

April 2, 1957

A. G. R. GATES
INKING MECHANISM

2,787,216

Filed Nov. 17, 1952

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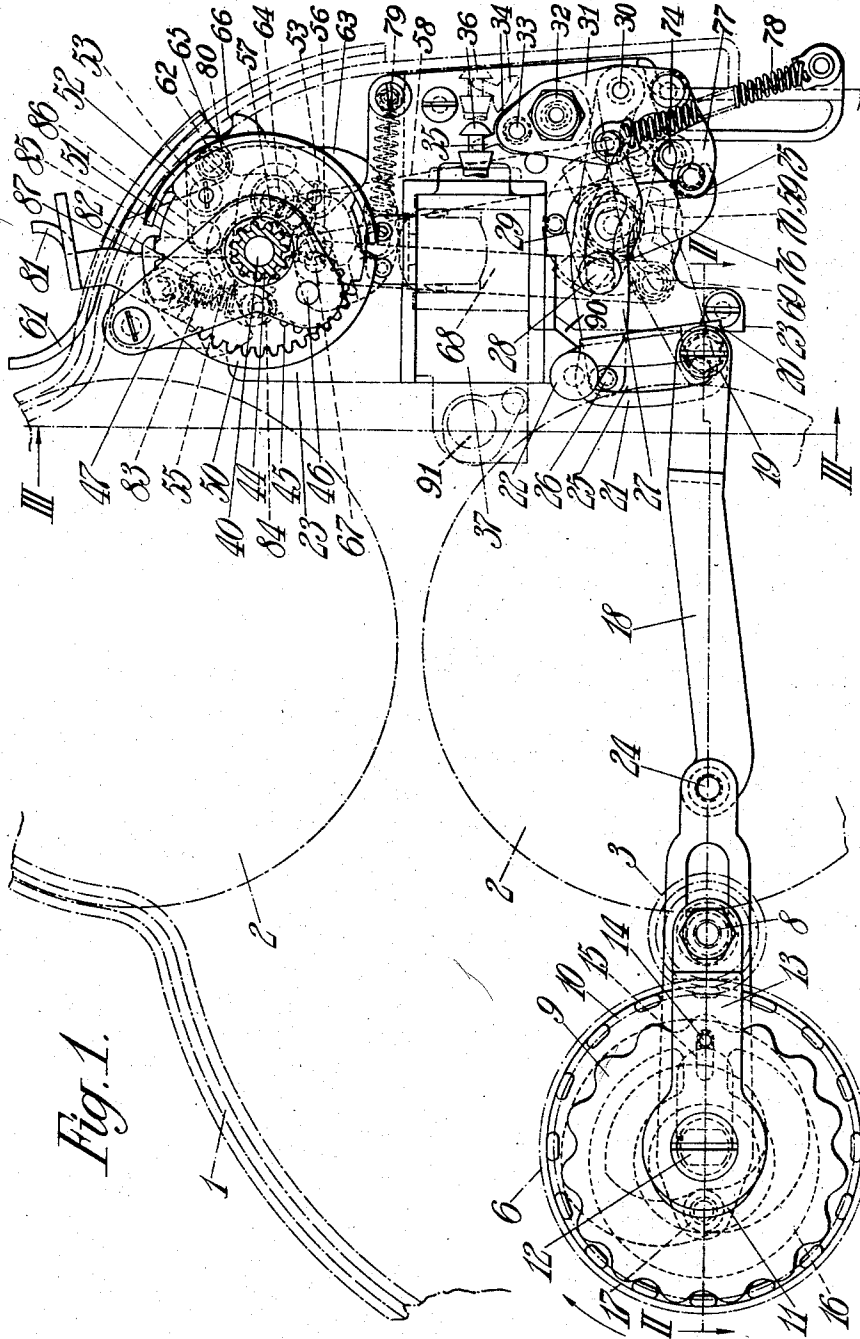


Fig. 1.

Inventor
A. G. R. Gates
By *Frank Downing* *Subst.*
Attys.

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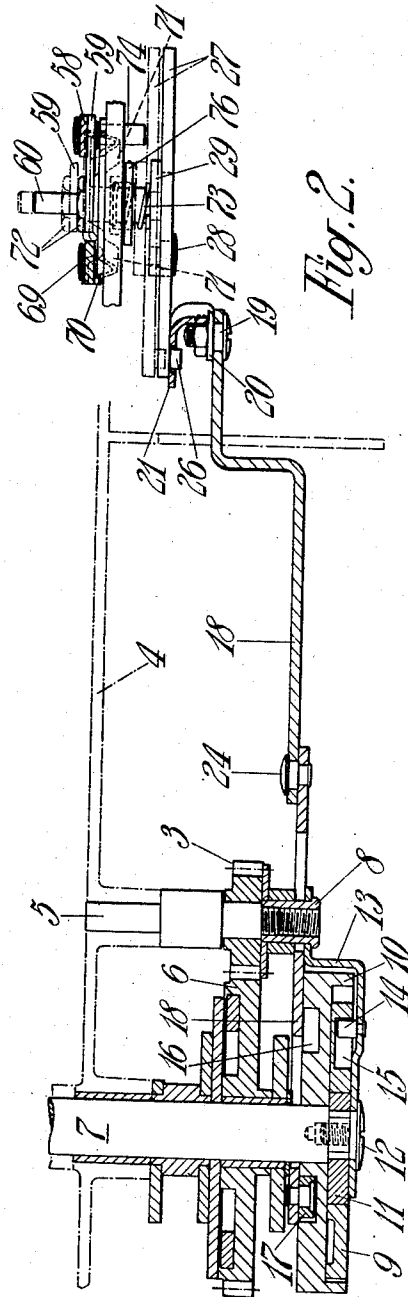


Fig. 2.

Inventor
A. G. R. Gates
By David Downing Hubbs
Attys.

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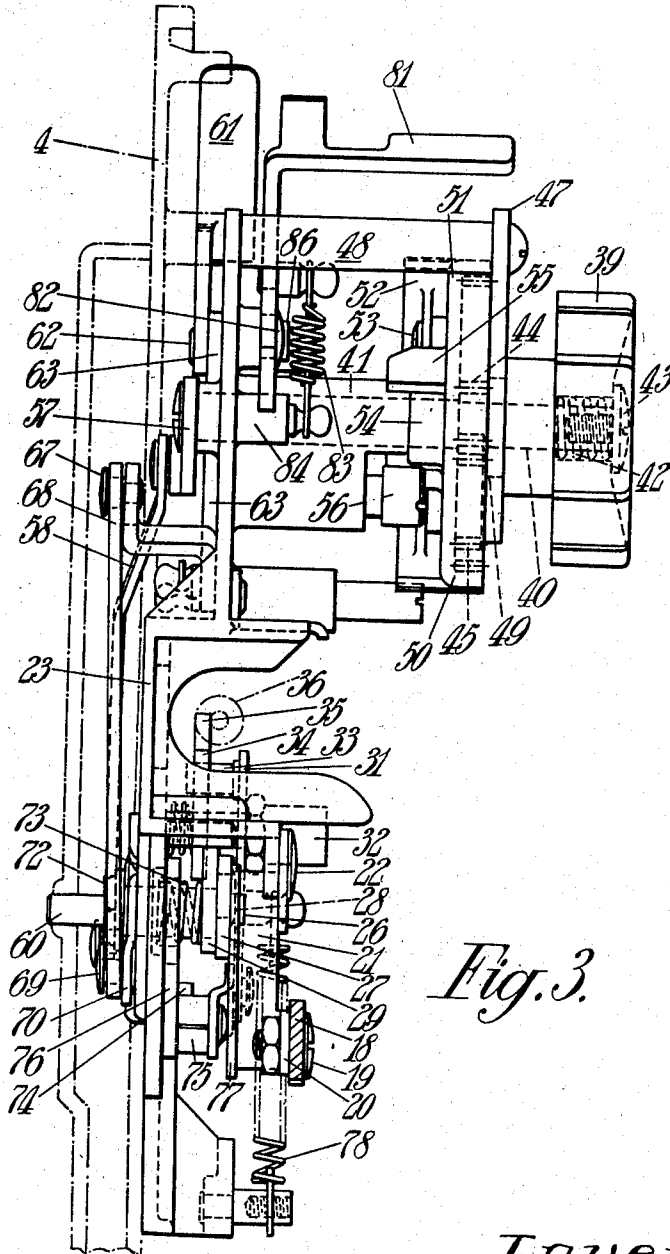


Fig. 3.

Inventor
A. G. R. Gates
By *Clawson Downing Rubold*
Attys

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FIG. 4.

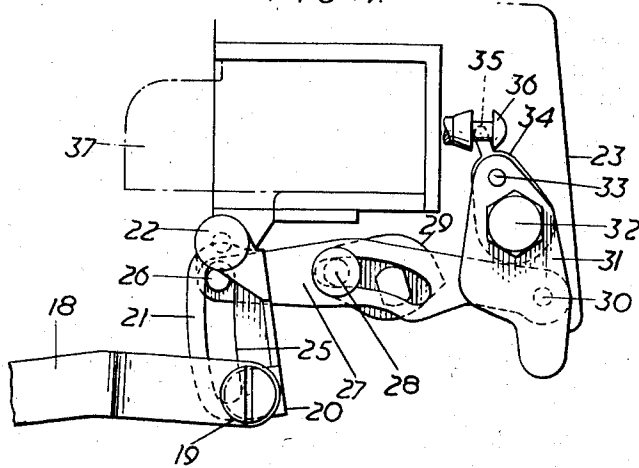
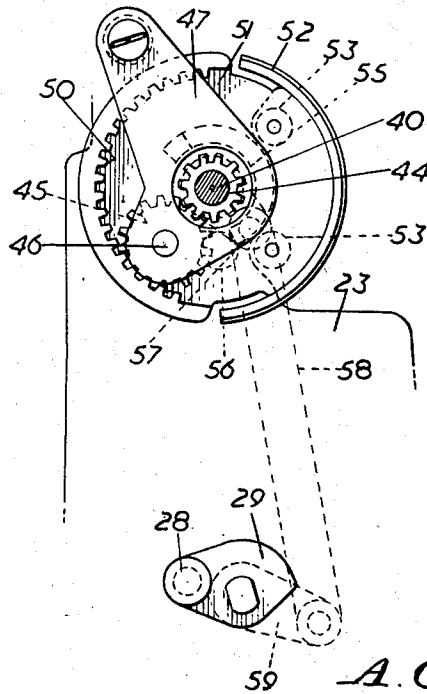


FIG. 5.



INVENTOR

A. G. R. Gates

BY

Glascott Downing Bechtold
ATTORNEYS

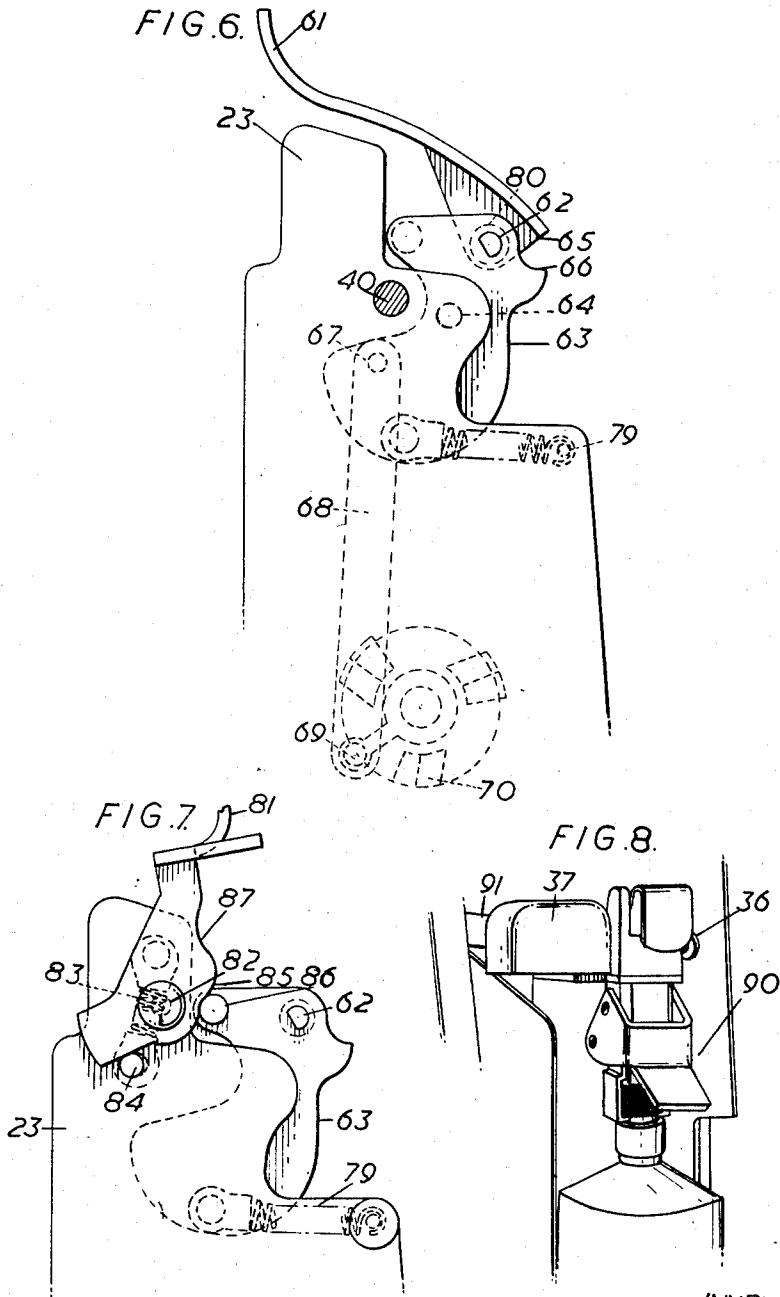
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INVENTOR
A. G. R. Gates
BY
Glascock Downing & Sebald
ATTORNEYS

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2,787,216

INKING MECHANISM

Albert George Ronald Gates, London, England, assignor to Gestetner Limited, London, England

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Claims priority, application Great Britain November 16, 1951

14 Claims. (Cl. 101—366)

This invention concerns inking mechanisms for twin cylinder duplicating machines and relates to an inking mechanism wherein there is provided a pump which withdraws the ink from a container and delivers it to an inking roller of the duplicating machine, the pump being driven with the duplicating machine so that the ink is automatically supplied to the inking roller. The quantity of ink to be delivered by the pump is adjustable so that it accords with the requirements of a particular stencil.

In such an arrangement the pump is arranged so that on its delivery stroke the entire output of the pump is supplied to the inking roller and on the return stroke no ink is supplied, with the result that it is necessary to deliver ink in excess of requirements in order to sustain the duplicating process during the periods when the copies are being run off without delivery of the ink (return stroke of the pump). The effect is broadly that there is a tendency to obtain over-inked and under-inked copies.

The present invention has for its object to provide an improved inking mechanism which enables more uniform supply of ink to the inking roller to be achieved.

Another object of the invention is to supply the ink to the inking roller substantially as required. More specifically, this object of the invention is aimed at delivering a supply of ink substantially to each copy during the duplicating operation.

A further object of the invention is to provide an inking mechanism wherein the periods in which ink is not being supplied to the inking roller are substantially reduced.

Yet a further object is to ensure that the periods of non-delivery of the pump due to the latter performing its return stroke are relatively small.

Finally it is a further object of the invention to provide that during the return stroke the delivery of ink to the inking roller is maintained by adopting a pump as disclosed in Patent No. 2,575,870 wherein on the forward stroke of the piston ink passes from before to behind the piston and the delivery corresponds to the volume of the piston stem while on the return stroke ink is expelled by the piston in an amount corresponding to the difference between the volume of the cylinder and the piston stem.

The accompanying drawings illustrate one embodiment of this invention, of which:

Figure 1 is a side elevation, certain parts not concerned with the inking mechanism being omitted for clarity.

Figure 2 is a sectional view on the line II—II of Figure 1.

Figure 3 is a sectional view on the line III—III of Figure 1.

Figures 4-7 are views, drawn to a larger scale, of various parts of the mechanism shown in Figure 1, and

Figure 8 is a perspective view of the ink delivery pump of Figure 1, showing its connector for receiving a col-

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lapsible ink container and its discharge passage for supplying ink to the inking roller.

The machine comprises a frame 1 and duplicating rollers 2. A pinion 3 is journaled outside a side cheek 4 of the frame on a short shaft 5 in driven relationship with the machine motor (not shown) and engages a spur wheel 6 mounted on a shaft 7 which also carries the intermittent gear described below. The pinion 3 is retained by a nut 8 engaged about the screw-threaded end of the shaft 5.

The drive between the machine motor, the rollers 2 and spur wheel 6 (by way of pinion 3) is such that the spur wheel makes one revolution for each duplicating operation of the machine.

The intermittent gear comprises a star wheel 9 having fifteen teeth meshing internally with a larger cup wheel 10 having sixteen teeth, the star wheel being journaled about an eccentric 11 which serves to impart a planetary motion to the star wheel and which is mounted at the end of shaft 7 and retained by a screw 12. An arm 13 secured by nut 8 and screw 12 carries an inwardly projecting pin 14 which, by sliding engagement in a groove 15 formed in the outer face of star wheel 9, constrains the latter against rotation so that a driving connection is established between shaft 7 and cup wheel 10 at a 16:1 ratio. Thus the cup-wheel 10 will be turned stepwise through an angle corresponding to one tooth for each rotation of the eccentric 11.

In the rear face of cup wheel 10 there is formed a cam groove 16 engaging a roller 17 attached to one end of a driving link 18, which is held in slotted engagement with the nut 8. The other end of the driving link is pivoted at 19 to a lug 20 (see Fig. 4) formed at the lower end of a swinging lever 21 pivoted in turn at its upper end by a screw 22 to a plate 23 mounted on the side cheek 4 of the frame 1, and a knuckle joint 24 in the driving link enables the latter to perform an approximately horizontal reciprocatory motion.

The swinging lever 21 is formed with a longitudinal slot 25 in which a pin 26, attached at one end of a link 27, is adapted to engage. Link 27 is longitudinally slotted at an intermediate position and constrained, by means of a stud 28 passing through the slot, to a retractable arm 29 described more fully below. At its other end link 27 is pivoted by a pin-and-hole connection 30 to a swinging plate 31, the pin extending rearwards from plate 31 to a greater depth than pin 26 extends forwards. The swinging plate is pivotally secured to plate 23 by a screw 32 and, beyond this screw, carries a rearwardly extending pin 33 engaging in an aperture in a swinging arm 34 also pivotally secured to a plate 23 by the screw 32; a finger 35 extending from arm 34 is adapted to engage the piston rod 36 of an ink delivery pump 37 mounted on plate 23 in the manner described in the aforementioned patent specification, the suction side of the pump communicating with a connector 90 (see Fig. 8) which receives a collapsible ink container and the delivery side of the pump communicates with a discharge passage 91 leading to the inking roller of the duplicating machine. Stepwise reciprocatory motion can therefore be transmitted to piston 36 from the rotary cam groove 16 by way of driving link 18, swinging lever 21, link 27, swinging plate 31, swinging arm 34 and finger 35 thus the delivery stroke of the piston 36 will be performed as a succession of steps during each of which ink is delivered to the inking roller. The cam groove 16 and roller 17 are provided so that the number of steps of the return stroke of the pump may be substantially less than those of the delivery stroke.

For varying the amplitude of the movement of finger 35 (so as to vary the stroke of the pump and hence the

quantity of ink delivered) there is provided a control knob 39 (removed in Figures 1 and 5 to show the underlying mechanism more clearly) freely mounted at the front end of a shaft 40 journaled in a bearing 41 extending forwards from plate 23. The knob, which is retained under pressure from a helical spring 42 behind the head of a screw 43 engaged in the end of shaft 40, carries a coaxial pinion 44. This meshes with a pinion 45 journaled on a stud 46 extending rearwardly from one arm of an L-shaped plate 47, which is secured at the end of its other arm by a bolt 48 to the plate 23 and further held in position by engagement about a sleeve bearing 49 carried by the control knob. In turn, the pinion 45 meshes internally with a toothed sector 50 formed as a half cylindrical flange of a disk 51. A complementary half cylindrical flange 52 mounted on disk 51 by screws 53, takes the form of a dial rotatable by the control knob with a slow motion effect.

A boss 54 formed coaxially at the rear of disk 51 is secured to shaft 40 and part encircled by a similarly formed half cylindrical sleeve 55; the annular extremities of this sleeve co-operate with the head 56 of a screw engaged in the wall of bearing 41 to define end stops for the rotation of disk 51 and hence for shaft 40. The latter extends through to the rear of the plate 23 on which this ink-regulating mechanism is mounted and there carries a short crank arm 57 pivoted at its end to a link 58, which is pivoted at its lower end to another crank arm 59 attached to a shaft 60 extending rearwardly from the arm 29. Rotation of the control knob 39 will therefore cause slow rotation of arm 29.

As already mentioned, a slot in the link 27 is engaged by a stud 28 carried by arm 29, so that rotation of the latter will swing link 27 to move the pin 26 to a higher or lower position in the slot in swinging lever 21 and hence nearer to or further from screw 22 which is the swinging lever's fulcrum, with concomitant decrease or increase in the amplitude of link 27's reciprocation.

To permit these adjustments to take place, the slots in swinging lever 21 and in link 27 are somewhat curved.

The position of the link 27 in which it is nearest to the screw 22 is shown in full line in Figure 1, and the other extreme position in dotted line.

Manual actuation of the pump 37 can be effected by means of a hand lever 61 (see Fig. 6). This is constructed so that in an inoperative position it lies back and conforms with the contour of the machine frame as shown in Figure 1. It is pivoted at 62 to the upper part of an approximately J-shaped lever 63 (which has this curved shape so as not to foul shaft 40) pivoted at 64 to the rear of plate 23. In the course of forward movement of the hand lever the lower end of a flange 65 formed thereon encounters a head portion 66 of lever 63, and continued forward movement will then cause the latter lever to swing about its pivot, in a clockwise direction as seen in Figure 1. At its tail lever 63 is stepped rearwards and pivoted at 67 to a link 68, which is pivoted eccentrically at 69 to a rotary cam plate 70.

The rotary cam plate is formed with three axially directed corrugations 71 (of which two are seen in Figure 2) and is freely journaled on shaft 60, being retained thereon by a nut 72 against pressure exerted by a helical spring 73 set about the shaft between plate 23 and the back of arm 29. The corrugations are adapted to seat in complementary grooves formed in the back of plate 23 so that when the cam plate is rotated by movement transmitted from hand lever 61, they emerge therefrom with concomitant rearward motion against the pressure of spring 73 of shaft 60 and the parts mounted thereon including arm 29. The latter carries with it link 27, and the extent of this rearward motion is sufficient to disengage pin 26 from the slot in the swinging arm 21 but not sufficient to disengage link 27 from pin 30. In this way, the driving connection between the machine

motor and pin 30 is severed without link 27 becoming dislocated.

As cam plate 70 reaches its fully retracted position a pin 74 extending forwardly therefrom is brought into axial alignment and engagement with a half cylindrical sleeve 75 carried at the end of an arm 76 journaled about (but not constrained to move axially with) shaft 60. Sleeve 75 is closed at its forward end, and a link 77 is pivoted at its ends to this sleeve and to the plate 31. Continued motion of the hand lever 61 in a forward direction is thus transmitted to plate 31 and thence in the manner already described to the piston 36. The reverse motion is effected by return springs 78 and 79 for plate 31 and lever 63 respectively, whilst the return of hand lever 61 to its inoperative, retracted position is effected by a helical spring 80.

The retracted position of shaft 60 and of the parts constrained to move axially therewith is shown in dotted line in Figure 2.

For retracting shaft 60 without moving link 77, when it is desired to run the machine without inking, a hand lever 81 (see Fig. 7) is provided pivoted by a stud 82 to plate 23. This hand lever, which is associated with a toggle-acting spring 83 urging it in the retracted position (shown in the drawings) against a stop 84 securing one end of the spring, is formed with a curved edge 85 adapted to bear against a pin 86 mounted at the top of lever 63. Forward movement of the last-mentioned hand lever will thereby move lever 63 in the same way as will hand lever 61, but only through a small arc sufficient to cause cam plate 70 to retract, when pin 86 becomes located in a recess 87 (Figure 1) formed in the curved edge 85. The pin 86 is held in this recess only by the pulls exerted by springs 79 and 83 and is readily ejected by upward thrust on the top of hand lever 81 when it is desired to re-engage the automatic inking mechanism.

If, when hand lever 81 is in a forward position, manual inking is effected by hand lever 61, the former hand lever drops under the action of spring 83 until the curved edge 85 comes up against bearing 41. When hand lever 61 is subsequently released, pin 86 re-engages said curved edge above recess 87 and lifts it, sliding along the edge until it again becomes located in said recess.

I claim:

1. An inking mechanism for twin cylinder duplicating machines comprising a connector to receive an ink container, a reciprocating pump to withdraw ink from the container through the connector, a discharge passage leading to the inking roller of the duplicating machine, said discharge passage being adapted to receive the pump delivery, mechanism for reciprocating the piston of the pump, means for driving said reciprocating mechanism with the duplicating machine for automatic delivery of ink to the inking roller during the duplicating operation, and an intermittent mechanism for transmitting the drive from said driving means to said reciprocating mechanism with a step-by-step movement so that the delivery stroke of the piston is performed as a succession of steps during each of which ink is delivered to the inking roller, said intermittent mechanism comprising an inner and an outer gear wheel, said outer gear wheel meshing internally with and having one more tooth than said inner gear wheel, means, driven by said driving means, for imparting planetary motion to said inner gear wheel, means for constraining the inner gear wheel against rotation and a driving connection between the outer gear wheel and the reciprocating mechanism.

2. An inking mechanism for twin cylinder duplicating machines comprising a connector to receive an ink container, a reciprocating pump to withdraw ink from the container through the connector, a discharge passage leading to the inking roller of the duplicating machine, said discharge passage being adapted to receive the pump delivery, mechanism for reciprocating the piston of the

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pump, means for driving said reciprocating mechanism with the duplicating machine for automatic delivery of ink to the inking roller during the duplicating operation, and an intermittent mechanism for transmitting the drive from said driving means to said reciprocating mechanism with a step-by-step movement so that the delivery stroke of the piston is performed as a succession of steps during each of which ink is delivered to the inking roller, said intermittent mechanism comprising a rotatable shaft rotated by said driving means, an eccentric secured to said shaft so as to be rotated thereby, an outer gear wheel rotatably mounted on said shaft and an inner gear wheel rotatably mounted on said eccentric, said outer gear wheel meshing internally with and having one more tooth than said inner gear wheel, a pin and slot mechanism for constraining the inner gear wheel against rotation, and a driving connection between the outer gear wheel and the reciprocating mechanism.

3. An inking mechanism for twin cylinder duplicating machines comprising a connector to receive an ink container, a reciprocating pump to withdraw ink from the container through the connector, a discharge passage leading to the inking roller of the duplicating machine, said discharge passage being adapted to receive the pump delivery, mechanism for reciprocating the piston of the pump, means for driving said reciprocating mechanism with the duplicating machine for automatic delivery of ink to the inking roller during the duplicating operation, and an intermittent mechanism for transmitting the drive from said driving means to said reciprocating mechanism with a step-by-step movement so that the delivery stroke of the piston is performed as a succession of steps during each of which ink is delivered to the inking roller, said intermittent mechanism comprising an inner and an outer gear wheel, said outer gear wheel meshing internally with and having one more tooth than said inner gear wheel, means, driven by said driving means, for imparting planetary action to said inner gear wheel, means for constraining the inner gear wheel against rotation and cam means for reciprocating said reciprocating mechanism, said cam means being driven by said outer gear wheel whereby the number of steps of the return stroke of the pump are substantially less than those of the delivery stroke.

4. An inking mechanism for twin cylinder duplicating machines comprising a connector to receive an ink container, a reciprocating pump to withdraw ink from the container through the connector, a discharge passage leading to the inking roller of the duplicating machine, said discharge passage being adapted to receive the pump delivery, mechanism for reciprocating the piston of the pump, means for driving said reciprocating mechanism with the duplicating machine for automatic delivery of ink to the inking roller during the duplicating operation, and an intermittent mechanism for transmitting the drive from said driving means to said reciprocating mechanism with a step-by-step movement so that the delivery stroke of the piston is performed as a succession of steps during each of which ink is delivered to the inking roller, said intermittent mechanism comprising a rotatable shaft rotated by said driving means, an eccentric secured to said shaft so as to be rotated thereby, an outer gear wheel rotatably mounted on said shaft and an inner gear wheel rotatably mounted on said eccentric, said outer gear wheel meshing internally with and having one more tooth than said inner gear wheel, a pin and slot mechanism for constraining the inner gear wheel against rotation, and cam means for reciprocating said reciprocating mechanism, said cam means being driven by said outer gear wheel whereby the number of steps of the return stroke of the pump are substantially less than those of the delivery stroke.

5. An inking mechanism for twin cylinder duplicating machines comprising a connector to receive an ink container, a reciprocating pump to withdraw ink from the

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container through the connector, a discharge passage leading to the inking roller of the duplicating machine said discharge passage being adapted to receive the pump delivery, mechanism for reciprocating the piston of the pump, means for driving said reciprocating mechanism with the duplicating machine for automatic delivery of ink to the inking roller during the duplicating operation, and an intermittent mechanism for transmitting the drive from said driving means to said reciprocating mechanism with a step-by-step movement so that the delivery stroke of the piston is performed as a succession of steps during each of which ink is delivered to the inking roller, said intermittent mechanism comprising an inner and an outer gear wheel, said outer gear wheel meshing internally with and having one more tooth than said inner gear wheel, means, driven by said driving means, for imparting planetary motion to said inner gear wheel, a cam groove in said outer gear wheel and a roller carried by said reciprocating mechanism and engaging said cam groove, whereby the number of steps of the return stroke of the pump are substantially less than those of the delivery stroke.

6. An inking mechanism for twin cylinder duplicating machines comprising a connector to receive an ink container, a reciprocating pump to withdraw ink from the container through the connector, a discharge passage leading to the inking roller of the duplicating machine, said discharge passage being adapted to receive the pump delivery, mechanism for reciprocating the piston of the pump, means for driving said reciprocating mechanism with the duplicating machine for automatic delivery of ink to the inking roller during the duplicating operation, and an intermittent mechanism for transmitting the drive from said driving means to said reciprocating mechanism with a step-by-step movement so that the delivery stroke of the piston is performed as a succession of steps during each of which ink is delivered to the inking roller, said intermittent mechanism comprising a rotatable shaft rotated by said driving means, an eccentric secured to said shaft so as to be rotated thereby, an outer gear wheel rotatably mounted on said shaft and an inner gear wheel rotatably mounted on said eccentric, said outer gear wheel meshing internally with and having one more tooth than said inner gear wheel, a pin and slot mechanism for constraining the inner gear wheel against rotation, a cam groove in said outer gear wheel and a roller carried by said reciprocating mechanism and engaging said cam groove, whereby the number of steps of the return stroke of the pump are substantially less than those of the delivery stroke.

7. An inking mechanism for twin cylinder duplicating machines comprising a reciprocating pump, a lever, a first means engaging the lever to swing it about its fulcrum and a second means engaging the lever for transmitting reciprocatory motion therefrom to the piston of said pump, the engagement of one of these means with the lever being at an adjustable distance from said fulcrum to vary the amplitude of said reciprocatory motion, and means including an intermittent mechanism for reciprocating said first means so that the delivery stroke of the piston is performed as a succession of steps, said intermittent mechanism comprising a rotatable shaft, means for rotating said shaft, an eccentric secured to said shaft so as to be rotated thereby, an outer gear wheel rotatably mounted on said shaft and an inner gear wheel rotatably mounted on said eccentric, said outer gear wheel meshing internally with and having one more tooth than said inner gear wheel, a pin and slot mechanism for constraining the inner gear wheel against rotation, and a driving connection between the outer gear wheel and the reciprocating means.

8. An inking mechanism for twin cylinder duplicating machines comprising a reciprocating pump, a lever, a first means engaging the lever to swing it about its fulcrum and a second means engaging the lever for transmitting reciprocatory motion therefrom to the piston of said

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pump, the engagement of one of these means with the lever being at an adjustable distance from said fulcrum to vary the amplitude of said reciprocatory motion, and means including an intermittent mechanism for reciprocating said first means so that the delivery stroke of the piston is performed as a succession of steps, said intermittent mechanism comprising a rotatable shaft, means for rotating said shaft, an eccentric secured to said shaft so as to be rotated thereby, an outer gear wheel rotatably mounted on said shaft and an inner gear wheel rotatably mounted on said eccentric, said outer gear wheel meshing internally with and having one more tooth than said inner gear wheel, a pin and slot mechanism for constraining the inner gear wheel against rotation, a cam groove in said outer gear wheel and a roller carried by said reciprocating means and engaging said cam groove, whereby the number of steps of the return stroke of the pump are substantially less than those of the delivery stroke.

9. An inking mechanism as claimed in claim 1 in which said driving connection comprises a lever, a first means engaging the lever to swing it about its fulcrum and a second means engaging the lever for transmitting reciprocatory motion therefrom to the piston of the pump, the engagement of one of these means with the lever being at an adjustable distance from said fulcrum to vary the amplitude of said reciprocatory motion.

10. A mechanism as set forth in claim 9, in which there is a longitudinal slot in said lever said second means comprising a reciprocatory link, a pin on said reciprocatory link engaged in said longitudinal slot, and a member which carries the reciprocatory link and which can be adjustably positioned to alter the position of said pin in said slot.

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11. A mechanism as set forth in claim 10 comprising a rotary cam-and-follower mechanism driven by said outer gear wheel and a reciprocatory link connected to said cam-and-follower mechanism, said last mentioned reciprocatory link constituting the said first means.

12. A mechanism as set forth in claim 1 comprising a hand lever for actuating the ink delivery pump, and a linkage interconnecting the hand lever and the reciprocating mechanism, said linkage disconnecting said reciprocating mechanism when the hand lever is brought into operation.

13. A mechanism as set forth in claim 12 comprising a cam, said reciprocating mechanism comprising a pair of members movable into and out of engagement with each other, said linkage being constructed so that the initial movement of the hand lever, before the actuation of the pump, brings about the rotation of the cam to cause disengagement of the said members.

14. A mechanism as set forth in claim 13 in which means are provided for locating, when desired, said linkage in a configuration where disconnection of said reciprocating mechanism is effected without causing an ink delivery to take place.

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