

Sept. 27, 1949.

E. J. JANKE

2,483,203

PRINTING MACHINE

Original Filed April 29, 1944

5 Sheets-Sheet 1

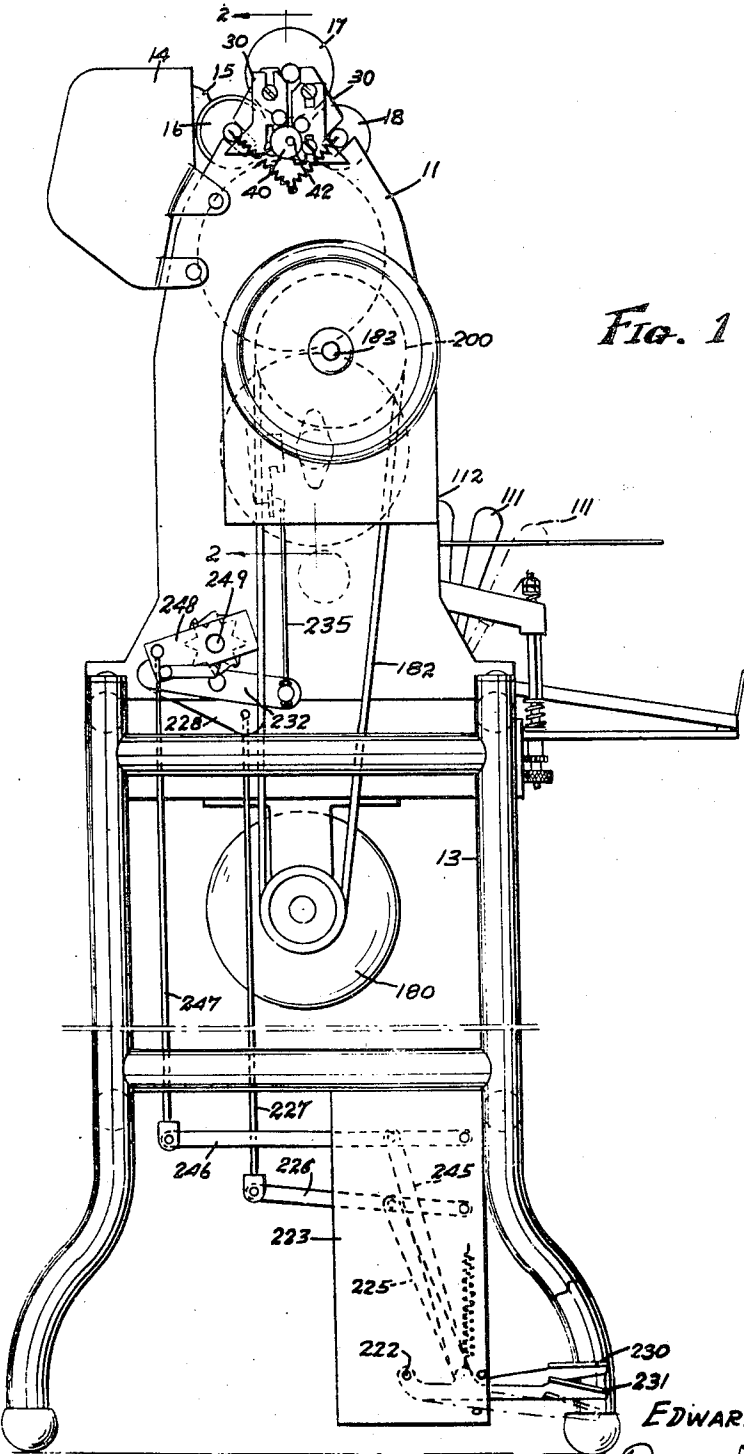


Fig. 1

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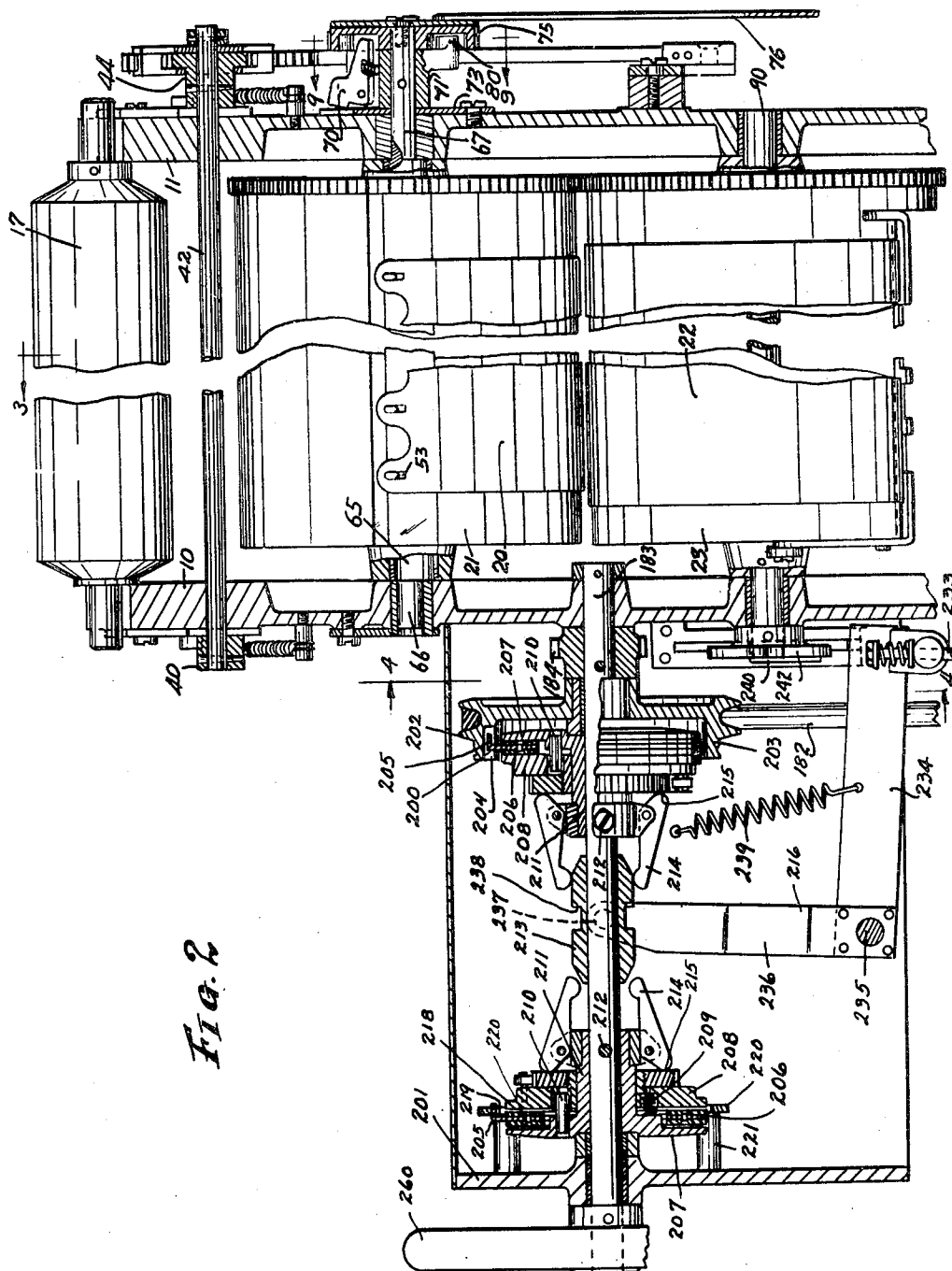
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5 Sheets-Sheet 2



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PRINTING MACHINE

5 Sheets-Sheet 3



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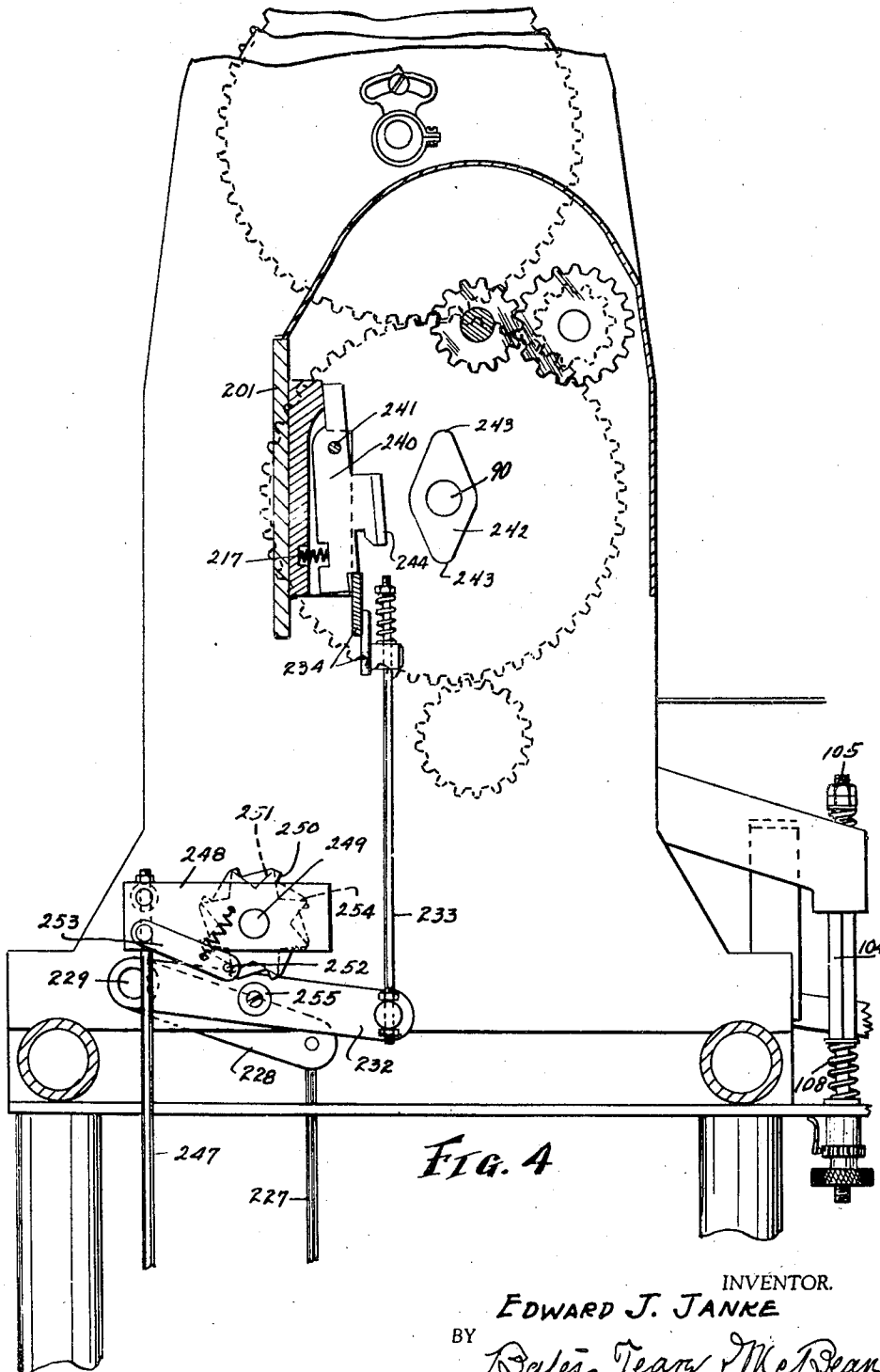
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5 Sheets-Sheet 5

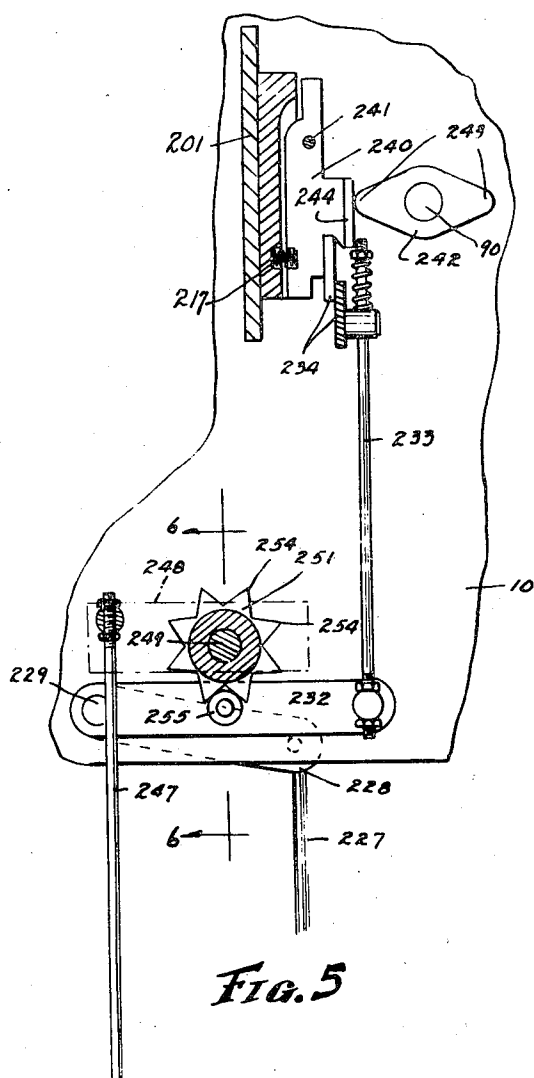


FIG. 5

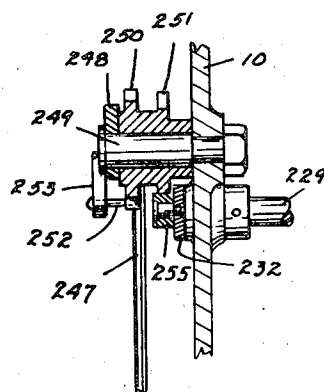


FIG. 6

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PRINTING MACHINE

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Original application April 29, 1944, Serial No.
533,276, now Patent No. 2,425,327, dated Au-
gust 12, 1947. Divided and this application
September 8, 1945, Serial No. 615,213

4 Claims. (Cl. 101—216)

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This application is a division of my copending application No. 533,276, filed April 29, 1944, and issued as Patent No. 2,425,327 on August 12, 1947, for a Printing machine.

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.

An object of the invention is to provide ready means for the stoppage of the master sheet drum in a convenient position for the removal and replacement of the master sheet, and in accomplishing this I provide a dual control preferably having two foot pedals, one for continuous rotation of the machine for printing and the other for half rotations of the master drum to enable the ready clamping of the leading end and the trailing end of the master sheet.

It is an object of the invention to provide effective mechanism for this purpose, including a clutch brake to stop the drum in desired position.

Other objects of the invention and features of the mechanism accomplishing it will be apparent from the following detailed description of the particular embodiment shown in the drawings.

In the drawings, Fig. 1 is a side elevation of a planographic machine incorporating my invention; Fig. 2 is a vertical section through the machine, as indicated by the line 2—2 on Figs. 1 and 3; Fig. 3 is a vertical section taken on a plane parallel with Fig. 1, as indicated by the line 3—3 on Fig. 2; Fig. 4 is a vertical section indicated by the line 4—4 on Fig. 2; Fig. 5 is a fragmentary vertical section through the machine; Fig. 6 is a sectional detail, the plane of the section being indicated by the line 6—6 on Fig. 5.

I will first give a general description of the machine shown in Fig. 1 before taking up the par-

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ticular portion thereof with which the present application is concerned. Referring to Fig. 1 and also to Figs. 2 and 3, it will be seen that the general frame of the machine comprises a pair of side plates 10 and 11 suitably spaced from each other by cross rods, as 12. This frame is shown as mounted on a suitable stand 13 which carries an operating motor 180 and two controlling pedals 230 and 231 linked to mechanism on the machine itself as later explained.

Mounted on the frame plates 10 and 11 is an ink supply unit 14 (Fig. 1), the details of which are not shown but which has at least an ink supply roll 15 applying ink to an applicator roll 16. A distributor 17 coacts with the roll 16 to insure an even distribution of ink thereon. These rolls, together with the liquid repellent applicator roll 18, extend between and are mounted in the upper portions of the frame plates 10 and 11.

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, 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, journaled in the frame plates. The sheet or article to be printed is fed between this offset or transfer drum and a platen roll 24 (Fig. 3) which is journaled in a bail 25, immediately below the transfer drum. 26 designates a curved guide for directing the printed sheet around the platen roll and between it and a coacting spring pressed roll 27 and discharging it, toward that face of the machine from which it was fed, between skeleton guides 28.

As indicated in Fig. 1, the shafts of the ink and repellent applicator rolls 16 and 18 are mounted in inclined slots in the frame plates and bear against the inclined edges of a pair of individually mounted cam plates 30 which are slidably mounted on the outer faces of the respective frame plates. These cam plates are operated by the cams 40, 44 on opposite ends of a shaft 42 which coact with pins projecting outwardly from the plates. The manipulation of this cam shaft serves to hold both the repellent and ink applying rolls out of contact with the printing drum or to allow the repellent roll and thereafter the ink roll to contact with the plate on the drum, as will be well understood.

The plate drum 21 is best shown in Figs. 2 and 3 and 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 drum. While any suitable means may be employed for this purpose, the particular means shown is intended for a plate having a row of holes at each end. As shown, a longitudinal recess 51 is formed in the periphery of the cylinder 21, and in this recess are a series of hooks 52, Fig. 3. 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 a 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 master sheet on the hooks 55, I show a pivotally mounted comb 60 on the tensioning member 56. The tines of this comb project between the hooks 55 and a spring 63 causes them to bear resiliently on the plate or master sheet.

The plate drum 21 is bodily movable in a direction away from the transfer or offset drum 23. As shown in Fig. 2, 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 tends to retain this latch in a notch in a latch plate 73, which plate is adjustably mounted on the frame plate 11.

The latch 70 is released and the shaft is turned by a knob or control member 75, rotatably mounted on the shaft portion 67, and connected by a link 76 to an operating lever 112. When the knob is turned in a clockwise direction a cam surface 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 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 to force it against the latch plate. Further movement of the knob turns the shaft until stopped by the latch engaging in the notch of the latch plate.

The transfer or offset cylinder 23 is secured to a shaft 90 which is rotatably journaled in bushings carried by respective frame plates 10 and 11. This cylinder has an axially extending gap 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 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 carried by the drum and is tensioned by a pair of screws 98 which threadingly extend through the bar and coact with a surface 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 which together with the shaft form the platen roll ball

25. These levers are pivoted intermediate their ends as at 102 to the inner faces 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 13 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.

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 the plate has been mounted on the plate drum 20, it is coated with liquid repellent and then the ink applied before the plate is brought into contact with the transfer blanket. This may be effected by manipulation of the cam shaft 42. There is suitable means not shown in detail for controlling 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 image on the transfer drum without danger of offsetting such image on the platen roller. Fig. 1 indicates at 111, 112 a pair of levers which may accomplish this operation by mechanism not shown.

It should be understood that the lever 111 may have an idle vertical position and two operation positions and operate the cam shaft 42 to apply first the repellent and then the ink without releasing the repellent application. The lever 112 also may have an idle vertical position and two operative positions, one of which causes the engagement of the transfer drum with the inked image and thereafter a movement into the other position may raise the platen roller into engagement with the transfer drum, rendering the machine ready for printing. In its active 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.

Coming now to the particular portion of the machine with which the present application is concerned, it will be seen from Fig. 1 that the machine is power operated from a motor 180. The motor is connected by a belt 182 with a shaft 183 (Fig. 2) by a clutch mechanism 200 about to be described in detail.

The clutch mechanism 200 is best shown in Fig. 2, 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. 2) 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. 2) 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 13. 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, 4 and 5). 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. 2, 4 and 5). 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. 2) thus operating the clutch to connect the motor 180 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. 4 and 5, 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. 4. In this position the latch overlies the bell crank and retains it in the position shown in Fig. 2, 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. 2 and 4, 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. 5; whereupon the spring 239 swings the bell crank in a counter-clockwise direction (Fig. 2) 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. 3, 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. 3, 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. 3, 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 and the holding of it there no matter how long the pedal may be held depressed, 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, 4, 5 and 6. 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. 5 and 6). 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. 5) 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. 5. 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. 2) disengaging the clutch and connecting the brake mechanism with the operating or clutch shaft 183.

It will be seen that the 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 the 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 plate 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 result in the entire printing operation being readily controlled by an operator sitting at the front of the machine.

I claim:

1. In a printing machine, a rotary drum, means for attaching the ends of a printing plate thereto, driving means for said drum, a clutch for coupling said driving means to the drum, clutch operating means for effecting said coupling, holding means for holding operating means active, means for automatically releasing said holding means at the end of a half revolution, a manually operable control mechanism for said operating means and including a member connected with said operating means and movable in one direction to cause the clutch to become active and in another direction to an inactive position to permit the clutch to be released, resilient means normally tending to retain said member in an in-

active position, a rotatable star wheel cooperating with said member to move said member into an active position as a tooth of the star wheel moves into engagement with said member and releases said member as a tooth passes out of engagement therewith during rotation of the star wheel, a manually actuatable means to rotate the star wheel to bring one tooth thereof into and out of cooperation with said member for each actuation of said means.

2. In a printing machine, the combination of a drum, means for attaching the ends of a printing plate thereto, a clutch adapted to couple power to the drum, a control mechanism for rendering the clutch active, said control mechanism including a clutch operating member for connecting the clutch to the drum, automatic means operating on said member to retain the member in an active position to cause the drum to rotate a half a revolution and then release the member to disconnect the clutch from the drum, pedal operated mechanism to initially move said member to an active position, said last named mechanism comprising a spring biased linkage mechanism connected to actuate said member, a star wheel, means carried by the linkage and cooperating with the star wheel to move the linkage against its bias and cause the clutch to become active and then inactive as the star wheel is rotated, a ratchet mechanism to rotate said star wheel to bring one tooth of the star wheel into and out of cooperation with the linkage for each movement of the mechanism in one direction, and a pedal connected to operate said ratchet mechanism.

3. In a printing machine, the combination of a drum, means for attaching the ends of a printing plate thereto, a clutch adapted to couple power to the drum, a control mechanism for rendering the clutch active, said control mechanism including a clutch operating member for connecting the clutch to the drum, resilient means acting to retain said member in an inactive position, a latch to retain the member in an active position, means to release said latch when the drum completes a half a revolution to disconnect the clutch from the drum, pedal operated mechanism to move said operating member to an active position comprising and including a spring biased pivoted lever, a link between said member and said lever, a rotatable star wheel cooperating with said lever to move said lever against its bias to move said operating member to an active position each time a tooth of the star wheel cooperates with the lever as the star wheel is rotated, a ratchet mechanism to rotate said star wheel one tooth at a time, and a pedal connected to said ratchet mechanism.

4. In a printing machine, a rotary drum, means for attaching the ends of a printing plate thereto, driving means for said drum, a clutch for coupling said driving means to the drum, clutch operating means for effecting said coupling, resilient means normally acting to render said operating means ineffective, holding means for holding operating means active, means for automatically releasing said holding means at the end of a half revolution, a manually operable control mechanism for said operating means and including a member connected with said operating means and movable in one direction to cause the clutch to become active and in another direction to an inactive position to permit the clutch to be released, resilient means normally tending to retain said member in an inactive position, a roller carried by said member, a rotatable star wheel cooperating with said roller to move said member into an

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active position as a tooth of the star wheel moves into engagement with said member and to release said member as a tooth passes out of engagement therewith during rotation of the star wheel; a ratchet wheel operatively connected with said star wheel, a pivoted pawl carrier, a pawl mounted on said carrier and engaging said ratchet wheel, resilient means acting to retain said pawl in engagement with said wheel, a pivoted pedal, a link between said pedal and said pawl carrier whereby depression of said pedal actuates said ratchet to move one tooth of the star wheel into and out of engagement with the roller each time said pedal is depressed, a second pedal, and means interconnecting said second named pedal directly with said member.

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