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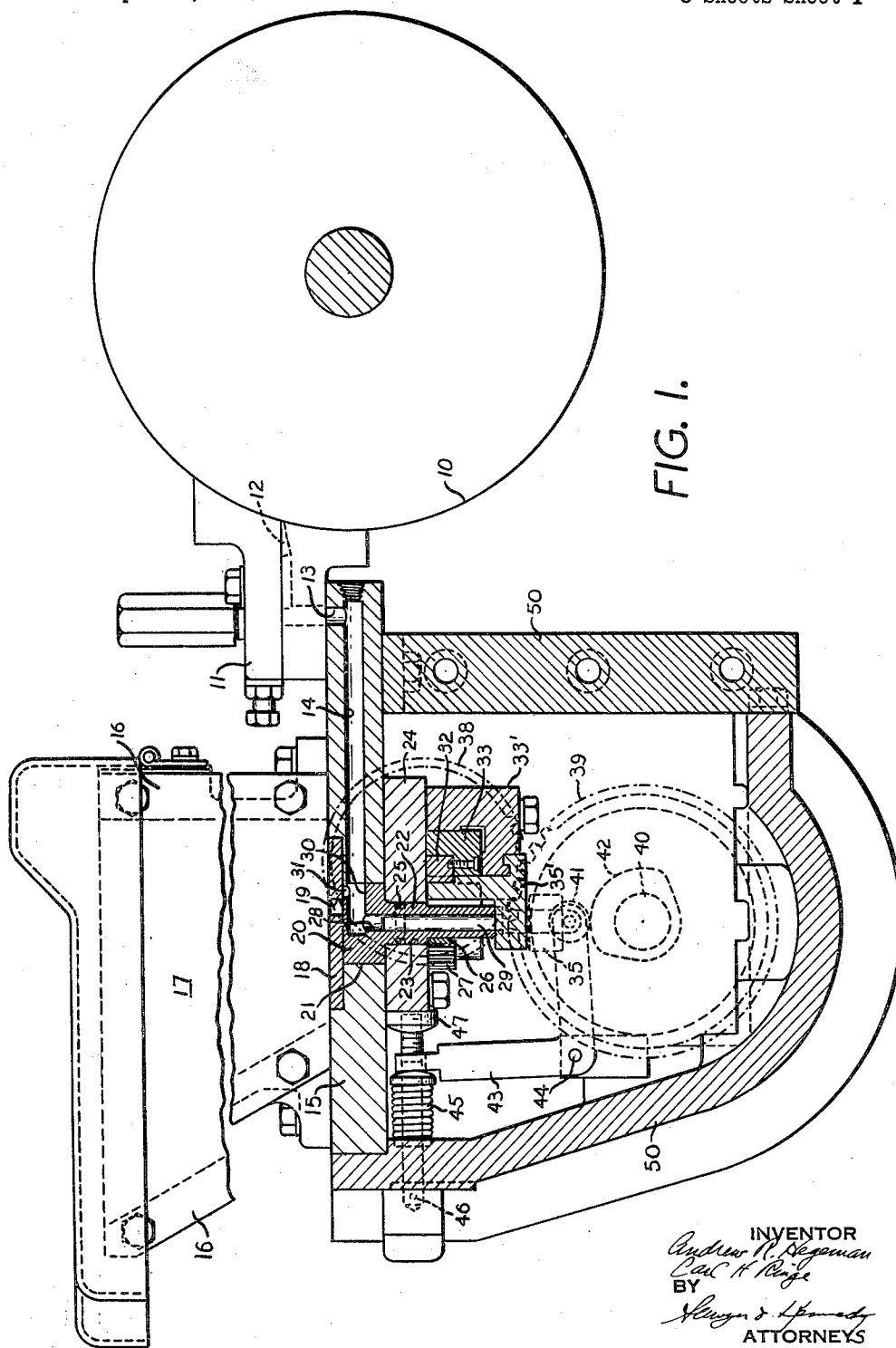
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3,018,727

INKING MECHANISM FOR PRINTING MACHINES

Filed April 4, 1956

3 Sheets-Sheet 1



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FIG. 3.

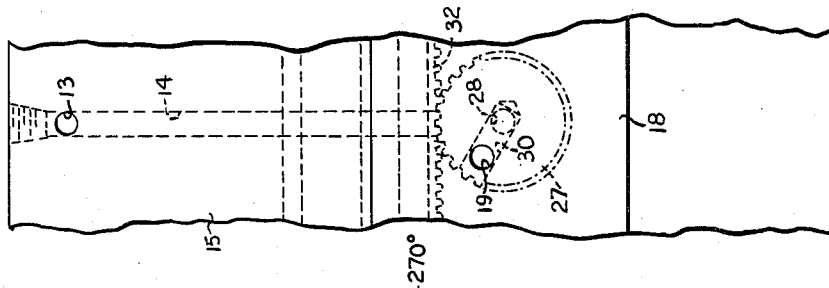


FIG. 4.

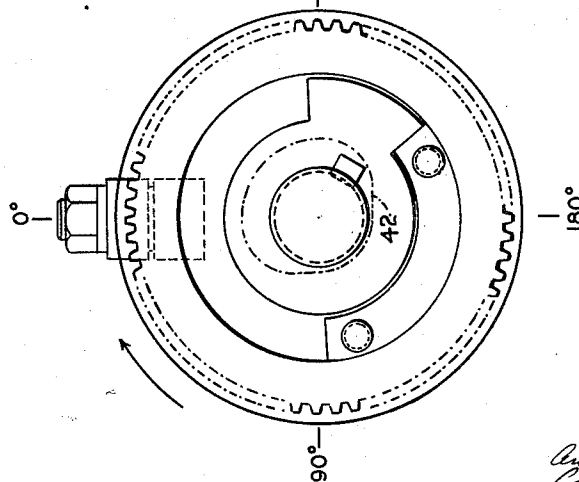
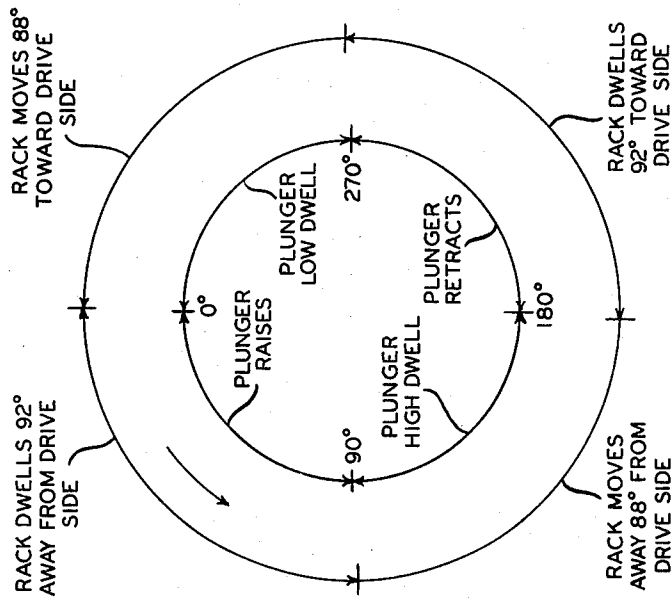


FIG. 5.



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INKING MECHANISM FOR PRINTING MACHINES

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6 Claims. (Cl. 101—366)

This invention relates to ink pumps for printing machines. More particularly, the invention relates to inking mechanism in which ink is supplied to a printing or plate cylinder through an ink motion by an ink pump comprising a plurality of pistons or plungers, generally one for each column width, and supplying ink to column widths of the initial drum of an ink motion.

The general object of the present invention is to provide an improved pumping mechanism in which the ink reservoir or trough is substantially free of obstruction and, hence, may be readily cleaned and in which the pumping mechanism is positioned outside the reservoir and can be lubricated and maintained in a satisfactory manner.

A further object of the invention is to provide a mechanism in which leakage and creeping of ink lengthwise of the ink rollers may be reduced to a minimum and in so doing to facilitate the compartmentalization of the ink trough, permitting use of a single trough for a plurality of colors.

A mechanism embodying the invention in a preferred form will now be described with reference to the accompanying drawings, and the features forming the invention will then be pointed out in the appended claims.

In the drawings:

FIG. 1 is a schematic view partly in end elevation and partly in vertical section, showing an ink pumping mechanism embodying the invention in a preferred form;

FIG. 2 is a plan view of the ink trough of FIG. 1;

FIG. 3 is a fragmentary bottom plan view showing principally one of the valving mechanisms;

FIG. 4 is an end elevation of a cam drive mechanism; and

FIG. 5 is a phase diagram, the angles indicated in which correspond to the angles indicated in FIG. 4.

Referring first to FIG. 1, there is indicated in that figure an ink drum 10 with ink rail 11 supplying ink thereto through a series of flat orifices 12, each of which is supplied with ink through an opening 13 which communicates with a bore or passage 14 formed in the bottom 15 of the ink trough. The ink trough comprises walls or superstructure 16 defining a space 17 for holding the ink, and has a plate 18 set into its bottom, in which plate ink discharge ports or openings 19 are formed. There is provided for each reservoir ink discharge port 19, a valve and cylinder body element 20, the enlarged upper end of which is rotatable in a bore 21 formed in the trough bottom 15, and a reduced shank portion 22 which is rotatable in a bore 23 formed in a bottom plate 24, upon which the enlarged upper end 20 of the valve member rests. The valve body member is sealed to the plate 24 as by means of an O-ring 25. Fixed to the lower and further reduced end 26 of the valve body member, is a gear 27 serving to rotate the same, and a cylinder bore 28 in which a piston plunger 29 reciprocates, and which communicates with the passage 14 is formed in the valve body member and is concentric with the bores 21 and 23 previously mentioned.

The valve action is obtained by oscillating or limitedly turning the valve and cylinder bodies 20 between the position shown in FIGS. 1 and 2 and the position shown in FIG. 3. As seen in FIG. 1, the head of the valve body 20 is provided with a side opening or port 30, through which ink may pass from the cylinder bore 28 to the

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passage 14 and thence to the ink rail. When the valve body is turned to the position shown in FIG. 3, the port 30 is closed off by the wall of bore 21, and an upper port 31 in the valve body is brought into registry with the port 19 in the plate 18 at the bottom of the ink reservoir. The latter position is a suction or filling position for the cylinders 28.

The valve bodies are rocked back and forth in unison by means of a rack assembly that comprises rack 32 secured to a bar 33 which is slidably supported by a plurality of guides 33' (FIG. 1), which are secured to the bottom plate 24. An arm 35' is secured to the bar 33, and carries a cam following roller 35 that engages a groove 36 (FIG. 2) in the periphery of a cam 34. The cam 34 is secured to a shaft 37 and when this shaft is rotated, the rack assembly is reciprocated thereby oscillating the cylinder body elements 20. The cam shaft 37 is coupled through gears 38 and 39 to a piston driving cam shaft 40, the structure and functioning of which will now be described.

Rotatably mounted at the lower end of each piston plunger 29 is a cam following roller 41 which rides on a cam 42 and is pressed thereagainst by a bell crank lever 43, pivoted at 44 and urged by a spring 45 mounted on a screw adjustable poppet rod 46. An adjusting nut 47 on a screw threaded rod 46, serves as a stop for limiting the clockwise or downward movement of bell crank 43 and, hence, of the plunger 29.

The entire assembly below the reservoir bottom 15 is enclosed in a tight housing structure 50, preferably filled with oil which provides complete lubrication for the parts and prevents entry of ink from the reservoir.

The sequence of operation may best be understood by referring to FIGS. 4 and 5, and involves for each piston plunger and its cooperating valve body a suitably timed cycle of movements. With respect to each piston plunger 29, the cam 42 is shaped so that during the first 90° of rotation clockwise from the 0° point of FIG. 5, the plunger is on a rise of the cam and completes its discharge stroke. During the next 90° of rotation, the plunger is on a high dwell, remaining in raised position. During the third 90° of rotation, the plunger moves downwardly accomplishing the suction stroke and during the fourth 90° of rotation, it remains upon the low dwell. There is thus provided 180° of the plunger cam shaft rotation during which the necessary valve movement may be accomplished.

Referring again to FIG. 5, during the first 90° of plunger cam shaft rotation, the rack will dwell, the valve body being then in the position of FIGS. 1 and 2, to permit discharge of the ink to the ink rail and ink drum. This dwell in the rack movement is prolonged slightly and for a degree or so before and after the rise of the plunger drive cam, so that the discharge port will be fully opened before the plunger stroke starts and remains so until the plunger stroke is completed. The rack accomplishes its movement to shift the valve body ports to the position of FIG. 3 during the next 88° of movement, so that the ports are in full communication with the ink reservoir space 17 at the time the descending or suction stroke of the plunger commences. During this stroke and for a degree before and after the same, the rack cam following roller 35 is on a dwell, so that the suction ports are fully open during the suction strokes of the pistons. During the fourth part of the cycle, the rack 32 accomplishes its return movement, while the plungers are on their low dwells, this rack movement again occurring during 88° of the cycle.

By turning screws 46, the suction stroke of any desired plunger may be shortened, thus reducing the quantity of ink supplied by a given plunger to its associated conduit 14, providing full control for the quantity of ink

supplied to each conduit 14 for use in the corresponding column width of the printing or plate cylinder.

As will be apparent from FIGS. 1 and 2, the space 17 within the reservoir walls 16 is open and unobstructed and is available to accommodate any desired agitating devices, or installation of partitions or "fountain dividers" to permit the use of different colored inks. The seal of plates 18 and 24 to the plate 25 around the bores 21, being a static seal or joint, may be made absolutely ink tight without difficulty. Since the bodies 20 rotate or rock about fixed vertical plunger reciprocating axes, and the longitudinal component of this movement is only a fraction (one third or so, as is apparent from FIG. 2), and the considerable spacing between the plungers 29, there is practically no tendency for ink to creep from the passages of any pump to those of another. By eliminating any longitudinal or transverse movement of the piston cylinder assemblies, the structure throughout is very much simplified and the amount of power required for moving the parts, as opposed to that required for the pumping of the ink itself, is markedly reduced. The seal by means of O-rings 25 and the seal of the piston plungers 29 to cylinder walls 28 is readily made highly efficient, so there is no appreciable tendency for ink or oil to leak past these sealing points. Thus when partitions are installed in the reservoir, ink of one color may be placed on one side of the partition and ink of another on the other side and there will be no mixing of the colors as printed.

What is claimed is:

1. Printing machine ink pumping mechanism comprising an ink reservoir, an aligned plurality of pumps and discharge conduits for pumping ink therefrom to an ink rail, each pump comprising reciprocating piston and cylinder pumping means, and a valve body rotatable about the piston axis and having an axial port communicating with the cylinder and a port in its upper surface connecting the pumping means to the reservoir in one position of the valve body and a second port in its side surface connecting the pumping means to a discharge conduit in another position, each valve body comprising a gear for rotating it, a rack meshing with the said gears, means for reciprocating the rack to move the valve bodies between the two said positions, and means for operating the pumping means in timed relation to the valve bodies.

2. Printing machine ink pumping mechanism comprising an ink reservoir, an aligned plurality of pumps and discharge conduits for pumping ink therefrom to an ink rail, each pump comprising reciprocating piston and cylinder pumping means, and a valve body rotatable about the piston axis and having an axial port communicating with the cylinder and a port in its upper surface connecting the pumping means to the reservoir in one position of the valve body and a second port in its side surface connecting the pumping means to a discharge conduit in another position, each valve body comprising a gear for rotating it, a rack meshing with the said gears, cam means for reciprocating the rack to move the valve bodies between the

two said positions, and further cam means for operating the pumping means in timed relation to the valve bodies.

3. Printing machine ink pumping mechanism according to claim 2, in which the two said cam means have dwells out of phase with each other, whereby the pumping means is active when the ports are fully open and inactive while the ports are opening and closing.

4. Printing machine ink pumping mechanism comprising an ink reservoir having a plurality of discharge ports in its bottom and a corresponding plurality of ink discharge conduits, a pumping means for each said discharge port comprising a member rotatable about a vertical axis, the lower part of the member comprising a pump cylinder concentric with the said axis and the upper part comprising a valve body also concentric about the said axis, having a passage connecting a said discharge port to the cylinder in one rotative position of the member and a passage connecting a said conduit to the said cylinder in another position thereof, a piston reciprocable in the cylinder, means for reciprocating the said pistons and moving the said members between their two said positions in timed relation for pumping the ink, a lubricant housing enclosing the said pumping means and cam means, and means sealing the valve members to the reservoir bottom for preventing intermixture of ink and lubricant.

5. Printing machine ink pumping mechanism comprising an ink reservoir having a plurality of discharge ports in its bottom and a corresponding plurality of ink discharge conduits, a pumping means for each said discharge port comprising a member rotatable about a vertical axis, the lower part of the member comprising a pump cylinder concentric with the said axis, an intermediate part having external gear teeth and the upper part comprising a valve body also concentric about the said axis, having a passage connecting a said discharge port to the cylinder in one rotative position of the member and a passage connecting a said conduit to the said cylinder in another position thereof, a piston reciprocable in the cylinder, cam means for reciprocating the said pistons, and a rack meshing with the said gear teeth for moving the said members between their two said positions in timed relation for pumping the ink.

6. Printing machine ink pumping mechanism according to claim 5, comprising also a lubricant housing enclosing the said pumping means, cam means and rack, and means sealing the valve member to the reservoir bottom for preventing intermixture of ink and lubricant.

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