

Oct. 23, 1934.

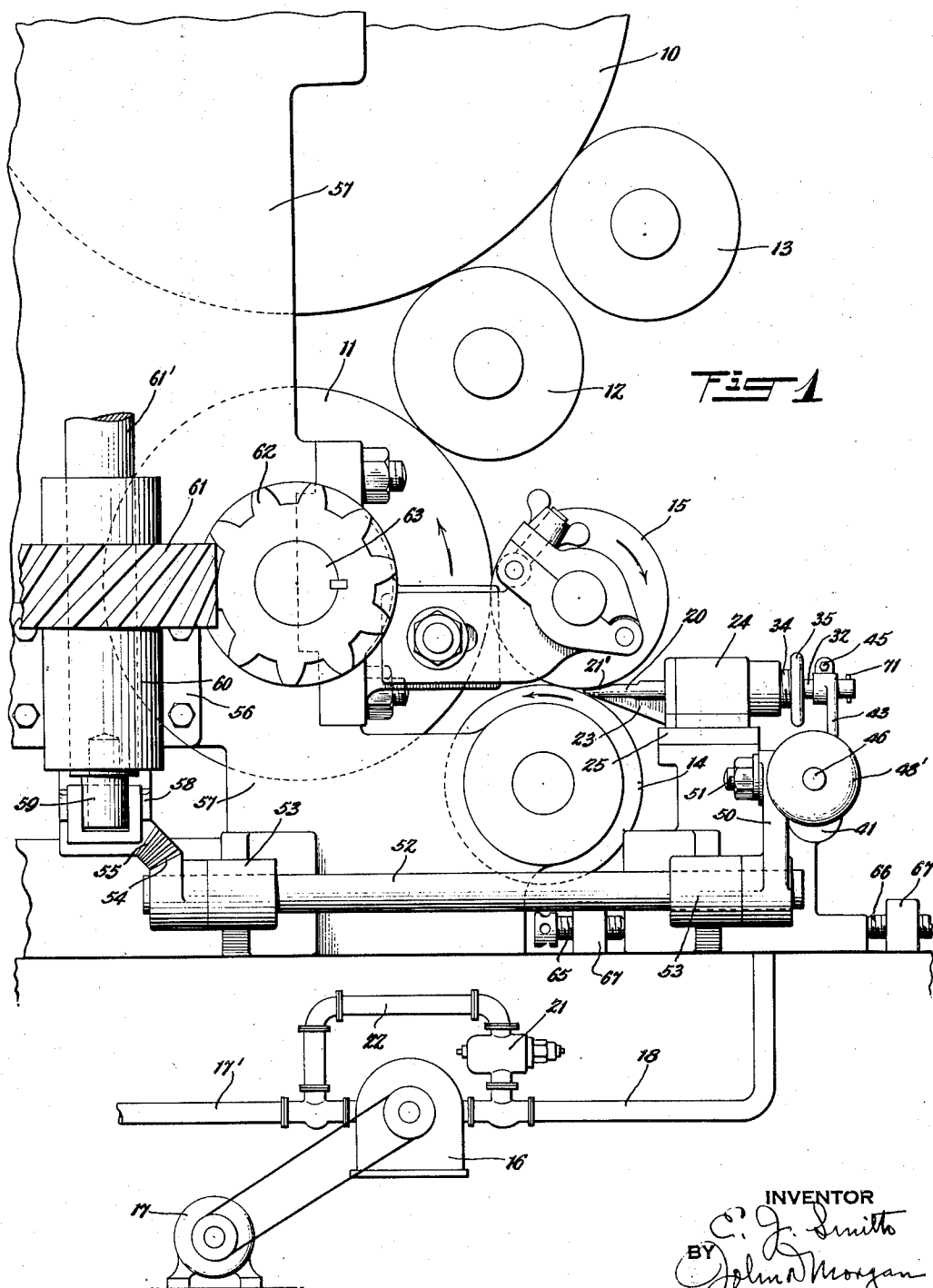
E. J. SMITH

1,978,285

INKING MECHANISM

Filed March 11, 1932

7 Sheets-Sheet 1



Oct. 23, 1934.

E. J. SMITH
INKING MECHANISM

1,978,285

Filed March 11, 1932

7 Sheets-Sheet 2

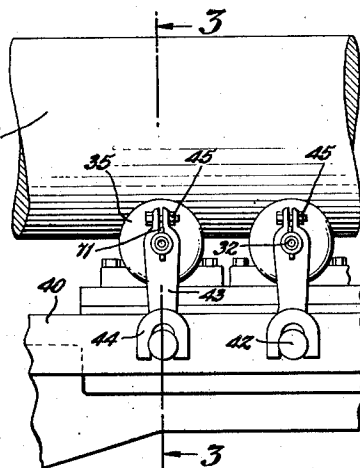
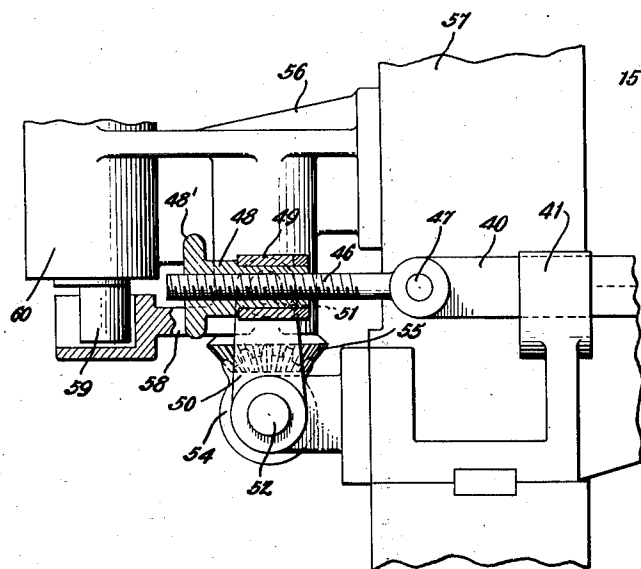


Fig 2

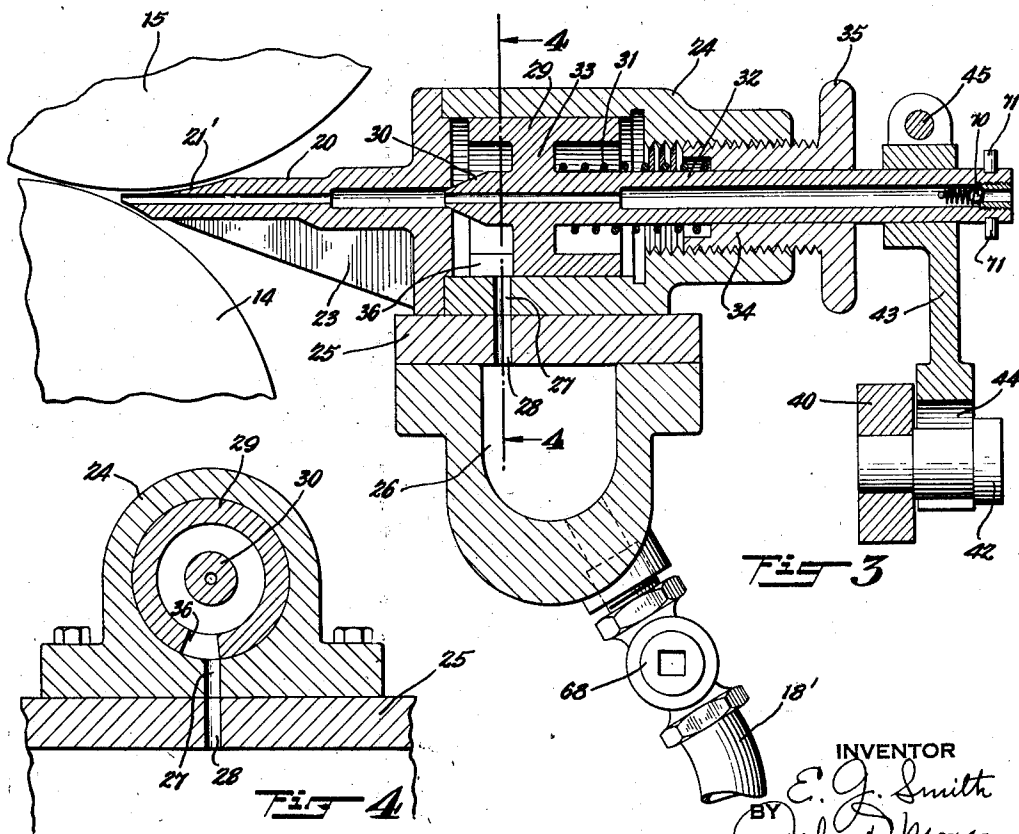


Fig 3

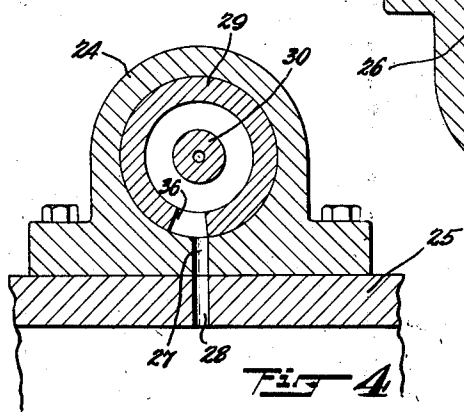


Fig 4

INVENTOR
E. J. Smith
BY John D. Morgan
ATTORNEY

Oct. 23, 1934.

E. J. SMITH

1,978,285

INKING MECHANISM

Filed March 11, 1932

7 Sheets-Sheet 3

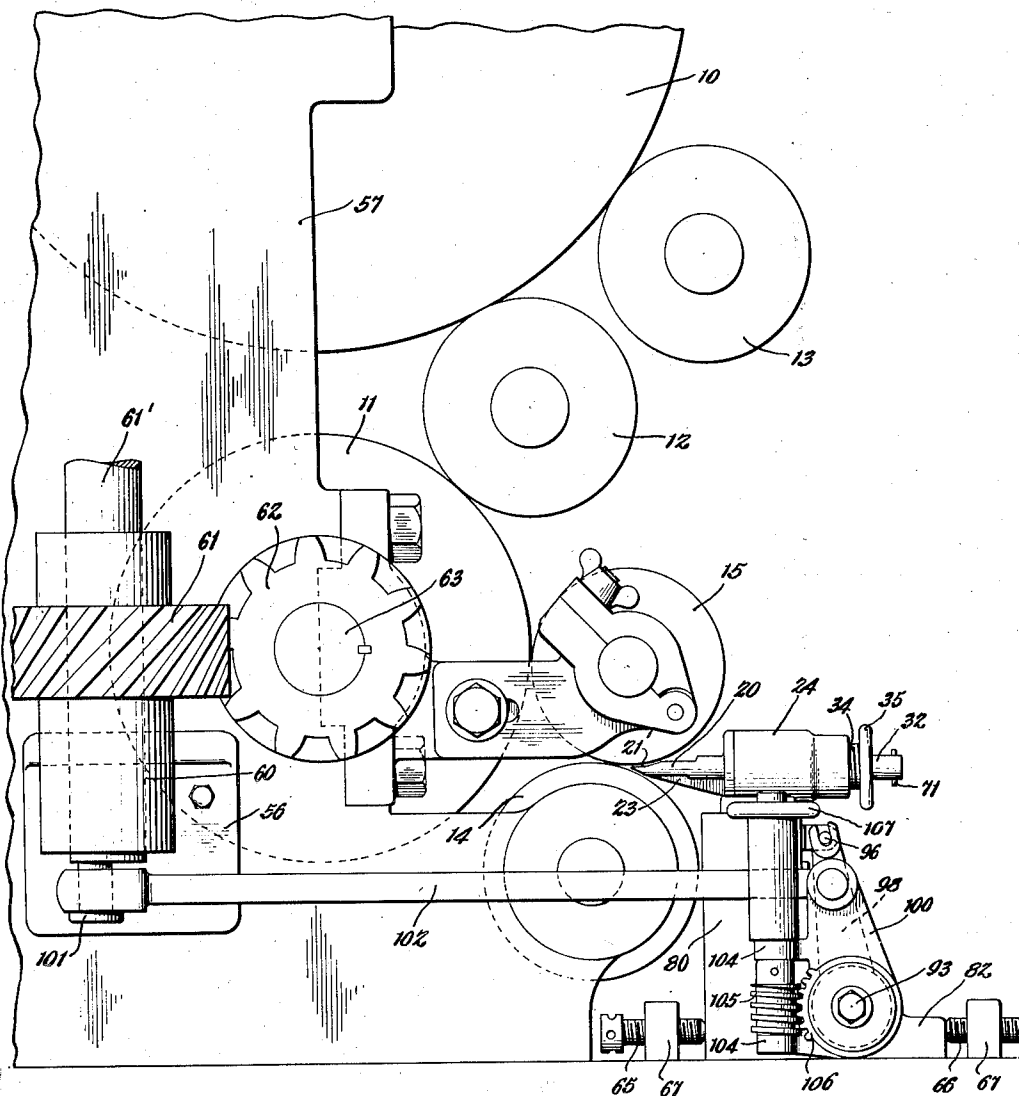


Fig 5

INVENTOR
E. J. Smith
BY John Morgan
ATTORNEY

Oct. 23, 1934.

E. J. SMITH

1,978,285

INKING MECHANISM

Filed March 11, 1932

7 Sheets-Sheet 4

FIG 6

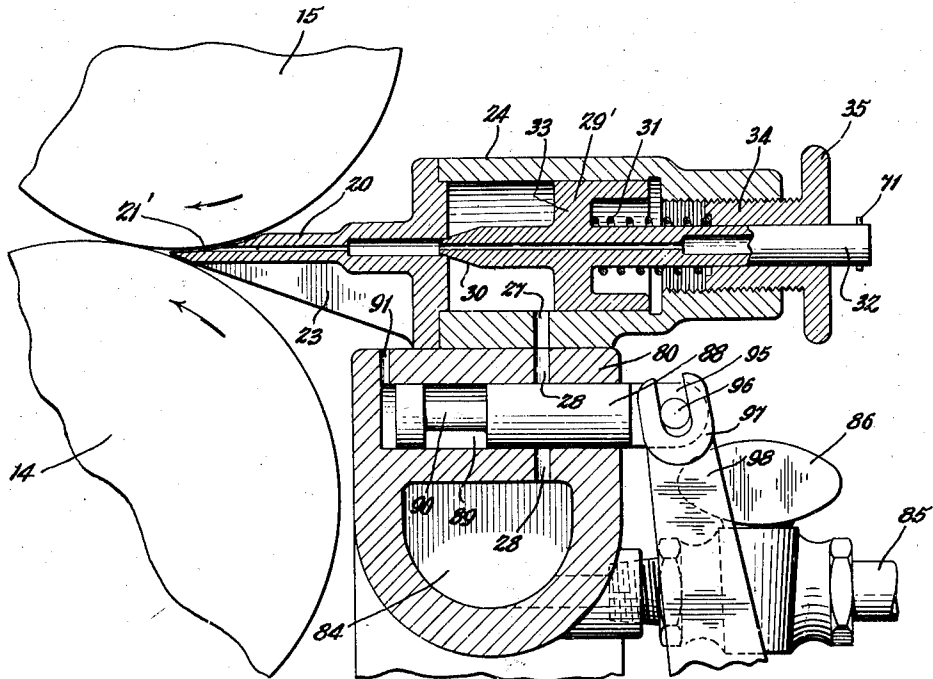
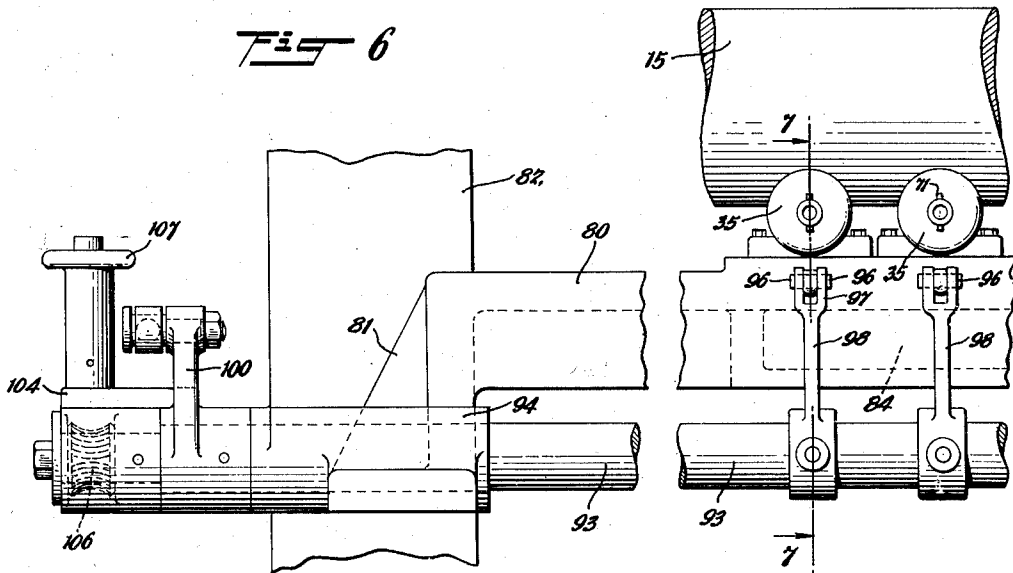


FIG 7

INVENTOR
E. J. Smith
BY John Morgan
ATTORNEY

Oct. 23, 1934.

E. J. SMITH

1,978,285

INKING MECHANISM

Filed March 11, 1932

7 Sheets-Sheet 5

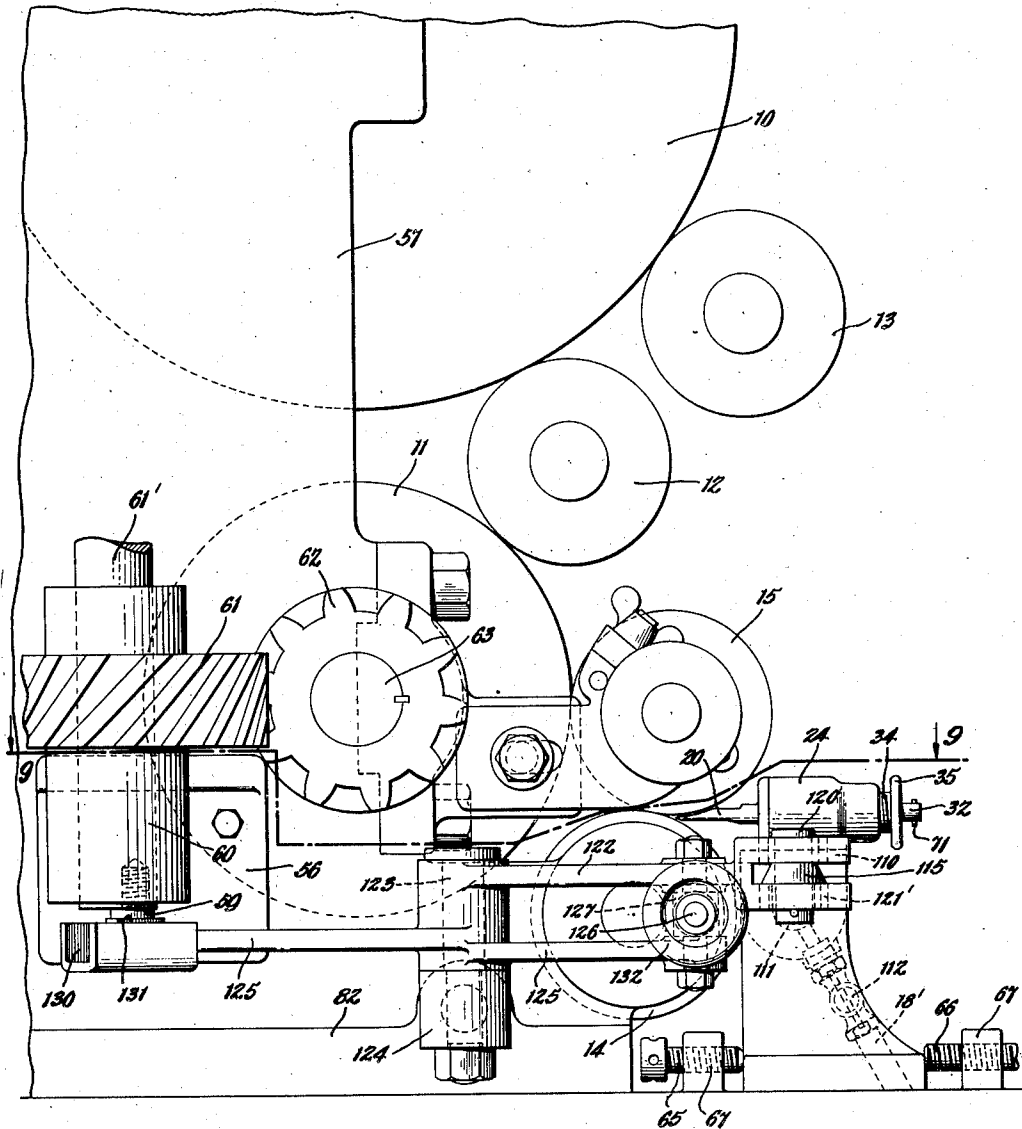


FIG 8

INVENTOR
E. J. Smith
BY John D. Morgan
ATTORNEY

Oct. 23, 1934.

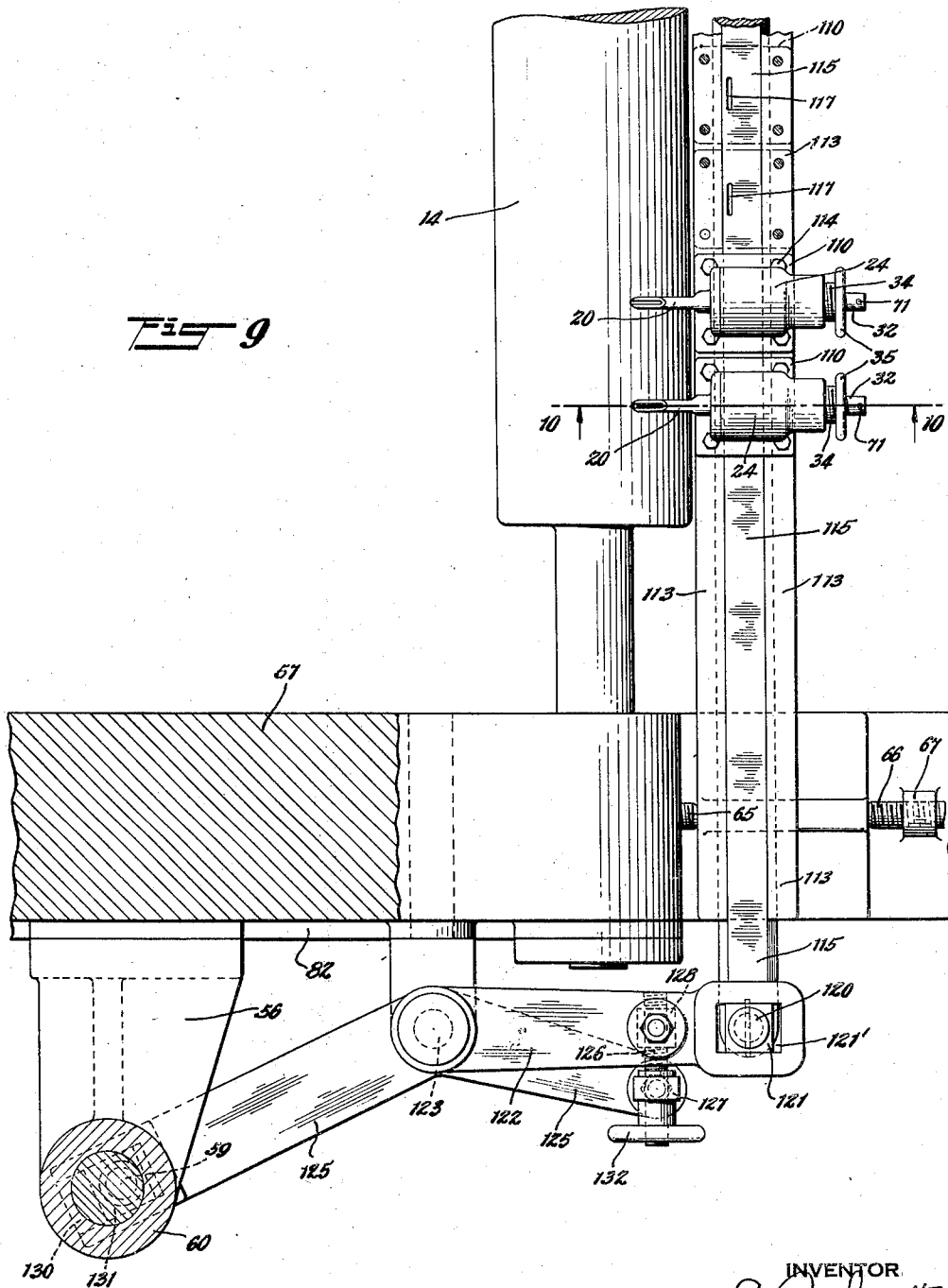
E. J. SMITH

1,978,285

INKING MECHANISM

Filed March 11, 1932

7 Sheets-Sheet 6



INVENTOR

BY *E. J. Smith*
John Morgan
ATTORNEY

Oct. 23, 1934.

E. J. SMITH

1,978,285

INKING MECHANISM

Filed March 11, 1932

7 Sheets-Sheet 7

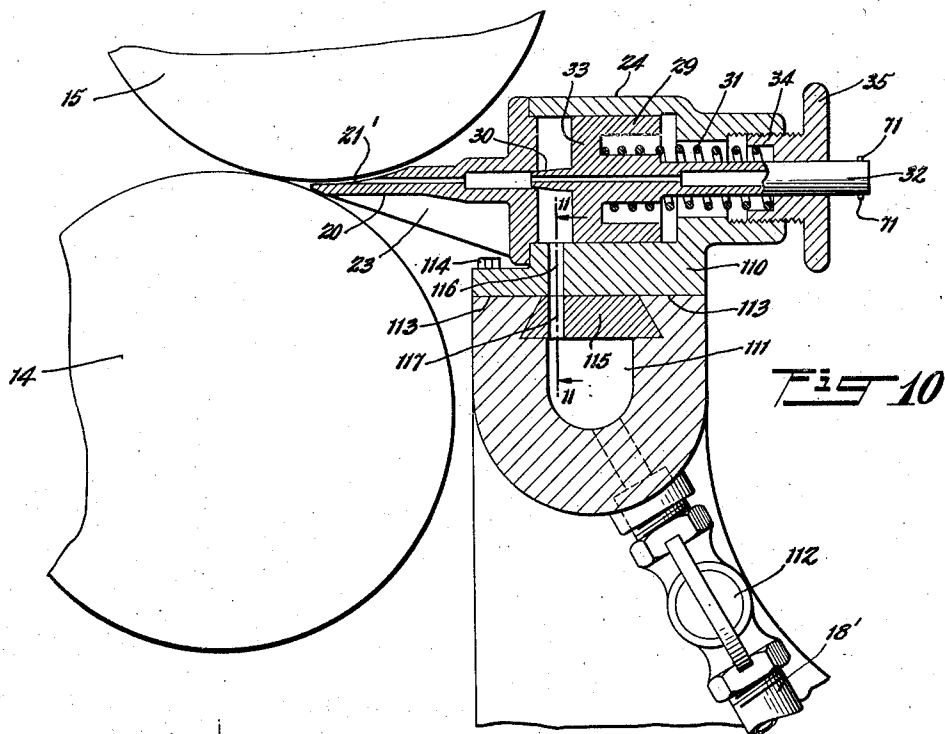


Fig 10

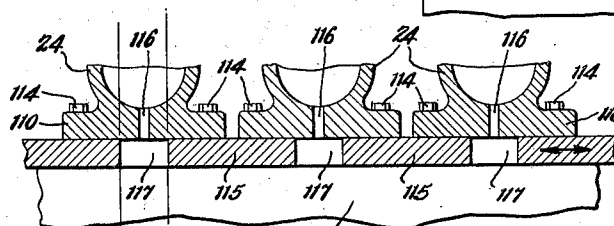


Fig 11a

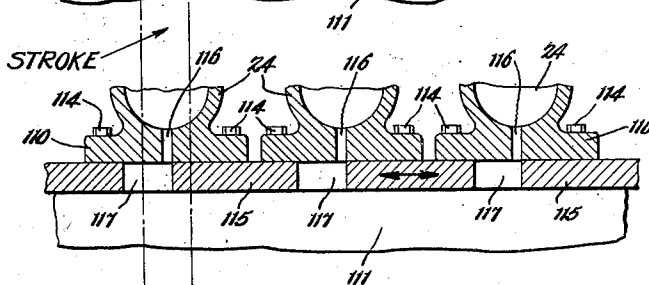


Fig 11b

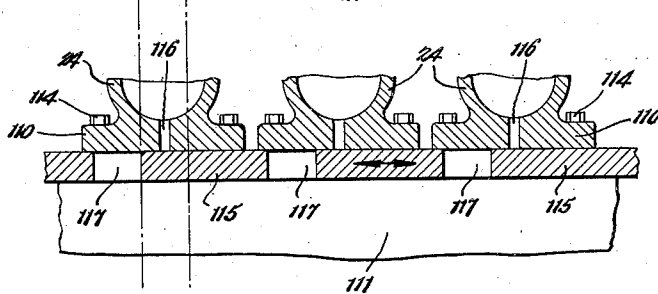


Fig 11c

INVENTOR
E. J. Smith
BY John D. Morgan
ATTORNEY

UNITED STATES PATENT OFFICE

1,978,285

INKING MECHANISM

Ernest James Smith, Fleet Street, England, assignor to The Goss Printing Press Company, Chicago, Ill., a corporation of Illinois

Application March 11, 1932, Serial No. 598,134

7 Claims. (Cl. 101—350)

The present invention relates to inking mechanism for high speed rotary printing presses and more particularly to a novel improved inking mechanism provided with means for minutely and accurately controlling the amount of ink fed to the printing press.

Objects and advantages of the invention will be set forth in part hereinafter and in part will be obvious herefrom, or may be learned by practice with the invention, the same being realized and attained by means of the instrumentalities and combinations pointed out in the appended claims.

The invention consists in the novel parts, constructions, arrangements, combinations and improvements herein shown and described.

The accompanying drawings, referred to herein and constituting a part hereof, illustrate three embodiments of the invention, and together with the description, serve to explain the principles of the invention.

Of the drawings:—

Figure 1 is a front elevation of one embodiment illustrative of the present invention;

Figure 2 is a fragmentary side elevation, with certain parts shown in section, of the embodiment shown in Fig. 1;

Figure 3 is a detailed vertical section taken on the line 3—3 of Figure 2;

Figure 4 is a detailed vertical section taken on the line 4—4 of Figure 3;

Figure 5 is a front elevation of a modified embodiment of the invention;

Figure 6 is a fragmentary side elevation of the mechanism illustrated in Figure 5;

Figure 7 is a fragmentary, detailed section taken on the line 7—7 of Figure 6;

Figure 8 is a front elevation of another modification of the present invention;

Figure 9 is a section taken on the line 9—9 of Figure 8;

Figure 10 is a detailed, fragmentary vertical section taken on the line 10—10 of Figure 9; and

Figures 11a, 11b and 11c are fragmentary sections taken on the line 11—11 of Figure 10, and showing different positions of certain parts.

The present invention has for its object the provision of a novel and improved inking mechanism particularly adapted for use in supplying ink to high speed rotary presses. A further object is the provision of an inking mechanism in which ink may be supplied under constant pressure and accurately controlled and varied to meet different operating conditions of the printing press. Still another object is the provision of an

improved inking mechanism in which the ink is supplied under pressure, and its flow is intermittently interrupted in accordance with the speed of operation of the press.

In certain of its aspects the present invention is an improvement upon the inking mechanism shown and described in my United States Patent No. 1,730,303, although in other aspects it is not so limited.

In the several illustrative embodiments of the present invention, a series of inking rollers are provided, certain of said rollers contacting with the plates carried by the plate cylinder of the printing press, and another of said rollers being supplied with ink under pressure. Means are provided for varying the quantity of ink fed to the inking roller, and for this purpose a plurality of interconnected, and preferably simultaneously operated valves are interposed in the path of the ink, one of said valves being provided for each column or other unit width of the press. These valves are preferably opened and closed in timed relation with the operation of the press, and the period during which they remain open may be varied to suit different operating conditions of the press. The ink is preferably delivered to the inking rollers by means of nozzles, one for each unit width of the press, and these nozzles preferably include valve structure for withholding the flow of ink when the pressure drops below a predetermined amount as shown in my prior Patent No. 1,730,303.

It will be understood that the foregoing general description and the following detailed description as well, are exemplary and explanatory of the invention but are not restrictive thereof.

Referring now in detail to Figures 1 to 3 of the drawings illustrating one modification of the present invention, the ink roller train comprises ink drums 10 and 11, distributing rollers 12 and 13 and rollers 14 and 15. One of the rollers 14 and 15 is preferably covered with roller composition or rubber, while the other of this pair is provided with an iron surface. Roller 15 contacts with roller 14 and drum 11, and roller 12 contacts with drums 10 and 11 to transfer ink from one to the other. If desired, certain of the distributing rollers or drums may be vibrated. Suitable driving means are provided for driving the drums from the printing cylinder, while the rollers are preferably driven by frictional contact with each other or the drums.

Means are provided for supplying ink under pressure to the series of inking rollers, and as embodied, into the bite of rollers 14 and 15. For

this purpose, a pump 16 is driven by motor 17 and draws ink from a reservoir through pipe 17' and forces it into pipe 18, after which it is regulated and delivered by nozzles 20 at a point closely adjacent to the point of contact of rollers 14 and 15. For securing a uniform pressure, a relief valve 21 and by-pass 22 may be inserted in circuit with the pump so as to by-pass the ink at any desired predetermined pressure.

10 A plurality of nozzles 20 are provided across the width of the press, each of said nozzles corresponding to a single column or other unit width of the plate cylinder. Each of the nozzles comprises a tube having beveled surfaces 21' at its discharge end, conforming generally to the surface of rollers 14 and 15, and the tube is braced by means of a web 23 extending rearwardly on its under side. At its inner end nozzle 20 communicates with a cylindrical chamber 24 which is supported on a plate 25 overlying an ink conduit 26 extending from one side of the press to the other. On their under side, each cylindrical chamber 24 is provided with a small aperture 27 registering with a corresponding aperture 28 in plate 25, and through which ink is fed from the conduit 26 into the chamber. The chamber 24 is provided with a cylindrical bore within which is fitted a rotatable and axially movable plunger 29. For withholding the supply of ink to the inking rollers whenever the pressure drops below a predetermined amount, plunger 29 is provided with a forwardly-extending tapered axial portion 30 which may be projected into an enlarged portion of the bore of tube 20, and is pressed forwardly by means of spring 31 coiled about the rearwardly extending tubular member 32. Spring 31 is compressed between the web portion 33 of plunger 29 and a threaded member 34, threaded in the rear portion of the chamber 24 and slidably receiving the tubular member 32. By turning hand wheel 35, the degree of compression of spring 31 may be varied to suit different operating conditions and to correspondingly vary the pressure at which plunger 29 is rearwardly moved to permit passage of ink into the tube 20. On its under side, plunger 29 is provided with a slot 36 which can be moved into register with aperture 28 by rotation of the plunger, and means are provided for continuously oscillating the plunger to intermittently interrupt the supply of ink fed to the inking rollers.

For intermittently interrupting the supply of ink and controlling the interruption in accordance with the operation of the printing press, means are provided for continuously oscillating all of the plungers 29 simultaneously and through an arc sufficient to cause closing and opening of the apertures 27. For this purpose, a slidable bar 40 is mounted beneath the chambers 24, and is supported by brackets 41 on the side frames of the press. Bar 40 is provided with a plurality of pins 42 projecting laterally therefrom, one for each unit width of the press, and preferably positioned directly below the tubular members 32. At their rear ends, tubular members 32 are provided with an arm 43 having a forked lower end 44 to be fitted over the pin 42, while the upper end of the arm is clamped to the tubular member by screw 45.

Bar 40 is reciprocated by the operation of the printing press and at one end the bar is provided with a threaded link 46 which is pivoted to the bar at 47 and projects into a correspondingly threaded collar 48. Collar 48 is rotatably mount-

ed in a sleeve 49 which is pivotally supported on arm 50 by means of a pivot pin 51. Arm 50 is mounted on and oscillated by shaft 52 journalled in suitable bearings 53, and driven from bevel segments 54, 55. Segment 55 is journalled in bracket 56, extending from the side frame 57, and is formed with a forked integral radial extension 58 which is fitted over an eccentric 59 at the lower end of shaft 61' which is rotatable in journal 60. Mitre gear 61 is fast on shaft 61' and drives distributing cylinder 11 by means of mitre 62 keyed to the distributing cylinder shaft 63.

Means are also provided for moving the nozzles 20 toward and away from the inking rollers 14 and 15, and for this purpose a plurality of screws 65 and 66 are provided transversely of the inking mechanism, and threadedly secured in lugs 67 projecting upwardly from the bed of the press. Screws 65 and 66 may be variably positioned to move the inking nozzle forwardly or rearwardly and to firmly secure them in the desired position.

For the purpose of facilitating cleaning of the nozzles 20, tubular member 32 is formed with an open rear end, normally closed by means of check valves 70. When it is desired to clean the nozzles and remove any ink contained therein, lye or any other suitable cleaning solution may be forced through the tubular member 32 and into nozzles 20. Pins 71, at the rear end of the tubular member 32 are provided and may be used in conjunction with a bayonet coupling on the hose through which the cleaning solution is supplied.

Conduit 26 is preferably divided into a plurality of aligned sections, each of single page width, and separated from each other by walls or partitions in the conduit. One supply pipe 18' is provided for each section and receives its ink from the common pump 16. For silencing any page width and preventing supply of ink to any desired portion of the press, valves 68 are provided connecting pipes 18' to their corresponding sections of the conduit 26.

In the operation of the above-described mechanism, motor driven pump 16 furnishes a supply of ink under constant pressure to conduit 26 through pipes 18, 18'. The distributing cylinders 10 and 11, and the inking rollers 12, 13, 14 and 15 are rotated, as usual, during the operation of the printing press and at a speed proportionately thereto. During this operation of the press, eccentric 59 is rotated, causing a corresponding oscillation of the forked extension 58, gears 54, 55 and arm 50, and a reciprocation of the bar 40. As bar 40 is reciprocated, pins 42 mounted thereon cause the simultaneous oscillation of plungers 29, and oscillation of these plungers opens and closes apertures 27, thereby interrupting the supply of ink to chambers 24. Springs 31 serve to maintain the entrance to nozzles 20, normally closed, but as the pressure within chambers 24 builds up, plungers 29 are moved rearwardly, permitting ink to pass into the nozzles 20 past the tapered ends 30. As the ink flows out the end of nozzles 20, it is applied to the inking roller 15, is spread out by roller 14 and then transferred to the distributing cylinder 11 from which it is supplied to the press in the usual manner.

When it is desired to vary the amount of ink supplied across the entire width of the inking mechanism, hand wheel 48' may be rotated to variably position bar 40, thereby varying the limits of oscillation of plungers 29, and conse-

quently varying the proportionate time during which the flow of ink is interrupted.

When it is desired to vary the amount of ink fed to any particular column, or other unit width, of the plate cylinder, hand wheel 35 may be rotated to vary the tension on spring 31; an increase in the tension of the spring decreasing the amount of ink delivered by the nozzle, while a decrease in spring tension permits a greater flow of ink.

Referring now in detail to Figures 5, 6 and 7 of the drawings illustrating a modified embodiment of the invention, the intermittent flow of ink through the nozzle is controlled by means of a plurality of interconnected and simultaneously actuated plunger valves. The series of inking rollers 12, 13, 14 and 15, and the inking drums 10 and 11, may be the same in construction as those described in connection with the previous embodiment.

Means are provided for supplying ink under pressure to the inking rollers 14, 15, and from there to the printing cylinder, and for this purpose a plurality of nozzles 20 are provided projecting towards and positioned closely adjacent to the point of contact of inking rollers 14, 15. Nozzles 20 project forwardly from their individual cylindrical chambers 24 which are securely mounted on the upper face of a rigid ink conduit 80 supported by brackets 81 on the side frames 82. On the under side, each chamber 24 is provided with an aperture 27 in alignment with apertures 28 formed in the upper surface of the conduit 80 and communicating with the chamber 84 extending transversely of the press. Chamber 84 is preferably divided into a plurality of longitudinal sections separated from each other, each section receiving its ink from the ink pump by means of individual pipes 85. These sections preferably correspond to page widths of the printing press, and each ink supply pipe 85 is provided with the valve 86 by which any desired section may be cut off.

Means are provided for interrupting the supply of ink to the chambers 24 and from thence to the nozzles 20, and for this purpose, the upper portion of conduit 84 is provided with a plurality of simultaneously operated plunger valves, one for each nozzle 20. Each plunger valve is preferably located directly beneath its corresponding chamber 24 and nozzle 20, and comprises a plunger 88 slidable in a cylindrical bore 89 and intermediate the upper and lower ends of aperture 28. Plunger 88 is provided with a reduced portion 90, near its inner end, which may be moved into alignment with aperture 28 to permit passage of ink there-through. At the inner end of cylinder 89, a vent 91 is provided to facilitate movement of the valve plunger.

For continuously reciprocating plungers 88 to intermittently interrupt the flow of ink, a shaft 93 is rotatably journaled in journals 94, supported on end frames 82 below the plungers 88. Each plunger 88 is provided with a reduced rearwardly-extending end 95 having a pin 96 fitting into the forked ends 97 of an upright arm 98 rigidly secured to shaft 93.

Means are provided for oscillating shaft 93 by operation of the press, and arm 100, mounted on said shaft, is connected with an eccentric 101 on the lower end of shaft 61', by means of link 102. The position of arm 100 may be varied with reference to shaft 93 for the purpose of varying the limits of oscillation of the shaft and thereby controlling the portion of the time during which the

flow of ink is interrupted. For this purpose, arm 100 is formed with an integral offset bracket 104 in which is rotatably journaled a worm 105, meshing with segmental gear 106 fast on shaft 93. A hand wheel 107 fast with respect to the worm 105 may be rotated to vary the relative position of the arm 100 and gear 106.

Means are also provided for withholding the flow of ink through the nozzle until the pressure reaches a predetermined value. For this purpose, plunger 29' is closely fitted and axially movable in the cylindrical bore of chamber 24, and the tapered forwardly-projecting end is pressed into the enlarged portion of nozzle 20 by means of spring 31 which is variably compressed between web 33 and the threaded member 34. As previously described, threaded member 34 may be moved by hand wheel 35 to vary the compression of spring 31 and thereby regulate and predetermine the pressure necessary to move plunger 29' to permit the flow of ink.

In the operation of this embodiment, ink is supplied from the ink pump to conduit 84 through pipes 85, and one or more of the page-sections may be cut off by valves 86. As the press operates and the inking rolls and distributing cylinders are rotated, eccentric 101 is also rotated, causing a corresponding oscillation of shaft 93 and the simultaneous reciprocation of the valve plungers 88. On each reciprocation, plungers 88 are moved to permit flow of ink through apertures 28, supplying ink to the chambers 24, axially moving plungers 29' and forcing a measured quantity of ink through the nozzles 20 and onto the inking roller 15.

While the press is in operation, the operator may vary the amount of ink fed to the unit as a whole by movement of hand wheel 107 to cause a variation in the limits of reciprocation of plungers 88 and a corresponding shortening or lengthening of the periods during which ink is permitted to flow through apertures 28. The amount of ink delivered to any particular column or other unit width of the press may also be varied by movement of hand wheel 35 to vary the tension on spring 31.

Figures 8, 9, 10 and 11 illustrate a further modification of the invention in which a single slide operates as a valve to control the flow of ink through all of the ink supply nozzles, the slide being reciprocated by operation of the press.

In this modification, the arrangement of the inking rollers is similar to that previously described, and ink delivering nozzles 20 projecting forwardly from the ink chambers 24 deliver ink onto roller 15 at a point closely adjacent to the point of contact between rollers 14 and 15. Each chamber 24 is provided with a flat and large base 110, by which it is individually securely fastened to the upper surface of an ink conduit 111 extending parallel to rollers 14 and 15 and closely adjacent thereto. Conduit 111 is divided by partitions into a plurality of longitudinally-alined, non-communicating sections of single page width, each of which receives its ink from a pipe 18', the supply to the individual page sections being controlled by valves 112.

The upper portion of conduit 111 is formed as a pair of narrow flat faces 113 extending from one end of the conduit to the other, and the bases 110 of chambers 24 are fastened to these faces by bolts 114. Immediately beneath the faces 113, the inner sides of conduit 111 are undercut for a short distance and then extend sharply inwardly to provide a seat in which is slidably fitted a valve

slide 115 extending from one end of the conduit to the outer and tightly closing the various sections thereof.

The forward part of each chamber 24 communicates with an aperture 116 formed in the base 110, and ink is supplied to the forward part of said chamber and through aperture 116 from conduit 111 by means of narrow slots 117, spaced throughout the length of slide 115 and adapted to be moved into register with apertures 116 as the slide is reciprocated. Slotted apertures 117 are spaced from each other a distance corresponding to the spacing of apertures 116, and as slide 115 is reciprocated, they are simultaneously moved into and out of registry with apertures 116, interrupting the supply of ink to all of the nozzles 20 at the same time.

Means are provided for reciprocating the slide 115 in timed relation to the operation of the press and for this purpose pivot pin 120 connects one end of slide 115 with slide blocks 121 which are received within the elongated rectangular opening 121' at the end of forked arm 122. Arm 122 is pivoted on vertical shaft 123 mounted in lug 124 projecting from the bottom of the side frame 82. Bell crank 125 is coaxially mounted with lever 122 on shaft 123 and is connected to lever 122 by means of threaded member 126 rotatably held in a collar 127 which is swiveled to one end of lever 125. The other end of member 126 is threaded in a collar 128 swiveled on the under side of lever 122. At its other end lever 125 is formed with a guideway 130 in which is slidably fitted a block 131, fitted over the end of eccentric 59. A hand wheel 132 at the outer end of threaded member 126 serves for turning this member to vary the relative position of levers 122 and 125 and thereby vary the amount of ink fed to the press.

Figs. 11a, 11b and 11c illustrate various central positions of the valve slide 115 which may be secured by relative movement of levers 122 and 125, thereby effecting a variation in the amount of ink flowing through apertures 117, 116 for delivery to the inking rollers through nozzles 20. Figure 11a illustrates the extreme central position, in which the valve apertures 116 and 117 are always maintained in register during reciprocation of slide 115 and ink flows during the entire time. Figure 11b illustrates a median adjustment in which the flow of ink through apertures 116 takes place during a portion only of the stroke of slide 115. Fig. 11c illustrates the minimum central position of slide 115 when ink is fed to apertures 116 during only an extremely small portion of each reciprocation.

The invention in its broader aspects is not limited to the specific mechanisms shown and described but departures may be made therefrom within the scope of the accompanying claims without departing from the principles of the invention and without sacrificing its chief advantages.

What I claim is:—

1. An inking mechanism for printing presses including in combination a series of inking rollers for transferring ink to the plate cylinder of a printing press, means for supplying ink to said rollers including a pump, ink nozzles opening onto one of said rollers and having means for withholding the flow of ink until a predetermined

pressure is attained and intermittently operated valves for interrupting the supply of ink to the press.

2. An inking mechanism for printing presses including in combination a series of inking rollers for transferring ink to the plate cylinder of a printing press, means for supplying ink to said rollers including a pump delivering ink at constant pressure, ink nozzles opening onto one of said rollers and having means for withholding the flow of ink until a predetermined pressure is attained, and intermittently operated valves for controlling the flow of ink through said nozzles.

3. An inking mechanism for printing presses including in combination a series of inking rollers for transferring ink to the plate cylinder of a printing press, means for supplying ink to said rollers including a pump delivering ink at constant pressure, ink nozzles opening onto one of said rollers and having means for withholding the flow of ink until a predetermined pressure is attained, intermittently operated valves for controlling the flow of ink through said nozzles and means for operating said valves in unison.

4. An inking mechanism for printing presses including in combination a series of inking rollers for transferring ink to the plate cylinder of a printing press, means for supplying ink to said rollers including a pump delivering ink at constant pressure, ink nozzles opening onto one of said rollers and having means for withholding the flow of ink until a predetermined pressure is attained, intermittently operated valves controlling the flow of ink and driven by the press and means for varying the time during which said valves are open.

5. An inking mechanism for printing presses including in combination a series of inking rollers for transferring ink to the plate cylinder of a printing press, means for supplying ink to said rollers including a pump, ink nozzles opening onto one of said rollers and having means for withholding the flow of ink until a predetermined pressure is attained, oscillating valves, one for each nozzle, and a common operating means for said valves.

6. An inking mechanism for printing presses including in combination a series of inking rollers for transferring ink to the plate cylinder of a printing press, means for supplying ink to said rollers including a pump, ink nozzles opening onto one of said rollers and having means for withholding the flow of ink until a predetermined pressure is attained, slide valves for controlling the supply of ink to said nozzles and press driven means for continuously operating said valves in unison.

7. An inking mechanism for printing presses including in combination a series of inking rollers for transferring ink to the plate cylinder of a printing press, means for supplying ink to said rollers including a pump delivering ink at constant pressure, ink nozzles opening onto one of said rollers and having means for withholding the flow of ink until a predetermined pressure is attained, slide valves for controlling the supply of ink to said nozzles, press driven means for continuously operating said valves in unison and means for varying the time during which said valves are open.

ERNEST JAMES SMITH.