Dec. 31, 1940. A. W. STEPHENSON 2,226,642

MERCURY FEEDING DEVICE

Filed May 29, 1939 3 Sheets-Sheet 1

FIG-2-

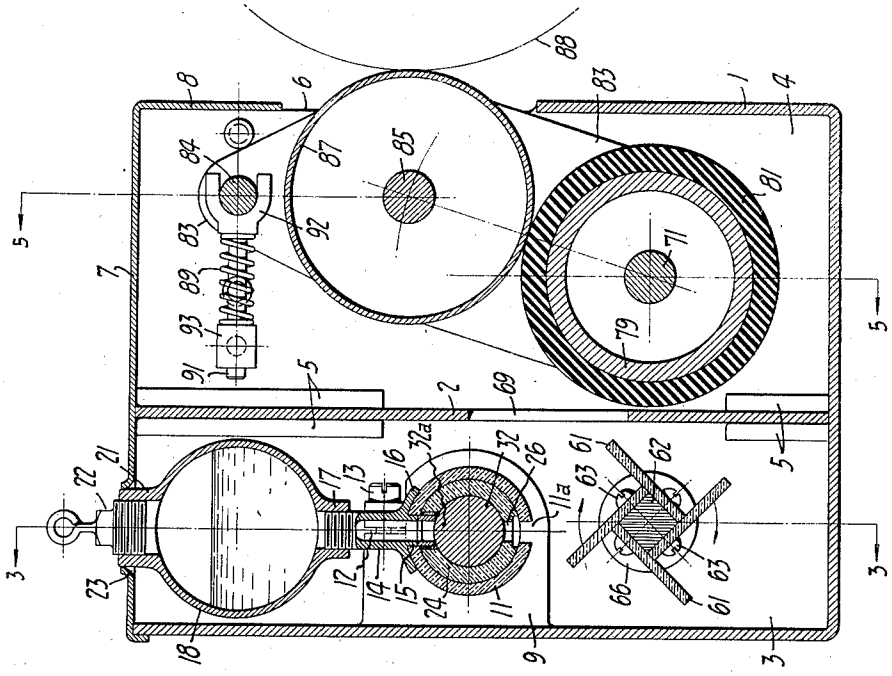
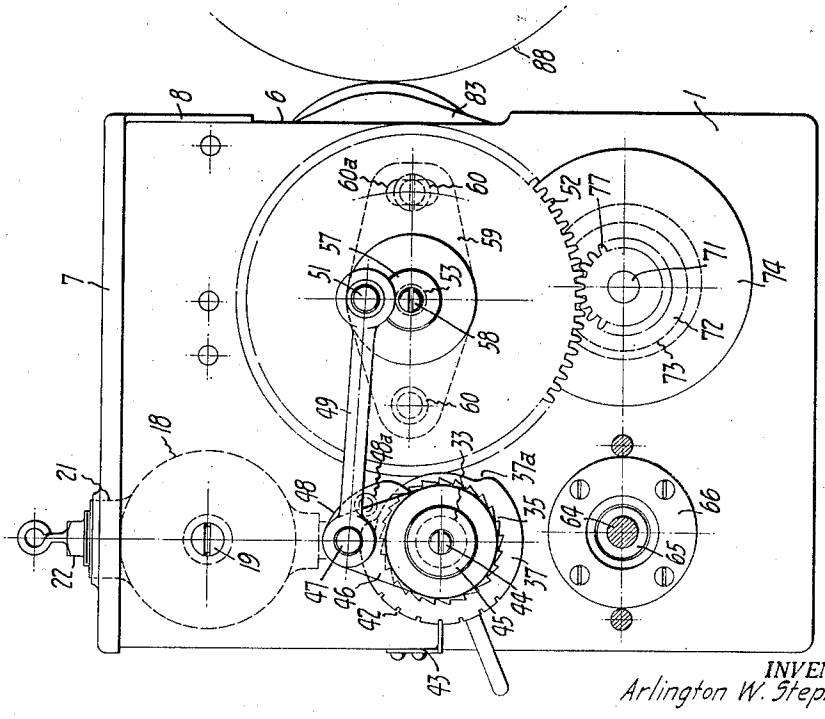


FIG-1-



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FIG-4

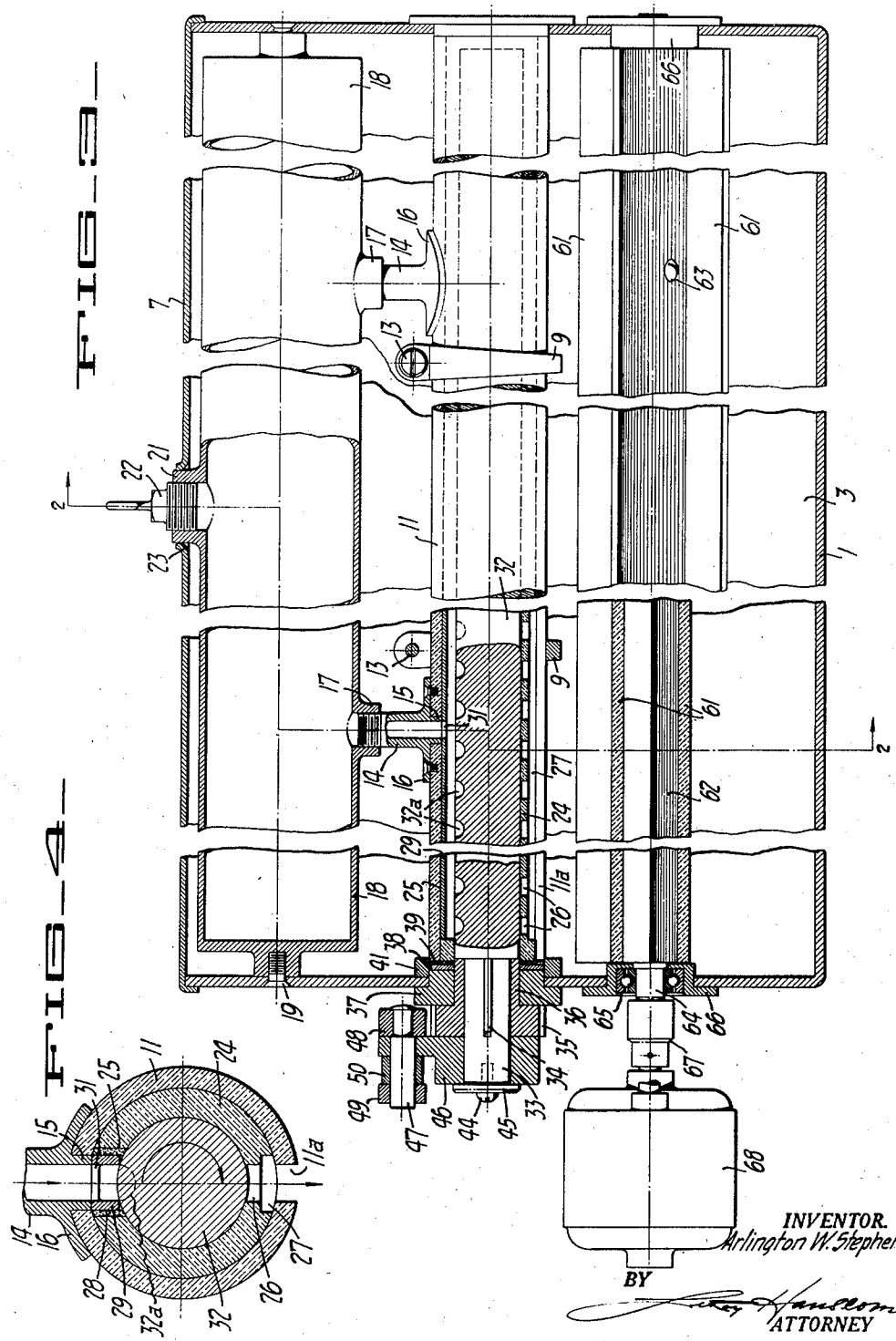


FIG-5

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Dec. 31, 1940. A. W. STEPHENSON 2,226,642

MERCURY FEEDING DEVICE

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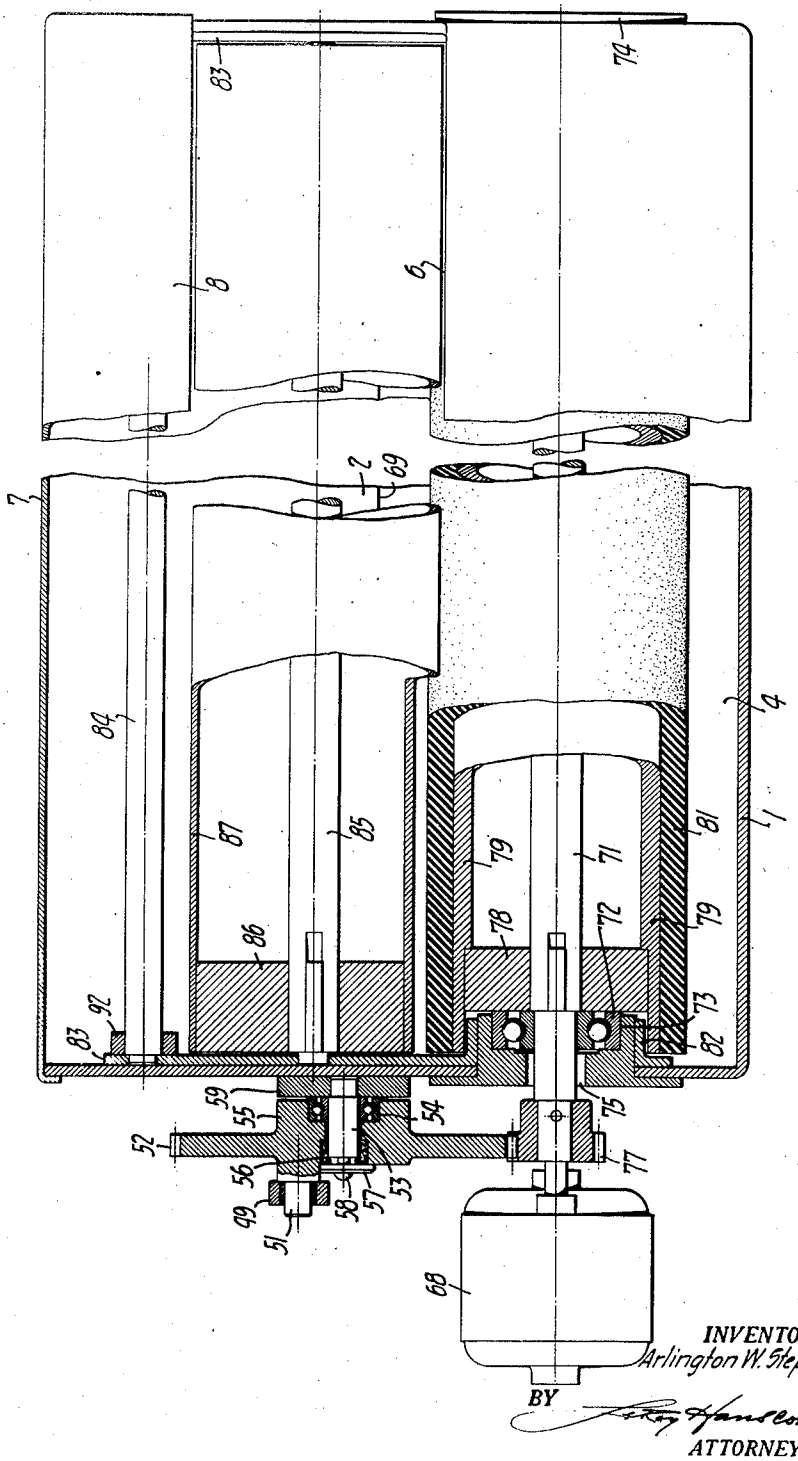


FIG-5

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UNITED STATES PATENT OFFICE

2,226,642

MERCURY FEEDING DEVICE

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Application May 29, 1939, Serial No. 276,337

10 Claims. (Cl. 101—147)

This invention relates in general to equipment for use in the mercury printing process wherein the non-printing areas of a planographic plate are coated with a film of mercury.

The success of the mercury printing process depends upon the uniform application of mercury to the ink rollers in finely divided form, without excessive loss of mercury and without subjecting the operators of the press to mercury vapors. Due to the physical characteristics of mercury such as its weight and cohesion, this requirement has been extremely difficult to comply with. Attempts have been made to spray the mercury onto the ink rollers, but this has been found to be impractical for the reason that the mercury is difficult to control, resulting in undue loss of mercury and the production of extraneous mercury vapors. Although the device shown in my Reissue Patent No. 19,489 of March 5, 1935, has proved successful in delivering mercury in suitable form to the ink rollers, it nevertheless is still desirable to comminute further the globules of mercury as they are supplied from this device, before finally delivering the mercury to the ink rollers.

In general, the object of this invention is the provision of a device wherein globules of mercury are first sheared from a body of mercury and then further subdivided by the action of a rapidly rotating impeller and thrown against one of a train of rolls by which the mercury is transmitted to the printing plate.

The invention possesses other advantageous features, some of which with the foregoing will be set forth at length in the following description where that form of the invention which has been selected for illustration in the drawings accompanying and forming a part of the present specification is outlined in full. In said drawings, one form of the invention is shown, but it is to be understood that it is not limited to such form, since the invention as set forth in the claims may be embodied in a plurality of forms.

Referring to the drawings:

Figure 1 is an end elevation of a device embodying the objects of my invention with the motor for driving the impeller removed.

Figure 2 is a vertical section of my device taken on the line 2—2 of Figure 3.

Figure 3 is a longitudinal vertical section taken on the line 3—3 of Figure 2.

Figure 4 is an enlarged vertical section of the mercury shearing roll forming part of the device shown in Figures 1, 2, and 3.

Figure 5 is a vertical longitudinal section taken on the line 5—5 of Figure 2.

The device shown in these various figures comprises a generally rectangular metal casing 1 provided with a removable longitudinally extending partition 2 which with the sides, ends, and base of the casing defines compartments 3 and 4. Spaced strips 5 welded or otherwise secured to the ends of the casing hold the partition 2 in place. The upper half of the right hand side or front of the casing as shown in Figures 1 and 2 is formed with a cut-away portion 6, and the top of the casing is closed by a cover 7 formed along its right hand side with a depending lip 8. Located within the upper half of the compartment 3 is a mercury fountain (see Figure 2) comprising a plurality of spaced longitudinally aligned clamps 9 formed with circular openings adapted to receive a cylindrical "Bakelite" tube 11. Each clamp is split along its upper side as indicated by the reference numeral 12 in Figure 2 and is provided with a screw 13 for forcing the two ends of the clamp together to thereby secure the tube 11. Communicating with the tube 11 at longitudinally spaced points on its upper surface are a plurality of fittings 14. These fittings are provided at their lower ends with nipples 15 extending into apertures formed in the tube 11 and with arcuate saddles 16 screwed to the tube 11. The upper ends of the fittings 14 are threadedly engaged in bosses 17 formed on the lower side of a cylindrical mercury reservoir 18 which is secured at each end by screws 19 to the end walls of the casing 1. Formed along the upper surface of the reservoir 18 is a threaded mercury feed intake 21 adapted to be closed by a plug 22 and extending through a circular opening 23 formed in the cover 7. Disposed within the tube 11 and having a force fit therewith is a "Bakelite" cylinder 24 formed on its upper side with a longitudinally extending channel 25 in alignment with the nipples 15 of the fittings 14, and formed on its lower side with a plurality of spaced apertures 26 communicating with a longitudinally extending recess 27 in registration with a channel 11a formed in the tube 11. Sealed within the recess 25 by packing 28 is a channel bar 29 provided along its upper surface with apertures 31 in registration with the nipples 15. Accommodated within the cylinder 24 is a solid cylinder 32 terminating at its left hand end as shown in Figure 2 in a stub shaft 33 extending through the left hand end of the casing 1 and secured by a key 34 to a ratchet wheel 35. Longitudinally aligned on the surface of the cylinder 32 are a

plurality of mercury receiving depressions 32a adapted upon rotation of the cylinder 32 to register with the spaced apertures 26 of the cylinder 24. The ratchet wheel 35 is provided with an inwardly extending collar 36 journaled in a bearing 37 extending through the end of the casing 1 and formed on its periphery as shown in Figure 1 with a cam surface 37a. Disposed between the inner end of the bearing 37 and the left hand end of the tube 11 are a metal washer 38 and a felt washer 39, and surrounding these washers is a ring 41. The right hand end of the tube 11 extends through the right hand end of the casing 1 and may be secured thereto in any suitable manner. Formed on the bearing 37 opposite the cam surface 37a are a plurality of notches 42 adapted to be engaged by a latch 43 secured to the back of the casing 1 and by which the cam surface 37a may be angularly adjusted as desired. Secured to the end of the stub shaft 33 by a screw 44 and washer 45 is a ratchet crank 46 carrying at its outer end a pin 47. Journaled on the inner end of the pin 47 is a pawl 48 adapted to engage the ratchet wheel 35 and provided with an inwardly extending pin 48a adapted to engage the cam surface 37a of the bearing or bushing 37. Journaled on the outer end of the pin 47 is one end of a connecting rod 49 held in spaced relation with respect to the ratchet crank 46 by a spacing washer 50. The opposite end of the connecting rod 49 is journaled on a pin 51 carried by a gear 52. The gear 52 is rotatably mounted on a pin 53 by a bearing 54 housed within a recess formed in a boss 55 of the gear 52 Disposed about the outer end of the pin 53 is packing 56, and the gear 52 is held in place on the pin 53 by a washer 57 and screw 58. The pin 53 is carried by a bracket 59 which in turn is adjustably secured to the left hand end of the casing 1 by screws 60. One of the screws 60 passes through a slot 60a formed in the bracket 59, so that the slotted end of the bracket may be moved about the opposite screw 60 so as to adjust its position within limits.

Housed within the lower portion of the compartment 3 is an impeller consisting of longitudinally extending rectangular paddles or blades 61 secured in pinwheel formation to a square shaft 62 by screws 63 (see Figures 2 and 3). The ends of the square shaft 62 terminate in stub shafts 64 journaled within bearings 65 disposed in bearing housings 66. The bearing housings 66 extend through openings in the casing 1 and are secured thereto in any suitable manner. Fitting over the left hand end of the stub shaft 64 as viewed in Figure 3 is a coupling 67 for operatively connecting the shaft 62 with an electric motor 68. The upper portion of the impeller so formed and located within the compartment 3 is in line with a longitudinally extending slot 69 formed in the vertical partition 2.

Disposed within the compartment 4 of the casing 1 is a double roll assembly comprising a shaft 71, the left hand end of which, as viewed in Figure 5, extends through the casing 1. Each end of this shaft is carried by a bearing 72 supported within a circular recess 73 formed in a bearing housing or bushing 74 extending through a circular opening formed in the end of the casing. The recess 73 is eccentrically disposed with respect to the axis of the bushing 74 and the bushing is provided with a relatively large central opening 75 so that upon rotation of the bushing 74 the axis of the shaft 71 may be located as desired. Fixed to the end of the shaft 71 is a spur gear 77 adapted to mesh with the gear 52 carried by the bracket 59. Keyed to each end of the shaft 71 adjacent the bearings 72 is a circular disc 78 and carried by the discs 78 is a metal cylinder 79 to which is secured a rubber sleeve or roll 81. Journaled on each of the bushings 74 is a sleeve 82 of an upwardly extending bracket 83. The upper ends of these brackets are held in spaced relation immediately adjacent the ends of the casing 1 by a tie rod 84. Rotatably carried by the opposed brackets 83 is a shaft 85, to either end of which is keyed a circular disc 86. Secured on the discs 86 is a metal cylindrical roll 87 adapted to engage and drive the rubber sleeve 81 carried by the cylinder 79, as best shown in Figure 2. The right hand portion of the roll 87 extends through the opening 6 formed in the casing 1 and is arranged to contact and be frictionally driven by a rubber covered ink roll 88. Resilient contact between the rolls 87 and 88 is maintained by springs 89 surrounding pins 91. The right hand end of each spring 89 as viewed in Figure 2 engages the end of a fork 92 straddling the tie rod 84, while the left hand end of the spring engages a bushing 93 through which the pin 91 passes and which is rotatably secured to an end wall of the casing 1.

The operation of the device as above described is as follows:

The ink roll 88 drives the metal roll 87, which in turn drives the rubber covered roll 81, and in this connection it is to be noted that the rolls 81 and 87 may if desired be reversed. Since the spur gear 77 rotates with the roll 81 and is in mesh with the gear 52, the pin 51 will rotate and cause the reciprocation of the connecting rod 49 and the pawl 48. The pawl 48 being in operative engagement with the ratchet wheel 35, serves to rotate the solid cylinder 32 step by step. The rate of advance of the cylinder 32 is of course determined by the ratio between the spur gear 77 and the gear 52 and the contour of the cam surface 37a engaged by the pin 48a carried by the pawl 43. This step by step advance of the cylinder 32 may also be controlled by means of the notches 42 formed on the periphery of the housing or bearing 37 and the latch 43 so that contact between the pin 48a and the cam surface 37a may be advanced or retarded. The motor 68 is arranged to drive the impeller formed by the paddles or blades 61 at a relatively high rate of speed and entirely independent of the action of the other movable parts. With these motions in mind it will be observed that mercury contained within the reservoir 18 will drop by gravity through the fittings 14 into the channel bar 29 carried by the cylinder 24. It will therefore be seen that the channel bar 29 serves as an intermediate mercury reservoir disposed over the entire length of the cylinder 32. Upon rotation of the cylinder 32 its depressions 32a will come into communication with this intermediate reservoir, and upon further rotation past the channel bar 29 and the packing 28, each depression 32a will shear away a globule of mercury from the body of mercury contained within the intermediate reservoir. Upon still further rotation of the cylinder 32, the mercury filled depressions 32a will come into registration with the apertures 26 and the channels 27 and 11a, whereupon each globule of mercury will fall by gravity into the path of the rotating blades 61. The impact of these blades upon the mercury globules serves to comminute or finely divide the mercury globules and to throw the comminuted or finely divided mer-

cury through the slot 69 against the roll 81. Since the ink roller 88 is one of a train of rolls coated with a film of ink, each of the rolls 81 and 87 will also be coated with a film of ink and consequently the finely divided mercury will adhere to the roll 81 and be transferred indirectly through the rolls 87 and 88 to the ink roll in direct contact with the printing plate or cylinder. In this manner the spaced globules of mercury which are delivered by the mercury fountain disposed in the upper portion of the compartment 3 are finely divided and uniformly distributed through the action of the impeller below the fountain and the intermediate rolls 81, 87, and 88 to the printing plate or cylinder, without undue loss of mercury or the formation of objectionable extraneous mercury vapors. A uniform distribution of the mercury to the printing plate is required for the reason that the non-printing areas of the plate must always be coated with a film of mercury, and I have found that the device above described produces a more uniform feed than the device described in my reissue patent above referred to.

I claim:

1. A device of the character described, comprising: a roll; means for coating said roll with an adhesive film; an impeller mounted adjacent and confronting said roll; and means adjacent said impeller for delivering drops of mercury to said impeller whereby said drops are thrown by said impeller against said roll in finely divided form.

2. A device of the character described, comprising: a roll; means for coating said roll with a film of ink; an impeller mounted adjacent and confronting said roll; and means adjacent said impeller for delivering drops of mercury to said impeller whereby said drops are thrown by said impeller against said roll in finely divided form.

3. A device of the character described, comprising: a train of contacting rolls; means for applying a film of ink to each of said rolls; an impeller mounted adjacent one of said rolls; and means for dropping globules of mercury in the path of said impeller whereby said globules are thrown in finely divided form against the said roll adjacent the impeller.

4. A device of the character described, comprising: a rotatable roll; means for coating said roll with a film of ink; an impeller mounted adjacent said roll; means adjacent said impeller for delivering drops of mercury in the path of said impeller whereby said drops are thrown by said impeller against said roll in finely divided form; and means for correlating the rate of delivery of said drops of mercury to said impeller with the rate of rotation of said roll.

5. A device of the character described, comprising: a roll; means for driving said roll; an impeller adjacent and confronting said roll; means for driving said impeller; a mercury fountain disposed above said impeller and arranged to shear globules of mercury from a body of mercury and to drop said globules in the path of said impeller; and means for correlating the shearing action of said mercury fountain with the rate of rotation of said roll.

6. A device of the character described, comprising: a roll; means for coating said roll with an adhesive film; a blade mounted for rotation adjacent and confronting said roll; and means for delivering mercury drops in the path of said blade whereby said drops are thrown by said blade against said roll in finely divided form.

7. A device of the character described, comprising: a driven roll provided with a non-metallic surface; an intermediate roll formed with a metallic surface and arranged to contact said driven roll and an ink roll of a printing press; an impeller mounted adjacent and confronting said driven roll; and a mercury fountain disposed above said impeller and arranged to drop globules of mercury in the path of said impeller.

8. A device of the character described, comprising: a driven roll provided with a non-metallic surface; an intermediate roll formed with a metallic surface and arranged to contact said driven roll and an ink roll of a printing press; an impeller mounted adjacent and confronting said driven roll; means for driving said impeller; a mercury fountain disposed above said impeller and provided with a pair of relatively movable shearing surfaces for shearing globules from a body of mercury and dropping such globules in the path of said impeller; and means for correlating the shearing action of said fountain with the rate of rotation of said driven roll.

9. A mercury fountain comprising: a horizontally disposed outer cylinder; an inner cylinder journaled within and arranged for relative circumferential movement with respect to said outer cylinder; a mercury reservoir formed on the surface of said outer cylinder and communicating with its interior; a substantially vertical mercury outlet extending through the lower portion of said outer cylinder; a mercury receiving recess formed on the surface of said inner cylinder in circumferential alignment with said reservoir and mercury outlet; and means for effecting relative circumferential movement between said outer and inner cylinders.

10. A mercury fountain comprising: a fixed horizontally disposed outer cylinder; an inner cylinder journaled within and arranged for relative circumferential movement with respect to said outer cylinder; a mercury reservoir formed on the surface of said outer cylinder and communicating with its inner surface; a plurality of spaced substantially vertical mercury outlets extending through the lower wall of said outer cylinder; a plurality of mercury receiving recesses formed on the surface of said inner cylinder in circumferential alignment with said spaced mercury outlets; and means for effecting relative circumferential movement between said outer and inner cylinders.

ARLINGTON W. STEPHENSON.