

June 10, 1947.

W. R. ALLEN ET AL

2,421,824

PRINTING MACHINE

Original Filed June 29, 1942

4 Sheets-Sheet 1

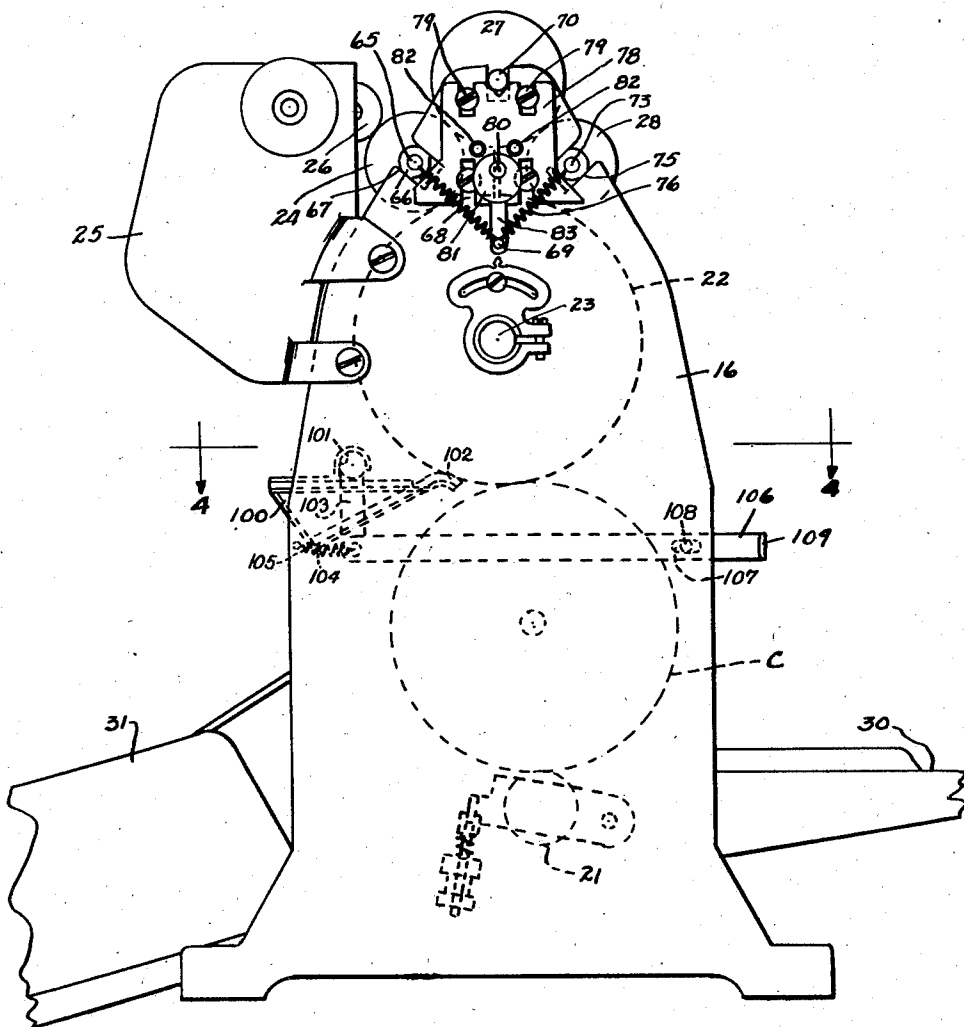


FIG. 1

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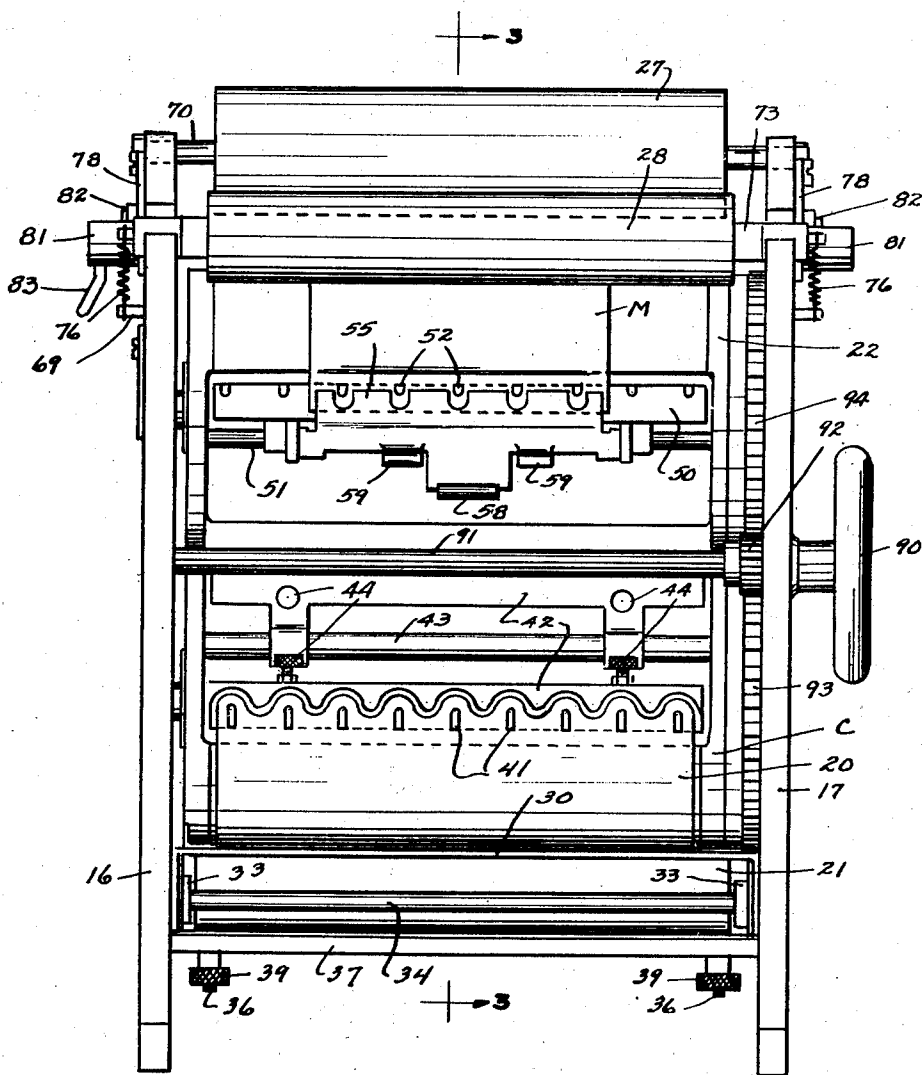


FIG. 2

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4 Sheets-Sheet 3

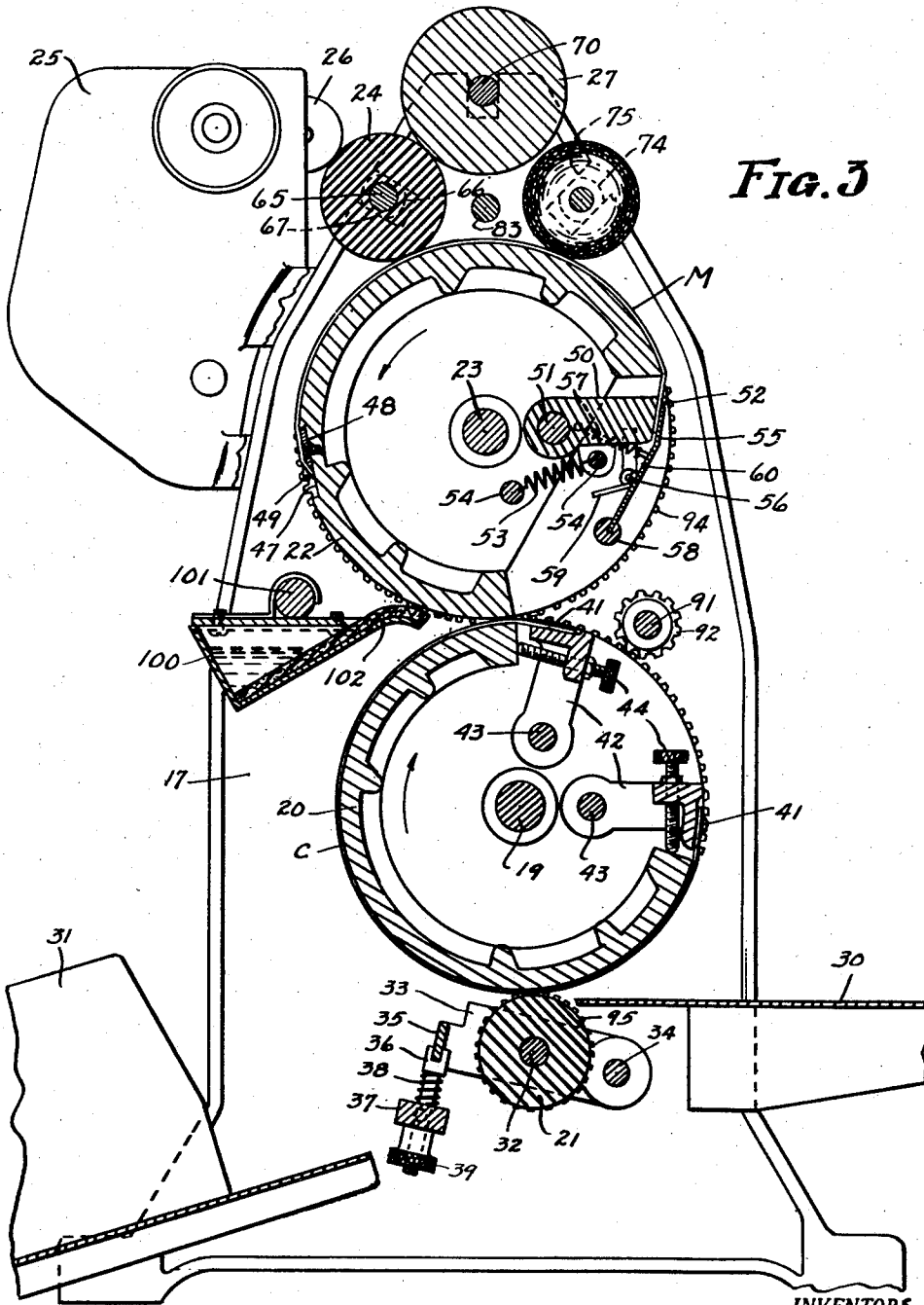


FIG. 3

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4 Sheets-Sheet 4

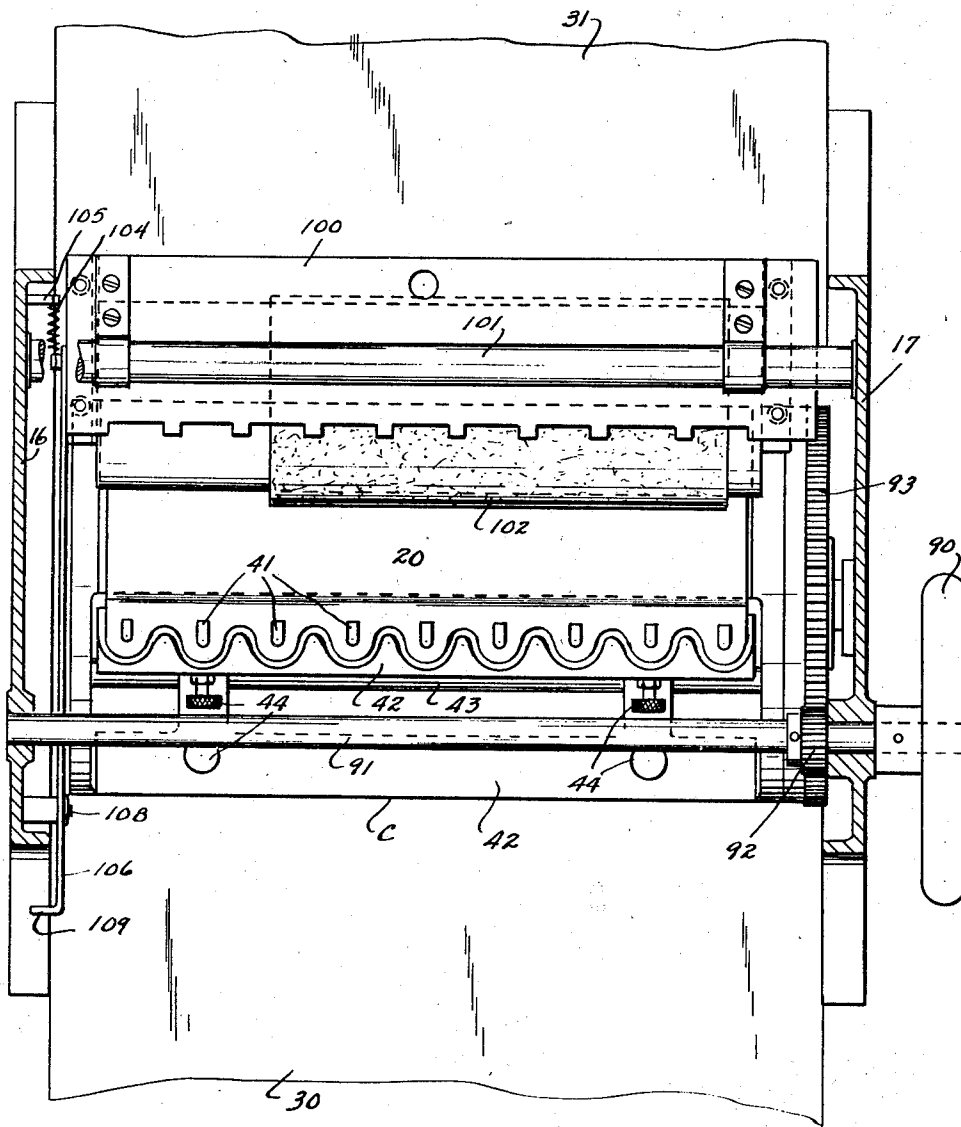


Fig. 4

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2,421,824

PRINTING MACHINE

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Original application June 29, 1942, Serial No. 448,912. Divided and this application March 10, 1944, Serial No. 525,818

3 Claims. (Cl. 101—132.5)

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This invention relates to means for reproducing matter on the planographic principle by the application of a greasy image to a carrying sheet, thereafter applying to the sheet repellent to prevent adherence of ink to the non-printing regions of the sheet, and applying ink effectively to the printing image and non-effectively to the non-printing region. This application is a division of application, Serial No. 448,912, filed June 29, 1942. The object of the invention is to provide an extremely simple system and mechanism for reproducing images by this principle in a manner adapted to be carried out by an operator without special skill in planographic reproduction. The apparatus for performing the method may accordingly be readily embodied in a machine suitable for use by usual office attendants.

Important objects of this invention are to enable a master to be treated in any manner which may be required by the nature thereof after it has been installed in the machine so as to thereby enable the master to perform its intended function in the machine; to utilize an arrangement which may be selectively rendered effective or ineffective for applying a required treatment to a master; to so arrange the apparatus that is effective to apply a treatment to a master that it may be rendered effective either when the master is initially installed in the machine or from time to time in the course of use of the master should this be found to be necessary; to so arrange an apparatus of this character that a quantity of the material required in the treatment of the master may be stored therein; to utilize a wick arrangement for withdrawing the material required in the treatment from a quantity thereof stored in the apparatus and for applying the material to the master; and to facilitate installation and operation of an apparatus of the aforesaid character.

To the above ends, we have provided an offset printing machine comprising a drum on which a sheet carrying a positive or non-reversed image, may be readily attached, a coating offset drum carrying a yielding blanket, and a platen roller coating with the offset drum, and have provided a peculiar system for applying the repellent and ink as necessary to the image sheet.

More particularly, we provide inking means to engage the sheet and deliver ink to the ink receptive image, and we provide two repellent applicators. One of these applicators comprises a receptacle to contain repellent and a wick immersed therein and extending into position adjacent the image carrying drum and adapted, when-

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ever desired, to be caused to engage the image sheet. The other repellent applicator comprises a roller having an absorbent surface serving the double purpose of removing excess repellent applied to the sheet by the first mentioned applicator and storing such repellent within the absorbent surface material of the roller available for application to the sheet on a subsequent rotation thereof. We provide simple means for pressing the wick against the image sheet whenever desirable but leaving such wick normally out of contact with the sheet.

In operating this system of reproduction, the image-carrying sheet is first clamped on the drum, then the rotation of the drum started, and then the repellent wick pressed against such sheet in the absence of ink while the storage roll removes excess repellent and thus has its absorbent surface gradually saturated with the repellent. After a few revolutions of the drum with the parts in this condition the wick is moved out of contact with the master sheet and the inking mechanism is thrown into action and successive copies may then be printed on paper passed between the offset cylinder and the platen, the sheet being automatically covered with repellent from the absorbent roller acting on regions of the sheet before they reach the inking roller. This operation continues until there is evidence that more repellent is needed, whereupon the operator presses the wick against the master sheet supplying an excess of repellent thereto, some of which is removed by the storage roller, which is thus replenished.

The drawings illustrate apparatus, of our invention, adapted for use in carrying out the method above outlined. Details of such apparatus will be apparent from the following description of the disclosure in the drawings.

In the drawings, Fig. 1 is a side elevation of a printing machine embodying our invention; Fig. 2 is a front elevation of the same; Fig. 3 is a vertical section on a larger scale in a plane indicated by the line 3—3 on Fig. 2; Fig. 4 is a horizontal section of the machine in a plane indicated by the line 4—4 in Fig. 1.

It is convenient to describe first the construction of the particular machine shown in the drawings, to form a background for the features with which the present invention is concerned.

The frame of the machine shown in the drawings includes two parallel vertically disposed side plates 16 and 17 between which various operative parts of the machine are disposed. Thus, a transfer cylinder C is mounted on a shaft 19 journaled in the side plates 16 and 17. A blanket 20 is re-

movably mounted on the periphery of the cylinder C and cooperates with a platen roller 21; Fig. 3, to produce offset impressions on sheets or the like which are passed into the bite of the cylinder C and platen roller 21. The image which it to be thus printed upon the sheets is transferred there-to by the blanket 20 from a lithographic master sheet M removably mounted on the periphery of a cylinder or drum 22 carried by a shaft 23 journaled in the side plates 16 and 17.

An inking roller 24 cooperates with the master sheet M to ink the image areas of the master sheet in the manner well understood in the art. Ink is supplied to the roller 24 by a conventional inking unit 25 which may include a ductor roller 26 periodically conveying ink from a fountain in the unit 25 to the inking roller 24. A distributing roller 27 is shown as cooperating with the inking roller 24 to distribute the ink evenly over the surface of the roller 24.

Our invention, as hereinafter described, provides means to prevent adherence of the ink to the non-printing regions of the master sheet. For the present, we call attention merely to the absorbent roller 28 of our repellent system which cooperates with the master sheet M on the drum 22 to supply repellent effective on the non-image areas but without effect on the image itself, which receives ink from the inking system and delivers it to the transfer roller. This absorbent roller 28 it will be noticed is out of contact with the inking distributing roller 27, though adjacent thereto.

The sheets which are to be printed are fed one at a time across a table 30, Figs. 1, 2 and 3, into the bite of the printing couple comprising the platen roller 21 and blanket cylinder C. As each sheet passes through the printing couple it receives an impression of the image from the blanket 20 and is then discharged to a receiving rack or collector 31.

The platen roller 21 is shown as mounted on a shaft 32 journaled in a rocker including arms 33 which are pivotally mounted on a rod 34 extending between the side plates 16 and 17. The arms 33 are interconnected by a cross bar 35 which is received in the slotted heads of screws 36 which extend downwardly through openings in a stationary cross bar 37 secured to the side plates 16 and 17. Coil springs 38 encircling the screws 36 intermediate the slotted heads of these screws and the cross bar 37 tend to urge the rocker carrying the platen roller 21 upwardly, but such action of the springs 38 is limited by nuts 39 which bear against the underside of the cross bar 37. The nuts 39 are adjusted to afford a predetermined clearance between the blanket 20 and the periphery of the platen roller 21. The adjustment is such that the platen roller will not pick up ink from the blanket when there is no sheet between the roller 21 and the blanket on the periphery of the cylinder 18.

The periphery of the blanket cylinder 18 is interrupted, as shown in Fig. 3, and the blanket 20 is stretched over the periphery of the cylinder between the edges along the recess affording the interruption. The ends of the blanket 20 may be scalloped, as shown in Figs. 2 and 4, and slots may be formed in these scalloped end portions to enable the blanket to be anchored to hooked projections 41 on rockers 42, Figs. 2 to 4, which are disposed in the recess in the cylinder 18. The rockers 42 are pivotally mounted on rods 43 extending axially of the cylinder 18 and fastened to the solid end portions of this

cylinder. Screws 44 are threaded into the rockers 42 and bear against the edges of the recess in the cylinder. By adjusting these screws, the blanket 20 may be drawn taut over the impression surface of the cylinder 18.

The drum 22 on which the master sheet M is removably retained is of the same diameter as the blanket cylinder 18 and likewise has an interrupted cylindrical impression surface. A recess 47 is formed in the cylinder 20 to receive means for anchoring one end of the master sheet M to the drum 22, as for instance a bar 48 secured to the drum 22 in any suitable manner. The other end of the master sheet M extends slightly beyond an end of the cylindrical shell of the drum 22 and is anchored to a rocker 50 disposed in the recess in the drum 22. The rocker 50 is pivotally mounted on a rod 51 extending axially between the end portions of the drum 22 and is provided with means to engage the master sheet M. Thus this rocker is shown as having hooked projections 52 which are received in holes in the end of the master sheet M. Springs 52 are extended between a rod 54 on the rocker 50 and a rod 55 secured in the drum 22, these springs serving to place the master sheet M under tension to maintain it taut and smooth on the drum 22.

A clamping plate 55 is shown in Figs. 2 and 3 as pivotally mounted as at 56 on the rocker 50 and as urged by a spring 57 against the outer end of the rocker 50 to clamp the end of the master sheet M firmly thereon. The free end of the clamping plate 55 is provided with a knob 58 to facilitate manipulation of the clamping plate when it is desired to insert or remove a master sheet. Tongues 59 struck out from the clamping plate 55 are disposed to engage the spring anchor rod 54 on the rocker 50 when the clamping plate 55 is pivoted against the action of the springs 57. This is done when it is desired to release the end of the master sheet M or insert a new master sheet, the tongues 59 bearing against the rod 54 and swinging the rocker 50 against the action of the springs 53 as the knob 58 is pushed inwardly. Stop pins 60 secured to the ends of the drum 22 limit the movement of the rocker 50 under the influence of the springs 53 when no master sheet is on the drum 22.

Hereinafter the end of the master sheet M anchored to the fixed bar 48 will be referred to as the leading end thereof, and the end which is anchored to the spring-urged rocker 50 will be designated the trailing end of the sheet.

The inking roller 24 is mounted on a shaft 65 journaled in bearing blocks 66, Figs. 1 and 3, which are arranged to slide in slots 67 in the side plates 16 and 17. Tension springs 68 are extended between the ends of the shaft 65 and pegs 69, Figs. 1 and 2, fastened to the outer faces of the side plates 16 and 17.

There are also tension springs 76 between the same anchorage points 69 and the absorbent wiping roller 28 of the repellent system. The roller 28 is mounted on a shaft 73 journaled in bearing blocks 74 arranged in slots 75 in the side plates 16 and 17 and the springs 76 extend between the bearing blocks and the pegs 69.

The springs 68 and 76 tend to urge the inking roller 24 and wiping roller 28 radially toward the drum 22 and the master sheet M carried thereby. The bearing blocks 66 and 74 in which the shafts 65 and 73 of the rollers 24 and 28 are journaled are adapted to cooperate with sloping shoulders

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on cam plates 78, Figs. 1 and 2, which are slidably mounted on the outer faces of the side plates 16 and 17. The ink distributing roller 27 is mounted on a shaft 70, Figs. 1, 2 and 3, journaled in the cam plates 78. Screws 79 passed through vertical slots in the cam plates 78 are threaded into the side plates 16 and 17 to guide the cam plates 78 for vertical movement. A shaft 80, Figs. 1 and 3, passing through the side plates 16 and 17 and openings in the cam plates 78, carries eccentrics 81 which cooperate with rollers 82 mounted on the cam plates 78.

The shaft 80 is provided with a handle 83, Figs. 1 and 2, by means of which the shaft 80 may be turned to bring the high portions of the eccentrics 81 into cooperation with the rollers 82, thereby elevating the cam plates 78. As the cam plates 78 are thus raised, the sloping shoulders thereon cam the bearing blocks 66 and 74 radially outwardly in the slots 67 and 75 to lift the inking roller 24 and the wiping roller 28 out of contact with the master sheet M on the drum 22, the ink spreading roller 27 being likewise elevated by the cam plates 78.

The separation described is effected whenever it is desired to insert or remove a master sheet, as will be explained in greater detail presently. In order to return the inking roller 24, spreading roller 27 and wiping roller 28 into cooperative relation with the master sheet M on the drum 22, the handle 83 is turned until the lower portions of the eccentrics 81 cooperate with the rollers 82 on the cam plates 78 whereby the cam plates 78 are lowered to enable the springs 68 and 76 to restore the rollers 24, 27 and 28 into the positions shown in Fig. 3.

The shoulders of the cam plates 78 are supported by adjustable stop screws in the bearing blocks 66 and 74 to prevent the inking roller 24 and wiping roller 28 from dropping onto the relieved portion of the drum 22 or into the recess of this drum but the arrangement is such as to enable the rollers 24 and 28 to contact the master sheet M.

In placing a new master sheet on the drum 22, the leading edge of the sheet M is first attached to the anchor bar 48 on the drum 42, Fig. 3, and the trailing end of the master sheet is thereafter attached to the spring-urged rocker 50. The leading end is best attached when the drum 22 is in a position in which the operator may with the greatest convenience have access to the bar 48, (the drum 22 being then approximately one hundred eighty degrees away from the position shown in Fig. 3) and then the drum is so disposed that the trailing end of the master sheet may be fastened to the rocker 50, which is the position of the drum shown in Fig. 3.

The drum may be readily given any position desired for installing the master sheet by the rotation of a suitable hand wheel 90 which is geared with the drum. As shown, the hand wheel is on a shaft 91 which carries a pinion 92 meshing with the gear 93 on the offset drum C, which meshes with the mating gear 94 on the master drum 22, as well as with a gear 95 on the platen 21.

Whenever the master sheet is to be applied and the drum positioned accordingly, it is desirable to manipulate first the handle 83 to lift the inking roller 24, the distributing or spreading roller 27 and the wiping roller 28 away from the periphery of the drum 22, inasmuch as such parts of the apparatus are to be rendered ineffective when a master sheet is to be initially attached to the drum 22.

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The master M being of lithographic character is first treated to render the non-image bearing portions thereof ink repellent. After this has been done the handle 83 is again manipulated so as to render the inking roll 24, the distributing roller 27 and the wiping roller 28 effective.

For short runs, that is the for the production of a comparatively small number of copies, a single preliminary application of repellent to the master sheet may be sufficient. When more copies are needed, repellent may be newly supplied from time to time and in any case it is very desirable to have the means at hand to supply fresh repellent wherever needed without disturbing the operation of the machine. This is accomplished by our invention, and the mechanism we prefer to employ for that purpose will now be described.

In order that a master sheet as M may be so moistened or otherwise treated after it has been installed on the drum 22, we have provided a moistening device 100, Figs. 1, 3 and 4, for applying a conditioning fluid to the master sheet M when it is mounted on the drum 22 and this drum is set in rotation. The moistening device 100 is located to the left, as viewed in Figs. 1 and 3, of the bite between the drums or cylinders 22 and C and desirably adjacent the horizontal plane of this bite.

In the present instance, the moistening device includes a trough-like member which is pivotally suspended from a rod 101 extending between the side plates 16 and 17 and this member affords a well in which the conditioning fluid may be stored. A wick 102 extends from the well in the trough-like member toward the periphery of drum 22 to be engageable therewith. The wick is normally out of contact with the master sheet (as about to be explained) though it is shown in the drawings in its applied position. However, since the wick 102 is to be intermittently engaged with the master sheet, an arm 103 is secured to and depends from the moistening device 100 and this arm is connected by a spring 104 to a pin 105 fastened to the side plate 16, this spring tending to retract the moistening device 100 so that the wick 102 normally does not engage the drum 22 or the master sheet M thereon.

Retraction of the moistening device 100 by the spring 104 is limited by a limit to the movement of a manually operable link 106. The link 106, Figs. 1 and 5, is pivotally connected at one end to the arm 103 and has a slot 107 therein through which the pin 108 attached to the side plate 16 projects. A finger piece 109 is formed on the free end of this link to be disposed at the side of the machine from which the table 30 projects, so that the operator may conveniently grasp the link and thereby rock the trough-like member about the rod 101 to bring the wick 102 into engagement with the master sheet M on the drum 22 whenever this is desired.

It is to be understood that power under the control of the operator may be applied to any of the gears 93, 94 and 95, heretofore mentioned, to drive the different cylinders of the machine in coating relationship for printing. Either as a preliminary to such printing operation, or from time to time during operation, the operator may manipulate the link 106 to cause the wick to engage the master. In the case of a preliminary operation the master may be rotated by power or by the hand wheel, as desired. In either case the repellent material is applied by the operator by merely pulling on the link 106 and as the master sheet passes the wick 102 the conditioning fluid

is applied thereto for the purpose explained. Liquid continues to be applied as long as the operator maintains the tension on the link 106. Whenever the pull thereon is relieved the spring 104 restores the repellent applicator to idle position.

Once the master sheet M has been properly conditioned in this manner, the link 106 is released and the spring 104 then disengages the wick from the master sheet and thereafter the inking roller 24, the spreading roller 27 and the wiping roller 28 may be lowered into their effective positions, shown in Fig. 3, by turning the handle 83, Figs. 1 and 2, and the machine may be continued in operation.

The wiping roller 28 serves to absorb any excessive conditioning fluid from the surface of the master sheet M prior to movement of the master sheet into cooperation with the inking roller 24. Then, as the master sheet M moves past the inking roller 24 it picks up ink on image areas thereof and then moves into cooperation with the blanket 20 on the cylinder 18, leaving an inked impression of the image on this blanket.

The platen roller 21 is spaced from the blanket 20 sufficiently so that no offset impressions will be made on the platen roller in the absence of a sheet intermediate the cylinder 18 and roller 21. The sheets to be printed are fed by hand over the feed table 30 into the bite between the blanket cylinder 18 and the platen cylinder 21, although, of course, it will be understood that an automatic feeding means may be employed.

Frequently, in the type of work for which the present invention is adapted to be used, only a small number of sheets are printed from each master sheet M, and in such case merely one application of the moistening fluid to each master sheet may be sufficient. In the event, however, a relatively large number of sheets are to receive an impression from a particular master, it will be desirable to apply the conditioning fluid to the master sheet from time to time in the course of such printing operations. This may be conveniently done by actuating the moistening device 100, in the manner above explained, and when and as required.

It will be appreciated that the inclusion of a manually applicable moistening device as 100 in a machine of this character is quite advantageous; it obviates the troublesome operation of swabbing the sheet by hand, and materially expedites applying treatment to master sheets either when initially installed or from time to time in the course of use thereof.

The wiping roller 28 is absorbent in character and the master sheet is passed into engagement therewith prior to the time it passes to the ink applying means and thus the wiping roller 28 may be and is effective to remove any excess conditioning fluid that may be applied to the master upon manipulation of the moistening device 100 in the manner hereinabove explained. If in the course of use of the machine the wiping roller 28 should receive too much liquid, it may be readily removed from the machine and run over a sheet of absorbent material such as blotting paper or the like whereupon the moisture content therein will be reduced so as to thereby insure the wiping roller 28 will be properly conditioned to perform its intended function.

While we have shown and described a preferred embodiment of our invention, it is to be understood that the features described are capable of variation and modification, and we therefore do not wish to be limited to the precise details set forth but desire to avail ourselves of such changes and alterations as fall within the purview of the following claims.

We claim:

1. An apparatus for printing on the planographic principle comprising the rotary drum, means for holding thereon a master sheet having an ink receptive image, two spacially arranged means for applying repellent to the master sheet, one of said means being constantly in engaging position, the other having a receptacle for liquid and a capillary carrier supplied thereby and normally out of engaging position, means operable at will for moving said carrier into and out of engaging position independent of the constantly acting applicator, and an inking roller adapted to engage the master sheet.

2. A rotary drum adapted to carry a master sheet, means for supplying ink and repellent to the master sheet automatically consequent upon the rotation of the drum, an ink repellent receptacle independent of and additional to the first mentioned repellent supplying means, a wiper adapted to lie in liquid in said receptacle and extend out of the liquid, and a pivotally mounted support for the wiper adapted to be swung to carry the external portion of the wiper at will into and out of engagement with the master sheet.

3. An apparatus for planographic printing comprising a rotary drum, means for holding thereon a master sheet having an ink receptive image, an ink applicator for applying ink to the image, impression means to transfer the inked image to an article to be imprinted, means accessible to the operator, from which articles to be imprinted are fed to the apparatus, a pair of spacially arranged repellent applicator means for applying an ink repellent to the master sheet, one of said repellent applicator means being in constant engagement with the master sheet, the other of said repellent applicator means being normally out of engagement with the master sheet, and means accessible to the operator adjacent the feeding position to enable the operator to move the last-named applicator means into and out of engaging position at will to thereby facilitate the periodic supplementing of the amount of repellent applied to the master sheet.

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