March 23, 1954 H. J. LUEHRS 2,672,812

INK PUMPING MECHANISM FOR ROTARY PRINTING PRESSES

Filed Nov. 24, 1951 4 Sheets-Sheet 1

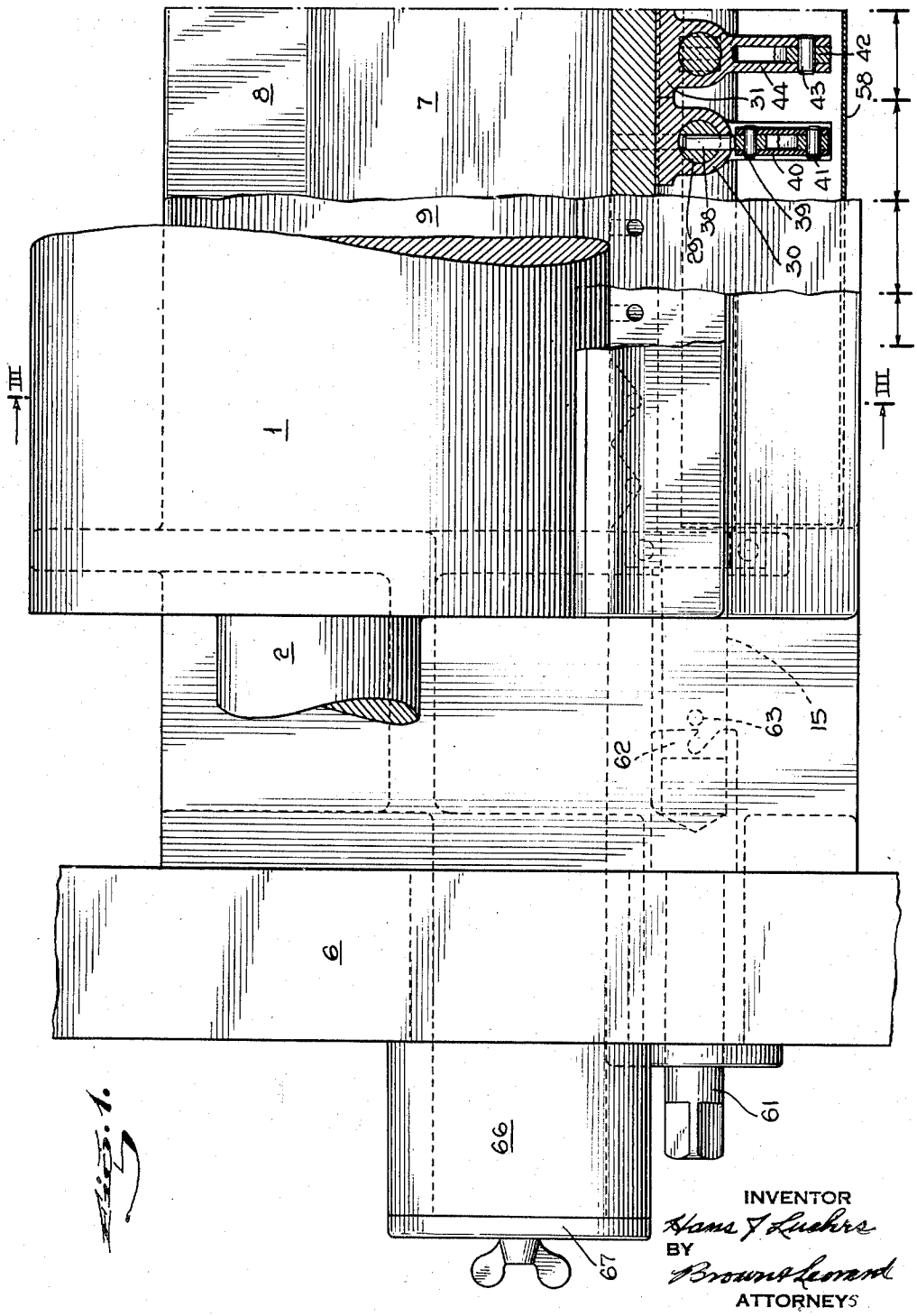


Fig. 1.

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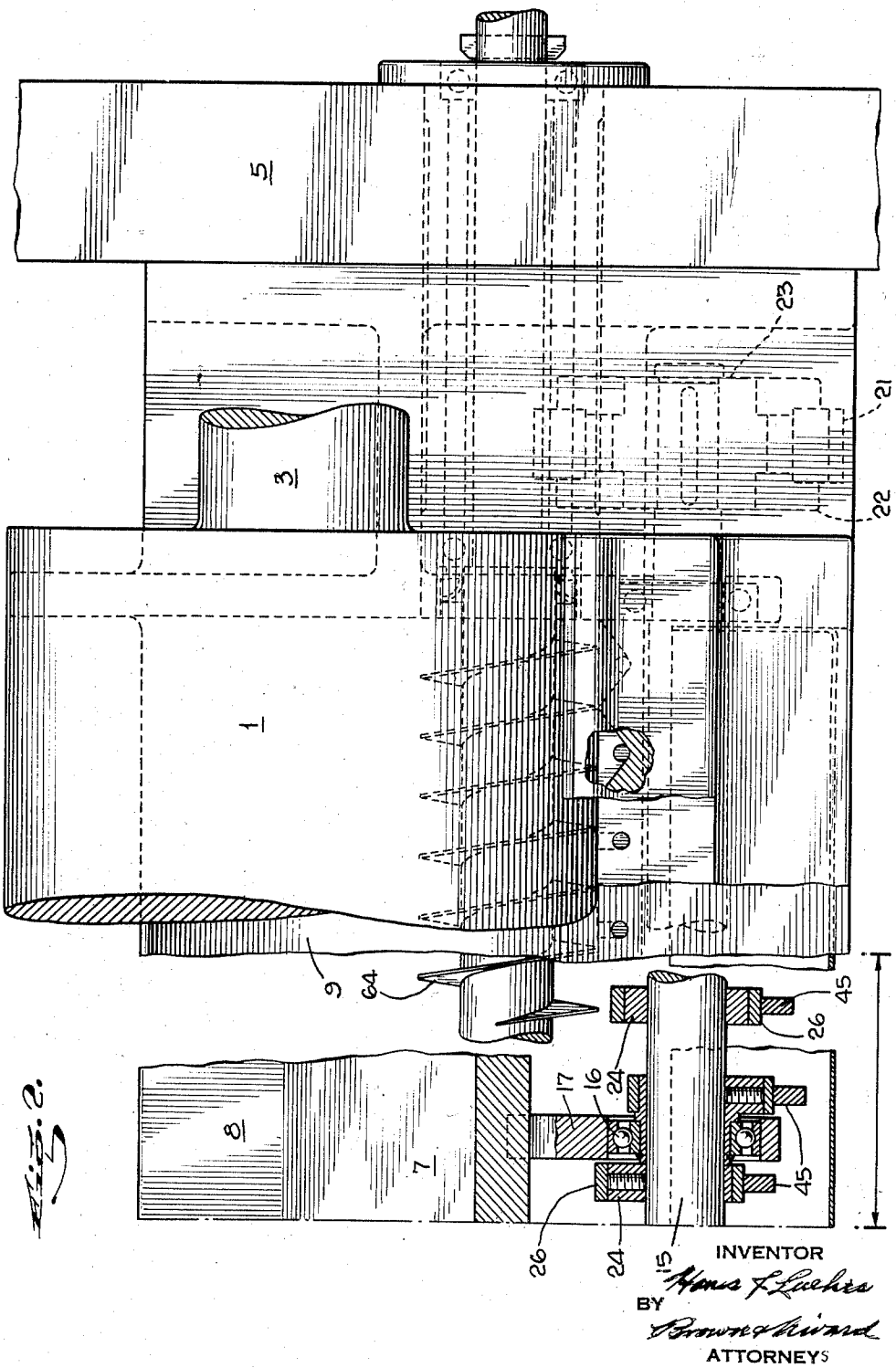


Fig. 2.

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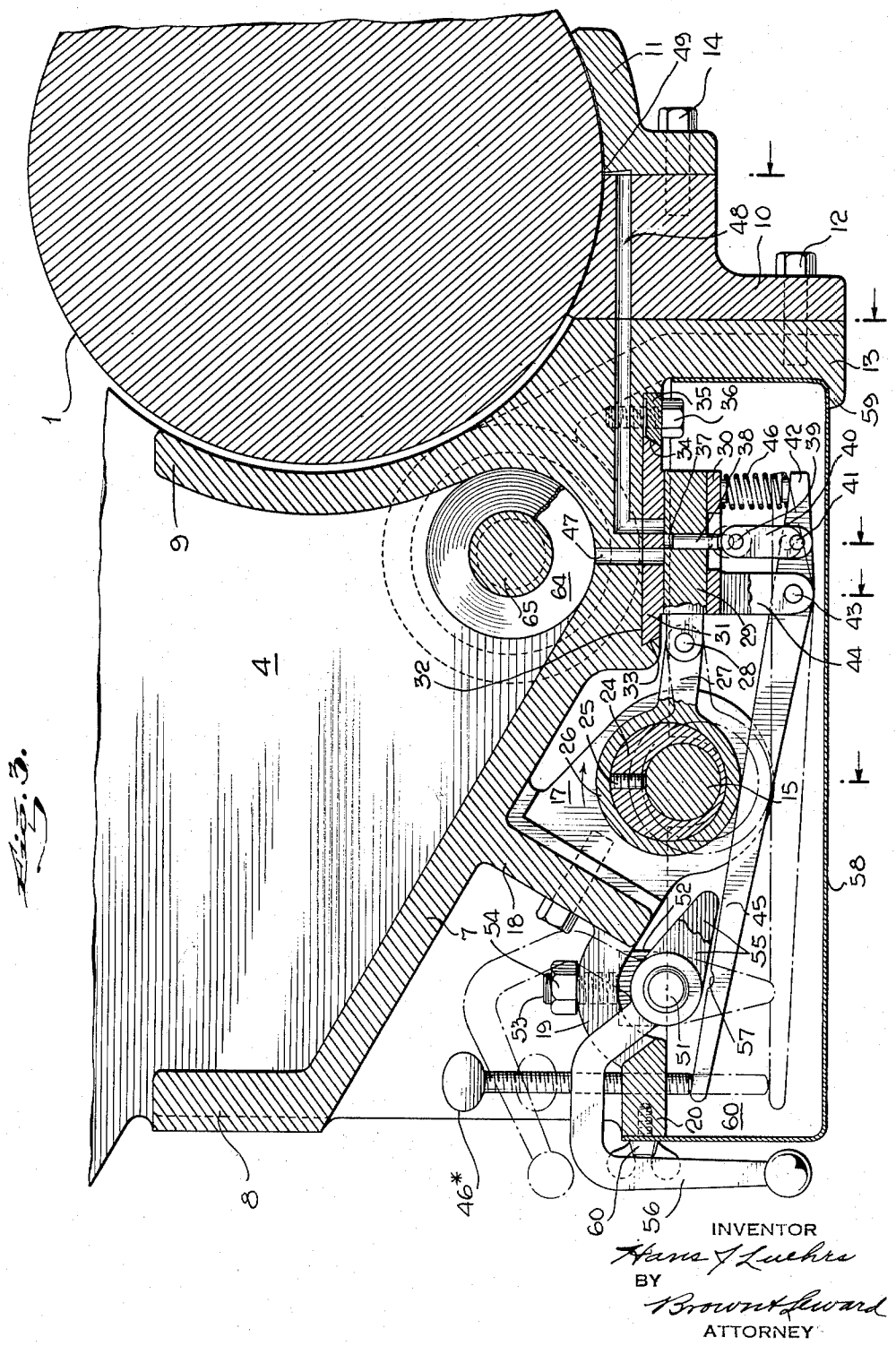


Fig. 3.

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INK PUMPING MECHANISM FOR ROTARY PRINTING PRESSES

Filed Nov. 24, 1951 4 Sheets-Sheet 4

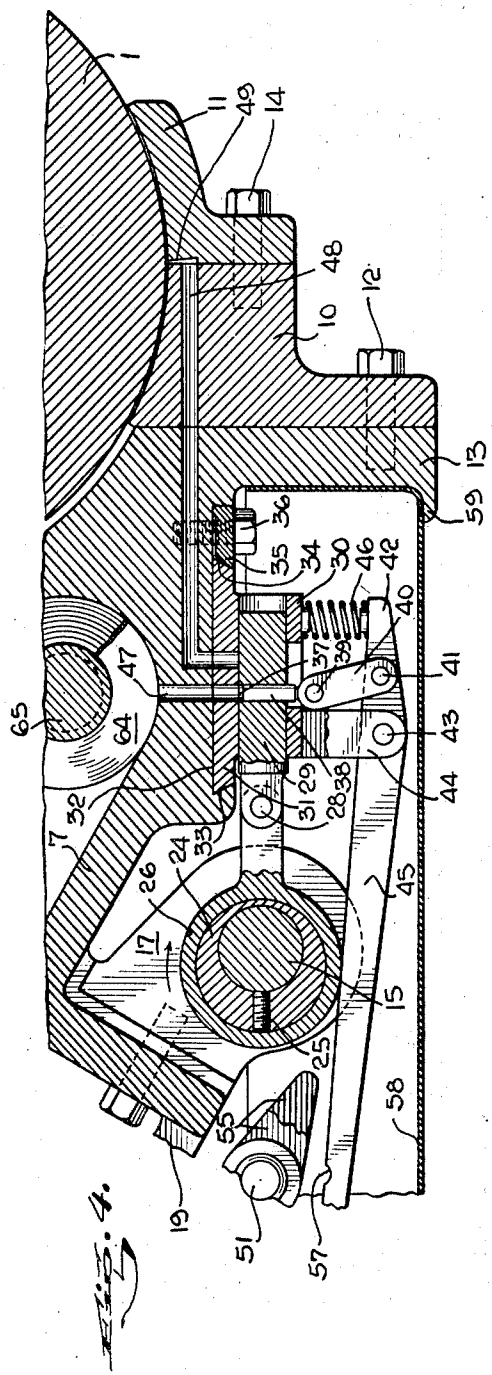


Fig. 4.

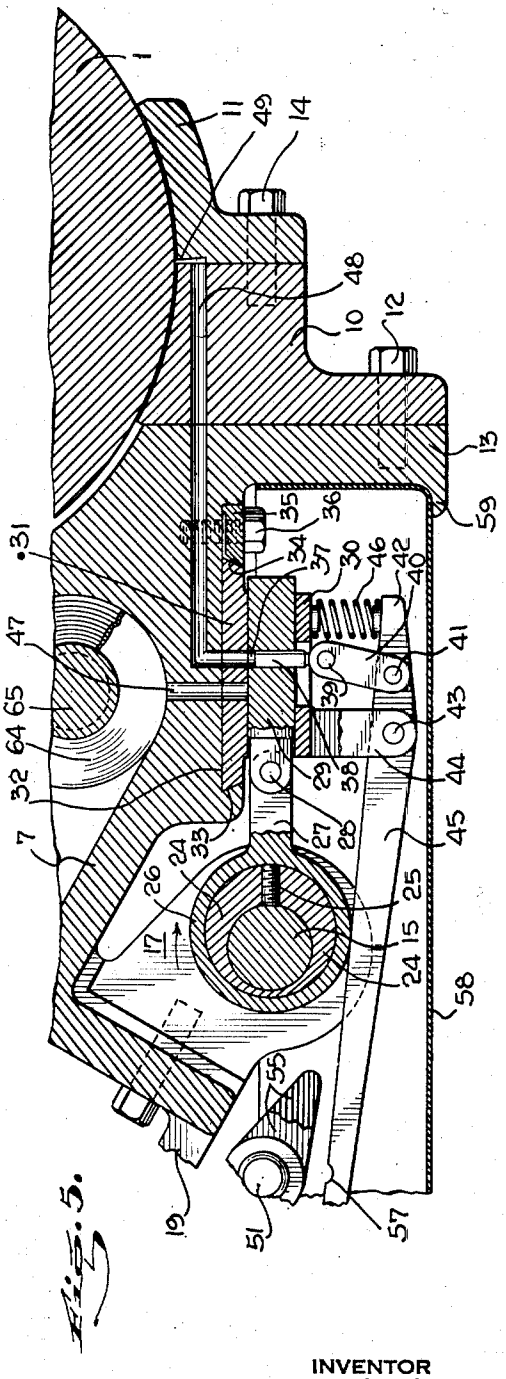


Fig. 5.

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Patented Mar. 23, 1954 2,672,812

UNITED STATES PATENT OFFICE

2,672,812

INK PUMPING MECHANISM FOR ROTARY PRINTING PRESSES

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Application November 24, 1951, Serial No. 258,053

16 Claims. (Cl. 101—366)

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My invention is directed to certain improvements in inking mechanism for rotary printing presses of the type where the ink is pumped in regulable quantities from an ink supply tank to an ink distribution cylinder.

One object of my invention is to provide individually detachable ink pumping units of novel construction in which each of the pumping units includes a novel combined valve and plunger motion which may be timed with respect to the other pumping units to ensure a uniform flow of power and a continuous supply of ink to the ink distribution cylinder from an ink supply tank.

Another object is to provide a single shaft for driving all of the pumping units.

Another object is to provide novel means for independently adjusting the ink pumping units to ensure the proper amount of ink supply from each pumping unit.

Another object is to provide novel means for independently silencing a group of ink pumping units.

Another object is to provide for a slight reciprocation of the valve plungers, when the supply of ink is cut off, to prevent the sticking of the parts due to the hardening of the ink.

Another object is to provide means whereby the working parts are partially submerged in a lubricant to minimize corrosive action of the ink on the said working parts.

Another object is to provide vertically disposed flared ink discharge nozzles for directing the ink upwardly against the bottom of the ink distribution cylinder where the ink will be most effective in covering the surface of the cylinder and will prevent drainage after the supply is cut off.

Another object is to provide a novel vertically divided ink rail in which the upwardly flared ink discharge nozzles will be located in the inner face of the removable outer ink rail member for ready cleaning of the nozzles and the ink discharge passages.

Another object is to provide an efficient device for agitating the ink in the ink supply tank, especially where heavy inks are employed, the said agitator being readily removable endwise through the drainage outlet of the ink supply tank.

A practical embodiment of my invention is represented in the accompanying drawings in which:

Fig. 1 represents a detail front view, partly in section, of the work side of my improved inking mechanism;

Fig. 2 represents a similar view of the gear side of the inking mechanism;

Fig. 3 represents a detail vertical cross section

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taken in the plane of the line III—III of Fig. 1 looking in the direction of the arrows, the pumping valve being shown at the middle of its stroke with the valve port located between and cut off from both the ink supply passage and the ink discharge passage;

Fig. 4 represents a similar detail section with the valve in its position to open its valve port to the ink supply passage and cut off from the ink discharge passage;

Fig. 5 represents a similar detail section with the valve port open to the ink discharge passage and cut off from the ink supply passage.

The ink distribution cylinder is denoted by 1 and its end shafts by 2, 3, which cylinder may be of either the vibrating or non-vibrating type, as desired.

The ink supply tank 4 extends along one side of the ink distribution cylinder 1 between the side frames 5, 6. The bottom 7 of the tank 4 is inclined downwardly and inwardly from the outer vertical side 8 toward the said ink distribution cylinder 1. The inner uprising side 9 of the ink supply tank is curved to conform to the adjacent side of the cylinder 1 and is spaced a short distance therefrom.

The ink rail, which is located beneath the ink distribution cylinder 1 is divided vertically into inner and outer ink rail members 10, 11; the concave tops of which members conform to and are slightly spaced from the bottom of the ink distribution cylinder 1 to permit the ink which is pumped thereto to be retained thereon.

The inner rail member 10 may be secured by bolts 12 to the outer vertical face of the dependent flange 13 of the ink supply tank 4 and the outer rail member 11 may be removably secured by bolts 14 to the outer vertical face of the inner rail member 10.

The ink pumping units are located beneath and exterior to the ink supply tank 4. These pumping units are preferably arranged in aligned groups.

The rotary shaft 15 for driving all of the ink pumping units is mounted, preferably by antifriction bearings 16, in brackets 17 secured to the upper flange member 13 depending from the bottom 7 of the ink supply tank 4, which upper flange member 13 is connected by bridges 19 to the lower flange member 20.

This rotary shaft 15 is shown as driven from an overrunning gear 21 fast on the outer member 22 of a clutch, the inner clutch member 23 being fast on the said shaft 15. This overrunning gear 21 may be driven at the desired speed from any suitable source of power, not shown herein.

As the ink pumping units are the same in con-

struction, arrangement and operation, one only of said pumping units will be specifically described herein.

Each ink pumping unit includes an eccentric 24 which is secured, as by a set screw 25, in the proper rotative position with respect to the eccentrics of the other pumping units of a group to avoid torque complications. A strap 26 surrounds the eccentric 24, the free end of the strap arm 27 being pivoted at 28 to the adjacent end of a horizontally disposed valve 29 slidable in the valve casing 30, which casing may be secured to the bottom of the ink supply tank 4 as follows:

This valve casing 30 is surmounted by a base 31 which is held securely in a shallow groove 32 in the underside of the ink supply tank 4, by beveling the outer and inner edges of the base as shown at 33 and 34. The outer beveled edge 33 of the base is engaged by the reverse beveled outer wall of the shallow groove 32 and the inner beveled edge 34 of the base is engaged by the beveled edge of a filler piece 35 secured in said groove by a screw bolt 36.

This slide valve 29, which is herein shown as cylindrical in cross section, is provided with a vertical valve port 37 therethrough for the reception of a sliding plunger 38 which is pivoted at 39 to the upper end of a swinging link 40, the lower end of which link is pivoted at 41 to the inner short arm 42 of a rock lever pivoted at 43 between a pair of lugs 44 depending from the valve casing 30. The long arm 45 of the said rock lever is normally held by a spring 46 against the lower end of an adjusting thumb screw 46* in position to be engaged by the eccentric strap 26, said coil spring 46 being located between the bottom of the valve casing 30 and the short lever arm 42. This adjusting screw 46* is threaded through one of the flange members 20, and may be turned to rock the lever arm 45 downwardly away from the eccentric strap 26 to vary the stroke of the plunger 38 in the valve port 37, as clearly shown in Fig. 3.

A short vertical ink supply passage 47 leads downwardly from the interior of the ink supply tank 4 to the upper side of the sliding valve 29 in position to coincide with the valve port 37 when the valve 29 is moved to the limit of its inward movement toward the shaft 15.

The ink discharge passage 48 leads upwardly from the upper side of the said sliding valve 29 and thence horizontally through the ink supply tank and the inner ink rail 10 to an upwardly flared ink discharge nozzle 49 in the adjacent vertical wall of the removable outer ink rail member 11. The inner end of this ink discharge passage 48 is positioned to coincide with the valve port 37 when the valve 29 is moved to the limit of its outward movement away from the rotary shaft 15.

The manually operated means for silencing a page group of the pumping units simultaneously is constructed, arranged and operated as follows:

A rock shaft 51 is provided for each group of pumping units, which shaft is mounted in two spaced bearing brackets suspended from two of the flange bridges 19 by bolts 53 and their nuts 54.

A plurality of lever arms 55 (one for each pumping unit) are fixed on the rock shaft 51 in position to be swung by a single hand lever 56, also fixed to the rock shaft 51, to engage and depress the lever arms 45 out of contact with eccentric straps 26 and hold the lever arms in their depressed positions. This downward movement of the lever arms 45 will raise the short lever arms 42 thereby causing the valve plungers 38 to be lifted to a position which will substantially close the valve ports 37. These lever arms 45 may be provided with recesses 57, if desired, to releasably retain the lever arms 45 in their depressed positions.

It will be noted that when the pumping units are silenced to prevent the pumping of ink to the ink distribution cylinder 1 the reciprocation of the valves 29 will rock the plunger link 40 to slightly reciprocate the plungers 38 for imparting a pulsing action on the ink in the supply and discharge passages 47, 48 to prevent solidification of the ink therein, thereby eliminating the necessity for frequent cleaning of said passages.

An oil tank 58 is located beneath the ink supply tank 4 in position to lubricate all the ink pumping units and to protect their bearing surfaces from the injurious action of certain inks. This oil tank 58 is shown as being removably supported along its inner side by a flange 59 projecting outwardly from the bottom of the depending flange 13. The outer side of this oil tank is shown as removably secured to the flange member 20 by thumb screws 60.

The means which I have shown for manually turning the rotary shaft 15 when desired to force an initial supply of ink to the ink distribution cylinder 1 comprises a crank operated additional shaft 61 which is aligned with the shaft 15, said additional shaft 61 having a one way clutch 62, 63 for operatively connecting the adjacent ends of the two shafts 61 and 15.

With heavy ink it may be necessary to provide means for agitating the ink in the ink supply tank 4 when the printing press is in operation. The agitator which I have shown for this purpose comprises a screw conveyor 64 extending along the lowest part of the ink supply tank 4, from end to end thereof, the adjacent walls of the bottom of the tank being curved to conform to the periphery of the screw conveyor 64. The shaft 65 of the agitator may be turned from any suitable power means, not shown herein. When the press is shut down the screw conveyor 64 may be used also to expel heavy pigmented inks from the ink supply tank 4 through the drainage hole 66 at one end of the ink supply tank 4. This screw conveyor 64 may also be removed through said drainage hole 66 to facilitate the cleaning of the tank 4. A suitable removable cover 67 may be provided for closing said ink drainage hole 66.

In operation, the eccentrics 24 may be rotatably adjusted around their shaft 15 so that a substantially continuous flow of ink will be pumped to the ink distribution cylinder 1.

The throw of the valve plungers 38 may also be adjusted by use of the thumb screws 46 which engage the arms 45 of the rock levers which reciprocate the plungers 38, thereby supplying the ink in regularable quantities to the ink distribution cylinder 1. The rotation of the shaft 15 will cause each pump valve 29 to reciprocate to bring its port 37 into alternate communication with the ink supply passage 47 and the ink discharge passage 48. While valve port 37 is open to the ink supply passage 47, the valve plunger 38 will be withdrawn to fill the valve port 37 with ink from the supply tank 4 by suction. As the valve 29 advances to bring the valve port 37 into communication with the discharge passage 48 the upward movement of the plunger 38 will force the ink through the said discharge passage 48 to and through the upwardly flared

nozzle 49 to the bottom of the ink distribution cylinder 1. It will be noted that the eccentric strap 26 not only reciprocates the valve 29 but also rocks the lever arms 45, 42, to reciprocate the plunger 38. When it is desired to silence a group of the ink pumping units the hand lever 56 is raised to the position shown by dotted lines in Fig. 3, thereby causing the arms 55 to engage and depress the rock lever arms 45 out of contact with the eccentric straps 26.

When the supply of ink is cut off, the continued reciprocation of the valves 29 by the rotation of the eccentrics 24 will be sufficient to cause the links 40 to slightly reciprocate the plungers 38 and thereby prevent the sticking of the parts due to the hardening ink.

It will be understood that various changes may be resorted to in the form, construction and arrangement of the several parts without departing from the spirit and scope of this invention and hence it is not intended to be limited to the particular embodiment shown and described herein.

What I claim is:

1. An ink distribution cylinder, an ink rail extending along the bottom of the cylinder, an ink supply tank extending along the side of the cylinder substantially the length thereof, a plurality of ink pumping units located beneath said tank, each pumping unit including a horizontal valve disposed at right angles to the cylinder and having a vertical cross-port therethrough, a plunger therein, an ink supply passage leading downwards through the bottom of the tank to the upper side of the valve and an ink discharge passage leading from the upper side of the valve through the tank and ink rail to the bottom of the cylinder, and means for reciprocating said valve and plunger to draw the ink from the tank and to force the ink upwards to the bottom of the cylinder.

2. An ink distribution cylinder, an ink rail having its top wall curved to conform to the bottom of the cylinder, an ink supply tank having its inner uprising wall curved to conform to the side of the cylinder substantially the length thereof, a plurality of ink pumping units located beneath said tank, each pumping unit including a horizontal valve disposed at right angles to the cylinder and having a vertical cross-port therethrough, a plunger therein, an ink supply passage leading downwards through the bottom of the tank to the upper side of the valve and an ink discharge passage leading from the upper side of the valve through the tank and ink rail to the bottom of the cylinder, and means for reciprocating said valve and plunger to draw the ink from the tank and to force the ink upwards to the bottom of the cylinder.

3. An ink distribution cylinder, an ink rail extending along the bottom of the cylinder, an ink supply tank extending along the side of the cylinder substantially the length thereof, a plurality of ink pumping units located beneath said tank, each pumping unit including a horizontal valve disposed at right angles to the cylinder and having a vertical cross-port therethrough, a plunger therein, an ink supply passage leading downwards through the bottom of the tank to the upper side of the valve and an ink discharge passage leading from the upper side of the valve through the tank and ink rail to the bottom of the cylinder, and means for reciprocating said valve and plunger to draw the ink from the tank and to force the ink upwards to the bottom of the cylinder, said ink pumping units being separately detachable.

4. An ink distribution cylinder, an ink rail extending along the bottom of the cylinder, an ink supply tank extending along the side of the cylinder substantially the length thereof, a plurality of ink pumping units located beneath said tank, each pumping unit including a horizontal valve disposed at right angles to the cylinder and having a vertical cross-port therethrough, a plunger therein, an ink supply passage leading downwards through the bottom of the tank to the upper side of the valve and an ink discharge passage leading from the upper side of the valve through the tank and ink rail to the bottom of the cylinder, and means for reciprocating said valve and plunger to draw the ink from the tank and to force the ink upwards to the bottom of the cylinder, said ink pumping units being separately operated.

5. An ink distribution cylinder, an ink rail extending along the bottom of the cylinder, an ink supply tank extending along the side of the cylinder substantially the length thereof, a plurality of ink pumping units located beneath said tank, each pumping unit including a horizontal valve disposed at right angles to the cylinder and having a vertical cross-port therethrough, a plunger therein, an ink supply passage leading downwards through the bottom of the tank to the upper side of the valve and an ink discharge passage leading from the upper side of the valve through the tank and ink rail to the bottom of the cylinder, and means for reciprocating said valve and plunger to draw the ink from the tank and to force the ink upwards to the bottom of the cylinder, said supply and discharge passages being located in the same vertical plane at right angles to said cylinder.

6. An ink distribution cylinder, an ink rail extending along the bottom of the cylinder, an ink supply tank extending along the side of the cylinder substantially the length thereof, a plurality of ink pumping units located beneath said tank, each pumping unit including a horizontal valve disposed at right angles to the cylinder and having a vertical cross-port therethrough, a plunger therein, an ink supply passage leading downwards through the bottom of the tank to the upper side of the valve and an ink discharge passage leading from the upper side of the valve through the tank and ink rail to the bottom of the cylinder, and means for reciprocating said valve and plunger to draw the ink from the tank and to force the ink upwards to the bottom of the cylinder, said means including a rotary shaft, an eccentric thereon connected to said valve, and a lever connected to said plunger and positioned to be rocked by said eccentric.

7. An ink distribution cylinder, an ink rail extending along the bottom of the cylinder, an ink supply tank extending along the side of the cylinder substantially the length thereof, a plurality of ink pumping units located beneath said tank, each pumping unit including a horizontal valve disposed at right angles to the cylinder and having a vertical cross-port therethrough, a plunger therein, an ink supply passage leading downwards through the bottom of the tank to the upper side of the valve and an ink discharge passage leading from the upper side of the valve through the tank and ink rail to the bottom of the cylinder, and means for reciprocating said valve and plunger to draw the ink from the tank and to force the ink upwards to the bottom of the cylin-

der, said means including a rotary shaft, an eccentric thereon connected to said valve, and a spring-pressed rock-lever connected to said plunger and positioned to be rocked by said eccentric.

8. An ink distribution cylinder, an ink rail extending along the bottom of the cylinder, an ink supply tank extending along the side of the cylinder substantially the length thereof, a plurality of ink pumping units located beneath said tank, each pumping unit including a horizontal valve disposed at right angles to the cylinder and having a vertical cross-port therethrough, a plunger therein, an ink supply passage leading downwards through the bottom of the tank to the upper side of the valve and an ink discharge passage leading from the upper side of the valve through the tank and ink rail to the bottom of the cylinder, and means for reciprocating said valve and plunger to draw the ink from the tank and to force the ink upwards to the bottom of the cylinder, said means including a rotary shaft, an eccentric thereon connected to the said valve, a lever having one arm positioned to be rocked by said eccentric, and a link pivotally connecting the other arm of the lever to the plunger.

9. An ink distribution cylinder, an ink rail extending along the bottom of the cylinder, an ink supply tank extending along the side of the cylinder substantially the length thereof, a plurality of ink pumping units located beneath said tank, each pumping unit including a horizontal valve disposed at right angles to the cylinder and having a vertical cross-port therethrough, a plunger therein, an ink supply passage leading downwards through the bottom of the tank to the upper side of the valve and an ink discharge passage leading from the upper side of the valve through the tank and ink rail to the bottom of the cylinder, and means for reciprocating said valve and plunger to draw the ink from the tank and to force the ink upwards to the bottom of the cylinder, said means including a rotary shaft, an eccentric thereon connected to said valve and a lever connected to said plunger and positioned to be rocked by said eccentric, and an adjusting device for engaging said lever to vary its stroke.

10. An ink distribution cylinder, an ink rail extending along the bottom of the cylinder, an ink supply tank extending along the side of the cylinder substantially the length thereof, a plurality of ink pumping units located beneath said tank, each pumping unit including a horizontal valve disposed at right angles to the cylinder and having a vertical cross-port therethrough, a plunger therein, an ink supply passage leading downwards through the bottom of the tank to the upper side of the valve and an ink discharge passage leading from the upper side of the valve through the tank and ink rail to the bottom of the cylinder, and means for reciprocating said valve and plunger to draw the ink from the tank and to force the ink upwards to the bottom of the cylinder, said means including a rotary shaft, an eccentric thereon connected to said valve and a lever connected to said plunger and positioned to be rocked by said eccentric, and a device for engaging said lever to rock it out of contact with said eccentric to silence the pumping unit.

11. An ink distribution cylinder, an ink rail extending along the bottom of the cylinder, an ink supply tank extending along the side of the cylinder substantially the length thereof, a plurality of ink pumping units located beneath said tank, each pumping unit including a horizontal valve disposed at right angles to the cylinder and having a vertical cross-port therethrough, a plunger therein, an ink supply passage leading downwards through the bottom of the tank to the upper side of the valve and an ink discharge passage leading from the upper side of the valve through the tank and ink rail to the bottom of the cylinder, and means for reciprocating said valve and plunger to draw the ink from the tank and to force the ink upwards to the bottom of the cylinder, said means including a rotary shaft, an eccentric thereon connected to said valve and a lever connected to said plunger and positioned to be rocked by said eccentric, and a device for simultaneously engaging a plurality of said levers to swing them out of contact with their eccentrics for silencing the pumping units.

12. An ink distribution cylinder, an ink rail extending along the bottom of the cylinder, an ink supply tank extending along the side of the cylinder substantially the length thereof, a plurality of ink pumping units located beneath said tank, each pumping unit including a horizontal valve disposed at right angles to the cylinder and having a vertical cross-port therethrough, a plunger therein, an ink supply passage leading downwards through the bottom of the tank to the upper side of the valve and an ink discharge passage leading from the upper side of the valve through the tank and ink rail to the bottom of the cylinder, and means for reciprocating said valve and plunger to draw the ink from the tank and to force the ink upwards to the bottom of the cylinder, said means including a rotary shaft, an eccentric thereon connected to said valve and a lever connected to said plunger and positioned to be rocked by said eccentric, and a device for engaging said lever to vary its stroke, and a separate device for simultaneously engaging a plurality of said levers to swing them out of contact with their eccentrics for silencing the pumping units.

13. An ink distribution cylinder, an ink rail extending along the bottom of the cylinder, an ink supply tank extending along the side of the cylinder substantially the length thereof, a plurality of ink pumping units located beneath said tank, each pumping unit including a horizontal valve disposed at right angles to the cylinder and having a vertical cross-port therethrough, a plunger therein, an ink supply passage leading downwards through the bottom of the tank to the upper side of the valve and an ink discharge passage leading from the upper side of the valve through the tank and ink rail to the bottom of the cylinder, and means for reciprocating said valve and plunger to draw the ink from the tank and to force the ink upwards to the bottom of the cylinder, said means including a rotary shaft, an eccentric rotatably adjustable thereon, a strap surrounding the eccentric and pivoted to the adjacent end of the valve, and a lever having its outer arm rocked by contact with said strap, the inner arm of the lever being connected by a link to said plunger.

14. An ink distribution cylinder, an ink rail, an ink supply tank, a plurality of pumping units located beneath the ink supply tank, each pumping unit including a valve casing depending from the tank, a valve reciprocable in the casing at right angles to the cylinder and having a vertical cross-port, a plunger reciprocable therein, ink supply and discharge passages connecting the valve with the tank and cylinder respectively, and means for reciprocating said valve and

plunger including a rotary shaft mounted by said tank underneath the same, an eccentric on said shaft operatively connected to said valve, and a spring-pressed rock-lever pivoted to said valve casing and having one arm connected to the said plunger, the other arm of said lever being positioned to be rocked by said eccentric.

15. An ink distribution cylinder, an ink supply tank having an ink drainage hole through one end thereof, a plurality of pumping units for drawing the ink from the said tank and forcing it to said cylinder, and a rotary agitator of the screw conveyor type located along the lowest part of the ink supply tank for agitating the ink therein, said agitator being separately operable, when the pumping units are silenced, to expel the ink remaining in the tank, through said drainage hole.

16. An ink distribution cylinder, an ink supply tank having an ink drainage hole through one end thereof, a plurality of pumping units for drawing the ink from the said tank and forcing it to said cylinder, and a rotary agitator of the screw conveyor type located along the lowest part of the ink supply tank for agitating the ink therein, said agitator being separately operable, when the pumping units are silenced, to expel the ink remaining in the tank, through said drainage hole, the agitator being also removable through the drainage hole to facilitate the cleaning of the tank when so desired.

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References Cited in the file of this patent

UNITED STATES PATENTS

Number	Name	Date
1,214,856	White	Feb. 6, 1917
1,311,198	White	July 29, 1919
1,427,853	Roesen	Sept. 5, 1922
1,583,172	Phythian	May 4, 1926
1,642,809	Granger	Sept. 20, 1927
1,988,454	Lamatsch	Jan. 22, 1935
2,053,297	Nittel	Sept. 8, 1936
2,053,542	Vandervoort	Sept. 8, 1936
2,479,103	Dorr	Aug. 16, 1949