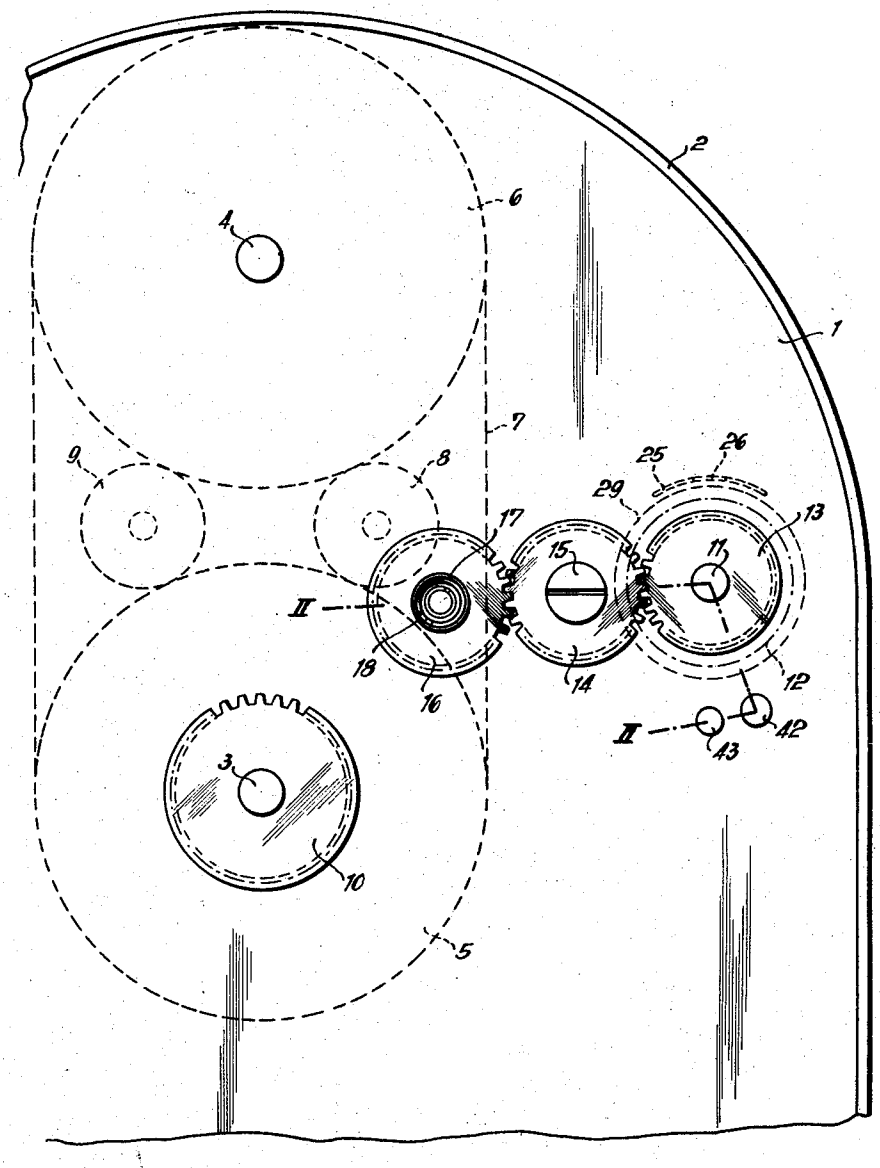
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INK SUPPLY DEVICES FOR MANIFOLD PRINTERS

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FIG. 1



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INK SUPPLY DEVICES FOR MANIFOLD PRINTERS

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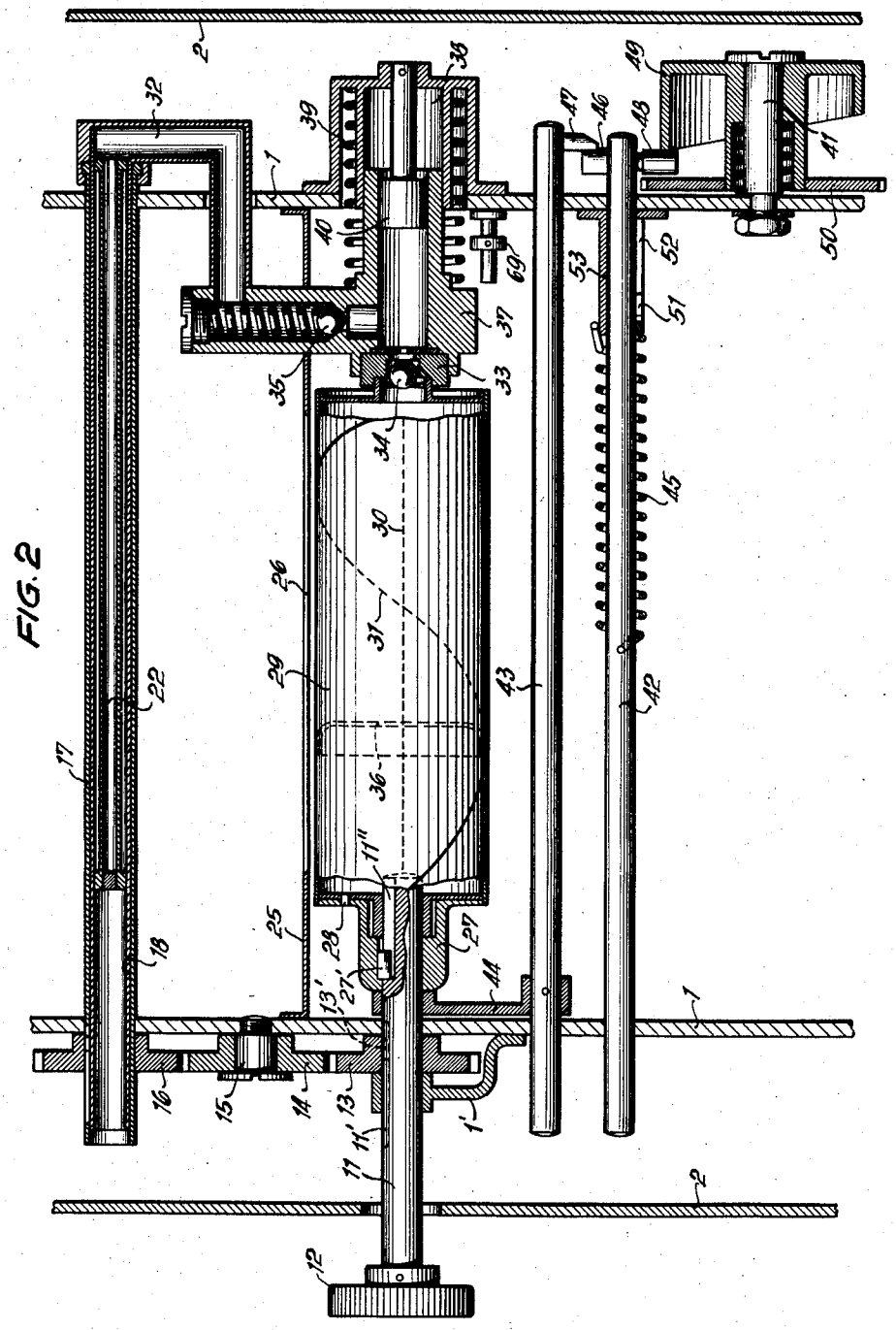


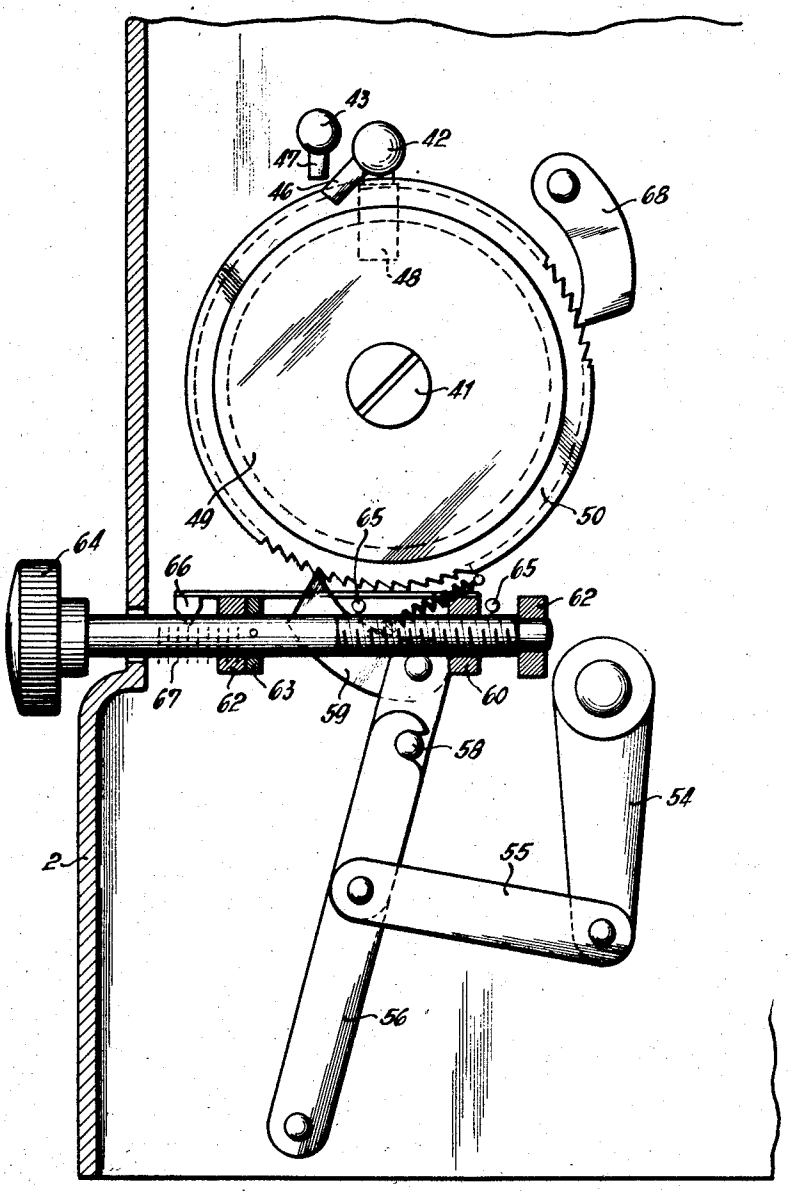
FIG. 2

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FIG. 3



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FIG. 4

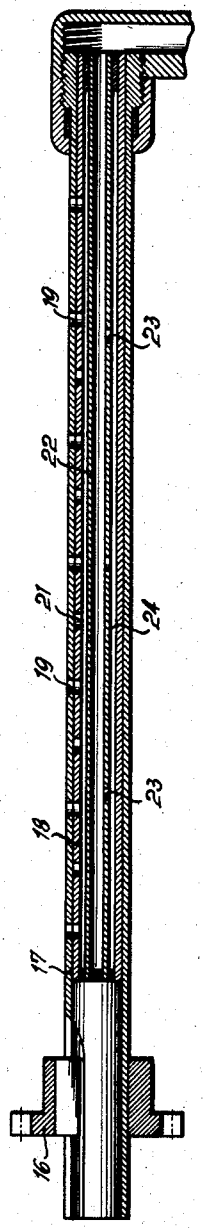


FIG. 5

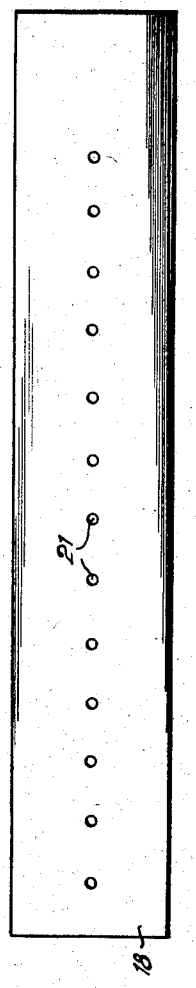
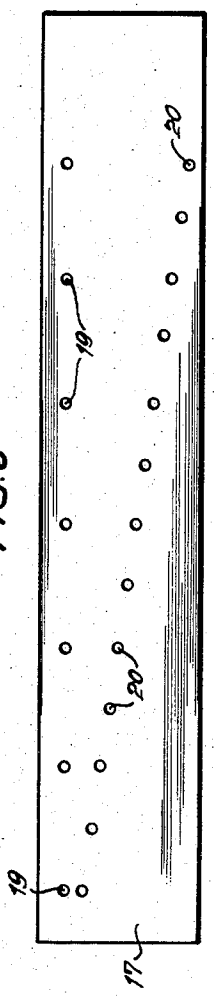


FIG. 6



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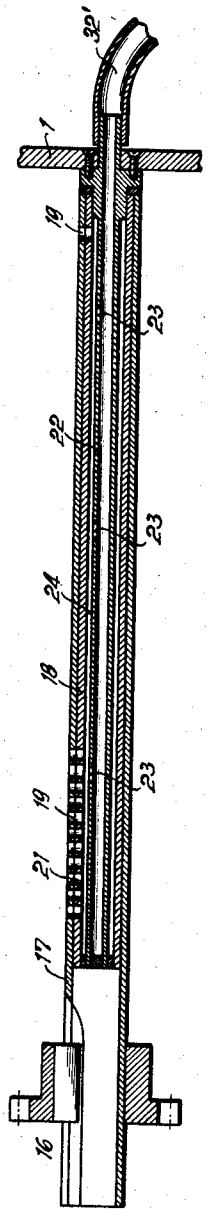


FIG. 7

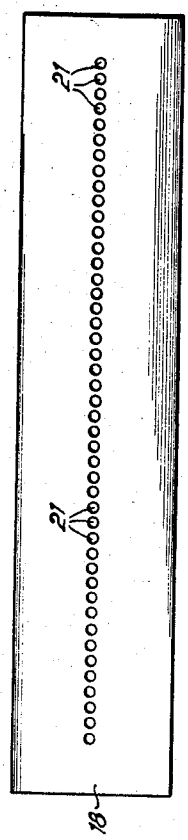


FIG. 8

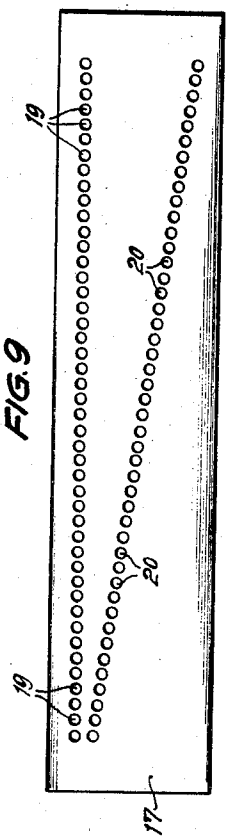


FIG. 9

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2,893,318

INK SUPPLY DEVICES FOR MANIFOLD PRINTERS

Rudolf Kreher, Hannover, Niedersachsen, Germany

Application December 7, 1953, Serial No. 396,632

Claims priority, application Germany December 8, 1952

21 Claims. (Cl. 101—366)

The invention relates to ink supply devices for manifold printers and more particularly to such devices having pump means for pumping the ink from a supply drum or container to an applicator for applying the ink to a stencil or the like.

Ink supply devices are known with ink tubes having several rows of longitudinally arranged rows of ink discharge apertures which can be controlled by turning one or both tubes of the ink supplier, so that the ink is either spread about the total area or about selected regions. The ink supply may be effected by hand or by mechanical drive means. The known ink supply devices allow no correcting ink application in that the ink may be supplied to any desired part in any desired width in fine and exactly defined quantities as is necessary to obtain proper prints with regard to the arrangement of the text or the script on the stencil. In known ink supply devices it is also necessary to make special arrangements to free the apertures through which the ink passes when these apertures are closed by small ink particles or in any other manner. These arrangements are of complicated construction and are not very satisfactory in operation.

The principal object of the invention is to overcome the disadvantages of the known ink supply devices and provide an ink supply device which is simple to operate for a line-like or substantially line-like ink supply in manifold printers and which permits the application of the ink not only to the total width and over selected zones to the ink receiving area but also allows the correction of the ink supply at any desired spot, and in any desired width.

Another object of the invention is to provide an ink supply device which selectively may be, manually and mechanically operated.

A further object of the invention is to provide an ink supply device with an ink applicator which may be readily and accurately controlled both as to the amount of ink applied and the location of the application thereof to the stencil.

Yet another object of the invention is to provide an ink supply device with an ink applicator which may be readily and accurately controlled both as to the amount of ink applied and the location of the application thereof to the stencil, and means for visually indicating the exact location of the application of the ink to the stencil.

Still another and more specific object of the invention is to provide an ink supply device with an ink applicator that is reciprocal transversely of the stencil to apply the ink in line form.

A still further object of the invention is to provide an ink supply device having simplicity of design, economy of construction and efficiency in design.

Briefly, the foregoing objects and others ancillary thereto, in accordance with a preferred embodiment of the invention, comprises an ink applicator having discharge openings that may be selectively opened to apply ink to a stencil completely across or at any selected location transversely of the stencil, pump means having a selectively adjustable output for supplying ink to the applicator, and an ink supply container connected with the pump means. Preferably, the supply container is in the form of a drum that is so coupled with the applicator and so marked that it also functions as an indicator to show the transverse location that ink is to be discharged and, conveniently, this drum is reciprocal to drive the pump means and capable of being reciprocated either manually or automatically from the printer in which the apparatus is assembled. In the preferred embodiment, the applicator is also reciprocal to apply the ink in a line transversely of the stencil, the stroke of the applicator being substantially equal to the spacing between discharge openings, and is so connected with the pump means as to be reciprocated thereby.

The novel features that are considered characteristic of the invention are set forth with particularity in the appended claims. The invention itself, however, both as to its organization and its method of operation, together with additional objects and advantages thereof, will best be understood from the following description of specific embodiments when read in connection with the accompanying drawings, wherein like reference characters indicate like parts throughout the several figures and in which:

Fig. 1 shows a cross section through a two-drum manifold printer viewed from the operation side of the machine, equipped with a device according to the invention,

Fig. 2 is a longitudinal section on the line II—II of Fig. 1,

Fig. 3 shows a side elevation of the gears and the arrangement to control the periods in which ink is supplied on enlarged scale,

Fig. 4 shows the ink applicator alone in longitudinal section,

Figs. 5 and 6 show the surface of the inner respectively outer tube of the ink applicator,

Figs. 7 to 9 show another form with an ink applicator fixedly arranged in a manner corresponding to that of Figs. 4 to 6.

The new device comprises mainly the applicator, the pump, the control, the device for manual operation, the driving equipment, the arrangement to selectively set the ink application period, and an indicating drum preferably constituting the ink vessel.

In the example of Fig. 1 a two-drum machine is shown which has side walls 1 and is surrounded by a cover 2. In the side walls 1 the axles 3, 4 of the two drums 5, 6 are mounted above each other and around which the endless ink cloth 7 is trained. The distribution of the ink is achieved in known manner by means of two ink rolls 8, 9 located between said two drums. The drive of the drums 5 and 6 is effected by means of a driven gear wheel 10 located on the lower drum axle 3. The lower drum 5 transfers the ink to the ink cloth supporting the stencil (not shown).

On the side from which the machine is operated a handle 12, Fig. 2, is arranged on the outer side of the cover 2 on a projecting axle 11. A driving gear wheel 13 is fixed to the axle 11 and meshes with a gear 14 on a stub shaft 15, which in turn meshes with a gear 16 which is keyed to an outer tube 17 of the ink applicator. By turning the handle 12 it is possible to rotate the outer tube 17 with respect to an inner tube 18 telescoped therein.

Both tubes 17 and 18 have, as shown in Fig. 4 and especially in Figs. 5 and 6, rows of holes 19, 20, 21 so that the outer tube 17 has a row 19 extending parallel to the axis of the tube and also a row 20 extending in a spiral line about the surface of the tube and which does not intersect with the row 19. The holes of the row 20 are arranged closer together than the holes of the

linear row 19 and are spaced, as shown, in such a way that a hole of the row 20 is located between two evenly spaced holes of the row 19. In the inner tube 18 the holes 21 are also equally spaced so that by turning the outer tube 17, either all holes of the row 19 or only one hole of the spiral linear row 20 may be registered with the corresponding holes 21 of the inner tube 18. The holes in the spiral linear row 20 of the outer tube 17 are staggered and have such a diameter that in cooperating with other holes of corresponding size of the linear row 21 in the inner tube 18, the ink applicator is never completely closed at any rotational adjustment of the two tubes 17, 18; either one hole of each of the tubes register with each other completely or two successive holes of both tubes cover each other partly.

The tubes 17, 18 are supplied with ink through a supply tube 22, Figs. 2 and 4, having apertures 23 spaced to obtain a uniform distribution of the ink within the total length of the tube. The tubes 17 and 18 are in telescopic engagement but the supply tube 22 is smaller than the interior of the inner tube 18 providing an annular reservoir 24 therebetween.

The parts arranged on the axle 11 or associated therewith and which will be described below, are covered by a metal cover 25 having a slot 26 through which the particular setting of the two tubes 17, 18 may be observed by a mark on the indicating drum and the registration of the holes in the tubes 17, 18 and location of the ink discharge may also be determined. The foregoing control arrangement enables the observation and the selective setting or adjustment of the applicator for applying ink across the full width or only a predetermined limited region of the stencil.

As best shown in Fig. 2, a flanged sleeve 27 is secured by a key 27' to the axle 11 and the flange of the sleeve forms a coupling disc releasably keyed by a pin 28 to the end of an indicating drum 29 rotatively supported by the axle 11, said drum preferably forming an ink supply container or vessel. The gear 13 is also secured to the axle 11 by a key 13'. The keys 13' and 27' are slidably fitted in axially extending keyways 11' and 11'', respectively, to enable reciprocal axial movement of the axle 11 and drum 29 relative to the side walls 1, the gear 13 being retained in meshing alignment with the gear 14 by a journal bracket 1' fixed on the adjacent side wall 1, the keyway 11'' also enabling reciprocal axial movement of the drum 29 relative to the axle 11.

The coupling disc 27 and pin 28 are removable from the end of the drum 29 to permit removal of the drum 29 for refilling it with ink. The keyway 11'' opens through the end of the axle 11 to permit mounting of the disc 27 and the opposite end of the keyway 11'' is located to engage and move key 27' and drum 29 to the right, as viewed in Fig. 2. The keyway 11' and key 13' prevent accidental removal of the axle 11 from the adjacent side wall 1 and housing 2.

The drum 29 is provided with an axially extending line mark 30 and a spiral line mark 31 corresponding to the arrangement of the lines of holes 19 and 20 in the tube 17. The line mark 30 is visible through the slot 26 when inking the full width of the stencil and the line mark 31 is visible and indicates the relative location of a limited range of ink application. Thus, by turning the handle knob 12, the axle 11 and drum 29 is rotated and the line marks 30, 31 may be observed through the slot 26 in the cover 25, and by reciprocating the knob 12, the shaft 11 and drum 29 may be reciprocated for purposes hereinafter described.

In the preferred embodiment, shown in Fig. 2, the ink applicator, constituted by the tubes 17, 18 and 22, is reciprocal longitudinally jointly with the ink container indicating drum 29 by means of a rigid supply tube 32 connected at one end to the outer tube 17 and in communication with the tube 22, the other end of said tube 32 being connected and in communication with a reciprocal pump housing 37. The end of the drum 29, opposite the axle 11, has a cylindrical bearing 33 that is removably journaled in the end of the pump housing 37. The bearing 33 has an axial discharge opening controlled by a valve 34, and the connecting tube 32 is provided with a return valve 35. The ink vessel 29 also serves as shipment vessel so that the ink need not be transferred, but the vessel may be placed into the machine in a simple manner and is easily detachable. Within the vessel 29 is located a piston 36 which follows the ink as it is consumed and therefore assures a full consumption of the ink supply contained in the vessel.

The pump housing 37 is mounted in a bush 38 fixed to the adjacent side wall 1 and is biased toward the drum 29 by a spring 39. Within the pump housing 37 a rigidly arranged piston 40 is located.

The distance between the inner free end of the axle 11 and the bearing 33 is such that the ink vessel 29 may be installed by inserting the bearing 33 in the pump housing 37 and the ink vessel and pump housing can be displaced to the right, as seen in Fig. 2, against the action of the spring 39 so that the inner end of the axle 11 may be mated with an axial opening in the adjacent end of the vessel 29. When the vessel is moved by hand and under assistance of the expanding spring 39 to the left, the ink supply pump at once starts to operate but admission of air into the pump housing is prevented which air would interfere with uniform ink flow during subsequent operation of the pump. When the operation handle 12 is pushed inwards the pump starts to operate and in effect forces ink through the open holes of the applicator tubes 17, 18. If all holes of the row of holes 19 are open, the ink is applied in the form of a line across the total width since the little lines starting at the single ink dots merge and form a continuous straight line. If only a single hole of the row 20 is set, only a small region of the ink cloth 7 is covered with ink. When the operation handle is released, the spring 39 compressed by the inward movement returns the ink application device into its initial position or assists this return movement when the handle is pulled back by hand. In the return stroke, the valve 34 opens and a certain amount of ink flows out of the vessel 29 into the pump housing 37. The distance over which the ink vessel and the pump housing 37 may be displaced is limited by means of an adjustable stop 69 which engages the pump housing. The distance corresponds to the distance between the holes of the linear row of holes 19 of the outer applicator tube 17 or is only a little longer than this distance. The stop 69 may be selectively adjusted to vary and control the amount of ink forced through the applicator openings according to the momentary requirements.

By turning and displacing in the axial direction of the handle 12 the adjustment of holes through which ink emerges, the pumping to supply the ink and the longitudinal displacement of the applicator may take place simultaneously and continuously. This allows the inking of the ink cloth at any desired place and in any desired width.

An arrangement suitable for automatic operation of the device, which also allows operation by hand, is shown in Fig. 2. Beneath the handle axle 11 a control rod 42 is displaceably mounted in the side walls 1 of the machine and rotatable through a relatively small angle. A rod 43, lateral of and parallel to the control rod 42, carries an arm 44 engaging the coupling disk 27 and is longitudinally displaceable but not rotatable. The control rod 42 is biased to the right, as viewed in Fig. 2, by means of a coil spring 45 which is tensioned both torsionally and axially. The control rod 42 has a dog pin 46 which temporarily engages a follower 47 on the rod 43 and which in the rest position of the control rod, however, is out of engagement with the follower 47. The rod 42 also has a pin or roller member 48 located at an acute angle to the dog pin 46. The member 48 engages a

cam formed by the rim of a cylindrical disk **49** which is supported on a bolt **41** on the side wall **1** and is secured to and driven by a ratchet wheel **50**.

While the pin **48** is moved by the cam rim to the most forwardly projecting part of the disk **49**, the control rod **42** is displaced to the left against the pressure of the coil spring **45**. When the highest point on the cam is reached the pin **46** is swung under the follower **47** because the control rod **42** is turned somewhat by action of the torsion force of the spring owing to the cessation of the lateral push movement of the cam of the disk **49**. The control rod **42** and the rod **43** are then coupled together for mutual lateral displacement to the right. The pin **48** follows on further rotation of the disk **49** the part of the cam which continuously descends. The spring **45** relaxes thereby and effects through the rod **43** a longitudinal displacement of the applicator **29** and the ink supply tubes **17, 18, 22**, compressing the pump spring **39**, but the handle axle **11** and the handle **12** remain in their initial position. The contraction of the spring **45** also effects a torsional reaction which rotates the rod **43** and swings the pin **46** from behind the follower **47**. Upon release of the follower **47**, the force of the compressed spring **39** returns the pump housing **37**, the ink vessel **29** and also the rod **43** to the initial position. The above described play is repeated after each rotation of the cam disc **49** by the ratchet wheel **50**.

To limit the turning movement of the rod **42** when shifting and sliding away from the cam disc **49** the control rod **42** has a roller **51** which moves in a slot **52** of the bush **53** which serves as bearing and guide for the control rod and secures the one end of the spring **45**. The bush **53** is mounted to the side wall **1**. The width of the longitudinal extending slot **52** is greater than the diameter of the roller **51** so that the control rod **42** is permitted to perform the necessary rotation for engagement and disengagement of the dog pin **46** and the follower **47**.

The drive of the ratchet wheel **50** may be derived from a rotating part of the machine in any suitable manner. An arrangement suitable for this purpose is shown in Fig. 3. As a driving member, an oscillating lever **54** is employed which performs at any rotation of the printing drum **5** an oscillation and effects the movement of the ratchet wheel **50** through a link **55**, levers **56** and **57** coupled by a bolt **58**, and a pawl **59**. The ratchet wheel is in known manner blocked by a pawl **68** against rotation in opposite direction. By turning the ratchet wheel the ink supply and the longitudinal displacement of the ink applicator takes place in the above described manner. The periods in which ink is supplied depends on the revolutions of the ratchet wheel.

To selectively alter the periods in which ink is supplied, an adjustable stop **60** for the pawl **59** is selectively positioned within certain limits. The stop **60** is in the form of a nut and is displaceable longitudinally of a spindle **61** but is prevented from rotation. The spindle is supported in the bearings **62** and is secured against longitudinal displacement by a ring **63**. The spindle projects through the cover **2** of the machine and is provided with a button **64** which permits an easy turning of the spindle. The travelling distance of the nut **60** is limited in both directions by stop pins **65**. The momentary adjustment of the nut is discernible by a pointer **66** cooperating with a scale **67**. A respective adjustment of the nut determines exactly the number of rotations of the printing drum **5** that are required to operate the ink supply device so as to satisfy the particular printing requirements. It is to be understood that the same result may be achieved also in another way, e.g. by changing the transmission rate in the lever system **54** to **57** or with the aid of other equipment as is well known for changing the drive of ratchet wheel and pawl arrangements.

In the construction of the ink application device according to the invention shown in Figs. 7 to 9 substantially the same machine parts are used as in the above described construction. Corresponding parts therefore have the same references in Figs. 7 to 9 as in Figs. 4 to 6.

In contrast to the first example the ink applicator in the second example is not displaceable in the longitudinal direction but is mounted rigidly between the side walls **1** whereby the outer tube **17** which closely surrounds the inner tube **18** is turnably mounted in the same manner as in the first example.

Both tubes **17** and **18** have, as can be seen in Figs. 8 and 9, on the flattened surfaces of the tubes rows of holes **19, 20, 21**, and of course the outer tube **17** has a linear row of holes **19** extending parallel to the axis of the tube. The holes are closely spaced and in addition a spiral line-like row of holes **20** extends around the surface of the tube but does not intersect the row **19**. The spacing of the holes of the row **20** corresponds to the spacing of the holes of the row **19**. The distances between the holes of the rows **19, 20** such that the ink is applied in a row of closely side by side lying dots which merge with each other to form a line, which then is applied to the ink cloth.

In the inner tube **18** the holes **21** have the same distance between each other as the holes of the rows **19, 20** of the outer colour supply tube **17**. By a turning displacement of the outer tube **17** with respect to the inner tube **18** either all holes of the linear row **19** may be registered with the holes **21** of the inner tube. In this case an inking of the whole width of the ink cloth or stencil is achieved. By turning the outer tube, it is on the other hand possible to cover the holes of the row **20** with corresponding holes of the row **21** of the inner tube, one after the other, so that in this case ink is discharged only at a precisely determined part of the ink applicator.

Obviously, the outer tube **17** may be mounted non-rotatably and may have the linear row of holes **21**, whereas the inner tube **18** is turnable and has in addition to the linear row of holes **19** a row of holes arranged in spiral line-like manner. The gear wheel **16** should then be fixed to the inner tube **18**.

It is to be understood that in the second example further linear rows of holes can be provided in the tubes **17** and/or **18** for selectively inking limited regions, and instead of rows of holes, rows of slots may be used.

In this second example or modification, the connection of the supply tube **22** with the pump housing **37** may be made by a flexible tube **32'**, the one end of which is attached to a projection of the supply tube **22** extending through the side wall **1** whereas the other end is forced over a nipple on the pump housing **37**

The operation and effect of the fixed ink applicator of this second modification should be obvious in view of the prior description of the first or reciprocal applicator, the principal difference residing in the close spacing of the ink discharge holes to enable the ink dots to run together to form a line rather than linearly spreading the ink by reciprocation.

I claim:

1. In an inking device for rotary stencil printers, an ink supply vessel, a reciprocally mounted ink applicator having ink discharge holes for applying ink to a stencil in the printer, reciprocally operated pump means for feeding ink under pressure from said supply vessel to said applicator, and drive means for simultaneously reciprocating said pump means and said applicator to transfer ink from said vessel to said applicator and to spread the ink linearly on a stencil as it is discharged from said applicator.

2. In an inking device according to claim 1 wherein said drive means comprises means driven by the drive mechanism of the stencil printer to reciprocate said pump means and said applicator in timed relation to the operation of the stencil printer.

3. In an inking device according to claim 2 wherein said drive means comprises a driven pawl and ratchet assembly whereby the reciprocation of said pump means and applicator is effected at predetrmined timed intervals relative to the operation of the printer.

4. In an inking device according to claim 3 further

comprising means for selectively adjusting the stroke of the pawl to regulate the rotation of said ratchet.

5. In an inking device according to claim 2 wherein clutch means are operatively associated with the drive means for permitting manual operation of the pump means and ink applicator.

6. The device of claim 1 wherein means are provided on said applicator for varying the location, arrangement, and number of said discharge holes so that the regions of ink application may be controlled.

7. The device of claim 6 wherein said varying means includes a handle carried by said pump means, a clutch in said drive means, said pump means being operatively connected to said applicator, said varying means handle also defining a manual pump actuating handle so that when said clutch is disengaged said handle may be manually actuated to reciprocate said applicator and said pump means and at the same time control said applicator.

8. In an inking device according to claim 1 wherein the discharge holes in said applicator are arranged in a linear row, and the greatest displacement in the longitudinal direction of the applicator corresponds approximately to the distance between the holes of the linear row.

9. In an inking device according to claim 1 wherein the pump means includes two parts, one part being connected with the applicator for displacement therewith, and the other part being fixedly mounted.

10. In an ink supply device for rotary stencil printers, an ink applicator comprising two relatively rotatable telescopically disposed tubes, said tubes having longitudinally extending rows of ink discharge holes with one of said tubes having an axially extending row of holes and a spirally extending row of holes which does not intersect the axially extending row of holes while the other tube has only one axially extending row of holes, means for rotating one of said tubes relative to the other to selectively register said axially aligned rows of holes or at least one selected hole in said spiral row with the corresponding hole in the axial row of the other tube, and an ink supply tube within the inner of the two ink applicator tubes and having an inlet opening at one end and discharge holes spaced along its length for providing uniform ink distribution over the total length of the ink applicator, said supply tube being smaller than the inner applicator tube to provide a discharge reservoir therebetween.

11. In an ink supply device according to claim 10 wherein the holes of the spiral row of said one tube and the holes of the axial row of said other tube are of such diameter that the relative rotation of the tubes partially opens the following hole prior to the complete closing of the preceding hole.

12. In an ink supply device according to claim 10 wherein the holes of the axial row of said one tube are spaced the distance between alternate holes of the spiral row of holes, and said other tube is provided with holes of like number and spaced to correspond to all of the holes of said spiral row.

13. In an ink supply device for rotary stencil printers, an ink applicator comprising two relatively rotatable telescopically disposed tubes, said tubes having longitudinally extending rows of ink discharge holes with one of said tubes having an axially extending row of holes and a spirally extending row of holes which does not intersect the axially extending row of holes while the other tube has only one axially extending row of holes, a rotatable indicator drum having a longitudinally disposed marking and a spiral marking on the surface thereof and respectively corresponding to the axially and spirally extending rows of holes on said one tube, a cover overlying said drum and having a slot extending longitudinally of said drum for viewing said drum markings, and rotatable drive means operatively connecting said one tube and said drum with said rows of holes and markings in corresponding relation for rotating said one tube relative to the other to selectively register said axially aligned rows of holes or at least one selected hole in said spiral row with the corresponding hole in the axial row of the other tube and simultaneously rotating said drum relative to said viewing slot to indicate the setting of the tubes defining the ink applicator.

14. In an ink supply device according to claim 13 wherein the indicator drum serves as an ink supply vessel.

15. In an ink supply device according to claim 13 wherein said ink applicator and drum are reciprocal longitudinally, and reciprocal drive means to be driven by the printer drive mechanism for simultaneously reciprocating said applicator and drum, said rotatable drive means including a manually operable handle for both adjusting and reciprocating said ink applicator and drum, said reciprocal drive means including automatically releasable clutch means to permit manual reciprocation of the drum and applicator.

16. In an ink supply device according to claim 13 wherein the indicator drum is a detachably and exchangeably mounted ink supply vessel.

17. In an inking device according to claim 13 wherein the discharge holes are disposed sufficiently close together that the ink flowing therethrough substantially defines a solid line.

18. In an ink supply device according to claim 13 in which the holes of the spiral row of said one tube and the holes of the linear row of said other tube are of such diameter that the rotation of the outer tube partially opens the following hole prior to the complete closing of the preceding hole.

19. An inking system for rotary stencil printers, comprising pump means, an ink applicator connected with said pump means for receiving ink therefrom and applying such ink to a stencil in the printer, a longitudinally displaceable ink supply drum operatively connected with said pump means, and means for reciprocating said drum to actuate said pump means to supply ink from said drum to said applicator.

20. In an ink supply device according to claim 19 comprising an adjustable stop limiting the stroke of the pump means to control the quantity of ink supplied to the applicator.

21. In an ink supply device according to claim 19 wherein said reciprocating means includes resilient means biasing the pump means in one direction to the initial position.

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