

Aug. 12, 1947.

E. J. JANKE

2,425,327

PRINTING MACHINE

Filed April 29, 1944

7 Sheets-Sheet 1



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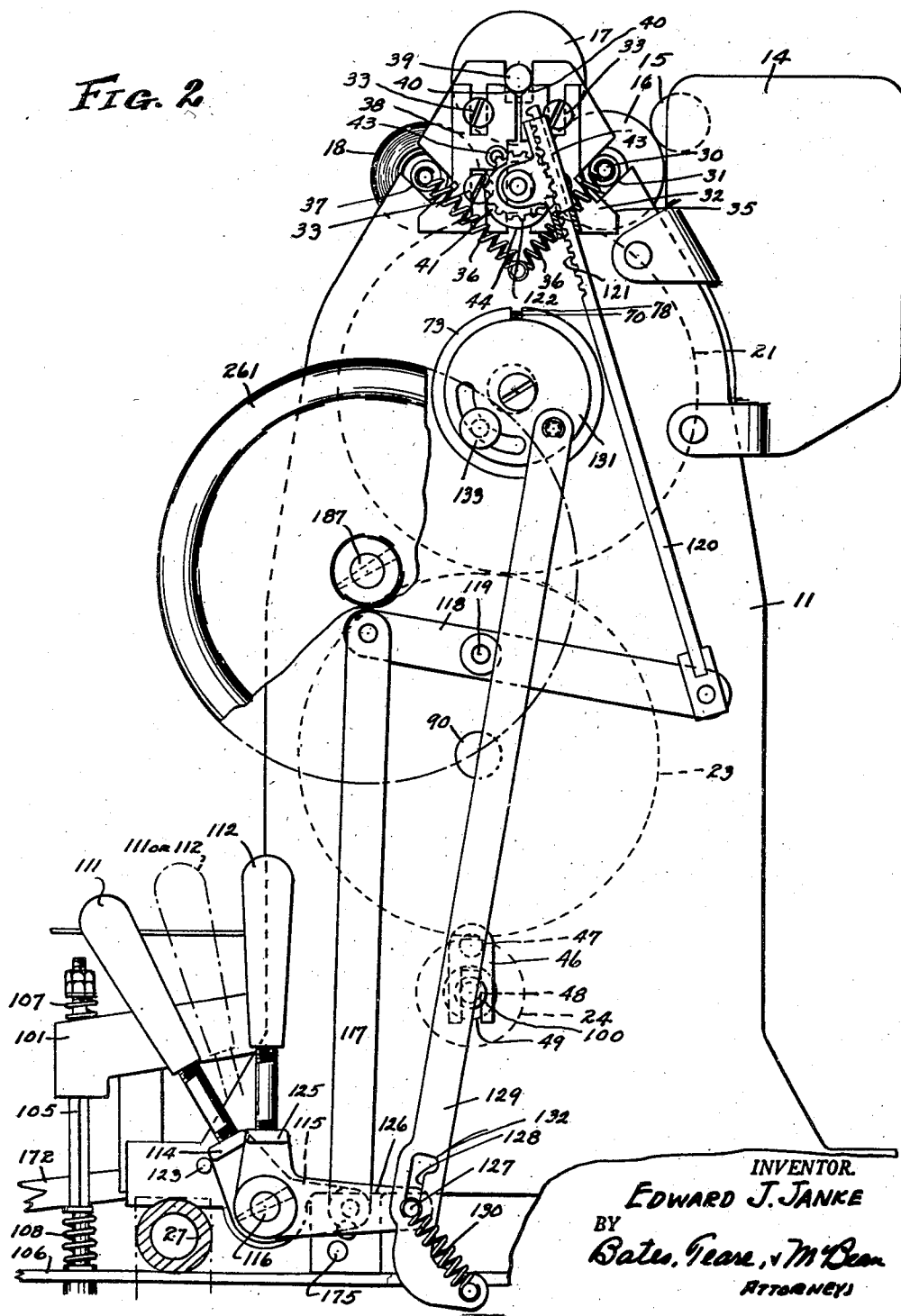
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PRINTING MACHINE

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7 Sheets-Sheet 2

FIG. 2



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7 Sheets-Sheet 3

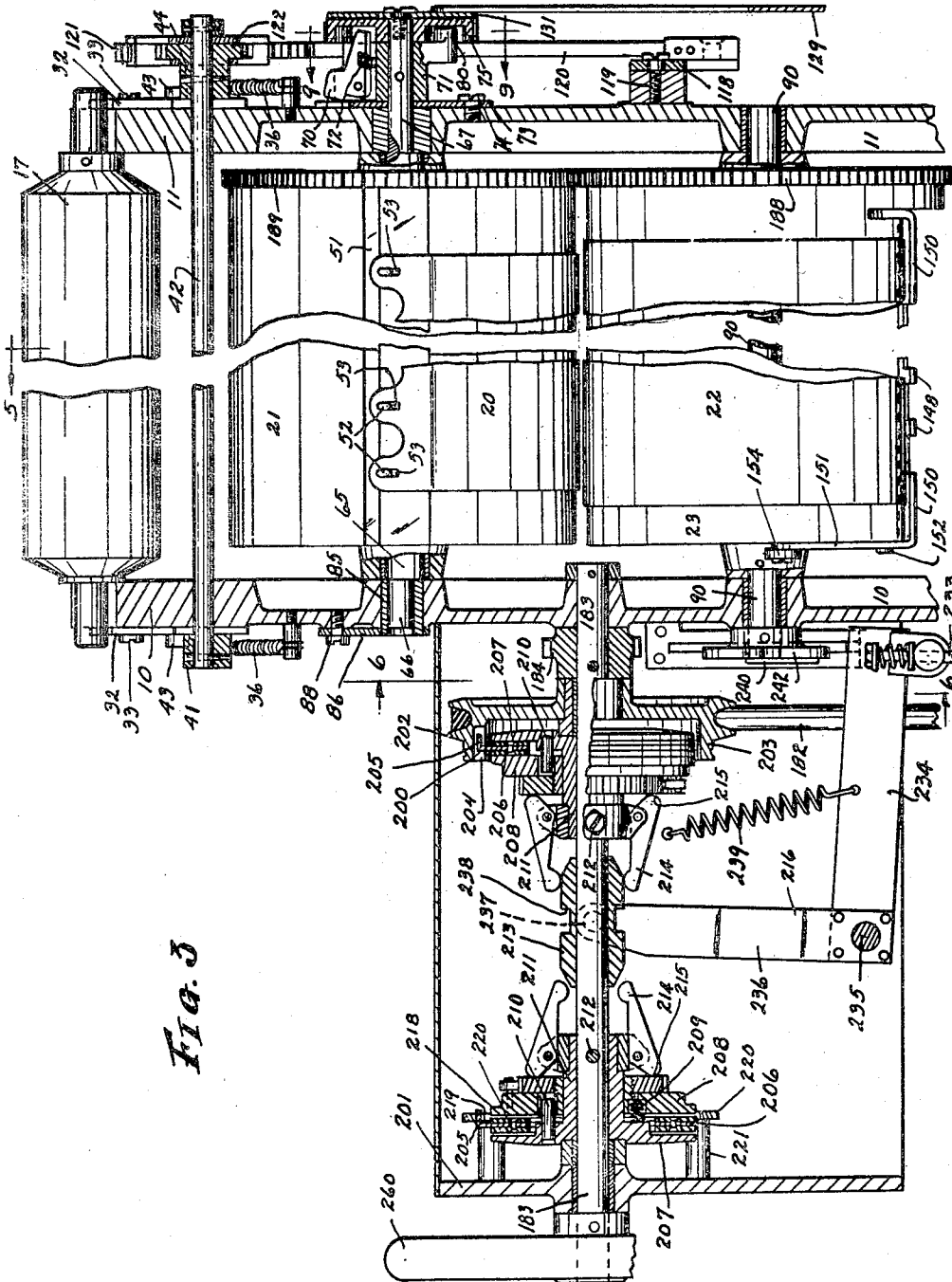


Fig. 3

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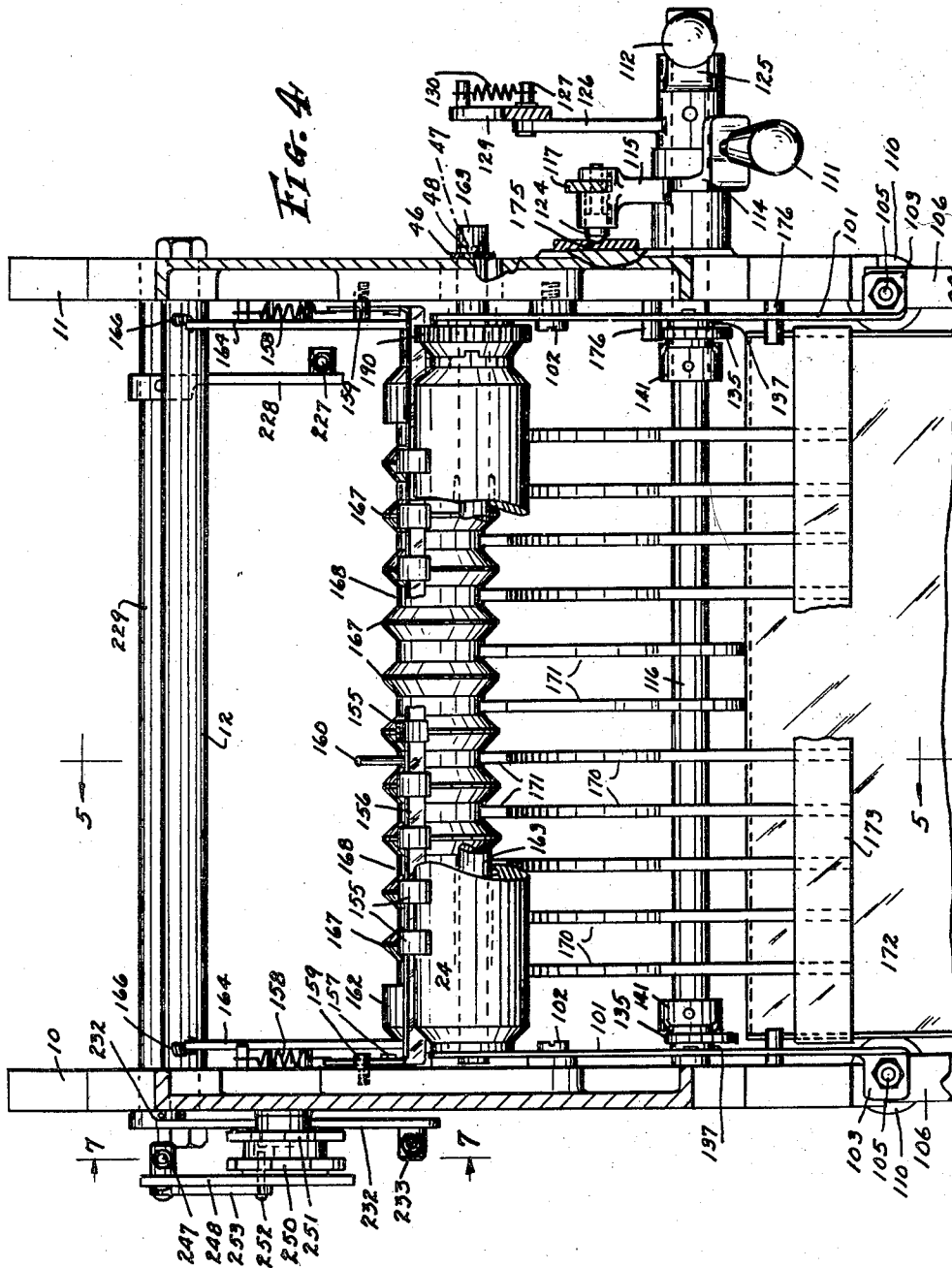
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PRINTING MACHINE

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7 Sheets-Sheet 4



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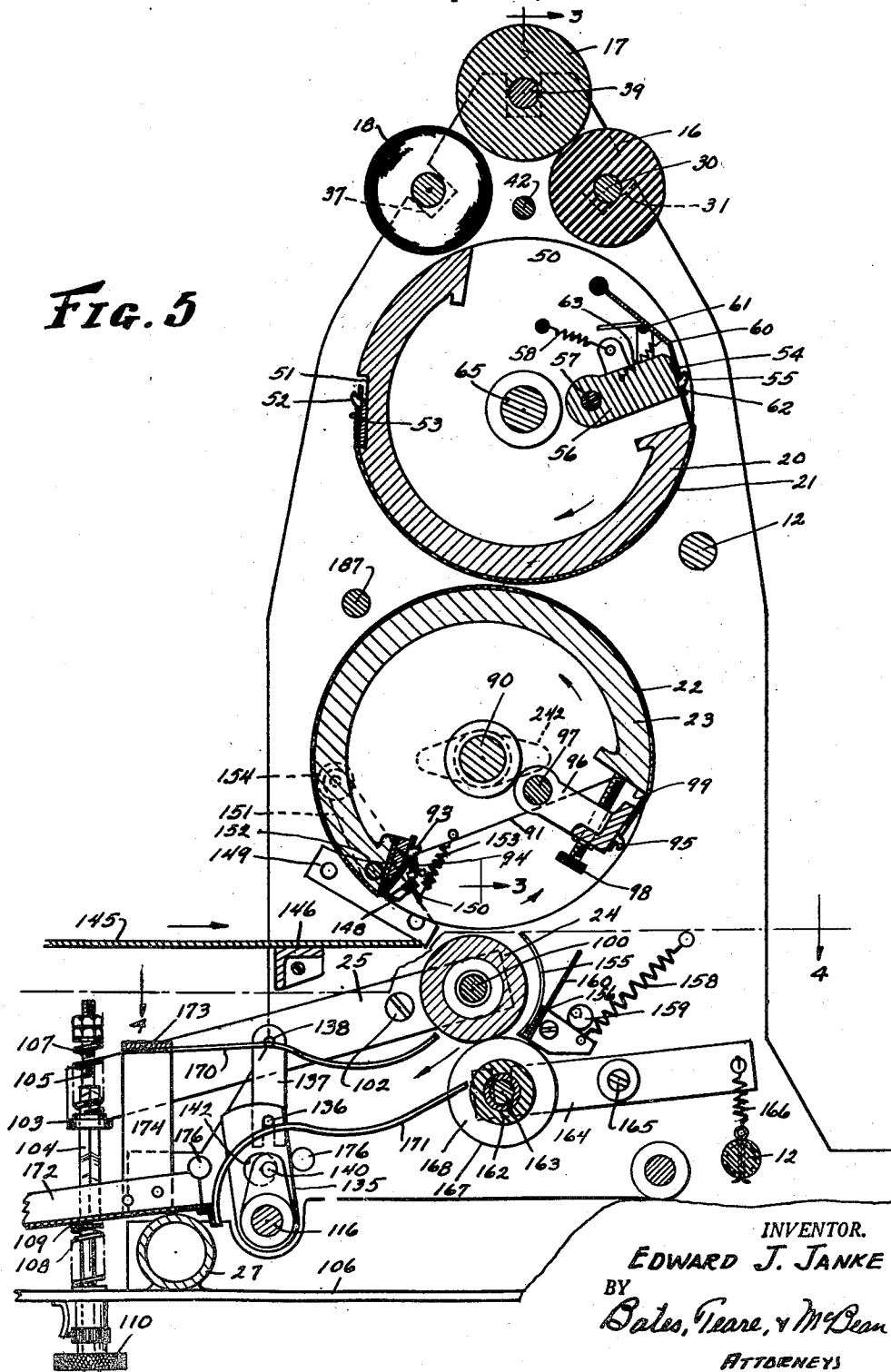
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PRINTING MACHINE

Filed April 29, 1944

7 Sheets-Sheet 5

FIG. 5



Aug. 12, 1947.

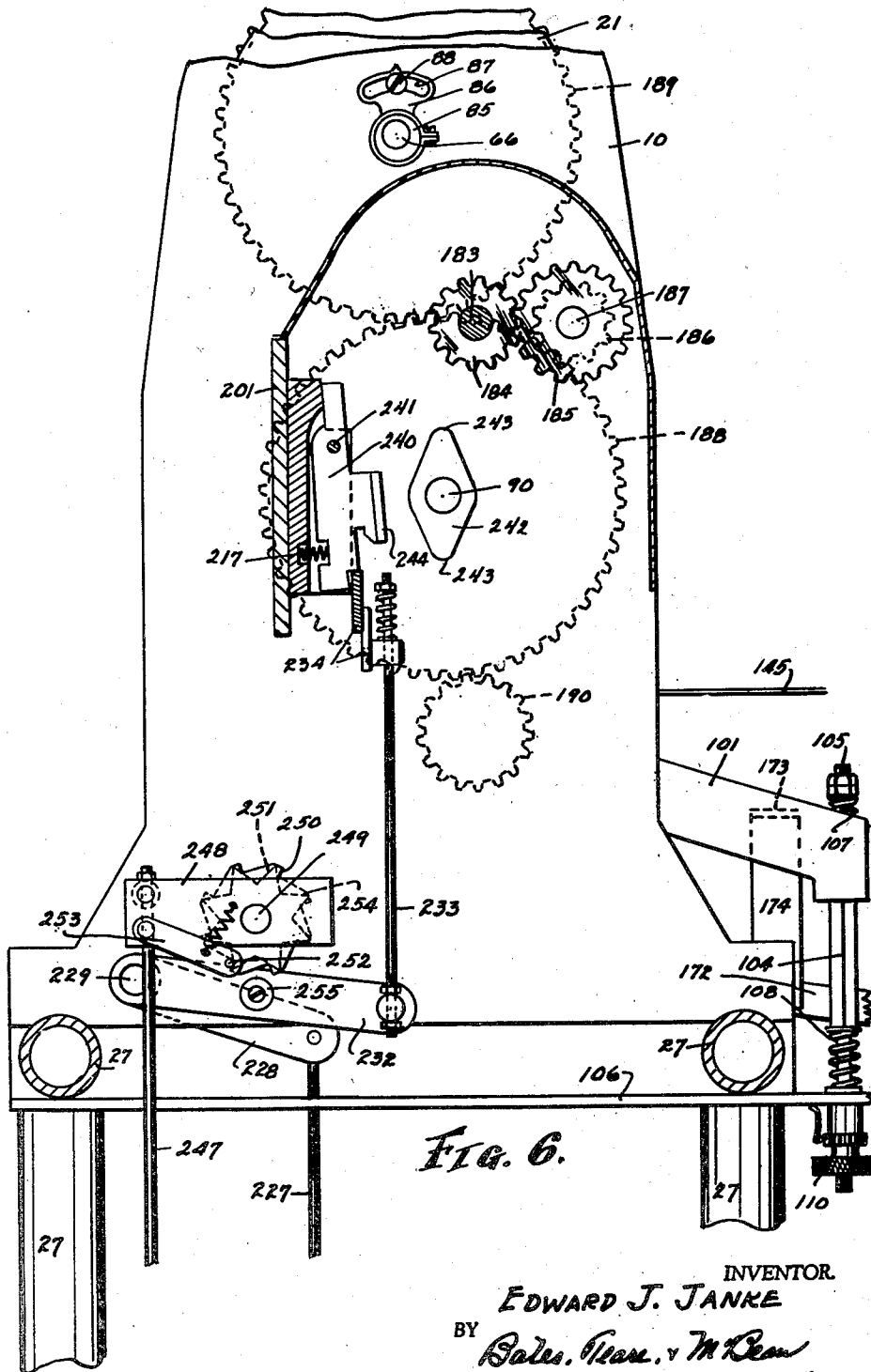
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PRINTING MACHINE

Filed April 29, 1944

7 Sheets-Sheet 7

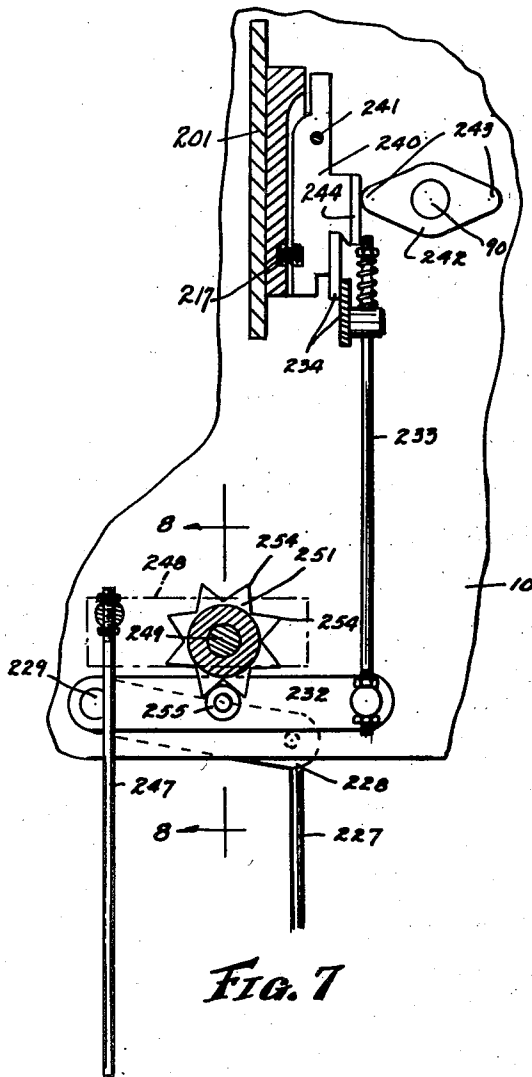


FIG. 7

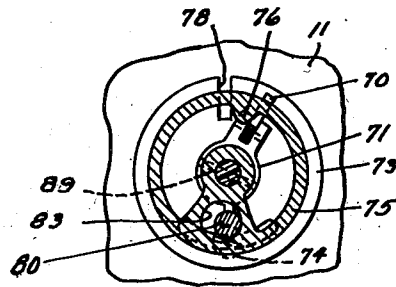


FIG. 9

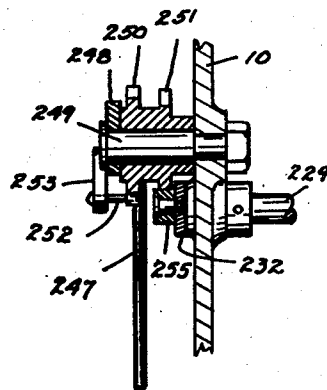


FIG. 8

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UNITED STATES PATENT OFFICE

2,425,327

PRINTING MACHINE

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land, Ohio, a corporation of Delaware

Application April 29, 1944, Serial No. 533,276

10 Claims. (Cl. 101-142)

1

This invention relates to means for reproducing material on the planographic principle by the use of a master sheet carrying a greasy image and the application to the sheet of liquid repellent, to prevent adherence of the ink to the non-printing regions of the sheet, and the subsequent application of ink effectively to the printing image and non-effectively to the non-printing regions. The master sheet is readily changeable from time to time so that a few or many imprints from the same image may be made as desired.

The invention is especially well adapted for a printing machine of the offset type having a drum to carry the master sheet and equipped with suitable clamping means to hold the sheet thereon, an offset drum having a yielding blanket to coact with the master sheet, and a roller platen coacting with the offset drum.

Among the objects of the invention is the provision of readily controllable means to apply the repellent and the ink in proper order and to proper extent to the master sheet, and to this end I provide two hand levers, one of which has two positions for controlling the presentation of the repellent and the ink respectively to the master sheet, and the other of which has two positions respectively for controlling the separation of the master sheet from the transfer blanket and the separation of the transfer blanket from the platen. It is an object of the invention to provide such hand lever control in a simple and effective manner.

Another object of the invention is to provide for the ready stoppage of the master sheet drum in convenient position for the removal and replacement of a master sheet, and in accomplishing this I provide a two-pedal control, one for continuous rotation of the machine for printing, the other for half rotations of the master drum, enabling the ready clamping of both the leading end and the trailing end of a master sheet. It is an object of the invention to provide mechanism for this purpose including a very effective clutch brake to stop the drum in desired position.

Another object of the invention is to provide suitable means for delivering the printed product at the front of the machine beneath the paper table over which the blank sheet is fed to the machine. In accomplishing this, I provide simple and effective stripping mechanism which receives the printed copy immediately after its printing impression and diverts it around the platen roller for delivery to the front of the machine. One of the objects attained in this mechanism is the provision of means engaging the

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printed face of the sheet without injury to the image just printed thereon.

Other objects of the invention, and features of the mechanism accomplishing the same, will be apparent from the following detailed description of a preferred embodiment illustrated in the drawings.

In the drawings, Fig. 1 is a side elevation of a planographic printing machine incorporating my invention; Fig. 2 is a fragmentary elevation, looking at the side of the machine opposite to that shown in Fig. 1; Fig. 3 is a vertical section through the machine, as indicated by the line 3-3 on Fig. 1; Fig. 4 is a sectional plane, as indicated by the lines 4-4 on Figs. 1 and 5; Fig. 5 is a vertical section taken in a plane parallel with Figs. 1 and 2, the plane of the section being indicated by the lines 5-5 on Figs. 3 and 4; Fig. 6 is a vertical section, as indicated by the line 6-6 on Fig. 3; Fig. 7 is a fragmentary vertical section, as indicated by the line 7-7 on Fig. 4; and Figs. 8 and 9 are sectional details, the planes of the sections being indicated by the lines 8-8 and 9-9 on Figs. 7 and 3, respectively.

Referring now to the drawings in detail and particularly to Figs. 1, 3 and 5, it will be seen that the printing machine of the present invention comprises in general a pair of side frame plates 10 and 11 suitably spaced from each other by cross frame members, such as the rods 12. Mounted on these frame plates 10 and 11 is an ink supply unit 14, the details of which are not shown, but which has an ink supply roll 15 (Fig. 1). Any mechanism may be used to provide the roll 15 with a continuous supply of ink.

The ink supply roll 15 applies ink to an ink applicator roll 16. A distributor roll 17 coacts with the roll 16 to insure an even distribution of the ink thereon. These rolls, together with a liquid repellent applicator roll 18, extend between and are mounted in the upper portions of the frame plates 10 and 11, as will be hereinafter more fully described.

The applicator rolls 18 and 16 apply liquid repellent and ink, in that order, to the surface of a flexible planographic printing plate 20 which is mounted on the periphery of a plate drum 21. This drum is rotatably mounted in the frame plates 10 and 11 immediately below the applicator rolls.

The inked image of the printing plate is transferred to a transfer blanket 22 mounted on an offset drum 23 which is journaled in the frame plates. The sheet or article to be printed is fed between this offset or transfer drum and a platen

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roll 24 which is journaled in a ball 25 immediately below the transfer drum. The sheet is guided around the platen roll and discharged toward the same face of the machine from which it was fed.

As heretofore mentioned, one of the features of my invention contemplates bodily movement of the applicator rolls away from the pattern roll and bodily movement of the pattern and platen rolls away from the transfer or offset roll.

The ink applicator roll 16 is secured to a shaft 30, the ends of which project into upwardly inclined slots 31 formed in the frame plates 10 and 11, the walls of the slots providing a journal for the shaft. The position of the shaft 30 in the slot is controlled by a pair of cam plates 32 which are secured to the outer faces of the respective frame plates by studs 33 which pass through vertically extending slots 34 in the cam plates. Each cam plate has a cam surface 35 on which the ends of the shaft 30 are retained by springs 36. The arrangement is such that when the cam plates are moved upwardly the ink roll 16 will be moved diagonally upward in its slot out of contact with the printing plate.

The repellent applicator roll 18 is a fabric covered roll and is mounted on a shaft 36, the ends of which are journaled in slots 37 formed in the frame plates 10 and 11 and coact with cam plates 38, the movement of which move the repellent applicator roll into and out of contact with printing plate 20. The cam plates 38 are mounted on respective frame members in the manner heretofore described in connection with the cam plates 32.

When either the ink or the repellent applicator roll moves upwardly and outwardly out of contact with the plate drum, the ink distributor roll 17 also moves upward, thus preventing interference between it and the movement of the other rolls. As shown in Figs. 1 and 2, it will be seen that the cam plates 35 and 38 each have beveled cam surfaces 40 which engage the ends of the distributor roll shaft 39. This shaft like the applicator roll shafts is journaled in slots formed in the frame plates.

The cam plates 35 and 38 are actuated by a pair of cams 41 and 44. These cams are secured to respective ends of a shaft 42 (Fig. 3) which is journaled in the frame plates 10 and 11. Each cam engages a roller 43 carried by the cam plates 35 and 38. The cams are constructed so that when the shaft 42 is turned in a direction clockwise in Fig. 1, the cam plates together with the rolls 16 and 17, and thereafter the roll 18, will be moved upwardly away from the plate cylinder 21. When this shaft is turned in a counter-clockwise direction to lower the rolls, the cams act first to permit the springs 36 to lower the repellent applicator roll 18 into contact with the plate 20. During this movement of the cams, a concentric portion 44 of the cam engages the rollers of the cam plate 32 retaining it in its upper position. This feature permits the repellent applicator to act to thoroughly apply repellent to the printing plate before any ink is applied thereto. Further movement of the cam shaft in a counter-clockwise direction lowers the ink applicator roll 16 and its distributor roll 17 without disturbing the repellent applicator roll 18.

The plate drum 21, which is best shown in Figs. 3 and 5, comprises a cylinder having a gap 50 and suitable means in the gap for clamping and tensioning a plate anchored at its other end to the cylinder.

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Any suitable means may be employed for anchoring and tensioning the plate. The particular means shown is intended for a plate having a row of holes at each end. As shown a recess 51 is formed in the periphery of the cylinder 21 and extends axially along it, and in this recess are a series of hooks 52, Fig. 5. These hooks are adapted to engage openings 53 formed in one end of the printing plate 20. At its other end, the plate shown has a second series of slotted openings 54 which are engaged by hook-like formations 55 on tensioning member 56. This tensioning member is pivotally mounted on a shaft 57 within the gap 50 of the drum and is normally swung in a plate-tensioning direction by a spring 58 which is interposed between the member and a rod 59 carried by the end walls of the drum.

To retain the plate on the hooks 55, I pivotally mount a comb 60 on the tensioning member 56, as at 61. The tines 62 of this comb project between the hooks 55 and by the action of a spring 63 they resiliently retain the plate in contact with the face of the tensioning member and prevent its inadvertent movement from the attaching hooks 55.

A fuller description and showing of the details of the particular clamp herein illustrated appears in the pending application of Messrs. William R. Allen and Charles H. Sand, No. 448,912, filed June 29, 1942, assigned to my assignee Addressograph-Multigraph Corporation.

The plate drum 21 is bodily movable in a direction away from the transfer or offset drum 23. As shown in Fig. 3, the drum 21 is rotatably mounted on a shaft 65 having eccentric end portions 66 and 67 which project into bushings carried by the frame plates 10 and 11 respectively. Thus, as the shaft is turned, the drum is moved bodily. The shaft 65 is latched in its printing position by a pivoted latch 70 carried by a sleeve 71 which is pinned to the eccentric portion 67 of the shaft. A spring 72 tends to retain this latch in a notch 78 of a latch plate 73. This plate is adjustably mounted on the frame plate 11 and is secured in position by a stud 74 which passes through a slotted opening in the latch plate and threadingly engages the frame plate.

The latch 70 is released and the shaft is turned by a knob or control member 75. This knob is rotatably mounted on the shaft portion 67 and as it is initially turned in a clockwise direction a cam surface 76 thereof engages the latch 70 and moves it out of engagement with the cam plate. Thereafter the knob engages a pin 80 carried on an arm of the latch sleeve and turns the shaft. The pin 80 is engaged by the walls of an opening 83 which is considerably larger than the diameter of the pin. Due to this lost motion connection the turning of the knob in a latching direction first moves the cam past the latch 70 permitting its spring 72 to force it against the latch plate. Further movement of the knob turns the shaft and latch until the latter engages the notch 78 in the latch plate.

Alignment of the drum 21 axially with the transfer drum 23 is accomplished by turning the left hand bushing 85 of the plate cylinder shaft. This bushing is an eccentric bushing and is adjusted by means of a plate 86 secured to the bushing adjacent the external surface of the frame plate 10. A suitable bolt 88 passing through a slotted opening 87 in the plate 86 permits the slot and bushing to be locked in an adjusted position.

The transfer or offset cylinder 23 is secured to a shaft 90 which is rotatably journaled in bush-

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ings carried by respective frame plates 10 and 11. This cylinder has an axially extending gap 91 at one end of which is a bar 92 provided with a series of hooks 93. One end of the transfer blanket is provided with slotted openings 94 for engagement with these hooks. The other end of the blanket is provided with a similar set of slotted openings which are engaged by hooks 95 on the tensioning bar 96. This bar is pivotally mounted on a rod 97 carried by the drum and is tensioned by a pair of screws 98 which threadingly extend through the bar and coast with a surface 99 of the drum gap.

The platen 24 is a relatively small roll and is rotatably mounted on a shaft 100, the ends of which are mounted in respective levers 101 which together with the shaft form the platen roll bail. These levers are pivoted intermediate their ends as at 102 to the inner face of respective frame plates and at their outer ends are bent inwardly as at 103. These inwardly bent ends are each provided with a square opening to receive the squared portion 104 of a respective rod 105 carried by respective bars 106 forming part of the base 27 to which the machine is secured and projecting forwardly therefrom. A coil spring 107 surrounding the rod between the portion 104 of the lever and a nut carried by the threaded upper end of the rod serves to move the platen roll assembly resiliently toward the offset roll.

Axial vibration of the platen roll, is prevented by a yoke 46 (Figs. 2 and 4). This yoke is pivotally mounted as at 47 to the exterior of the frame plate 11, and engages an annular groove 48 on the plate shaft 100, which passes freely through an enlarged opening 49 in the frame plate 11. This arrangement permits the platen roll shaft to be independently mounted at its opposite ends, as just described.

The rods 105 which support the platen roll spring assembly are resiliently maintained in position by second coil springs 108 which are interposed between the bars 106 and shoulders 109 of the respective rods and are stiffer than the springs 107. These springs 108 act to retain the rods in their uppermost positions. An adjusting nut 110 carried by a threaded portion of each rod extending beneath the respective bar 106 limits the upward movement of the rod and by varying the compression of the spring 107 controls the pressure of the platen roll.

After a new plate has been applied to the plate drum 20, it is desirable that it be thoroughly coated with liquid repellent and then the ink applied, before the plate is brought into contact with the transfer blanket. One of the features of this invention is the provision of an efficient manually operable control to enable the above sequence of operation. A further feature of the present invention is the provision of a simple manually operable mechanism to control the separation between the plate drum 21, the platen roller 24, and the offset drum 23 in such manner as to enable the building up of an inked image on the transfer drum without danger of offsetting such image on the platen roller. These operations are controlled by a pair of levers 111 and 112, which, in the form shown, are conveniently positioned at the right hand side of the machine.

The application of liquid repellent and ink to the printing plate is controlled by the lever 111. This lever and its associated control mechanism is best shown in Figs. 2, 3, and 4. As there shown,

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the lever 111 is secured to one arm 114 of a bell crank which is pivotally mounted on a shaft 116 journaled in the frame plates 10 and 11. The other arm 115 of the bell crank is connected by a link 117 to one end of a lever 118. This lever is pivoted intermediate its ends as at 119 to the frame plate 11. The other end of this lever is pivotally connected to a rack bar 120 the teeth 121 of which engage a pinion 122. This pinion is secured to the cam shaft 42 heretofore described.

The arrangement of the lever 111 and the linkage above described is such that when the lever is in a vertical position both the repellent applicator roller 18 and the ink rollers 16 and 17 are in their uppermost or idle positions. When the lever 111 is moved to the dotted-line position (Fig. 2) the cams 41, 44 have been rotated sufficiently to permit the repellent roll 18 to lower into contact with the printing plate, while the inking roll is still out of contact therewith. The drum 21 is rotated while the lever is in this position and the plate is thus coated with repellent.

The lever 111 is then swung to the full line position shown in Fig. 2. When moved to this position the ink roll 16 moves into contact with the printing plate and the printing drum is rotated to cause the ink to build upon the image portions of the printing plate 20. It is, of course, assumed that the printing drum 21 has been previously separated from the transfer drum 23 during this time.

After the image has been built upon the printing plate, the plate drum is moved into contact with the transfer drum. This is controlled by the lever 112, which when the drums are separated is in its vertical position as illustrated in full lines in Fig. 2. The lever 112 is mounted on one arm 125 of a bell crank which is secured to the shaft 116 already mentioned. The other arm 126 of this bell crank carries a pin 127 which engages the walls of a slot 128 in a link 129 and which is operably connected to the link by a spring 130.

As the lever 112 is moved from its vertical position, shown in Fig. 2, to the dotted line position, the spring 130 serves as a connecting member between the bell crank and link so as to move the link upwardly. The upper end of the link 129 is pivotally connected to a disc 131 which is secured to the knob 75 of the printing roll eccentric shaft portion 67 heretofore described. The arrangement of this mechanism is such that the movement of the lever 112 moves the eccentric until the plate drum 21 moves into contact with the transfer drum 23. The ink and repellent applicator rolls, being drawn downward by the spring 36, follow the printing drum in its downward movement.

After the drums have rotated sufficiently to cause the building up of the inked image on the transfer drum; the lever 112 is moved to raise the platen roll, as hereinafter described, into cooperation with the transfer drum, and the machine is then ready for printing. In its cooperative position, the platen roll is spaced from the transfer blanket a distance slightly less than the thickness of the sheet to be printed, so that no offsetting on the platen occurs in the absence of a sheet between them, but they are able to impress the image on the sheet when presented. The raising of the platen roll is accomplished by moving the lever 112 to a position similar to that in which the lever 111 is shown in Fig. 2. When the lever 112 is in its vertical position shown in Fig. 2, a toggle mechanism about to be described

acts on the platen roll supporting arms 101 to hold the platen out of contact with the transfer drum. The movement of the lever to the dotted line position has no effect on this toggle mechanism, but its movement to its farthest position breaks the toggle and permits the springs 107 to raise the platen into contact with the transfer drum.

The toggle mechanism above mentioned is best illustrated in Figs. 4 and 5. As there shown, a pair of plates 135 are journaled on the shaft 116 substantially beneath the respective platen-supporting arms 101. These plates each carry a pin 136 which engages in the upper ends of slots in respective links 137 which are pivotally connected as at 138 to the arms 101. When in the position shown in Fig. 5, the pins 136 lie in a line drawn between the pivots 138 and the axis of the shaft 116, or slightly at the right thereof.

The toggle mechanism is actuated by pins 140 carried by respective levers 141 which are pinned to the shaft 116. As the lever 112 is moved from its vertical position to the position indicated by the dotted lines in Fig. 2, the pins 140 move idly in enlarged openings 142 in the toggle plates 135. However, as the lever 112 is moved to its left hand position the pins 140 engage the walls of the openings 142 and swing the toggle pins 136 to the left thus breaking the toggle and permitting the springs 107 to move the platen roller into contact with the transfer drum.

The movement of the lever 112 to raise the platen roll has no effect on the plate drum 21. As heretofore mentioned, the latch 70 retains the plate drum in its active position. Due to this latching, the movement of the lever 112 to the left from its dotted-line position does not move the link 129 but causes the stretching of the spring 130 as the pin 127 moves to the upper region of the slot 128 (Fig. 2). In this movement the pin is drawn into an offset portion 132 of the slot and retained there by the spring 130, and this retains the lever 112 in its left hand or forward position until it is again swung toward the right (Fig. 2).

An adjustment is provided between the knob 75 and the disc 131 which is actuated by the lever 112. As shown in Fig. 2, the disc is adjustably secured to the knob by a bolt 133 which passes through an arcuate slot in the disc. This permits the adjustment of the platen as heretofore described without altering the operation of the control mechanism, the adjustment of the latch plate 73 being compensated for by adjustment of the disc 131.

The movement of the lever 111 is limited in its extreme positions by a pair of pins 123 (Fig. 2) carried by the frame plate 11 and projecting into the path of the arm 114 of the bell crank carrying such lever. The lever is retained in any of its selected positions by a spring-pressed plunger 124 (Fig. 4) carried by the bell crank 114 and engaging a suitable indentation 175 in the frame plate 11.

The movement of the lever 112 is limited by a pair of pins 176 (Figs. 4 and 5) which are secured to the frame plate 12 and are engaged by one of the toggle plate arms 135 heretofore described. If desired, this lever may be retained in any of its selected positions by a similar arrangement to that described in connection with the lever 111. In such instance the plunger mechanism would be carried by one of the toggle plate arms 135.

As heretofore mentioned sheets to be printed are fed to the machine from the front, namely,

the right hand side of Fig. 1, or the left hand side of Figs. 2 and 5, and are discharged toward the side from which they are fed. The sheets are fed, one at a time, across a feed table 145 carried by a suitable cross frame member 146, into the bite of the transfer drum and platen roller to receive the impression from the transfer drum, and are returned, printed, beneath such table, as about to be described.

Immediately after the sheet to be printed passes between the bite of the drum 23 and the platen roller 24, it is stripped from the transfer blanket and directed downwardly around the platen roller to the bite of the platen roller and an ejector roller which is positioned below the platen and cooperates with it to feed the printed sheet forwardly. The stripper mechanism is best shown in Figs. 3, 4 and 5, and comprises an ejector bar 150 carried by the transfer drum 23, and stripping fingers curving about the platen, to direct the sheet downwardly and forwardly.

The ejector bar 150 lies in the gap 91 of the offset drum and is carried by a pair of arms 151 which are pivoted as at 152 to the ends of the drum. Springs 153 interconnected between this bar and the drum serve to maintain the ejector bar normally within the cylindrical confines of the drum 23. However, immediately after the sheet has passed between the drum and the platen, a roller 154 on one of the arms 151 engages a stationary cam formation 149 carried by the frame plate 10 and causes the bar 150 to force the sheet away from the drum toward the set of stripper fingers 155.

The stripper fingers 155 complete the stripping of the sheet from the transfer drum 23 and guide it around the platen roller. These stripper fingers 155 are carried by a bail 156 pivotally secured to the frame plates 10 and 11 as at 157. These fingers are spaced from and conform to the curvature of the platen roller. Springs 158 interposed between the ends of the bail 156 and the respective frame plates retain the bail in position against eccentric stops 159 on the frame plates. This mounting permits the bail and stripper fingers to be swung away from the platen whenever desired, the bail being provided with a handle 160 for this purpose. This enables the ready removal for instance of any torn sheet or any sheet jammed from the feeding of more than one sheet at a time.

The arrangement described is such that the upper ends of the fingers are as close to the transfer drum as is practicable. Therefore, the ejector bar 150 is in the nature of a comb, only the tines 148 of which project out of the cylindrical confines of the drum and then only when the ejector is actuated by the cam 149.

The stripper fingers guide the sheet around the platen into the bite of the platen and a discharge roller 162. This roller is preferably made of a resilient material such as a rubber composition and is journaled on a rod 163 supported at its ends in arms 164. These arms are pivoted as at 165 to the respective frame plates and are engaged by springs 166 which act to retain the ejector roller resiliently in contact with the platen roller.

The ejector roller 162 is so arranged as to avoid injury to the freshly printed surface of the sheet being delivered. As shown best in Fig. 4, the ejector roll 162 is grooved as at 168 so as to present a series of spaced narrow ribs 167 to the freshly printed sheet, and the ejector rolls springs

exert only sufficient tension on the ejector roller to cause it to contact lightly with the platen roller.

The platen 24 and ejector roller 162 discharge the sheet through a passage formed by upper and lower sets of curved tines 170 and 171 (Fig. 5). The lower set of tines is secured to the edge of a receiving tray 172 supported by the frame of the machine. The inner ends of these tines project into the grooves 168 of the discharge roller 162, thus insuring the stripping of the sheet from such roller. The upper set of tines is carried by the cross bar 173 of a bail, the arms 174 of which are secured to the receiving tray 172. The sheet receiving tray is removably secured to the machine in any suitable manner, so that it and the tines 170, 171 may be removed as a unit from the machine.

The printing mechanism just described is power operated. As shown in Fig. 1, the machine is mounted on or secured to a stand 180, which carries a motor 181. The motor is connected by a driving belt 182 with a shaft 183 (Figs. 3 and 6) by a clutch mechanism 200 hereinafter to be described in detail. This shaft carries a pinion 184 meshing with a gear 185 on a countershaft 187 is journaled in the frame plates 10 and 11. Adjacent the frame plate 10, a pinion 186 is secured to this countershaft. This pinion meshes with a gear 188 secured to transfer roll drum, which in turn drivingly engages gears 189 and 190 carried by the printing drum and platen roller respectively.

The ink and repellent applicator rolls 16, 17 and 18, as well as the discharge roller 167 are all preferably driven by frictional contact with their respective coacting rolls or drums. Suitable hand wheels one, 260, at the left hand side of the machine, on the shaft 183, and another, 261, at the right hand side of the machine on the shaft 187, permit manual operation of the mechanism when desired.

The clutch mechanism 200 is best shown in Fig. 3 and is mounted between the frame plate 10 and a frame bracket 201 secured thereto. The clutch shaft 183 is journaled in such bracket and frame plate. A flanged pulley 202 is rotatably mounted on this shaft adjacent the pinion 184. This pulley is continuously driven by the belt 182 heretofore described. The flange 203 of this pulley is provided with a plurality of internal axially extending grooves 204. These grooves receive lugs 205 on a friction clutch plate 206, which is disposed between a pair of discs 207 and 208. These discs are normally held apart by springs (which may be similar to the springs 209 in the brake hereinafter described) and are drivingly connected by pins 210. The disc 207 has an axially extending hub 211 which is drivingly secured to the clutch shaft 183 by a pin 212. The clutch discs when drawn together grip the clutch plate 206 and thereby form a driving connection between the clutch pulley 202 and the shaft 183. The clutch discs are operated by a collar 213 which is slidably mounted on the shaft 183. As the collar is moved toward the clutch it engages a plurality of fingers 214. These fingers are pivoted to a collar carried by the hub 211 of the disc 207 and as they are swung by the collar 213 their inner ends 215 engage the disc 208 thereby drawing the plates 207 and 208 together in driving relation with the friction clutch plate 206.

The shaft 183 is also provided with a brake 218 which serves to bring the shaft, and therefore the entire printing mechanism, to a rapid stop.

The brake is similar to the clutch mechanism heretofore described and the corresponding parts have been given corresponding reference numbers. In the brake mechanism the lugs 205 of the clutch plate are engaged by the walls of notches 219 of a stationary plate 220. This plate is mounted on posts or bosses 221 carried by the bracket 201. The clutch discs of the brake are operated by movement of the collar 213 toward the left (Fig. 3) in the same manner as heretofore described in connection with the clutch.

It will be noted that the collar 213 is so arranged that a relatively small movement from its clutch engaging position (shown in Fig. 3) will cause the engagement of the brake mechanism, there being substantially no neutral position of this clutch-and-brake-operating collar.

The clutch mechanism is controlled by foot pedals 230 and 231 (Fig. 1). The former controls the operation of the clutch during normal operation of the machine and the latter serves a purpose hereinafter to be more fully described. These pedals are pivotally mounted for independent movement on a rod 222 carried by a bracket 223 secured to the lower end of the stand 180. The forward or right hand end of the pedals are normally held in a raised position by suitable springs, one of which is indicated at 224.

The pedal 230 is connected by a link 225 to a lever 226 which in turn is connected by another link 227 with a lever 228 (Figs. 1, 6 and 7). This lever is secured to a rock-shaft 229 which is journaled in the frame plates 10 and 11. Secured to the outer end of this shaft is a lever 232 which is connected by a link 233 with one arm 234 of a bell crank 216 (Figs. 3, 6 and 7). This bell crank is pivotally mounted on a rod 235 carried by the bracket 201 of the clutch mechanism. The other arm 236 of the bell crank carries a pin 237 which engages a peripheral groove 238 formed in the clutch collar 213. A spring 239 normally acts on the bell crank to retain it in a position that will keep the clutch collar in a brake-engaging position.

Due to the mechanism above described, the depression of the pedal 230 by the operator moves the clutch collar 213 to the right (Fig. 3) thus operating the clutch to connect the motor 181 drivingly with the printing mechanism. So long as the pedal 230 is retained in a depressed position the printing mechanism will continue to rotate.

It is desirable that the machine stop in a predetermined position when the clutch pedal 230 is released. To this end, there is provided a latch mechanism to retain the clutch-operating bell crank 216 in clutch-operating position until a predetermined point in the cycle of operation of the printing mechanism. As shown in Figs. 6 and 7, this latch mechanism comprises a latch member 240 pivoted as at 241 to the bracket 201, and urged toward the arm 234 of the bell crank 216 by a spring 217.

The arrangement of the mechanism just described is such that when the bell crank is actuated by the depression of the pedal 230, the latch will be moved into the position shown in Fig. 6. In this position the latch overlies the bell crank and retains it in the position shown in Fig. 3, even though the pedal 230 be released by the operator, until the latch 240 is automatically released by the printing mechanism, as about to be described.

As shown in Figs. 3 and 6, the transfer roll shaft 90 extends outwardly beyond the frame

plate 10 and has secured to it a cam 242. This cam has two active cam portions 243 spaced one hundred and eighty degrees apart. These cam portions are arranged to engage a lip 244 of the latch and swing it out of engagement with the bell crank 216, as shown in Fig. 7; whereupon the spring 239 swings the bell crank in a counter-clockwise direction (Fig. 3) moving the collar 213 from the clutch-engaging position to the brake-engaging position.

The cam 242 is so arranged that it will stop the printing drum either in the position shown in Fig. 5, where the plate retaining hooks 52 are accessible at the front of the machine, or in the diametrically opposite position, in which the plate clamp 56, etc., is accessible at the front of the machine.

Assuming the machine be stopped in the position diametrically opposite to that shown in Fig. 5, then the plate clamp mechanism 56, etc., may be operated to release the plate 20. Then if the mechanism is rotated half a revolution, into the position of Fig. 5, the plate retaining hooks 52 are accessible to permit removal of the printing plate and the substitution of a new plate therefor. Following the positioning of a new plate 20 on the hooks 52, the rotation of the drum 20 for one half a revolution will wrap the plate around the drum and again bring the plate clamp 56, etc., into position to enable the operator to secure the plate thereto, thus completing the attachment of the new plate to the drum.

The rotation of the printing mechanism one half a revolution, for the purposes above described, is accomplished by the depression of the pedal 231 by the operator. The mechanism associated with this pedal is such that for each depression of the pedal the printing drum will rotate one half a revolution and then come to a stop, regardless of how long the operator retains this pedal depressed, and further rotation will require the release of the pedal. This arrangement assures the safety of the operator's person during the changing of printing plates, and is especially desirable where the runs are short and the plates changed frequently.

The pedal 231 and its associated mechanism is best shown in Figs. 1, 6, 7 and 8. As shown in Fig. 1, this pedal is connected by a link 245 with a lever 246 which in turn is connected by a link 247 with a plate 248. This plate is pivotally mounted on a stud 249 carried by the frame plate 10. Rotatably mounted on this stud, between the plate 248 and the frame 10, is a compound ratchet and star wheel member 250, 251 (Figs. 7 and 8). When the pedal 231 is depressed by the operator a pin 252 of a pawl 253 carried by the plate 248 advances the ratchet 250 a distance of one tooth and this advances the star wheel 251 a distance of one tooth. As the star wheel tooth 254 is progressed it engages a roller 255 carried by lever 232 heretofore described. This rocks the lever downward (Fig. 7) causing it to depress the arm 234 of the clutch-operating bell crank 216, energizing the clutch, and this causes the latch 240 to retain the lever in its clutch-actuating position.

It will be noted that the ratchet and star wheel member is so arranged that normally the roller 255 lies between two adjacent teeth 254 of the star wheel. As the star wheel is advanced a distance of one tooth for each actuation of the pedal 231, it is obvious that as such pedal is depressed a star wheel tooth depresses the lever 232 and immediately moves out of reach of the roller 255 which then, so far as the star wheel is concerned,

is free to return to its normal position, as shown in Fig. 7. Therefore the latch mechanism 240 will be released by the cam 242 as soon as the printing drum has turned a half a revolution, whereupon the spring 239 will cause the bell crank 216 to swing in a counter-clockwise direction (Fig. 3) disengaging the clutch and connecting the brake mechanism with the operating or clutch shaft 183.

It will be seen that my machine provides, in a most convenient manner, for the various controls desired in a rapidly operating planographic printing machine. One hand lever by its two positions controls the application of the materials to the image on the plate and the other hand lever by its two positions enables the ready transfer of the image to the offset blanket and then controls the printing impression. One of two pedals and the mechanism operated thereby enable the continuous rotation of the drum to effect printing as desired, while the operation of the other pedal enables the partial rotation of the plate carrying drum to bring it to a stop in position where the plates may be quickly detached and a new plate attached to the drum. This enables the master sheet to be changed with the minimum loss of time and is especially desirable where the runs are short. These features, and the provision of the delivery mechanism, acting to return the sheet to a stacking position beneath the feed table, result in the entire operation being readily controlled by an operator sitting at the front of the machine.

Reference is made to my divisional application No. 615,213, filed September 8, 1945, for claims relating to a printing drum with drive and control mechanism for stopping the drum in selected positions as shown herein and to my divisional application No. 616,493, filed September 15, 1945, for claims relating to a sheet rotary printing structure with associated sheet delivery structure herein shown.

I claim:

1. In an offset printing machine of the planographic type, the combination of a plate cylinder, an offset cylinder, a platen, means for applying repellent to a plate on the plate cylinder, means for applying ink to such plate, two hand levers each having two positions and both located so that they may be actuated by the operator without changing his position, mechanism connecting one hand lever with the repellent applicator and the ink applicator and operative to apply the repellent by movement of that hand lever into one position and ink by movement of the same hand lever into another position, and mechanism operated by the other lever to put the plate cylinder into coaction with the offset cylinder in one position of that lever, and to put the platen into coaction with the offset cylinder in the other active position of that lever.

2. In a planographic offset printing machine, the combination of a plate cylinder, an offset cylinder, a platen roller, an ink applying roller, a repellent applying roller, and two hand levers both located so that they may be actuated by the operator without changing his position, mechanism connecting one of the hand levers with the ink and repellent applicators, mechanism connecting the other hand lever with the plate cylinder and platen roller, the normal position of said levers maintaining the two applicator rollers out of contact with the plate and the plate cylinder and platen both separated from the offset cylinder, each of said members having two

successive positions with a dwell between them, the connecting mechanism between the first lever and the ink and repellent rollers being such that the first movement of the lever brings the repellent roller into engagement with the plate and the second movement brings the ink roller into engagement with the plate without disturbing the coaction between the repellent roller and plate, and the connecting mechanism from the other hand lever being such that the movement of that lever to its first active position moves the plate cylinder into coaction with the offset blanket and the movement to the second position brings the platen into coaction with the offset blanket without disturbing the coaction between the plate and blanket.

3. In a planographic printing machine, the combination of a plate cylinder, an offset cylinder, a platen roller, an ink applying roller, a repellent applying roller, a shaft, mechanism operated thereby to control the presentation of the platen roller to the offset cylinder, a hand lever on said shaft adapted to operate the same, mechanism controlled by said hand lever for changing the presentation of the plate cylinder to the offset cylinder, a hand lever loose on said shaft, mechanism controlled thereby for changing the presentation of the repellent applying roller and the ink applying roller to the plate on the plate cylinder.

4. In a planographic printing machine, the combination of a plate cylinder, an offset cylinder, a platen roller, an ink applying roller, a repellent applying roller, a spring tending to apply the platen roller to the offset cylinder, mechanism to retain the platen roller out of such coaction, a hand lever controlling such mechanism, mechanism controlled by said hand lever for changing the presentation of the plate cylinder to the offset cylinder, a second hand lever located alongside of the first hand lever so that either may be actuated by the operator without changing his position, mechanism controlled by said second hand lever for changing the presentation of the repellent applying roller and the ink-applying roller to the plate on the plate cylinder and means for establishing an intermediate dwell in the movement of each of said hand levers, whereby one lever may control successively the coaction of the plate to the offset blanket and then the platen to the offset blanket and the other lever may control the application of the repellent to the plate and then the ink to the plate.

5. In a printing machine, the combination with a plate cylinder, an offset cylinder, and a platen, of a repellent roll and an ink roll each adapted to coact with a plate on the plate cylinder, a rotary cam mechanism coacting with means on said rolls and adapted by movement in one direction to move the ink roll and the repellent roll out of contact with the plate and by reverse movement to restore the repellent roll into contact with the plate and thereafter restore the ink roll into contact with the plate without removing the repellent roll therefrom, a pinion rotatable with the cam mechanism, a reciprocable rack engaging the pinion and adapted to drive the same, mechanism adapted to move the plate cylinder into coaction with the offset cylinder, said last-named mechanism including two members connected by a loose play connection and a spring attached at its opposite end to said two members respectively, and a pair of manually actuable devices both of which are positioned for actuation by the operator in one position, one

of which devices may control the reciprocation of said rack and the other of which devices may operate the mechanism having the loose play connection whereby the platen may be brought into engagement with the offset cylinder without disturbing the relation of the plate cylinder to the offset cylinder.

6. In a printing machine, the combination of a plate cylinder, an offset cylinder, a platen, a lever, mechanism operated thereby to move the plate cylinder into coaction with the offset cylinder, said mechanism including two members connected by a loose-play connection and a spring connected to said members and strong enough so that one of the members may operate the other through the intermediacy of the spring, said lever having provision for an additional movement, and mechanism actuated by such additional movement to bring the platen into engagement with the offset blanket while the loose-play connection is merely constraining the spring.

7. In a printing machine, the combination of a plate cylinder, an offset cylinder, a platen, a latch for holding the plate cylinder in cooperation with the offset cylinder, an actuating lever, mechanism operated thereby to release the latch and move the plate cylinder, said mechanism including two members connected in series by a loose-play connection and by a spring connected to both members, said lever having provision for an additional movement, and means actuated by said additional movement to bring the platen into engagement with the offset blanket while the loose play connection is stressing the spring.

8. In an offset printing machine, the combination of a plate cylinder, an offset blanket cylinder and the platen roller, a hand lever, a link connecting the same with an eccentric for positioning the plate cylinder, said link having a slot occupied by a pin carried by the lever, the pin and link being connected by a spring strong enough to move the link and turn the eccentric, said lever having a further position, mechanism connecting it with the platen, whereby the lever moving from its first active position to its second active position will cause coaction between the platen and offset drum and in such movement will move the pin along the slot in the link mentioned, said slot having an offset portion adapted to be occupied by the pin at the end of the stroke of the lever to interpose a resistance to retain the lever in its final position.

9. In a printing machine, the combination of a plate cylinder, an offset cylinder and a roller platen, an eccentric mounting for the plate cylinder, a manually operable member, means connecting said member with said eccentric mounting whereby the member may position the plate cylinder, said connecting means including two members connected by a loose play connection and by a spring strong enough to move said means and turn the eccentric, mechanism connecting said manually operable member with the platen, whereby the manually operable member may move the platen to cause coaction between the platen and offset cylinder by stressing the spring when the eccentric cannot turn further.

10. In a printing machine, the combination of a plate cylinder, an offset cylinder and a roller platen, an eccentric mounting for the plate cylinder, a manually operable member, means connecting said member with said eccentric mounting whereby the member may position the plate cylinder, said connecting means including a link

having a slot and an operating pin carried by said member and occupying the slot, the pin and link being also connected by a spring which is effective to move the link when the eccentric can turn, mechanism connecting said manually operable member with the platen whereby further movement of the manually operable member will cause coaction between the platen and offset cylinder and in such movement will move the pin along the slot in the link, said slot having an offset portion adapted to be occupied by the pin at the end of the stroke of the pin to interpose a resistance to retain the manually operable member in its final position.

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