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INKING SYSTEM FOR PLANOGRAPHIC PRINTING MACHINES

Filed Oct. 19, 1933

4 Sheets-Sheet 1

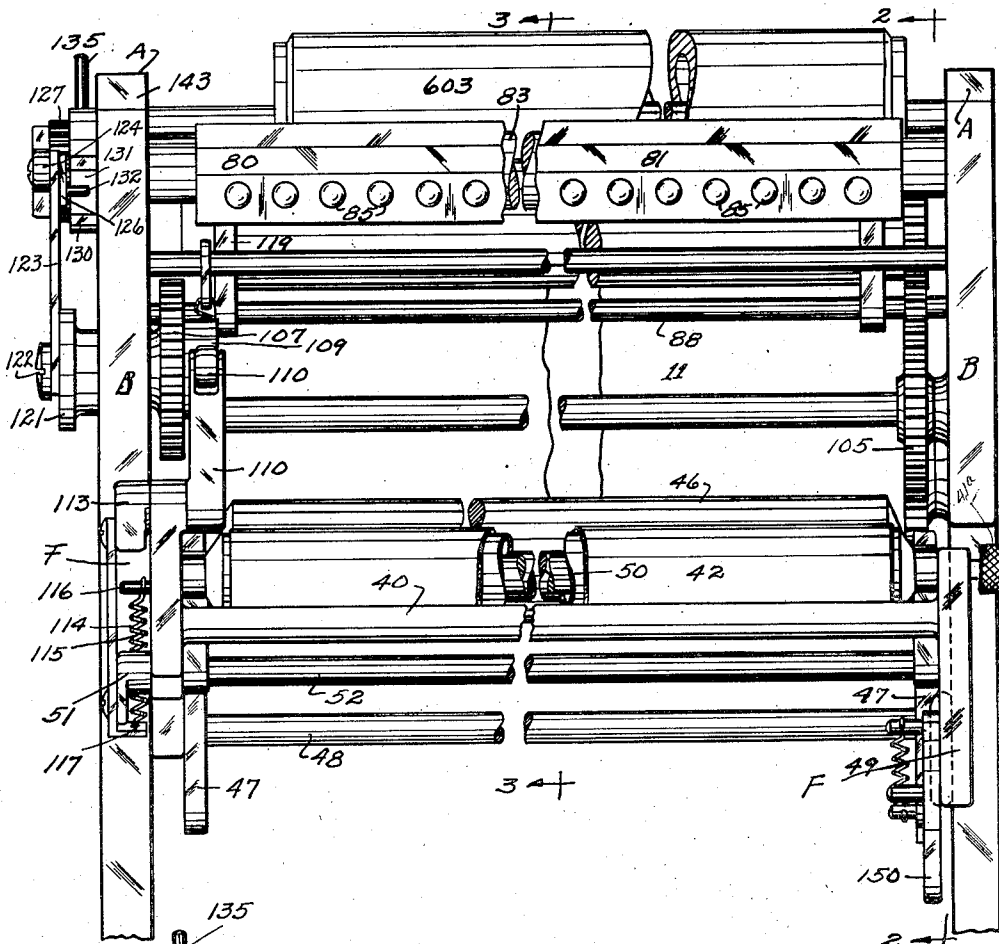


FIG. 1

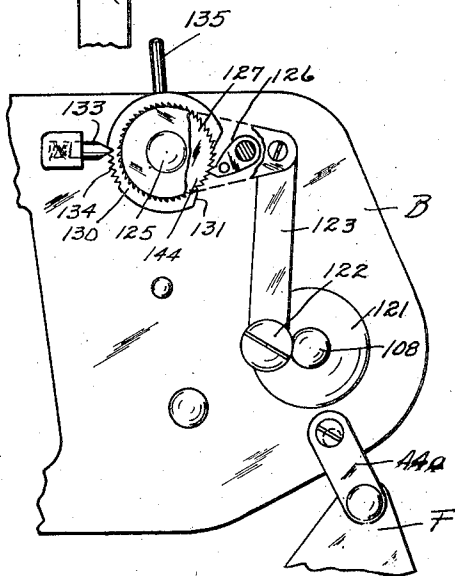


FIG. 6

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4 Sheets-Sheet 2

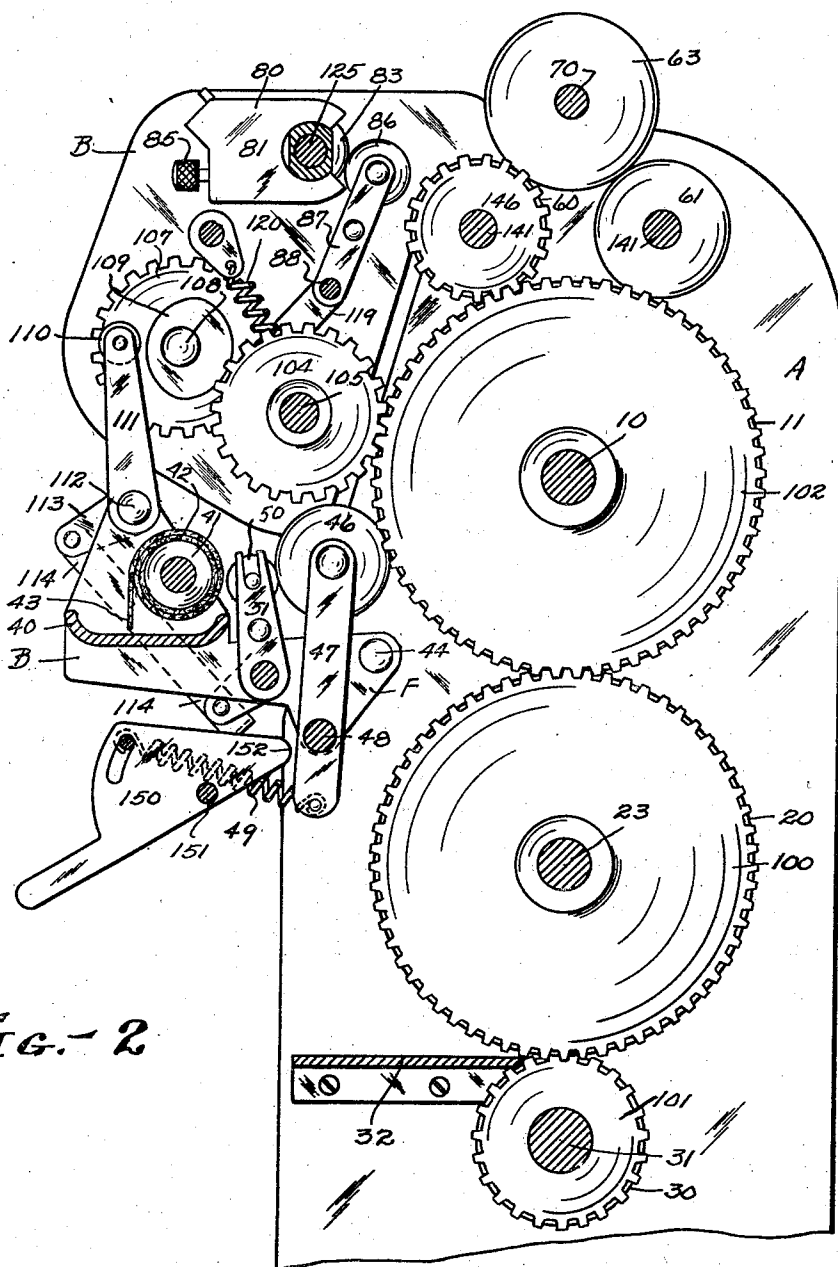


FIG. 2

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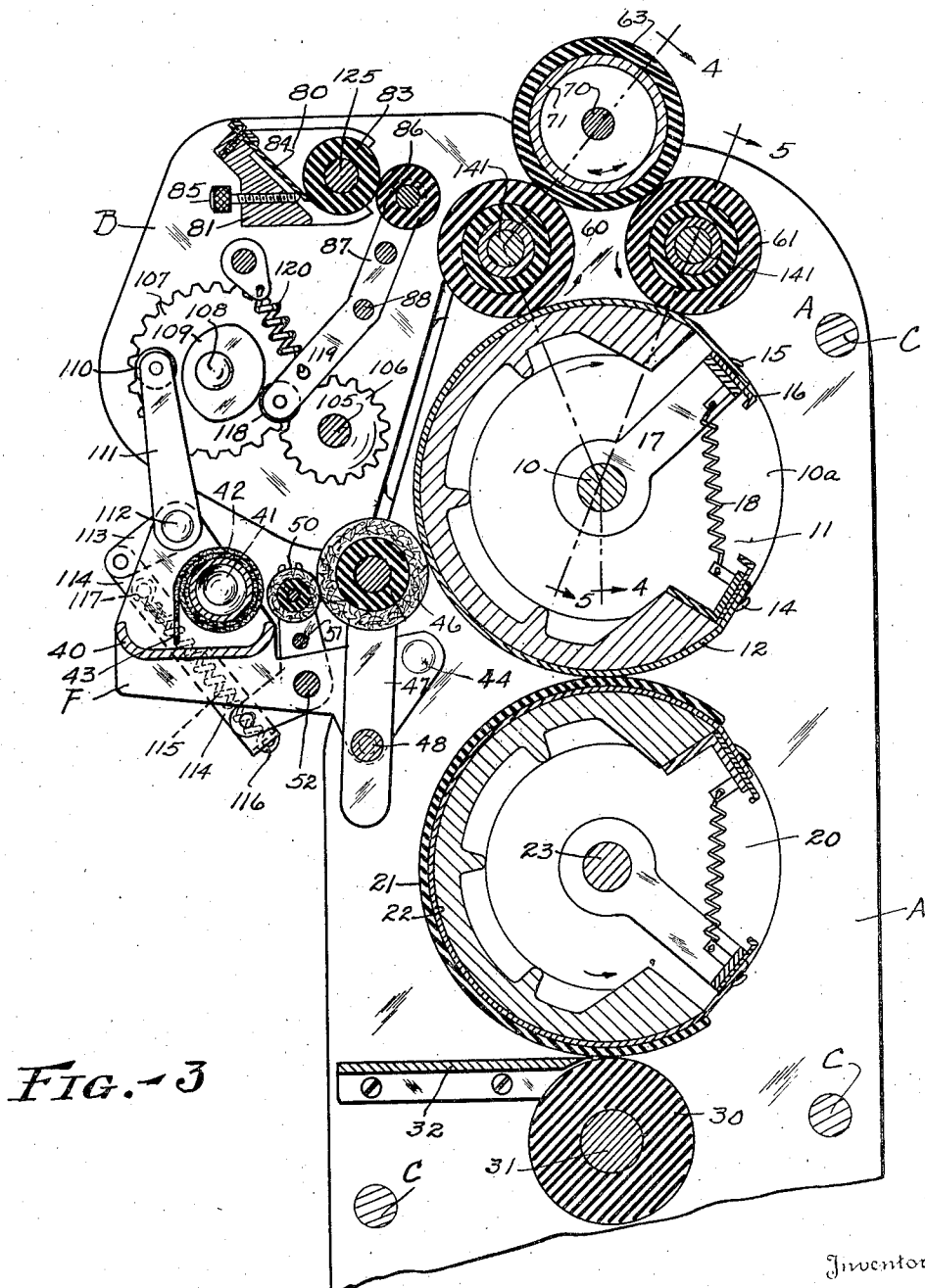
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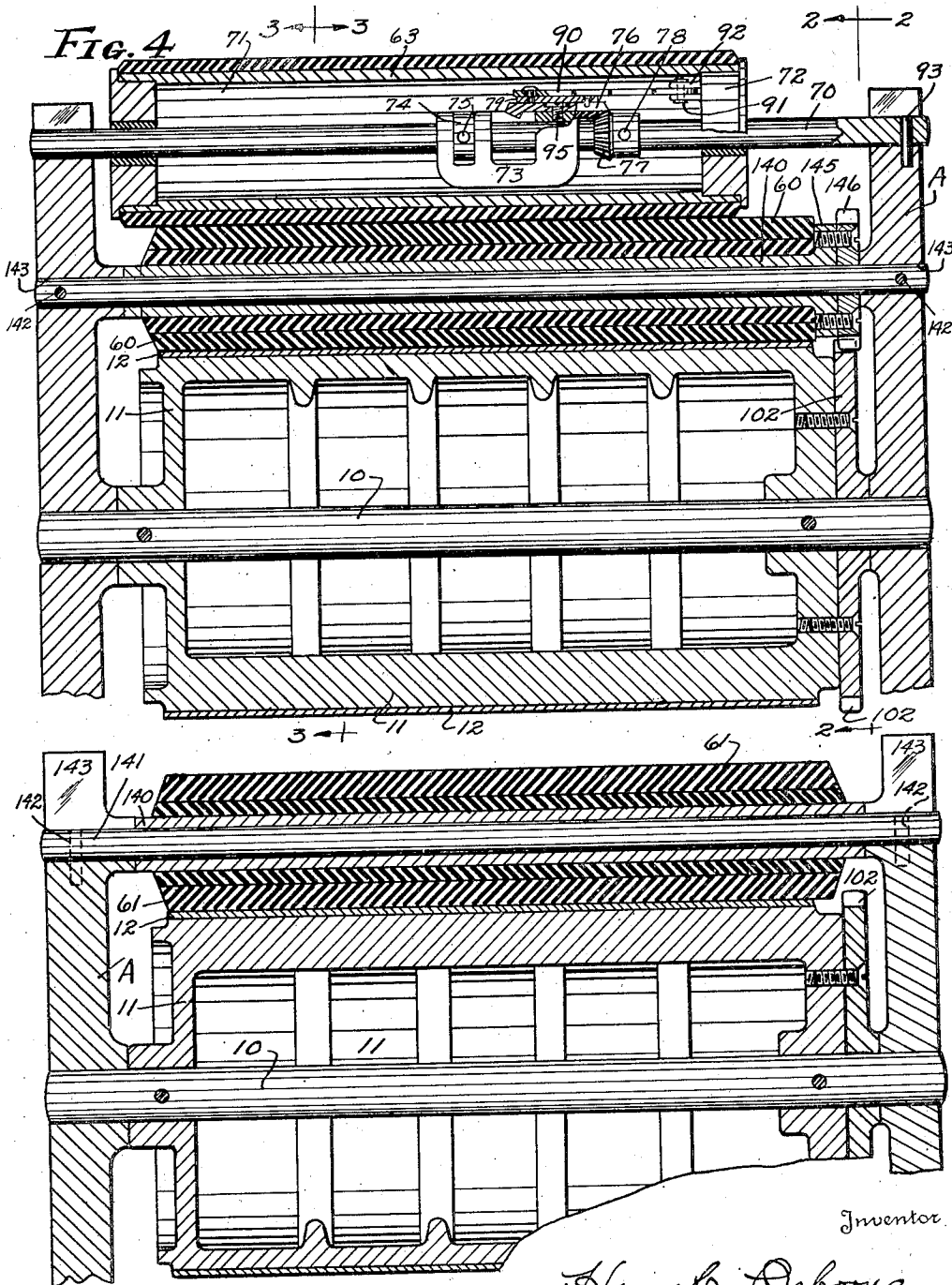
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INKING SYSTEM FOR PLANOGRAPHIC PRINTING MACHINES

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4 Sheets-Sheet 4



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UNITED STATES PATENT OFFICE

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INKING SYSTEM FOR PLANOGRAPHIC
PRINTING MACHINES

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ration of Delaware

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18 Claims. (Cl. 101—350)

The invention is especially concerned with a system which will supply ink smoothly to a non-continuous printing surface, as for instance, a planographic plate mounted on a pattern roll.

By this invention the even distribution of ink is unaffected by the gap between the ends of the plate on such roll. This is effected by gearing an inking roll with the plate carrier to positively drive that roll and providing a subsequently acting inking roll which is frictionally driven and operates to smooth out any irregularities resulting from the gear-driven roll.

Preferably there are but two form rolls, each of which is engaged by a single distributing roll, which is axially reciprocable but not positively driven. In such combination the first form roll is positively driven by the plate-carrying cylinder and receives ink by means of a suitable ductor roll. This first form roll frictionally drives the distributing roll which frictionally drives the second form roll, which is the last roll acting on the plate and hence is able to give a smoothing action to the previously applied ink.

A printing machine of the planographic type, embodying all features of this invention, is illustrated in the drawings hereof and hereinafter fully described.

Referring now to the drawings, Fig. 1 is a front elevation of a printing machine having my inking system; Fig. 2 is a transverse vertical section as indicated by the line 2—2 on Fig. 1; Fig. 3 is a transverse vertical section taken along the line 3—3 of Fig. 1; Fig. 4 is a section through and parallel to the axes of the various rolls as indicated by the offset line 4—4 on Fig. 2; Fig. 5 is a section as indicated by the lines 5—5 on Fig. 2; Fig. 6 is a side elevation of a ratchet feed mechanism used in connection with the fountain roll of the ink supply mechanism.

Referring to the drawings, and especially to Fig. 3, the 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 and support certain parts of the inking mechanism as will be hereinafter more fully described.

Journalled in the frame plates A is a pattern roll shaft 10, to which a suitable pattern roll 11 is drivingly secured. This roll has on its periphery a non-continuous planographic printing surface having the image to be printed reproduced thereon in the usual manner. The surface is provided by a removable plate 12, the end por-

tions of which are held within a gap 10a in the pattern roll.

As shown, the plate 12 comprises a comparatively thin flexible metallic member, one end of which may be 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) in the other end thereof may 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 roll 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 operations.

The pattern plate 12 is inked by an inking mechanism hereinafter to be more fully described, and the inked image of the plate 12 transfers the ink thereon to the surface of a transfer or offset roll 20 which lies beneath the pattern roll 11. As shown in Fig. 3, the offset roll 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 frame plates A. A blanket 21, composed of rubber or other suitable ink transferring material, is secured to a plate 22 and mounted on the periphery of the roll 20 in the same manner as the pattern plate 12 is mounted on the pattern roll 11 and heretofore described in detail.

The inked pattern transferred to the offset roll 20 from the pattern plate 12 is imprinted on the material to be printed by such offset roll. As shown in Fig. 3, a suitable platen roll 30 is drivingly mounted on a shaft 31 which is journalled in the frame plates A. The material to be printed may be fed over a suitable guide table 32 to the bite of the offset roll 20 and the platen roll 30 and thereby receives the inked impression from the offset roll. The image may be reproduced on the plate by any of the several well-known methods and hence need not be herein described.

The inking mechanism of this invention has been found particularly valuable with that type of planographic printing process wherein the plate 12 is given a chemical treatment to make its non-image areas receptive to an ink repellent, and especially to a repellent other than water. The drawings illustrate my mechanism for applying such repellent, known as the repellent applicator. This applicator is hereinafter more fully described but no claim is made to it per se in this application. As shown the applicator is

mounted in supplemental frame plates F, which are pivotally secured to the main frame plates A as at 44, and secured in position by an adjustable link connection 44a.

- 5 As shown in the drawings and especially Figs. 2 and 3, the ink repellent, which is a solution, is in a reservoir or suitable fountain trough 40, the supply of repellent being replenished from time to time by the operator, as required. Mounted above the trough or fountain 40 is a normally stationary roll 41 around which is wrapped several layers of fluid absorbing or wick material 42, the outermost end 43 of which is free and projects into the repellent in the fountain trough 40.
- 10 The roll 41 may be rotated slightly in either direction to adjust the length of wick which is submerged in the fluid, thereby regulating the amount of repellent on wrappings of the roll itself. This may be accomplished by the operator grasping the wick surface by his fingers, though I have shown a knob 41a (Fig. 1) for this purpose. The friction of the roll in its bearings holds it in any set position.

- Suitable mechanism is provided to transfer the repellent from the wick 42 to the plate 12 in a manner capable of fine adjustment, so that repellents which are required in small amounts and with much accuracy may readily be used. Such repellents are chemical solutions, usually more viscous than water, but the chemical constituents form no part of the present invention.

- As shown in Fig. 3, a form roll 45 which is covered with felt, fabric, or other fibrous wrapper 46 is mounted between a pair of arms 47, which are in turn rotatably supported on a cross-frame member, such, for instance, as the shaft 48. Suitable springs, one of which is shown in Fig. 2 at 49, act on the lowermost ends of the arms 47 and serve to maintain the form roll 45 in contact with the pattern or form 12.

- The repellent liquid is transferred from the wick 42 to the repellent form roll 45 by a suitable ductor roll 50. As shown in Fig. 3, the ductor roll 50 is mounted in the upper ends of a pair of arms 51 pivotally mounted on a shaft 52 which is carried in the supplemental frame members B. The ductor roll is oscillated, between the wick 42 and the form roll 45, about the shaft 52 in the usual manner by mechanism hereinafter to be described in detail.

- The ink supply is carried in a suitable reservoir or ink fountain 80 and is fed to the pattern or form plate 12 by a pair of spaced form rolls 60 and 61 which lie above and on opposite sides of the axis of the pattern roll 11. As shown in Fig. 3, the ink fountain 80 is mounted between and secured to the supplemental frame member B. The fountain may comprise the usual fountain frame 81 in which is rotatably mounted a rubber covered ink fountain roll 83. A suitable flexible fountain blade 84 is secured to the fountain frame and its lower edge is adjustably retained against the fountain roll 83 by a series of adjusting screws, one of which is shown in Fig. 3 at 85.

- The ink is removed from the fountain 80 by the fountain roll 83 and transferred to the form roll 60 by a suitable ductor roll 86. The ductor roll preferably comprises a rubber covered roll and is rotatably mounted between the upper ends of a pair of rock arms 87 secured to a rock shaft 88, as shown in Fig. 3, and are alternately swung into contact with the fountain roll 83 and the form roll 60.

- The form roll 61 serves to smooth out the ink applied to the form or pattern 12 by the roll 60 and

hence it is essential that the ink applied to this roll 61 be as evenly distributed as possible. I therefore mount a distributor roll 63 above and in contact with the rolls 60 and 61. In this way the ink is transferred to the distributor roll 63 by the roll 60, after the latter has contacted with the form, and transfers such ink to the other form roll 61.

The distributor roll 63 also is given a reciprocating axial movement to thoroughly distribute and mix the ink on both of the form rolls 60 and 61. Such mechanism is best shown in Fig. 4, and, as there shown, the distributor roll 63 comprises a hollow tube or cylinder 71 closed at either end by a pair of bushings 72 rotatably and slidably mounted on a shaft 70 which is secured against rotation in the frame plates A by a suitable pin 93 upon which the shaft is mounted for a free vertical sliding movement.

Rotatably mounted on the shaft 70 within the tube 71 is a bearing block 73 which is restrained from longitudinal movement relative to the shaft by a collar 74 secured to the shaft by a pin 75. Rotatably mounted on the bearing block, in a plane parallel to the axis of the shaft 70 is a bevel gear 76 which meshes with a bevel pinion 77, rigidly secured to the shaft 70 by a pin 78. Secured to the outer face of the gear 76 is a bearing plate 79 eccentrically pivoted to which is one end of a link 90, the other end of which is pivoted on a pin 91, carried by ears 92 of the right hand bushing 72. The operation of the mechanism above described is as follows:

When the roll 63 is rotated, as will be hereinafter more fully described, the link connection 90 causes the bearing block 73 to rotate about the shaft 70. The rotation of the bearing block about the shaft causes the gear 76, which meshes with the stationary pinion 77, to rotate about its axis, thereby driving the link or connecting rod 90 and causing the roll 63 to be reciprocated axially on its shaft 70.

The driving mechanism for the various rolls is best shown in Figs. 2 and 3. Power is applied to one of the roll shafts of the printing couple, for example, to the transfer roll shaft 23. Driv- 45 ingly secured to the shaft 23, as shown in Fig. 2, is a gear 100 which meshes with gears 101 and 102 secured to shafts 31 and 10 respectively, thereby driving the platen roll 30 and the pattern or form roll 11 respectively.

The ductor roll 50 of the repellent feed mechanism is preferably driven from the gear 102 through a train of gears and suitable linkage. As shown in Figs. 2 and 3, a gear 104 meshes with the gear 102 and is drivably mounted on a shaft 105 journaled in the supplemental frame members B. Drivably secured to the shaft 105 is a pinion 106 which meshes with a gear 107 rigidly secured to a stub shaft 108 journaled in the left hand frame plate B. Rigidly secured 60 to the shaft 108 is a suitable cam 109 which coacts with a roller 110 carried on the upper end of a lever 111 which is rigidly secured to a rock shaft 112 journaled in the frame member B. Secured to the rock shaft 112 is an arm 113 which is connected by a link 114 to one of the levers 51 which support the ductor roll 50. A suitable spring 115 (Fig. 3) one end of which is secured to the link 114 at 116 and the other end to the frame B as at 117, serves to maintain 70 the roller 110 in contact with the periphery of the cam 109.

As shown in Fig. 3, the ductor roll 86 of the ink fountain is operated by the cam 109. A suitable roller 118 is carried by an extension 119 of 75

one of the ductor roll supporting arms 87 and is maintained in contact with the cam 108 by a suitable spring 120.

The ink fountain roller 83 is intermittently turned through a partial rotation, the amount of the rotation being adjustable to control the amount of ink imparted from the fountain roll to the ductor roll 86 at each oscillation of such ductor roll. As shown in Fig. 6, a disc 121 is secured to the stub shaft 108 and eccentrically mounted, by means of a pin 122 in one end of a link 123, the other end of which is secured to a lever 124 rotatably mounted on the shaft 125 which is integral with the fountain roll 83. A suitable pawl 126 carried by the lever 124 engages a ratchet 127 which is drivingly secured to the shaft 125, thereby partially rotating that shaft with each rotation of the shaft 108. A suitable spring, not shown, retains the pawl 126 in position to normally coast with the ratchet 127.

The amount of rotative movement imparted to the ratchet wheel 127 is controlled to regulate the amount of ink transferred to the ductor roll 86 from the fountain roll 83. As shown, a disk 130 is rotatably secured to the shaft 125 and is provided with a cam surface 131 which coacts with a pin 132 on the pawl 126 to disengage the pawl from the ratchet 127 at a predetermined point during the stroke of the lever 124. A spring pressed plunger 133 engages notches 134 in the disk 130 and maintains it 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 126. A lever 135 is secured to the disk 130 to enable the operator to readily vary the effective stroke of the pawl 126 as more or less ink is required.

I have discovered that I can secure an even distribution of ink on the pattern 12, despite the gap 102 in the periphery of the pattern roll 11 and the non-continuity of the pattern or plate 12, by employing a positive gear drive for certain of the rolls of the inking mechanism and driving certain other rolls by frictional contact with adjacent roll surfaces. This is especially true of the three rolls above the printing plate 12, namely the form rolls 60 and 61 and the ink distributor roll 63. I find it highly advantageous to so arrange the drive for these rolls that the first form roll to coast with the pattern after the repellant has been applied to the form will be positively rotated in timed relationship with the pattern roll. This insures the application of ink to all parts of the printing plate and aids materially in rotating the distributor roll. I also find that when the distributor roll and other form roll are frictionally driven through frictional surface contact between the driven form roll and the pattern respectively and between each other, the ink deposited on the plate by the first form roll is smoothed out and irregularities in the distribution of the ink on the plate, due to the gap in the periphery of the pattern roll, or the action of the gears, are ironed or smoothed out by the action of the frictionally driven form roll, which is the last roll to coast with the form or pattern before the contact between the latter and the transfer roll.

As shown in Figs. 2, 3, and 5, each form roll is comprised of a rubber or gum covered roll integral with a tubular shaft 140 which is rotatably mounted on a shaft 141 carried by the frame member A. The shaft 141 is constrained against rotation by a pair of pins 142 carried by the frame and projecting through radially extend-

ing openings in opposite ends of the shaft. Each shaft is mounted in slots 143 to prevent radial movement of each roll shaft 140 toward the axis of the pattern roll. Rigidly secured to the flange 145 of the tube 140 of the form roll 60 is a gear 146 which meshes with the gear 102 of the pattern roll heretofore described. The rolls 61 and 63 are driven from frictional contact with each other and with the pattern and form roll 60 respectively.

As it may sometimes be desired to use the printing machine without the application of a separate ink repellant, as for instance where ink-repelling substances are carried by the ink itself and thus delivered to the plate, I arrange the apparatus so that the repellant-applying mechanism may be readily rendered ineffective. As shown in Fig. 2, a cam plate 150 is pivoted to the frame at 151 and a nose 152 thereof acts on the lever arm 47, below the pivot thereof and rocks the arm counter-clockwise (Figs. 2 and 3) moving the repellant form roll 46 away from the surface of the pattern and thereby preventing the application of repellant to the pattern 12. A suitable spring, such as the spring 49 heretofore mentioned, is connected between the plate 150 and the arm 47 in such a manner that it will serve to maintain the arm 47 swung in a counter-clockwise direction and thereby maintain the repellant applicator mechanism inactive.

It will be seen from the description given that I have provided a system of inking a planographic printing plate which operates without regard to the gap in the printing cylinder, and thus enables simple and readily operable means to be employed in the cylinder for attaching the ends of the planographic plate. By transferring a regulated quantity of ink from the fountain to a gear-driven form roller and then smoothing out the applied ink by a friction-driven roller, I do away with the irregularities which have heretofore rendered gear-driven form rollers undesirable in planographic printing, and at the same time I obtain a positive drive for the inking system in a very simple manner. Furthermore, by employing the reciprocating frictionally driven distributing roller which carries the ink from the first form roller to the second, I not only provide the frictional drive for the second roller, but smooth the ink coating on it to give the most desirable result on the plate.

It will also be seen that in my invention the liquid repellant is applied to the plate before the image reaches the first-acting form roller by means of an applicator roller periodically supplied from the wick leading from the repellant fountain. This provides an effective device very suitable for use with repellants in the form of chemical solutions. Finally by the throw-off mechanism, the moisture applicator may be rendered idle and the machine used with ink alone, when the ink carries its own repellant. The whole device is simple and compact and adapted for comparatively cheap manufacture.

I claim:—

1. In a printing machine, the combination of a plate cylinder, a plurality of form rolls engaging the same, the roll which first acts on the plate being positively gear driven and the last acting form roll being frictionally driven, and means for supplying ink to the gear-driven form roll.

2. The combination of a rotary drum having a gap, means within the gap for holding the ends of a planographic printing plate embracing the drum, a gear rigid on the drum, a form roller

fixed on its shaft and having a gear rigid therewith and meshing with the gear on the drum, a second form roller frictionally driven from the first form roller, and means for rotating the drum in the direction to carry the plate first into engagement with the geared roller and thereafter into engagement with the non-geared roller.

3. The combination of a plate cylinder, a form roller geared thereto and extending substantially entirely across said cylinder, a fountain roll, a ductor movable between the fountain roll and the first form roll, a second form roll frictionally driven by the first form roll and the plate, and means for rotating the plate in the direction to cause the gear-driven form roller to act on it in advance of the friction-driven form roller.

4. The combination of a plate cylinder, a form roller geared thereto, a second form roll frictionally driven by the first form roll and an intermediate roller, a fountain roll, a ductor movable between the fountain roll and the first form roll, and a variable ratchet drive for the fountain roll to control the amount of ink fed to the first form roll.

5. The combination of a plate cylinder, a form roller geared therewith, a fountain roller, a ductor movable between the fountain roller and the first form roller, a second form roller not gear driven, and a longitudinally shiftable distributing roller having frictional contact with both of the form rolls and rotating only by such contact.

6. The combination of a plate cylinder, a form roller geared therewith, a fountain roller, a ductor movable between the fountain roller and the first form roller, a variable ratchet drive for the fountain roll to control the amount of ink fed to the first form roll, a second form roller not gear driven and a longitudinally shiftable distributing roller having frictional contact with both of the form rolls, and means for rotating the plate cylinder in the direction to bring the plate into contact with the second form roll immediately after the plate contact with the first form roll.

7. An offset printing machine comprising a plate cylinder, transfer cylinder and a platen cylinder all geared together, a paper feed table in front of the line of contact between the transfer cylinder and platen cylinder, an inking roller geared with a plate cylinder, a non-geared inking roller behind the geared roller, an intermediate non-driven distributing roller connecting the geared roller with the non-geared roller, and means for supplying ink to one of the rollers in advance of the non-geared form roller, whereby when the machine is driven in the direction to feed paper the plate engages the non-geared inking roller immediately after it has engaged the geared inking roller.

8. In a printing machine, the combination of a plate cylinder and a plurality of form rolls adapted to coact therewith, the form roll which acts last on the plate in the printing rotation being friction-driven, and a preceding form roll being positively gear-driven.

9. A plate cylinder carrying a gear, an inking system comprising a plurality of form rolls and distributing roller means, the form roll which acts last on the plate in printing rotation being driven by friction only, and a preceding form roll having a rigidly carried gear meshing with the cylinder gear.

10. In a printing machine, the combination of a plate cylinder and an inking system having two

form rolls only, the first acting form roll being positively gear driven and the last acting form roll being friction driven.

11. In a printing machine, the combination of a cylinder adapted to carry a plate and having a gear, a form roll positively geared with the cylinder gear, and another form roll which is the last inking roll to act on the plate and which is friction-driven.

12. The combination of a drum carrying a gear and having means for holding a planographic plate, an inking system having only two form rolls and having a distributing roll engaging both form rolls, the form roll which acts first on the plate in the printing rotation of the drum having a rigidly carried gear meshing with the drum gear, and the distributing roll being frictionally-driven from the first form roll, and the second form roll being frictionally-driven from the distributing roll.

13. The combination of a plate cylinder, a form roller geared to the cylinder and non-shiftable along its axis of rotation, a bodily movable ductor adapted to deliver ink periodically to the form roller, a second form roller frictionally driven from the first form roller and the plate, and means for rotating the plate cylinder in such direction that the friction driven roller acts after the gear-driven roller and before the printing impression.

14. The combination of a plate cylinder, a transfer cylinder and a platen, of a gear rigid with the plate cylinder and a pair of inking rolls adapted to coact with the plate, one of said rolls rigidly carrying a gear meshing with the gear rigid with the plate cylinder, the other inking roller frictionally engaging the plate, a distributing roller coacting with the two rollers mentioned, and means for rotating the transfer cylinder and platen in the direction to feed paper between them, the simultaneous rotation of the plate cylinder being in such direction that its plate coacts first with the gear-driven inking roller and then with the friction-driven roller.

15. In a printing machine the combination of a plate cylinder and a plurality of form rolls mounted on fixed axes and extending substantially the length of the plate cylinder, one of said form rolls being positive gear-driven and the other friction-driven.

16. The combination of a plate cylinder carrying a gear, a form roller geared with the plate cylinder by a gear rigid with the form roller, and a second form roller mounted on a fixed axis and frictionally driven by means of the first form roller, said form rollers being carried by a common supporting means in fixed relation to each other.

17. The combination of a plate cylinder, a form roller geared to the cylinder and extending substantially clear across said cylinder, a bodily movable ductor adapted to periodically deliver ink to the form roller, and a second form roller frictionally driven from the first form roller and the plate.

18. The combination of a plate cylinder carrying a gear, a form roller rigidly carrying a gear meshing with a gear of the plate cylinder, a second form roller constantly in position to engage the form moving past it and not positively driven, and a distributing roller frictionally engaging the first and second form rollers.

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