in contact with the ratchet.

The amount of rotative movement imparted to the ratchet wheels 111 is controlled to regulate the amount of repellant transferred to the ductor roll 63 from the fountain roll 61. As shown, a flanged disk 120 is rotatably secured to the shaft 110, and is provided with a cam surface 121, which coacts with a pin 122, on the pawl 112, and disengages the pawl from the ratchet 111, at a predetermined point during the stroke of the plate 113. A spring-pressed plunger 123 engages notches 124 in the disk 120, and maintains the disk in any one of several adjusted positions, whereby the position of the cam surface may be adjustably positioned to change the effective stroke of the pawl 112. A lever 125 is secured to the disk 120 to enable the operator to readily vary the effective stroke of the pawl 112, as more or less repellant is required.

When the mechanism is idle, it is desirable to maintain the form roll 75 out of contact with the pattern roll, and also to maintain the ductor roll 63 out of contact with the fountain roll 61. This is useful, for instance, when the mechanism be rotated to change pattern 12. The form roll is readily moved out of contact with the pattern roll 12 by merely turning the knob 88 and adjusting the position of the eccentric shaft 92, heretofore described.

To maintain the ductor roll out of contact with the fountain roll 61, the operator, immediately before shutting down the machine, throws a lever 130, (Figs. 4 and 5) to the right, thereby placing the lowermost end of the lever in contact with a pin 131 carried by the arm 132 of the bell crank 97, heretofore described. The spring 98, heretofore mentioned, is connected to the arm 132 of the bell crank and to the upper end of the lever 130 above its pivot 132. The arrangement is such that when the parts are in their normal position, as shown in Fig. 4, the spring 98 serves both to maintain the roller 96 in contact with the periphery of the cam 95 and to maintain the lever 130 idle, that is, swung in a clockwise direction.

When the lever 130 has been manually moved from the idle position shown in Fig. 4 to the operative position shown in Fig. 5, the spring passes from one side to the other of the pivot of the lever 130, and when so positioned the spring serves to maintain the pin 131 on the arm 132 of the bell crank 97 in contact with the lower edge of the lever 130, and also to maintain the lever 130 swung in a counter-clockwise direction, as shown in Fig. 5. The movement of the lever 130 may be restricted in both its counter-clockwise and clockwise directions by any suitable means, such as the boss 134 of the frame plate 57.

I have found it desirable, because of the chemical characteristics of the repellant, to provide a repellant fountain or trough, such as is shown in Figs. 1 and 6, which will retain a comparatively small amount of liquid. I also find it advisable to arrange the trough so that the repellant may be automatically replenished and the level of the fluid in the trough maintained substantially constant. For this purpose I provide the trough with an upstanding tubular portion 140, as shown in Fig. 6, the lower end of the tube opening into the trough, as at 141, and the upper end provided with suitable threads 142 to engage the neck of a bottle or suitable storage reservoir or container 143. Hence, as soon as the repellant is lowered below the bottommost line of the tubular portion 140 of the trough, air will be admitted into the container 143 and will replace enough repellant to bring the level in the trough substantially to the bottom line of the tube 140.

As heretofore mentioned, the frame members B are carried by the frame A and support the pattern roll 11, the inking mechanism and the repellant applicator mechanism. Hence, by moving the frame B relative to the frame A, the

pattern is moved away from the offset roll as a unit, with the inking and repellant applicator mechanisms. I find this highly advantageous in that after the machine has been idle the pattern roll must be given a number of rotations to properly distribute the ink and repellant thereon before a print may be taken.

It is accordingly preferable to pivot the frame B as at **150** to the main frame plates A and to provide an eccentric arrangement such as the eccentric shaft **151**, Fig. 9, to swing the frame B about its pivots **150** and thereby move the pattern roll **11** out of contact with the offset roll **20**. A suitable lever **152** is provided to enable the operator readily to adjust the relationship between the frames. The eccentric arrangement above described has been simplified for ease of illustration and may in practical use comprise an arrangement whereby the frames are locked in either of two adjusted positions, namely, with the offset and pattern roll contacting or out of contact as desired by the operator.

It will be seen from the foregoing description that by my invention the liquid repellant is supplied to the plate before the image reaches the first-acting form roller, by means of an applicator roller which is periodically supplied with repellant in a novel manner from a repellant fountain which is automatically maintained filled with repellant to a predetermined level at all times. The repellant applicator rollers, by means of their peculiar coverings, are adapted to return to the plate image any ink which may be offset therefrom temporarily onto the repellant form roll. The throw-off device enables the repellant applicator, the inking system and pattern roll to be operated together without making a transfer whenever desired, to effect the most desirable distribution of ink and repellant. These various characteristics provide a very effective device suitable to produce planographic printing by the employment of ink and a repellant in the form of a chemical solution.

I claim:

1. In a planographic printing machine, the combination of a trough to contain liquid, a fountain roll having a roughened metallic surface coacting with the liquid in said trough, a bodily shiftable ductor roll having a comparatively thick liquid absorbent and storage covering arranged to intermittently coact with said fountain roll, a roll to receive liquid from said ductor roll, said last-named roll having a comparatively thin fabric covering, and means to transfer moisture from said last-named roll to a printing plate.

2. In a planographic printing machine having a plate, the combination of a receptacle adapted to carry liquid, a fountain roll immersed in said receptacle and having a roughened surface, means for rotating the fountain roll, a bodily movable ductor roll and means for causing it to periodically engage the fountain roll in a region between the liquid and the top of the fountain roll on that side of the fountain roll which has just left the liquid.

3. In a moistening system for a planographic printing machine, the combination of a trough adapted to carry liquid, means for maintaining the liquid at a constant level, a roller adapted to be immersed in the liquid in said trough and having a non-absorbent roughened surface, means for giving periodic partial rotations to the fountain roll to cause it to lift liquid bodily from the trough, a bodily movable ductor roll, and means for causing it to contact periodically with an upwardly moving region of said roller directly above the trough, whereby the ductor roll may carry away moisture raised by the trough roller.

4. In a planographic printing machine the combination of means for carrying the plate, a form roll having a rubber sheath surrounded by fabric, an intermediate roll having a thin fabric covering, a ductor roll having an absorbent fibrous covering, a metallic fountain roll having a roughened surface, and means for moving the ductor roll between the metallic fountain roll and the fabric-covered intermediate roll.

5. In a planographic printing machine, the combination of a form roll covered with a moisture-absorbing fibrous material, a transfer roll coacting therewith and comprising a non-absorbent body covered with a comparatively thin covering of woven fabric material of substantially regular grain with little or no fibrous nap, in contrast with grainless fibrous material, covering the form roll, a fountain roll, and means for feeding repellant from the fountain roll to the transfer roll.

6. In a planographic printing machine, a fountain adapted to carry liquid, a metallic surfaced fountain roll adapted to be immersed in the liquid, means to impart an intermittent rotative motion to said roll, a metallic transfer roll covered with a woven fabric having substantially no nap thereon, one resilient form roll in contact with said transfer roll and adapted to transfer liquid to a printing member and a ductor roll covered with absorbent material adapted to transfer liquid from the fountain roll to the form roll.

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