

Dec. 20, 1955

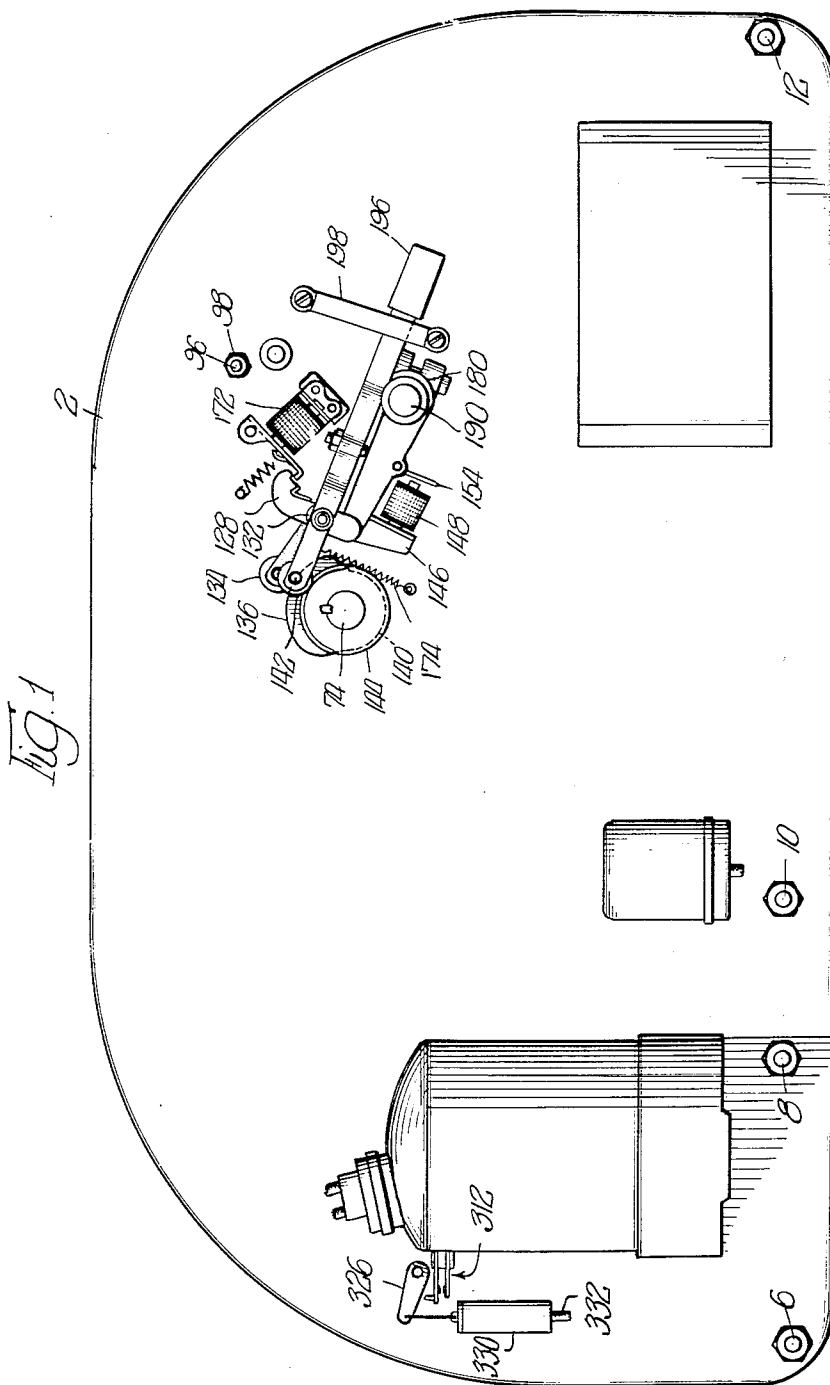
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2,727,461

INTERRUPTER CONTROL MEANS FOR ROTARY OFFSET DUPLICATING MACHINE

Filed Oct. 20, 1951

8 Sheets-Sheet 1



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INTERRUPTER CONTROL MEANS FOR ROTARY OFFSET DUPLICATING MACHINE

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8 Sheets-Sheet 2

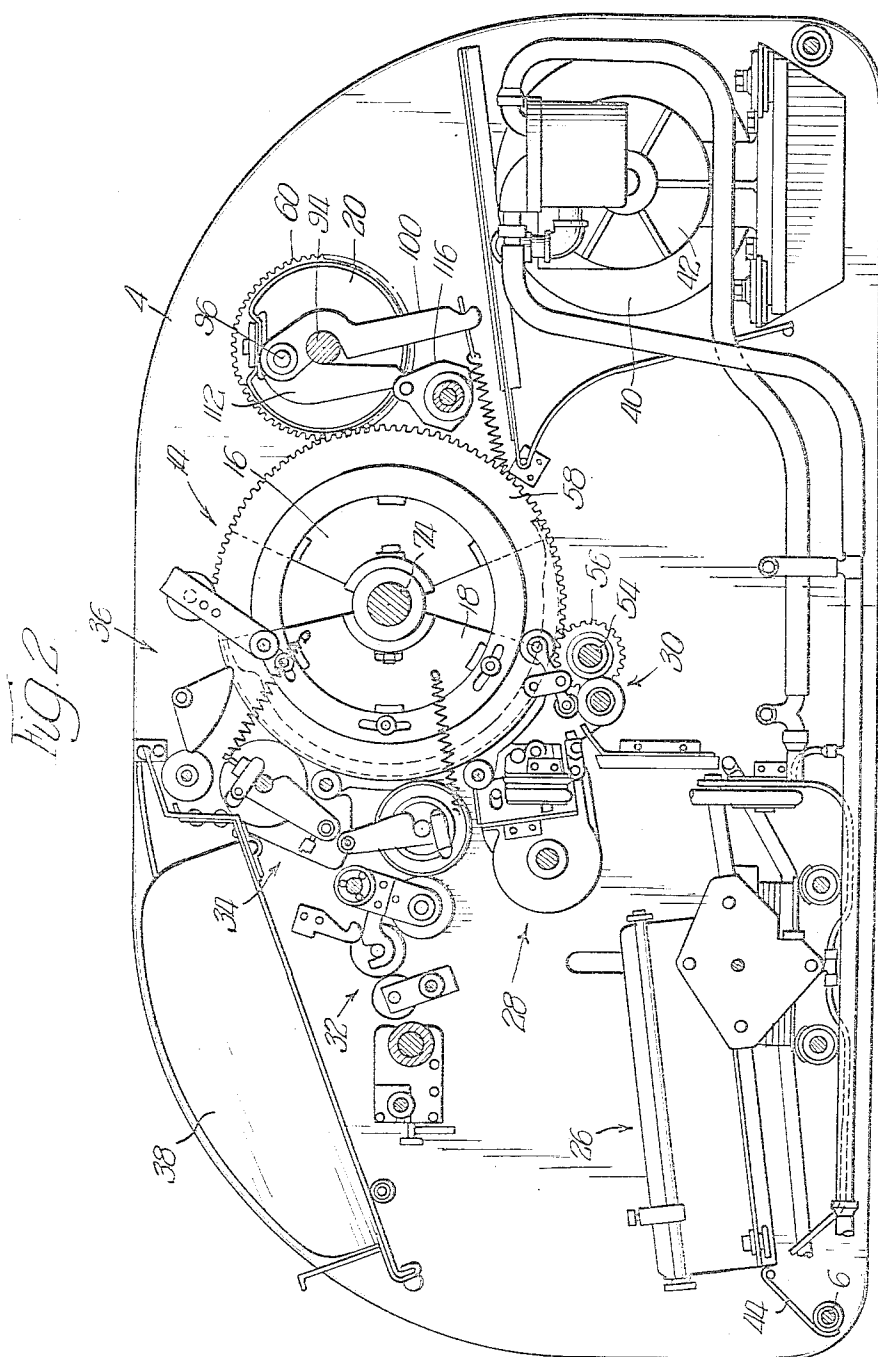


Fig. 2

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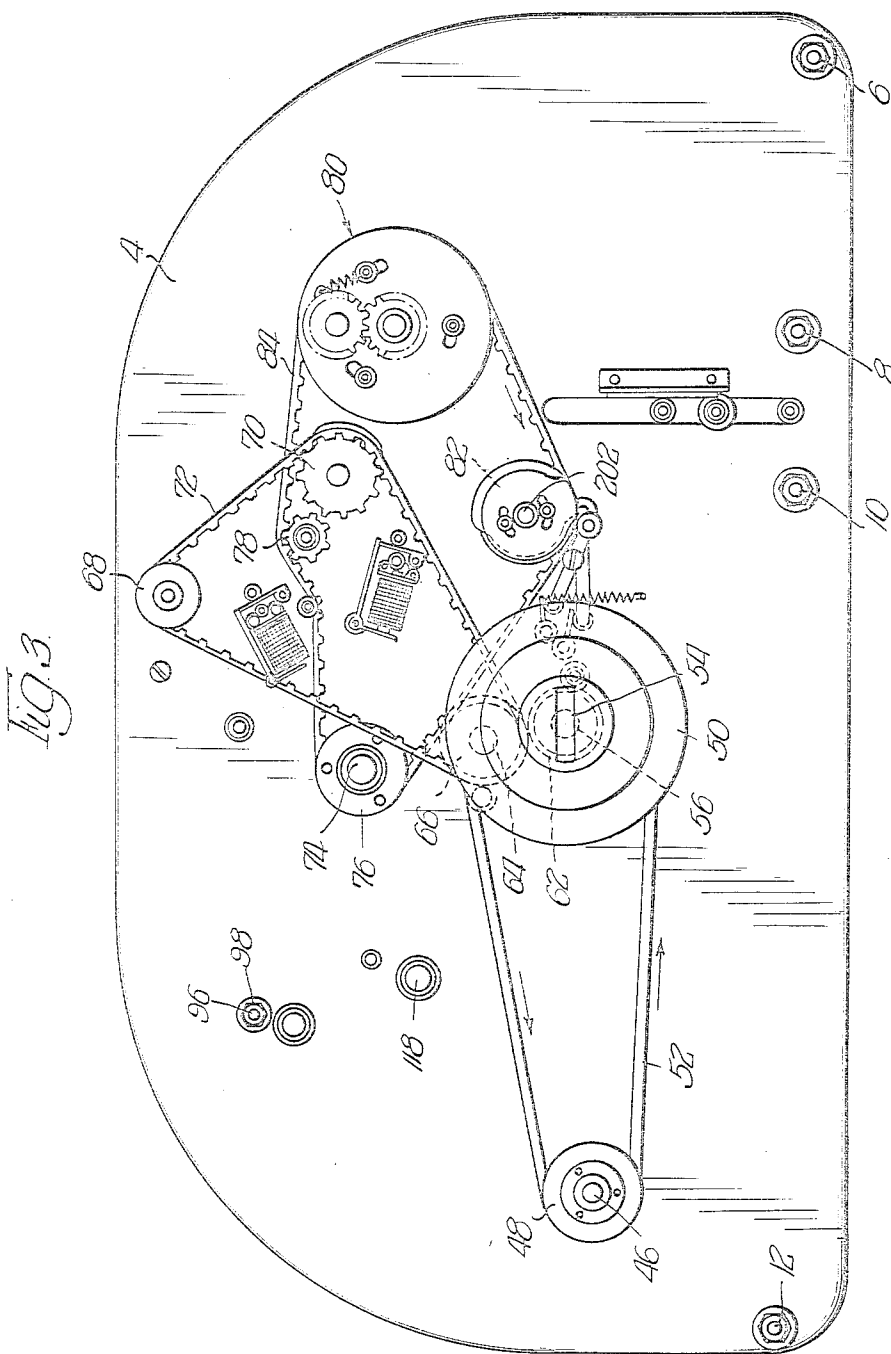
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INTERRUPTER CONTROL MEANS FOR ROTARY OFFSET DUPLICATING MACHINE

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8 Sheets-Sheet 3



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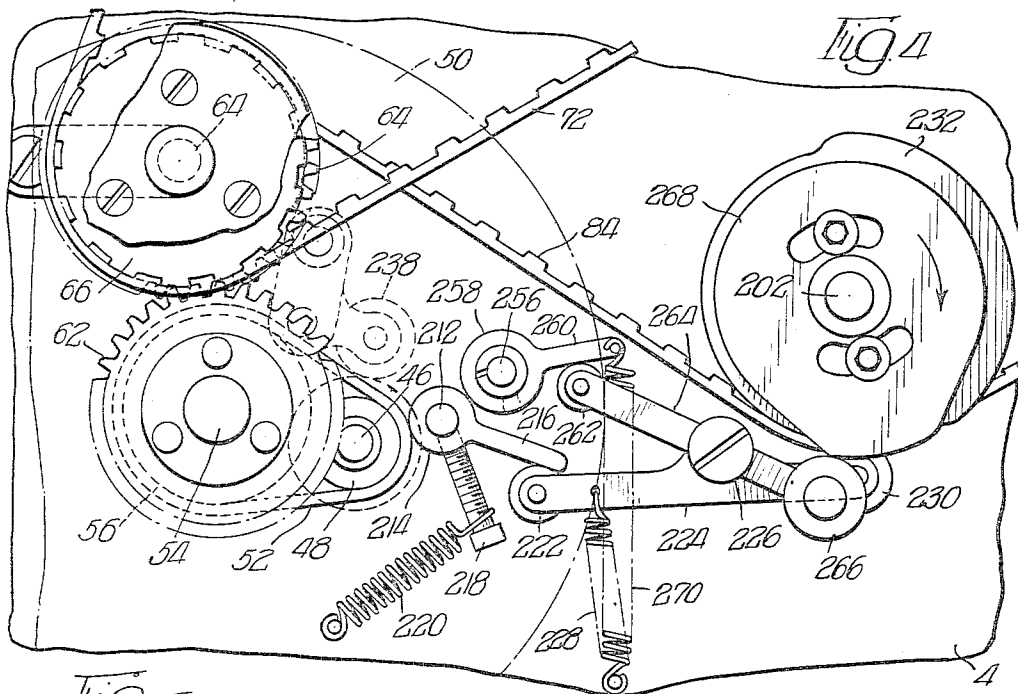
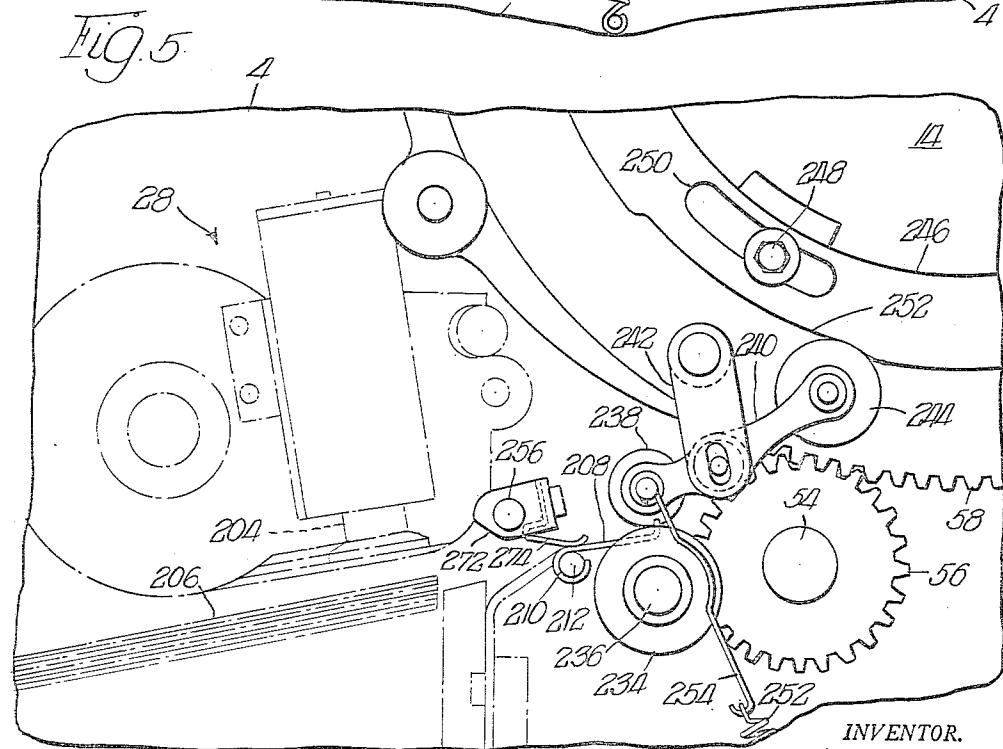
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INTERRUPTER CONTROL MEANS FOR ROTARY OFFSET DUPLICATING MACHINE

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8 Sheets-Sheet 4



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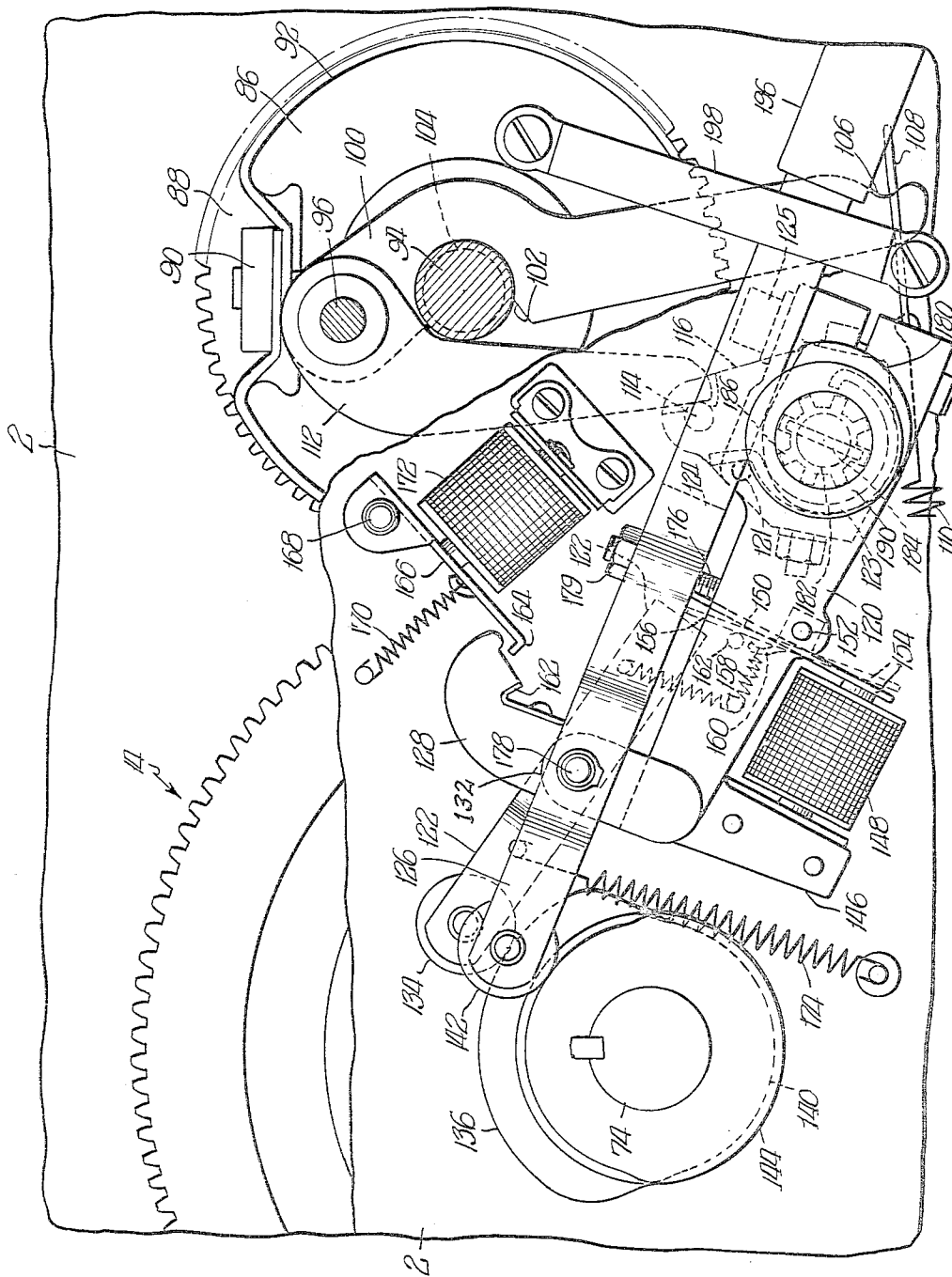
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INTERRUPTER CONTROL MEANS FOR ROTARY OFFSET DUPLICATING MACHINE

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3 Sheets-Sheet 5



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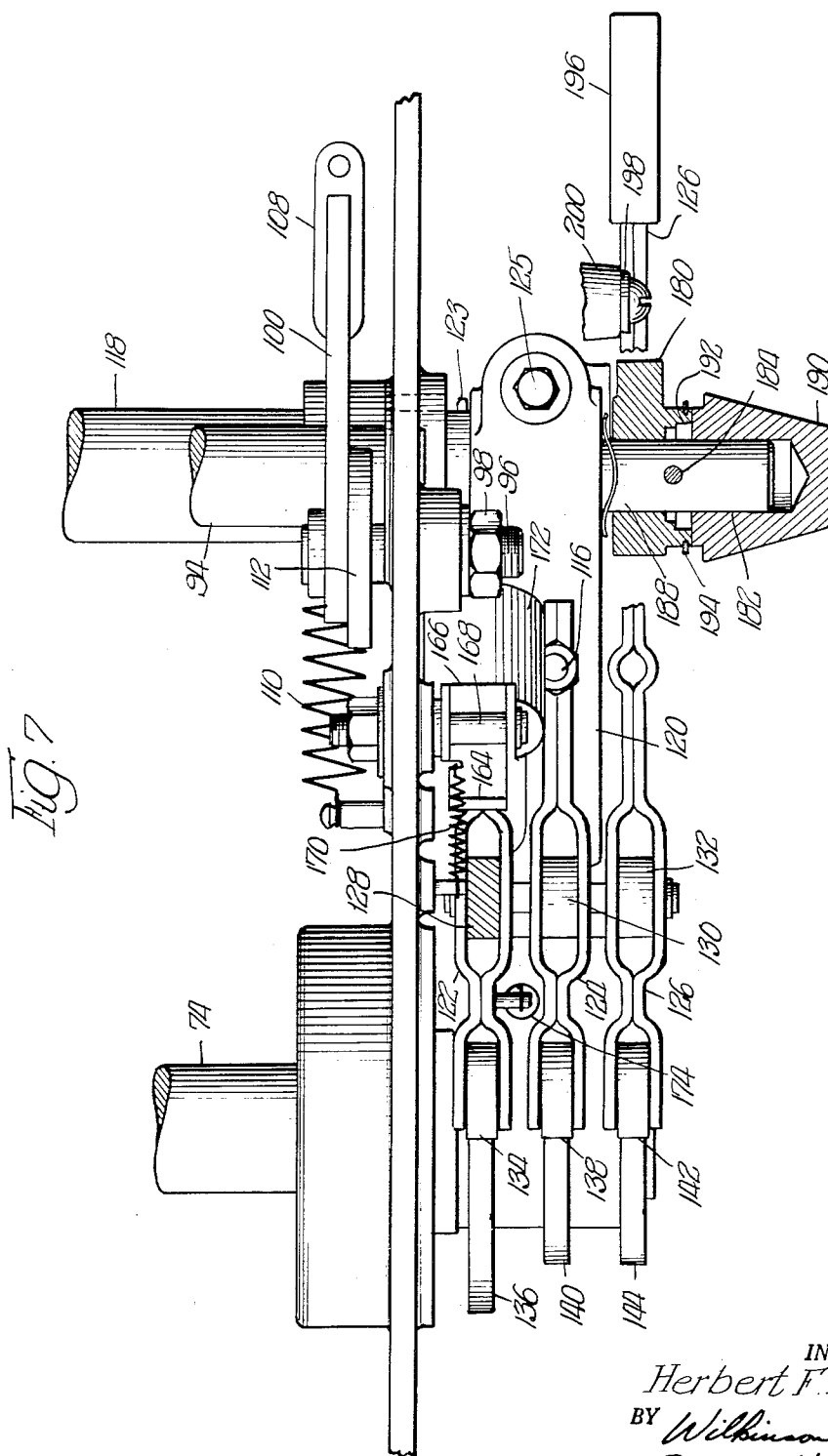
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INTERRUPTER CONTROL MEANS FOR ROTARY OFFSET DUPLICATING MACHINE

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8 Sheets-Sheet 6



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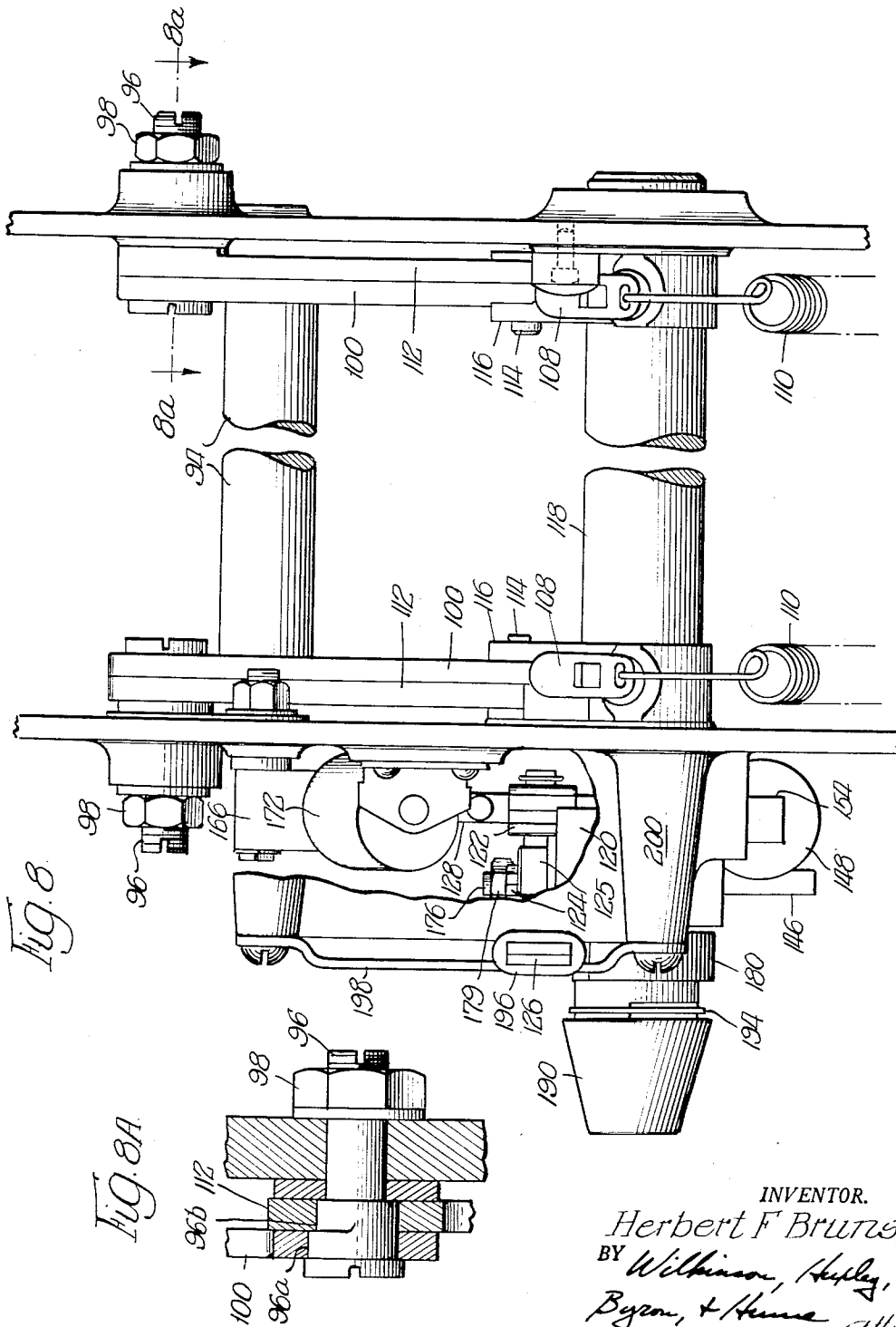
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INTERRUPTER CONTROL MEANS FOR ROTARY OFFSET DUPLICATING MACHINE

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8 Sheets-Sheet 7



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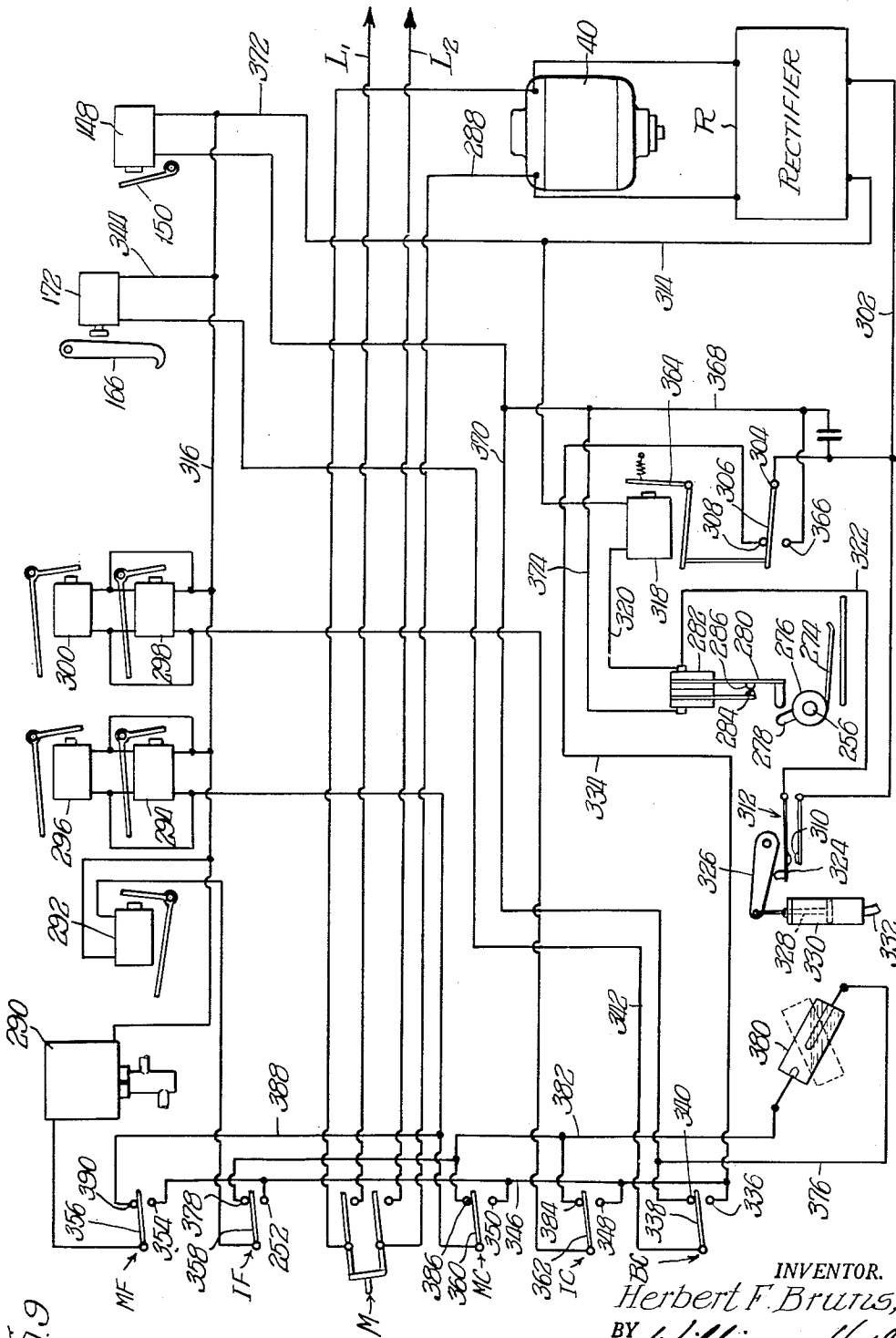
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INTERRUPTER CONTROL MEANS FOR ROTARY OFFSET DUPLICATING MACHINE

Filed Oct. 20, 1951

8 Sheets-Sheet 8



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2,727,461

## INTERRUPTER CONTROL MEANS FOR ROTARY OFFSET DUPLICATING MACHINE

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Application October 20, 1951, Serial No. 252,343

12 Claims. (Cl. 101—218)

This invention relates to duplicating machines and more particularly to machines of the offset, lithographic type.

This application is a continuation-in-part of applicant's previously filed application, Serial No. 154,009, filed April 5, 1950, and contains a number of important improvements.

One of the primary objects of the invention is to provide an offset duplicating machine in which the work of the operator is greatly simplified, to the end that a skilled duplicating machine technician is not required, to operate the machine. In this connection, the invention aims to provide a machine in which manual adjustment of various mechanisms are eliminated as far as possible; in which there is semi-automatic control of many of the instrumentalities and automatic control of others; and in which the few manual adjustments which are needed to be made from time to time are greatly facilitated, not only because of the convenient location of the control devices, but because of the rapidity of response of the machine to manual adjustments.

Another object of the invention is to so arrange the several sets of instrumentalities in an offset duplicating machine that the machine may be made at less cost than similar machines of the prior art.

Another object is to provide a machine which is more compact and occupies less space than comparable machines heretofore placed on the market.

Another object is to provide a machine in which the various mechanisms are more accessible, for repair and replacement of parts, than heretofore available.

Other important major objects of the invention are to improve several of the individual mechanisms which, by the nature of the things, are necessarily present in a duplicating machine of the offset lithographic type.

More particularly the invention means to provide an improved automatic throwout mechanism operating in conjunction with sheets handling mechanisms of the character described in applicant's above identified copending application. The automatic throwout mechanism is adapted to be actuated by the interruption of the feeding of sheets in the machine and thereupon renders the several sets of mechanisms in the machine inoperative to prevent the excessive build up of ink and moisture and to shift the blanket roll to an inoperative position. As in the previously mentioned copending application, an important feature of the sheet detector and throwout mechanisms is the use of simple electro-magnetic latches to hold the various rolls in their inoperative positions, when a sheet or sheets are not fed through the machine in the normal manner, and to provide positive, cam actuated means for shifting the rolls to the inoperative position. As a result of this system, the electro-magnetic latches may be relatively simple and inexpensive, consuming a minimum amount of current, since the power required to shift the rolls to their inoperative positions is supplied by cams driven by the main driving motor for the machine.

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Still another object of the invention is to provide a new and improved mechanism for independently regulating the pressure between the blanket roll and the plate segment and the impression segment of the main cylinder. This in turn provides an improved handling by the machine of printing plates of various thicknesses and likewise paper sheets of various thicknesses.

A further important object of the invention is to provide, in conjunction with the above mentioned automatic control of the various sets of mechanisms in the machine, a plurality of manual controls therefor, to the end that each mechanism may be rendered operative, substantially independently of the others, under manual control, for instance, for initially supplying moisture to the moistening roll or for increasing or decreasing the moisture supply from time to time when the machine is in operation; for initially supplying ink to the ink rolls and for increasing or decreasing the supply from time to time during the operation of the machine; and for initially moistening and inking-up the plate and the blanket roll at the start of operations and before sheets are fed through the machine.

Further objects and advantages of this invention will become evident as the description proceeds and from an examination of the accompanying drawings which illustrate one embodiment of the invention and in which similar numerals refer to similar parts throughout the several views.

In the drawings:

Figure 1 is a side view in elevation of the right-hand side of a duplicating machine incorporating one embodiment of the invention, the machine being shown with the cover plates or enclosing housings, which may be employed, removed;

Figure 2 is a view in elevation and partly in vertical section of the machine shown in Figure 1, the view being taken in the same direction as the view in Figure 1 immediately behind the side plate or frame shown in Figure 1;

Figure 3 is a view in side elevation of the machine shown in Figure 1, the view being taken in the opposite direction and showing the opposite side of the machine;

Figure 4 is an enlarged fragmentary view in side elevation of a portion of the mechanism shown in Figure 3 showing in greater detail a portion of the sheet feeding mechanism;

Figure 5 is an enlarged fragmentary view in side elevation and partly in vertical section with certain parts broken away of the sheet feeding mechanism, the view being taken in the opposite direction as the view in Figure 4;

Figure 6 is an enlarged fragmentary view in side elevation and partly in vertical section with parts broken away of a portion of the machine showing the blanket roll supporting means and the control devices therefor;

Figure 7 is a plan view from above and partly in horizontal section of a portion of the mechanism shown in Figure 6;

Figure 8 is an end view in elevation with parts broken away of a portion of the mechanism shown in Figures 6 and 7 and a corresponding portion of the opposite side plate;

Figure 8A is a detailed sectional view taken along the line 8a—8a of Figure 8; and

Figure 9 is an electrical circuit diagram for the duplicating machine shown in the preceding figures together with a somewhat diagrammatic representation of several of the associated mechanisms.

### General organization

As previously stated, the duplicating machine illustrated in the drawings just described closely resembles the duplicating machine disclosed in applicant's above identified

previously filed application. Only the elements of the present machine which differ substantially from the elements described in that preceding application and the elements operatively associated therewith will be described in detail in this application.

The various sets of instrumentalities making up the duplicating machine of the present invention are supported by a pair of side plates 2 and 4 which are secured in spaced relation by a plurality of tie rods including those indicated at 6, 8, 10 and 12. As best shown in Figure 2, the main cylinder of the machine, indicated generally by the numeral 14, is mounted for rotation between the sides plates 2 and 4 and comprises a plate segment 16 and an impression segment 18. The plate-holding segment is adapted to carry lithographic master plates in a manner described and shown in applicant's copending application, Serial No. 84,509, filed March 31, 1949, now U. S. Patent No. 2,586,146. Likewise, the impression segment 18 is adapted to have sheets of paper successively clamped thereon and rotated therewith so as to receive the desired material printed thereon during the operation of the machine.

Behind the main cylinder 14 and also between the side plates 2 and 4 is journaled a blanket roll 20 having a rubber surface adapted to make rolling contact first with the moistened and inked lithographic plate, for the transfer of an image to the blanket roll, and then to make contact with the paper on the impression segment, to transfer the image to the paper. The blanket roll and the main cylinder are interconnected for rotation in unison by gears 60 and 58 whose pitch diameters are substantially equal to the effective diameters of the blanket roll and the main cylinder, respectively. The specific form of the blanket roll mounting will be fully described below.

Also shown in Figure 2 is a stack supporting feed table indicated generally by the numeral 26, a sheet separator and sheet feeder indicated generally by the numeral 28, a sheet feed roll assembly indicated generally by the numeral 30, an ink applying assembly indicated generally by the numeral 32, a moisture supplying means and plate moistener indicated generally by the numeral 34, a sheet stripper and hold-down and delivery roll assembly indicated generally by the numeral 36, a receiving tray 38, an electrical motor 40, and a combined air compressor and vacuum pump 42 of conventional design, all of such elements being described in detail in applicant's copending application, Serial No. 154,009, filed April 5, 1950.

At the front of the machine disposed between the lower ends of the side plates is a control panel 44 upon which are mounted all of the control members for the various mechanisms in the machine. This arrangement is also specifically described in applicant's copending application just mentioned.

The machine may have any desired cover plates which are not shown in the drawings. However, the two sides shown in Figures 1 and 3 will, of course, normally be covered by appropriate cover plates during the normal operation of the machine.

#### Drive system

As shown in Figures 2 and 3, the electrical motor 40 which is the source of driving power for the machine, is mounted at the rear thereof. The driven shaft 46 of the motor protrudes through a suitable opening in the side plate 4, and has a driving pulley 48 secured to the outer extremity thereof as shown in Figures 3 and 4. This pulley 48 together with the pulley 50 and the belt 52 may form a variable speed drive such as is fully disclosed in applicant's copending patent application, the details of which will not be described here. The driven pulley 50 is secured to the shaft 54 which in turn carries a pinion 56 which is adapted to mesh with the ring gear 58 secured to the plate segment 16 of the main cylinder 14, as best shown in Figure 2. The blanket roll 20 has a similar ring gear 60 secured thereto which is adapted to mesh with the ring gear 58 so that the main cylinder

14 and the blanket roll 20 are driven in synchronism with each other.

A second pinion gear 62 is carried by the shaft 54 which is adapted to mesh with a gear mounted on the shaft 64 which also has the pulley 66 secured thereto. The pulley 66 together with the pulleys 68 and 70 form a driving support for the gilmer timing belt 72.

The main cylinder shaft 74 protrudes through the side plate 4 in a manner similar to the driven shaft 46 of the motor 40 and has secured to its outer extremity a driving pulley 76 which together with the pulley 78, the phase correcting mechanism indicated generally by the numeral 80, and the pulley 82 forms the driving support for the gilmer timing belt 84.

These two belt driven gear arrangements together with the driven shaft 54 and the gears associated therewith form the major portion of the drive system for the machine. Here again for a more detailed description of the various driving and driven elements, reference should be made to applicant's first mentioned copending application.

#### The blanket roll and its mounting

As shown in Figures 2 and 6, the blanket roll 20 may comprise a substantially cylindrical metallic body 86 having a longitudinally extending channel or gap 88 formed therein, in which clamping means 90 of suitable form are disposed, for securing upon the periphery of the body, a rubber blanket 92, as is well understood in the art. The end of the roll carries suitable bearings (not shown) by which the roll is journaled on a non-rotatable shaft 94. Secured to the left hand end of the blanket roll is the gear 60, in mesh with the ring gear 58, carried by the left hand end of the plate segment of the main cylinder so that the cylinders rotate in unison, as previously explained.

The ends of the shaft 94 extend with clearance through openings in the side plates 2 and 4. Above each opening is a stud 96, having a reduced end, threaded at its outer extremity, extending through the side plate, and held in angular adjustment by a nut 98, as best shown in Figures 8 and 8a. Depending from the stud is a pivoted hanger arm 100 having a forwardly facing recess 102 therein, constituting a seat to receive a circumferentially grooved portion 104 on the adjacent end of the roll shaft. At its lower end, each hanger is provided with a recess 106 in which one end of the spring couple 108 is adapted to seat, the forward end of which is connected to a strong tension spring 110 (Figure 2) attached to the machine side frame.

A second arm 112 depends from each stud 96, at opposite sides of the machine, in front of the shaft 94 and each is arranged to make clamping engagement therewith. The lower ends of arms 112 adapted to abut the pins 114 on the short, upwardly projecting arms 116 mounted on a rock shaft 118, extending transversely of the machine and journaled in the side plates. Thus, rock shaft 118 and arms 116 and 112 limit the degree of forward swinging movement imparted to the roll shaft 94 by the hanger arms 100 and springs 110. Rocking movement of the shaft 118 in a clockwise direction (Figure 6), moves the shaft 94 rearwardly against the force of said springs.

As shown in the detail sectional view, Figure 8a, each stud 96 for supporting the hangers 100 and the arms 112 has a concentric portion 96a upon which the hanger 100 is mounted and an eccentric portion 96b embraced by a circular opening in the upper end of the arm 112. The head of the stud is provided with a kerf so that, with the nut 98 loosened, its angular position may be changed, to move the upper end of arm 112 forwardly or rearwardly, by shifting the eccentric portion 96b forwardly or rearwardly, without, however, changing the fore and aft or vertical position of the upper end of the hanger 100. The position of each arm 112 determines the position to which the corresponding end of the blanket roll shaft

94 may be drawn forwardly by the spring 110 connected to the hangers 100. Hence, by adjusting the screws 96, the blanket roll may be brought into exact parallelism with the main cylinder.

*The blanket roll automatic throw-out and pressure control mechanism*

The automatic throw-out mechanism for the blanket roll and the means for controlling the pressure between the blanket roll and the main cylinder is mounted on the outside of the right hand side plate 2, as best shown in Figures 1, 6 and 7. Removably fastened to the outer end of the shaft 118 is a main lever arm 120 projecting forwardly and having a pin 121 thereon with which one end of the spring 123 cooperates to urge the arm 120 to pivot about the shaft 118 so that the arm 120 and the shaft 118 assume a particular angular relation to each other, when the bolt 125 is loosened, during initial alignment of the throw-out mechanism since the opposite end of the spring 123 is secured to the shaft 118. When the proper adjustment has been made the bolt 125 is again tightened so that the selected angular relation between the shaft 118 and the arm 120 is maintained. Three additional arms 122, 124 and 126 are pivotally mounted on the upper surface of the arm 120, as best shown in Figure 7. The outer end of the main lever arm 120 is provided with three upstanding spaced pivot posts 128, 130 and 132 upon which the arms 122, 124 and 126 are pivotally mounted, respectively. The outer end of the blanket roll throw-out arm 122 has a yoke formed thereon between the legs of which is journaled a cam following roller 134 disposed so as to make rolling contact with the throw-out and throw-in cam 136, which is in turn secured to one end of the main cylinder shaft 74.

Similarly the arm 124 has a yoke formed at the outer extremity thereof between the legs of which is journaled a cam following roller 138 which is adapted to make rolling contact with the plate control cam 140. Likewise, the arm 126 has a yoke formed at the outer extremity thereof between the legs of which the cam following roller 142 is journaled so as to make rolling contact with the paper control cam 144.

The blanket roll throw-out and throw-in arm 122 is adapted to pivot up and down during the printing operation, as cam 136 rotates with the main cylinder shaft 74, without affecting the disposition of the main lever arm 120. A latch mechanism is provided, however, to enable the arm 122 to be latched so that it will operate as a latched extension of main lever arm 120, and the latter will then be positioned in accordance with the position of the cam 136. The outer extremity of the main lever arm 120 is provided with a depending arm 146 upon which is mounted an electromagnet 148. Also carried by the main lever arm 120 is a latch arm 150 pivotally mounted intermediate its end on the pivot post 152 which is in turn mounted on the main lever arm 120, as best shown in Figure 6. The lower extremity 154 of the latch arm 150 is so disposed that it can be acted upon by the electromagnet 148 when the latter is energized. The upper end 156 of the latch arm 150 is normally urged in a counter-clockwise direction (as viewed in Figure 6) by the spring member 158 secured to the lug member 160 on the latch arm 150 so that it rests against the stop member 162.

The lower end 154 of the latch arm 150 shown in full lines in Figure 6 has been attracted by the energized electromagnet 148 so that the arm has pivoted in a clockwise direction about the pivot post 152, the position taken by the latch arm 150 when the electromagnet is de-energized being shown in dotted lines in that figure. The latch arm 150 is also disposed so that when in the position shown in dotted lines its upper end 156 will provide a stop for the inner end of the blanket roll throw-out and throw-in arm member 122. Thus as previously mentioned when the electromagnet 148 is de-energized, the

arm 122 will act as a rigid extension on the arm 120 whereas when the electromagnet 148 is energized, the arm 122 will be unlatched and will oscillate freely about the pivot post 128 without affecting the position of the arm 120.

The upper end of the pivot post 128 is provided with a stop 162 which is adapted to cooperate with the lower end 164 of the latch arm 166 which is pivotally mounted at one end on the pivot post 168, the latter being mounted in turn on the side plate 2. A spring member 170 having one end secured to the latch arm 166 and the other end to the side plate 2 is adapted to normally urge the latch arm 166 toward the stop member 162 on the pivot post 128 so that if arm 122 is in the latched position previously described and the arm 120 is raised by the cam following roller 134 riding up on the rise of the cam 136, the latch arm 166 will move into latching relation with the pivot post 128. Once the arm 120 is so latched in the raised position, it will remain so disposed until the electromagnet 172 is activated and the cam following roller 134 is on the rise of the cam 136. Although the electromagnet 172 is disposed so that when energized it urges the latch arm 166 in a direction opposite to that in which it is urged by the spring member 170, the latch arm 166 will not disengage from the stop member 162 until it is lifted slightly by the action of the cam 136 on the roller 134. The weight of the arm 120 and the force applied thereto by the arms 112 is such that the frictional resistance between the arm 166 and the stop member 162 cannot be overcome by the electromagnet 172 until the arm 120 is lifted slightly by the cam 136.

When the arm 122 is in latched relation with the main lever arm 120 and therefore the arm 120 is pivoted in accordance with the position of the cam following roller 134 on the cam 136, the arms 116, and the pins 114 mounted thereon, are likewise caused to move in an arcuate path. Since the pins 114 normally bear against the lower ends of the depending blanket roll stop arms 112, these latter arms are likewise pivoted about the studs 96 when the arms 116 are so moved. Pivotal motion of the arms 112 in a counter clockwise direction about the studs 96 will cause the blanket roll shaft 94 to be moved in a direction away from the main cylinder 14 whereas a clockwise movement of the arms 112 about the studs 96 will permit the shaft 94 and the blanket roll 20 to move toward the main cylinder 14 under the influence of the spring member 110 secured to the lower ends of the blanket roll hanger arms 190 as previously described.

Thus when the arm 122 is in latched relation to the main lever arm 120, the cam member 136 will serve to periodically move the blanket roll 20 in a direction away from the main cylinder 14. By properly shaping cam 136 and by proper orientation thereof on the cylinder shaft 74, the blanket roll may be caused to be moved out of association with the impression segment 18 of the main cylinder 14. The significance of this arrangement will be further discussed below.

As previously stated, the plate pressure control arm 124 is pivotally mounted on the pivot post 130 at the outer extremity of the main pivot arm 120 in substantially the same manner as the arm 122 is pivotally mounted on the pivot post 128. The inner end of the arm 124 is provided with an internally threaded bore in which the externally threaded abutment post 176 is adapted to be threadedly received so that the lower end thereof rests on the upper surface of the arm 120 as best shown in Figure 6. The upper end of the abutment post 176 may be provided with a holding nut 179 to maintain the post in any selected position of adjustment. As stated above the cam following roller 138 is adapted to make rolling contact with the plate control cam 140 which is secured to the main cylinder shaft 74. The cam 140 is provided with a rise which extends through substantially 180° of the periphery of the cam. The cam is so positioned with relation to the main cylinder shaft 74 that the cam following roller 138 is

disposed on this rise portion of the cam when the plate segment of the main cylinder is opposite the blanket roll, so that the position of the latter relative to the plate segment is determined thereby. The dwell in the cam 140 is provided primarily to allow the rise on the paper control cam 144 and the cam following roller 142 carried by the paper control arm 126 to determine the relative position of the blanket roll to the main cylinder when the impression segment of the latter is opposite the former, as will be more fully explained below.

In effect the rise of the cam 140 therefore forms a stop for the main pivot arm 120 when the blanket roll is opposite the plate segment of the main cylinder. The point at which this stop is disposed will determine how much of the pressure produced by the spring members 110 (which are best shown in Figure 8) is normally borne by the stop, or cam, and how much pressure is borne by a printing plate inserted between the plate segment of the main cylinder and the blanket roll. To provide for the best mode of operation, it is highly desirable that a proper setting of the blanket roll with relation to the plate segment is achieved prior to the engagement between the leading edge of the plate on the plate segment, and the blanket roll, so that the proper pressure is attained on the plate during the offset operation. The leading edge of the rise on cam 140 and the trailing edge of the rise on cam 144 are therefore positioned relative to each other and to the main cylinder so that this effect is achieved.

Obviously the effect of the plate control cam 140 on the arm 124 and in turn the arm 120 can be varied within the limits by adjustment of the relative position of the arm 124 to the arm 120 which is carried out as previously described by selective positioning of the abutment post 176. For example, if abutment post 176 is moved upwardly, the ultimate effect on the arm 120 will be to lower its position. Likewise, if the abutment post is lowered, the ultimate effect on arm 120 is to raise it into a higher position. By this means therefore, a desirable operating range may be selected for the arm 120 when it is being controlled by the plate control cam 140. This permits adjustments to be made in the position of the blanket roll relative to the plate segment and the pressure applied thereto by the blanket roll and also provides for the possible use of master plates of different thicknesses.

The paper control arm 126, as previously stated, is pivotally mounted on the pivot post 132 at the point 178 as best shown in Figures 6 and 7, and is adapted to adjust the position of the blanket roll 20 relative to the main cylinder 14 at the time when an impression is being transferred from the blanket roll 20 to a sheet of paper on the impression segment of the main cylinder 14. The paper control cam 144 has a configuration which is very similar to the plate roll cam 140 but the latter is mounted on the main cylinder shaft 74 with its rise diametrically opposite that of the former. Consequently, the rise on the paper control cam 144 is disposed substantially adjacent the dwell of the plate control cam 140, although the two overlap slightly as shown in Figure 6. The rise on the paper control cam 144 also forms a stop for the main pivot arm 120 in substantially the same manner as previously described for the rise on the plate control cam 140, except that it functions as such when the impression segment is adjacent the blanket roll. In other words, for a particular thickness of paper it is very desirable to have the blanket roll disposed at a particular point, with respect to the surface of the impression segment, so that when the sheet of paper is positioned therebetween, the proper printing pressure will be applied to the paper by the blanket roll. Here again the point at which the stop formed by the rise of the paper control cam 144 is disposed will determine how much of the pressure produced by the spring members 110 is applied to a sheet of paper carried by the impression segment, as it moves into association with the blanket roll.

In other words, if the blanket roll has been properly positioned by the cam 144, with respect to the impression segment of the main cylinder, before the leading edge of the impression segment is engaged by the blanket roll, the sheet of paper will cause the blanket roll to be compressed slightly when engagement does occur, because the surface of the blanket roll is formed of a somewhat compressible material, as previously described. The amount of compression will depend upon the position of the blanket roll relative to the impression segment, which, in turn, is controlled by the position of the stop or the rise portion of the paper control cam 144.

In order to provide for various thicknesses of paper, it is, of course, desirable to have means available for varying the relative position of the blanket roll and the impression segment. Such means is provided in the form of the cam member 180 shown in Figures 6 and 7 which cam member is rotatably mounted on the shaft 182 which may be an extension of the shaft 118. This cam member 180 is adapted to bear against the lower surface of the paper control arm 126 and therefore to function with respect to that arm substantially in the same manner as the abutment post 176 functions with respect to the plate control arm 124, as previously described. As shown in Figure 7, the shaft 182 is provided with a pin 184 which is normally adapted to be seated in a pair of diametric grooves 186 formed in the outer side of the cam 180, since the outwardly dished spring washer 188 normally urges the cam 180 toward the pin 184. The operating knob 190 is secured to the boss 192 on the outer side of the cam 180 by the retaining ring 194. By pressing inwardly on the knob 190, the spring washer 188 may be compressed and the cam member 180 moved inwardly so that the pin 184 may clear the diametric grooves 186 and the cam rotated to any desired position. When the knob 190 is released, the pin 184 will again be seated in a pair of the grooves 186. A suitable dial may be provided indicating the proper seating of the knob 190 for a particular paper thickness.

The lower extremity of the arm 126 is provided with a handle member 196 which is in a position as shown in Figure 7 so as to be readily grasped from above by the operator of the machine. By lifting upwardly of the handle 196 the main lever arm 120 may also be pivoted upwardly which in turn will allow the operator to disengage the latch arm 165 from the stop 162. The blanket roll may then be lowered into contact with the main cylinder. Such an arrangement enables the operator of the machine to check the alignment of the blanket roll and the pressure exerted thereby on the main cylinder. To do so the impression segment of the main cylinder is first positioned opposite the blanket roll and a sheet of paper the width of the impression segment slipped in between the blanket roll and that segment. The blanket roll is then lowered into contact with the sheet of paper and, if properly aligned, will make a narrow impression of constant width across the full width of the paper. The width of the impression is a measure of the pressure being applied. A guide member 198 is secured to the posts 200 which are in turn mounted on the side plate 2 in order to maintain the arm 126 in proper alignment during such an operation.

This arrangement also permits the ready alignment of the paper thickness adjustment previously described. For example, the knob 190 may be turned to the setting for the particular thickness of the sheet of paper which is slipped between the blanket roll and the impression segment. After the former is lowered into contact with the paper, the bolt 125 is loosened and the spring 123 will automatically take up any back lash. The bolt 125 is then tightened and the proper alignment of the paper thickness adjustment mechanism has been automatically attained. This is a great convenience to the operator and is one of the desirable features of the present invention.

*Sheet controlled interrupter structure*

As previously stated and as shown in Figures 3 and 4, the pulley 82 cooperates with the gilmer timing belt 84 and in turn drives the shaft 202 which also constitutes the driving element of the intermittent motion mechanism which drives the feeder 28. The intermittent motion mechanism and the feeder are described in detail in applicant's co-pending application and will not be further described here.

As shown in Figure 5, the suction foot 204 of the feeder which is one of a spaced pair is so disposed that it is adapted to lift the uppermost sheet 206 from the supply stack normally supported therebelow. The suction foot 204 carries the sheet upwardly into association with the remaining mechanism of feeder 28 which at the proper time moves the sheet 206 forward into association with the stop fingers 208 which are formed integrally with a plate 210 having its forward portion wrapped around and secured to a shaft 212, which is journaled between the side plates 2 and 4. The leading edge of the sheet 206 is normally moved into abutting relation with the upwardly bent rear ends of the stop fingers 208.

As shown in Figure 4, one end of the shaft 212 protrudes through the side plate 4 and has secured thereto a collar 214 having an arm 216 projecting therefrom. The set screw 218 for the collar 214 is engaged by one end of a light tension spring 220 having its other end secured to the side plate 4. The arm 216 overlies a roller 222 carried by lever arm 224 fulcrumed on a pin 226 threaded into the side plate 4. The rearwardly projecting end of the lever arm 224 is urged downwardly by tension spring 228 having its lower end secured to a pin carried by the side plate 4. The forwardly projecting end of the lever 224 carries a roller 230 which is disposed below the innermost cam 232 secured to the pulley 82 previously described. As the cam 232 rotates, the cam following roller 230 is depressed by the rise in said cam raising the roller 222 on the opposite end which raises the arm 216 and rocks the shaft 212 in a counterclockwise direction as viewed in Figure 4 which in turn causes the stop fingers 208 to be lowered from the position shown in Figure 5. When the cam following roller 230 passes off the rise of the cam 232 the parts pivot in the opposite direction under the influence of the spring 220 and 228 to project the stop fingers upwardly into the path of movement of the leading edge of a sheet of paper as mentioned above.

The lower feed roll 234 shown in Figure 5 is formed of a plurality of spaced rubber cylinders on a common shaft 236, the spaces therebetween being adapted to accommodate the stop fingers 208 when lowered so that the tip ends thereof lie below the plane of the upper surfaces of the cylinders. The shaft 236 is driven by a suitable driving mechanism, which is shown in Figure 4, at a relatively rapid rate so that its peripheral speed is greater than the peripheral speed of the main cylinder.

The upper feed roll 238 has a construction similar to the lower feed roll 234 disposed so that the rubber cylinders thereof register with the rubber cylinders of the lower feed roll 234 and the spaces therebetween register with the like spaces between the rubber cylinders of the roll 234. The roll 238 is mounted on a pair of arms 240 which are pivotally mounted on the links 242 which are in turn secured to the side plates 2 and 4. The rearwardly and upwardly projecting ends of the arm 240 carry the cam following roller 244 which is disposed in engagement with the ring cam 246 carried by the main cylinder 14 and secured thereto for circumferential adjustment by a plurality of cap screws 248 extending through the arcuate slots 250.

When the cam following roller 244 enters the depression 252 on the ring cam 246, the arm 240 is rocked in a counterclockwise direction as shown in Figure 5 under the influence of tension springs 252 which have the upper

ends secured to link 254 and their lower ends secured to the machine side plates 2 and 4. The upper feed roll 238 is therefore dropped on to the surface of a sheet of paper fed below it and holds the sheet firmly against the continuously rotating feed roll 234. It will be understood, of course, that the cam 232 and the depression 252 in cam 246 are so related that the stop fingers 208 are lowered out of the path of movement of the paper sheet prior to the dropping of the upper feed roll 238. Also the operation of the sheet feeder 28 is so synchronized with the movement of the main cylinder 14 that a sheet of paper is fed into association with the stop fingers 208 in proper synchronism with this movement of the feed roll 238, just described.

The sheet hold down shaft 256 is also journaled between the two side plates 2 and 4, one end thereof projecting through the side plate 4 as shown in Figure 4. This end of the shaft 256 carries a collar 258 having an arm 260 protruding therefrom. The arm 260 overlies a roller 262 on one end of the lever arm 264 pivoted on the stud 226 and having a cam following roller 266 mounted on its opposite end disposed in engagement with the outer cam 268 secured to the pulley 82. As the cam 268 rotates, the rise thereof depresses the roller 266, rocks the lever arm 264 in a clockwise direction (as shown in Figure 4), lifts the arm 260 against the tension of a spring 270 connected at one end of the machine side plate and rocks the shaft 256 in a counterclockwise direction. When the rise of the cam 268 leaves the roller 266, the parts oscillate in the opposite direction under the influence of the spring 270 and the shaft 256 is likewise rocked in a clockwise direction.

Mounted on the sheet hold-down shaft 256 is a U-shaped bracket 272 (Figure 5) which in turn carries a sheet hold-down finger 274 having a configuration such that its outer extremity overlies the plate 210 of the stop finger assembly. The rise of cam 268 is so oriented that the finger 274 is moved into abutting relation with the stop finger assembly after a sheet of paper has been first brought into association therewith and is raised simultaneously with the upper feed roll 238 making contact with the sheet being so held by the finger 274.

Although it does not appear in Figure 5, the shaft 256 also has a collar 276 secured thereto as is shown somewhat diagrammatically in Figure 9. The collar 276 carries an upwardly projecting arm 278 which is adapted to abut a movable contact arm 280 of the switch 282 and to break the contact between the two contact points 284 and 286 at the time the finger 274 is moved into contact with either the stop finger assembly or a sheet of paper carried by the latter. The significance of this arrangement will be discussed more fully below.

The electrical control circuit for the sheet controlled interrupter structure is shown somewhat diagrammatically in Figure 9 together with the control circuits for the remaining portions of the machine which are electrically controlled as described in detail in applicant's first mentioned co-pending application.

Operating current for the machine is delivered from a source of alternating housing current by lines L<sub>1</sub> and L<sub>2</sub> to the motor controlled switch M preferably mounted at the center of the control panel 44. Current is conducted through this switch when closed and through the lines 288 to the motor 40 and thence in parallel to the rectifier R.

Shown at the top of the diagram in Figure 9 are the various electromagnets operating particular elements of the machine. For example, the electromagnet 290 controls the moisture feed, the electromagnet 292 controls the ink feed, the electromagnets 294 and 296 control the moisture contact and the electromagnets 298 and 300 control the ink contact. In addition, previously mentioned electromagnet 172 which controls latch arm 166 is shown together with electromagnet 148 which controls latch arm 150 in a manner previously described.

All of the various electromagnets except electromagnet 148 control their associated mechanism in such a way that these mechanisms are latched out or otherwise rendered inoperative when the electromagnets are deenergized and are activated or unlatched so as to be rendered operative when the electromagnets are energized.

In the actual operation of the machine, the motor control switch M is first closed and current is supplied therethrough to the motor 40 and into the rectifier R. Closing switch M therefore starts both the main cylinder and the blanket roll rotating. From the rectifier R line 302 is connected to the center post 304 of the double throw switch 306 which is normally in the position shown in Figure 9 with contact being made with the contact point 308. Line 302 is also connected to the contact 310 of the sheet detector switch 312 which is normally open unless a sheet is actually being fed by the sheet feeder 28. Similarly current is supplied through the line 314 to the bus bar 316 and therefore to one side of the electromagnets 148, 172, 298, 300, 294, 296, 292, and 290 as well as to one side of the electromagnet 318 which controls switch 306. The opposite side of the electromagnet 318 is connected through the line 320 to the arm 230 of the switch 282 which arm carries the contact point 236. This side of switch 282 is in turn connected through the line 322 to the movable arm 324 of the sheet detector switch 312.

The sheet detector switch 312 may be adapted to be closed by the operating arm 326 on the sheet counter (not shown), although it could be closed in any suitable manner during the time the sheet feeder 28 is activated. The arm 326 is adapted to be moved downwardly as shown in Figure 9 by a downward movement of the piston 328 disposed in the cylinder 330. The cylinder 330 is in vacuum communicating relation through the conduit 332 with the sheet feeder mechanism 28. This arrangement causes the switch 312 to be closed whenever a sheet is picked up by the suction foot 204 and it is adapted to remain closed as long as a vacuum is applied to the sheet feeding mechanism which is normally during about  $\frac{2}{3}$  of a revolution of the main cylinder 14 when sheets are being fed.

Since the sheet detector switch 312 is normally open when no paper is being fed through the machine, no current will initially flow through the electromagnet 318 by way of the circuit containing this switch. Under these conditions, the switch 306, therefore, will remain in the position shown in Figure 9 so that contact is made by the arm 306 with the contact point 308. This point in turn is connected through the line 334 with the contact point 336 on the blanket control switch BC. The blanket switch BC may be mounted on the control panel 44 along with the ink control switch MC, the main switch M, the ink feed IF, and the moisture feed switch MF. All of these switches with the exception of main control switch M, are of the push button type and are normally maintained in the positions shown in Figure 9, unless the push button is held in a depressed position manually or by a suitable lock. Thus when the machine is not in printing operation and no sheets are being fed, depression of the push button of switch BC will cause the arm 338 thereof to break contact with the contact point 340 and to make contact with the contact point 336. Line 342 is connected at one end to arm 338 and at the other end to one side of the electromagnet 172, which controls the latch arm 166. The opposite side of the electromagnet 172 is connected through the line 344 to the bus bar 316 as previously stated. Thus depressing the push button of the switch BC when paper is not being fed will close a circuit from the rectifier through the switch 306 to the electromagnet 172 and back to the rectifier through the lines 344 and 314 and electromagnet 172 will be energized so that the latch arm 166 will be withdrawn from association with the stop member 162 on the pivot posts 128, when cam 136

causes arm 120 to lift sufficiently, as previously explained. This will permit the main pivot arm 120 to move into the unlatched position previously described. However, since the electromagnet 148 is not energized the arm 122 will be in latched relation to the arm 120 and the cam 136 will move the blanket roll 20 out of association with the impression segment of the main cylinder 14 during every revolution thereof. This is a very desirable arrangement as will be explained below.

The line 334 is also connected to the bus bar 346 which is in turn connected to the contact point 348 of switch IC, 350 of switch MC, 352 of switch IF, and 354 of switch MF. Since the movable arms of each of these switches are connected to one end of the various electromagnets related thereto in the same fashion as the arm 338 is connected to the electromagnet 172, when no paper is being fed electromagnet 290 may be energized by depressing the push button of the switch MF which controls the arm 356 thereof; electromagnet 292 may be energized by depressing the push button of the switch IF which controls the arm 358 thereof; electromagnets 294 and 296 may be energized by depressing the push button of the switch MC which controls the arm 360 thereof; and electromagnets 298 and 300 may be energized by depressing the push button of the switch IC which controls the arm 362 thereof. Thus manual control of the moisture applying, inking, and blanket mechanisms is possible while the machine is running, although no paper is being fed therethrough. Moisture and ink therefore may be applied to the plate and an impression formed on the blanket prior to the feeding of paper.

When a sheet of paper is picked up by the suction feet 204, the arm 326 of the sheet counter is immediately depressed and the sheet detector switch 312 is likewise closed. As previously explained, this switch is then held closed during approximately  $\frac{2}{3}$  of a revolution of the main cylinder 14. When the switch 312 closes, the line 322 is then connected to the line 302 from the rectifier and, since the former is connected to the line 320, the electromagnet 318 is immediately energized. Energizing the electromagnet 318 will cause the bell crank lever 364 to be pivoted in a counterclockwise direction (as shown in Figure 9) which in turn will cause the arm of the switch 306 to be moved downwardly into contact with the contact point 366. The line 368 is connected to the contact point 366 and the line 370. This latter line, as previously mentioned, is in turn connected at one end to the contact point 340 of the switch BC and at the other end to one side of the electromagnet 148 which controls the latch arm 150. The opposite side of the electromagnet 148 is connected to the line 314 through the line 372 and a circuit is thus completed by the feeding of a sheet which will cause the electromagnet 148 to be energized. The line 368 is also connected to the line 374 which is connected to the contact point 284 of the switch 282. The closing of the switch 306 thus also energizes a holding circuit for the electromagnet 318 which circuit includes the switch 282. Once this holding circuit has thus been energized, the switch 306 will remain closed until this switch 282 is opened.

As previously described, the arm 278 carried by sheet hold-down shaft 256 is adapted to move the arm 280 of the switch 282 so as to open switch 282 once during every revolution of the main cylinder 14. Since the switch 312 is disposed in parallel with the switch 282, opening of the latter will cause the switch 306 to also open unless the switch 312 is closed. The period in which the switch 282 is open is very short and is so timed as to fall well within the period in which the switch 312 is normally closed when paper is being fed. Therefore, when sheets are being fed through the machine and switch 312 is closed in the normal fashion, the opening of the switch 282 will have no effect on the control circuit. If, however, a sheet is missed, switch 312 will not close and when switch 282 subsequently opens, the holding

circuit for the electromagnet 318 will be broken. Switch 306 will immediately return to the position shown in Figure 9 and will remain in that position until another sheet is fed. All of the electromagnets will be immediately deenergized and the blanket roll will be latched out and no moisture or ink will be applied to the plate.

When sheets are being fed through the machine and the holding circuit is closed as just described above, current will normally flow through the line 302, the switch 306, the line 368, the line 370, and the line 376. Contact point 340 of the switch BC is also connected to the line 376 so that the electromagnet 172 is normally energized when the switch 312 closes. Since the line 370 is also connected to one side of the electromagnet 148 as previously described, this electromagnet is also energized when switch 312 is closed. The remaining electromagnets will normally be energized only if the mercury switch 380 is closed. This switch is mounted on the same shaft as the feeder control valve (not shown) and is so arranged that it may be opened while the feeder control valve is still open. In other words the feeder control valve handle may be disposed in three positions, namely, the straight up and down position which leaves the valve open, but also opens the mercury switch 380 or may be turned more fully to a second position in which the feeder control valve is open and the mercury switch 380 is closed and the off position.

Closing of the switch 380 connects the line 376 through the line 382 to the contact point 384 of the switch IC and the contact point 386 of the switch MC and the contact point 378 of the switch IF. The contact point 386 is connected through the arm 360 of the switch MC and the line 388 to the contact point 390. Electromagnets 290, 292, 294, 296, 298 and 300 are therefore normally energized by the closing of the switch 380 if sheets are being fed through the machine which will normally be the case since switch 380 may be closed only after the feeder control valve is opened.

Conversely, all of the electromagnets controlled by the switches on the control panel 44 may be deenergized while paper is being fed through the machine by depressing the push button controls so that arms 356, 358, 360, 362 and 338 are moved into the lower position shown in Figure 9. This is true since when switch 306 is activated by the electromagnet 318, the line 334 is open and the bus bar 346 is no longer energized.

Thus it may be seen that when the machine is turned on by closing of the main switch M the main cylinder and blanket roll start rotating. Sheets, however, will not be fed through the machine until the feeder control valve is open. As previously stated, the bus bar 346 is also normally connected to a source of current through switch 306 after the main switch M is closed. Each of the electromagnets 290, 292, 294, 296, 298, 300 and 172 may therefore be energized as desired by depressing the push button on the switch associated therewith.

Assuming that the master plate is in position on the plate segment of the main cylinder, the push button on the switch MF may be depressed which will in turn spray moisture on the moisture form roll. Similarly the ink feed mechanism may be energized by depressing the push button of the switch IF. The push button on the switch MC may subsequently be depressed to apply moisture to the plate and the push button on the switch IC may be depressed to apply ink to the plate. If it is desired to have the blanket roll make contact with the plate segment of the main cylinder before sheets are fed in order to build up an impression on the blanket roll, this may be accomplished by pressing the push button of the switch BC to energize the electromagnet 172 as previously explained. Since the electromagnet 148 may not be energized until sheets are actually being fed, the latch arm 150 remains effective to lock the throwout arm 122 to the main lever arm 120 with the result that the blanket roll drops into contact with the

plate segment under control of the cam 136 and is thrown out of contact with the main cylinder prior to the impression segment of the cylinder making contact therewith. This arrangement is highly desirable for inking up the blanket roll and to prevent the transfer of an image from the blanket roll to the bare impression segment.

When the machine has thus been prepared for the actual printing operation, the feeder control valve is moved to the fully open position and the mercury switch 380 is then closed. Simultaneously with the opening of the feeder valve, the feeding of sheets is begun and switch 312 is closed so that the holding circuit previously described is activated and all of the electromagnets including 148 are energized, the latter acting to remove the latch arm 150 out of association with the arm 122. The blanket roll will therefore no longer be thrown out of contact with the impression plate and printing will proceed as previously described until the feeding of sheets is interrupted.

The electrical control circuit is so designed that the effect of the operation of the control switches (with the exception of switch BC) on the control panel 44 is reversed during the actual printing operation. In other words, if any of the push button controls are depressed during the printing of sheets, the mechanism controlled thereby will be de-activated. For example, by depressing the push button of switch IC, the inking of the plate may be temporarily interrupted and the application of moisture to the plate may also be similarly controlled through switch MC.

After a run is completed, the process known as "plate run down" may be conveniently carried out by moving the feeder control valve to its intermediate position so that the sheets are still being fed but mercury switch 380 is opened as previously described. The opening of mercury switch 380 will deenergize the switches IC, IF, MC and MF and therefore additional moisture and ink will no longer be applied to the plate although the blanket roll will continue to obtain impressions from the plate and apply them to the sheets being fed. This process can be continued for approximately 8 or 10 revolutions of the main cylinder until substantially all the moisture and ink is removed from the plate and blanket roll. This operation can be carried out at the conclusion of the normal run, either at the end of the day or when a new plate is to be substituted for the one in use.

The drawings and the above discussion are not intended to represent the only possible forms of this invention in regard to details of construction. Changes in form and in the proportion of parts, as well as the substitution of equivalents are contemplated as circumstances may suggest or render expedient without departing from the spirit or scope of this invention as further defined in the following claims.

It is claimed:

1. A duplicating machine comprising a pair of spaced side frames, a main cylinder having plate and impression segments mounted for rotation between said frames, a blanket roll, means for supporting the same from said side frames for rolling contact with a plate and a sheet on said segments and for movement toward and from the main cylinder, a pivoted arm connected to the roll supporting means for controlling the positions of the roll, a cam following lever pivoted to the arm for free swinging movement with respect thereto, a cam rotating in timed relation with the main cylinder for moving said lever, a movable latch for locking the lever against movement relative to the arm, means for actuating the latch to cause the arm to move with the lever to separate the blanket roll from the main cylinder upon the occurrence of predetermined conditions in the machine, a second latch carried by the frame, means for actuating the second latch to hold the arm in the last mentioned position so long as said predetermined conditions exist, a

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plurality of additional cam following levers secured in independently adjustable, normally fixed angular relation to said pivoted arm, and a plurality of additional cams rotating in timed relation with the main cylinder, one of said additional cams controlling the position of one of said additional levers and said pivoted arm when both said latches are unactuated and when said roll is in contact with said plate segment, and another of said additional cams controlling the position of another of said additional levers and said pivoted arm when both said latches are unactuated and when said roll is in contact with said impression segment.

2. A duplicating machine comprising a pair of spaced side frames, a main cylinder having plate and impression segments mounted for rotation between said frames, a blanket roll, means for supporting the same from said side frames for rolling contact with a plate and a sheet on said segments and for movement toward and from the main cylinder, a pivoted arm connected to the roll supporting means for controlling the positions of the roll, a cam following lever pivoted to the arm for free swinging movement with respect thereto, a cam rotating in timed relation with the main cylinder for moving said lever, a movable latch for locking the lever against movement relative to the arm, means for actuating the latch to cause the arm to move with the lever to separate the blanket roll from the main cylinder just prior to the roll coming into contact with said impression segment and to return said blanket roll into contact with the leading edge of the plate segment, a second latch carried by the frame, means for actuating the second latch to hold the arm in the last mentioned position so long as said predetermined conditions exist, a plurality of additional cam following levers secured in independently adjustable, normally fixed angular relation to said pivoted arm, and a plurality of additional cams rotating in timed relation with the main cylinder, one of said additional cams controlling the position of one of said additional levers and said pivoted arm when both said latches are unactuated and when said roll is in contact with said plate segment, and another of said additional cams controlling the position of another of said additional levers and said pivoted arm when both said latches are unactuated and when said roll is in contact with said impression segment.

3. A duplicating machine in accordance with claim 1 in which the first named latch is normally maintained in the inoperative position, permitting free pivoting movement of the lever, by an electromagnet, and in which the first named latch is actuated to locking position by a spring when the electromagnet is de-energized.

4. A duplicating machine in accordance with claim 1 in which each of said latches is normally maintained in the inoperative position by an electromagnet and in which the means for actuating the latches comprises a spring connected to each latch to move the same when the associated electromagnet is de-energized.

5. A duplicating machine comprising a pair of spaced side frames, a main cylinder having plate and impression segments mounted for rotation between said frames, a blanket roll, a depending hanger pivotally carried by each side frame, a shaft having its ends carried by the hangers upon which the roll is journaled, resilient means for urging the hangers and the roll toward the cylinder, a depending arm pivotally carried by each side frame engageable with the shaft for limiting the movement of the roll toward the main cylinder, a master control arm operatively associated with each said depending arm, a plurality of secondary arm means associated with said master control arm normally held in adjustable angular relation thereto, cam means rotating in timed relation with the main cylinder for controlling the position of one of said secondary arm means while the plate segment is adjacent the roll, a second cam means rotating in timed relation with the main cylinder for controlling the position of another of said secondary arm means while the

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impression segment is adjacent the blanket roll, an adjustable, normally fixed stop means associated with each secondary arm means for independently selecting the angular relation between said secondary arm means and said master control arm and therefore the particular position at which said master control arm will be held by each said cam means during said separate portions of each cycle of operations, a third cam means rotating in timed relation with the main cylinder and normally ineffective, selectively operable control means positioned by said additional cam means adapted to override said second cam means, and to move said master control arm so that said roll is moved out of contact with said impression segment when operatively coupled to said master control arm.

6. A duplicating machine comprising a frame member, a cylinder mounted for rotation on a fixed axis on said frame member, a blanket roll, depending hanger means pivotally carried by said frame member, a shaft upon which the roll is journaled having its ends supported by said hanger means, resilient means connected to said hanger means for urging the roll toward the cylinder, arm means for limiting the movement of the shaft and hanger means toward the cylinder under the influence of said resilient means, a plurality of secondary arm means operatively associated with said first named arm means, a plurality of cam means rotating in timed relation with the cylinder for controlling the position of said secondary arm means during separate portions of each cycle of operations and an adjustable, normally fixed stop means associated with at least two of said secondary arm means for independently selecting the particular position at which each said secondary arm means associated therewith will be held by each said cam means during said separate portions of each cycle of operations, an electromagnetic latch member operatively associated with another of said secondary arm means to operatively couple the latter to said first named arm means and to separate the blanket roll from the main cylinder upon the occurrence of predetermined conditions in the machine, a second latch carried by the frame, means for actuating the second latch to hold said first named arm means in the last mentioned position so long as said predetermined conditions exist.

7. A duplicating machine comprising a cylinder having plate and impression segments, means for feeding sheets in succession to the impression segment, a blanket roll, means normally urging said blanket roll into rolling contact with a plate and successive sheets on said segments, said blanket roll being mounted for outward movement to a position out of contact with said plate and said successive sheets, a master control arm controlling the position of said blanket roll, cam actuated means on said master control arm for successively moving the blanket roll out of contact with said impression segment and into contact with said plate segment, electromagnetic means for controlling said cam actuated means, a latch arranged to take over from said cam actuated means for holding said master control arm and the roll in the outwardly moved position, electromagnetic means for controlling said latch, a plurality of cam actuated extension means on said master control arm for controlling the position of said blanket roll relative to said plate and said impression segments, respectively, when said blanket roll is in rolling contact therewith, and an adjustable, normally fixed stop means associated with each said cam actuated extension means for independently selecting the angular relation between each said extension means and said master control arm and therefore the particular position at which said cam actuated means will position said blanket roll.

8. A sheet controlled interrupter structure for a duplicating machine having a cylinder with plate and impression segments, means for feeding sheets in succession to the impression segment, and a blanket roll normally mak-

ing rolling contact with a plate and successive sheets on said segments and mounted for outward movement to a position out of contact therewith comprising a master control arm for limiting the movement of the shaft and hanger means toward the cylinder, a plurality of secondary arm extension means operatively associated with and normally fixed in adjustable angular relation to said master control arm, cam means rotating in timed relation with the cylinder for controlling the position of each said secondary arm extension means during separate portions of each cycle of operations and an adjustable, normally fixed stop means associated with each secondary arm extension means for independently selecting the angular relation between each said extension means and said master control arm and therefore the particular position at which each said secondary arm means will be held by each said cam means during said separate portions of each cycle of operations.

9. A duplicating machine comprising a frame member, a cylinder mounted for rotation on a fixed axis on said frame member, a blanket roll, depending hanger means pivotally carried by said frame member, a shaft upon which the roll is journaled having its ends supported by said hanger means, resilient means connected to said hanger means for urging the roll toward the cylinder, a master control arm for limiting the movement of the shaft and hanger means toward the cylinder under the influence of said resilient means, a pair of cam follower extension arms, each pivotally mounted on and normally held at an independently adjustable angle to said master control arm by independently adjustable stop members, a third cam follower extension arm pivotally mounted on said master control arm for free swinging movement with respect thereto, means for releasably locking said third extension arm against movement relative to said master control arm, a plurality of cams rotating in timed relation with said cylinder, one of said cams being adapted to move said master control arm when said third extension arm is locked thereto so that said roll is moved away from said cylinder, another of said cams controlling the position of one of said pair of extension arms and said master control arm during one portion of each cycle of operations and another of said cams controlling the position of the other of said pair of extension arms and said master control arm during another portion of each cycle of operations.

10. A duplicating machine comprising a frame member, a cylinder mounted for rotation on a fixed axis on said frame member, a blanket roll, depending hanger means pivotally carried by said frame member, a shaft upon which the roll is journaled having its ends supported by said hanger means, resilient means connected to said hanger means for urging the roll toward the cylinder, a master control arm for limiting the movement of the shaft and hanger means toward the cylinder under the influence of said resilient means, a pair of cam follower extension arms each mounted in adjustable angular relation to said master control arm, a third cam follower extension arm pivotally mounted on said master control arm for free swinging movement with respect thereto, means for releasably locking said third extension arm against movement relative to said master control arm, a plurality of cams rotating in timed relation with said cylinder, one of said cams being adapted to move said master control arm when said third extension arm is locked thereto so that said roll is moved away from said cylinder, independently actuated locking means adapted to releasably lock said master control arm in the last mentioned position, another of said cams controlling the position of one of said pair of extension arms and said master control arm during one portion of each cycle of operations and another of said cams controlling the position of the other of said pair of extension arms and said master

control arm during another portion of each cycle of operations, independently adjustable stop members also controlling the angle between each said extension arm and said master control arm, the position of said master control arm during each said portion of each cycle of operations also being a function of said angle.

11. A sheet controlled interrupter structure for a duplicating machine having a cylinder with plate and impression segments, means for feeding sheets in succession to the impression segment, and a blanket roll normally making rolling contact with a plate and successive sheets on said segments and mounted for outward movement to a position out of contact therewith comprising a master control arm for limiting the movement of the shaft and hanger means toward the cylinder, a pair of cam follower extension arms each pivotally mounted on and normally held at an independently adjustable angle to said master control arm by independently adjustable stop members, a third cam follower extension arm pivotally mounted on said master control arm for free swinging movement with respect thereto, means for releasably locking said third extension arm against movement relative to said master control arm, a plurality of cams rotating in timed relation with said cylinder, one of said cams being adapted to move said master control arm when said third extension arm is locked thereto so that said roll is moved away from said cylinder, another of said cams controlling the position of one of said pair of extension arms and said master control arm during one portion of each cycle of operations and another of said cams controlling the position of the other of said pair of extension arms and said master control arm during another portion of each cycle of operations.

12. A sheet controlled interrupter structure for a duplicating machine having a cylinder with plate and impression segments, means for feeding sheets in succession to the impression segment, and a blanket roll normally making rolling contact with a plate and successive sheets on said segments and mounted for outward movement to a position out of contact therewith comprising a master control arm for limiting the movement of the shaft and hanger means toward the cylinder, a pair of cam follower extension arms each mounted in adjustable angular relation to said master control arm, a third cam follower extension arm pivotally mounted on said master control arm for free swinging movement with respect thereto, means for releasably locking said third extension arm against movement relative to said master control arm, a plurality of cams rotating in timed relation with said cylinder, one of said cams being adapted to move said master control arm when said third extension arm is locked thereto so that said roll is moved away from said cylinder, independently actuated locking means adapted to releasably lock said master control arm in the last mentioned position, another of said cams controlling the position of one of said pair of extension arms and said master control arm during one portion of each cycle of operations and another of said cams controlling the position of the other of said pair of extension arms and said master control arm during another portion of each cycle of operations, independently adjustable stop members also controlling the angle between each said extension arm and said master control arm, the position of said master control arm during each said portion of each cycle of operations also being a function of said angle.

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