Aug. 8, 1950 J. J. CAMPHOUSE 2,518,221

SHEET POSITIONING DEVICE FOR DUPLICATING MACHINES

Filed Sept. 17, 1945 6 Sheets-Sheet 1

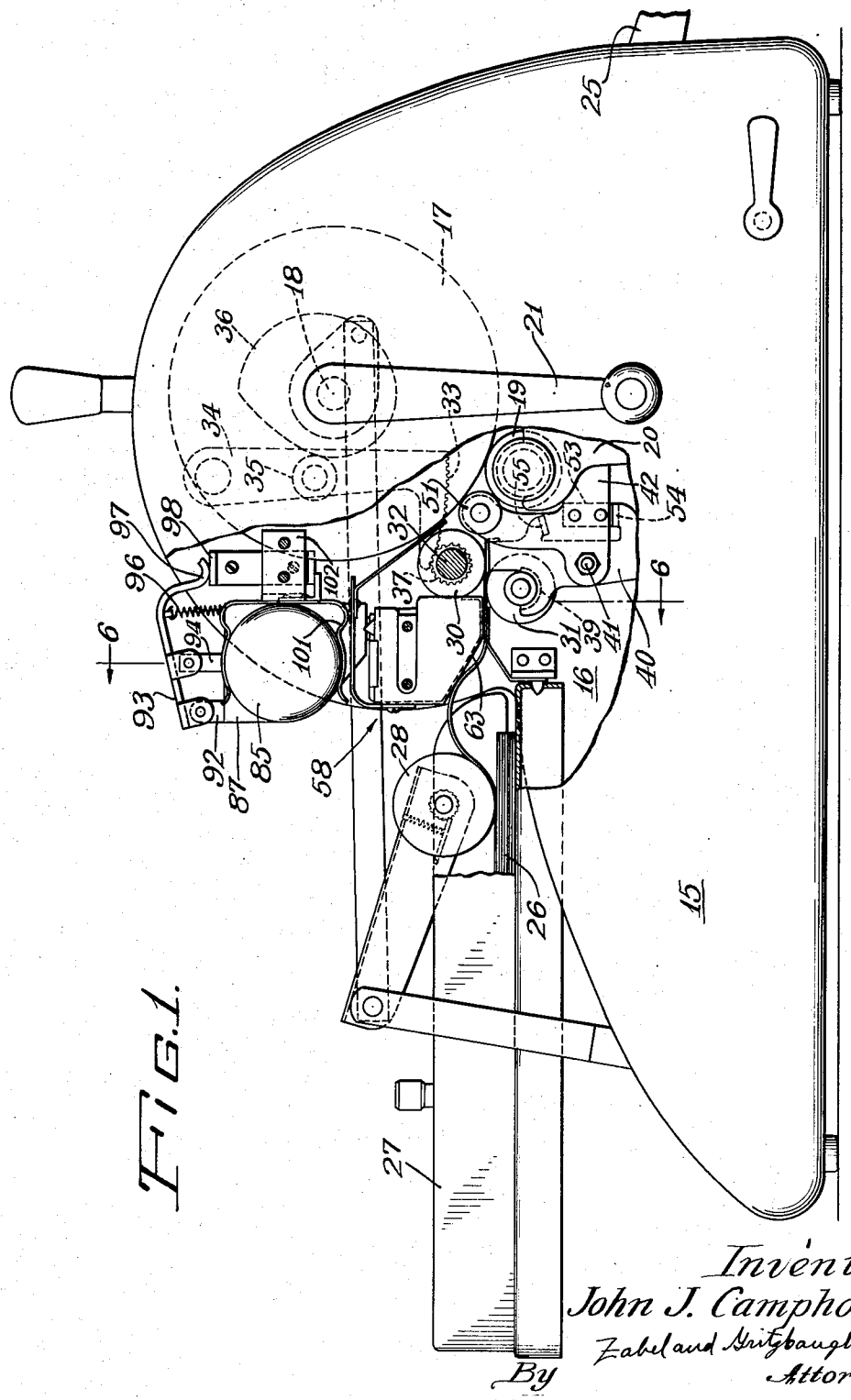


FIG. 1.

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SHEET POSITIONING DEVICE FOR DUPLICATING MACHINES

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FIG. 2.

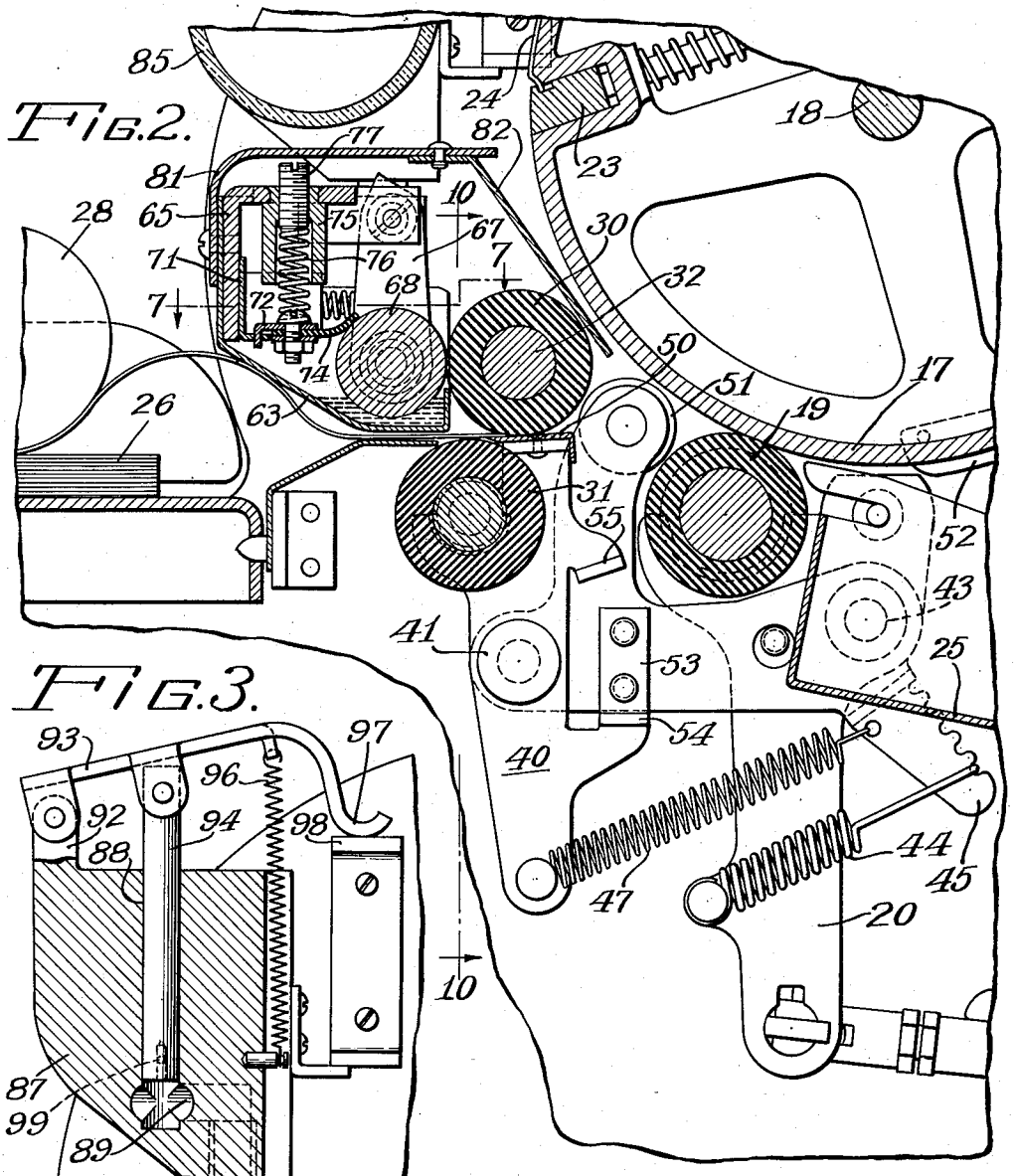


FIG. 3.

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SHEET POSITIONING DEVICE FOR DUPLICATING MACHINES

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Fig. 5.

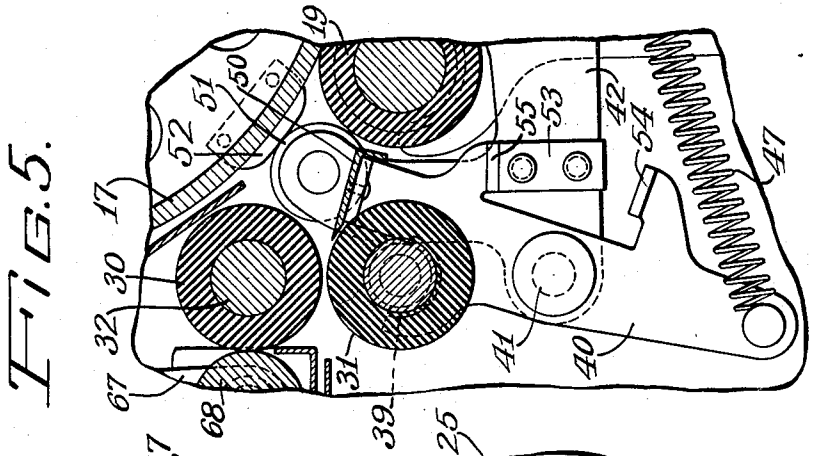
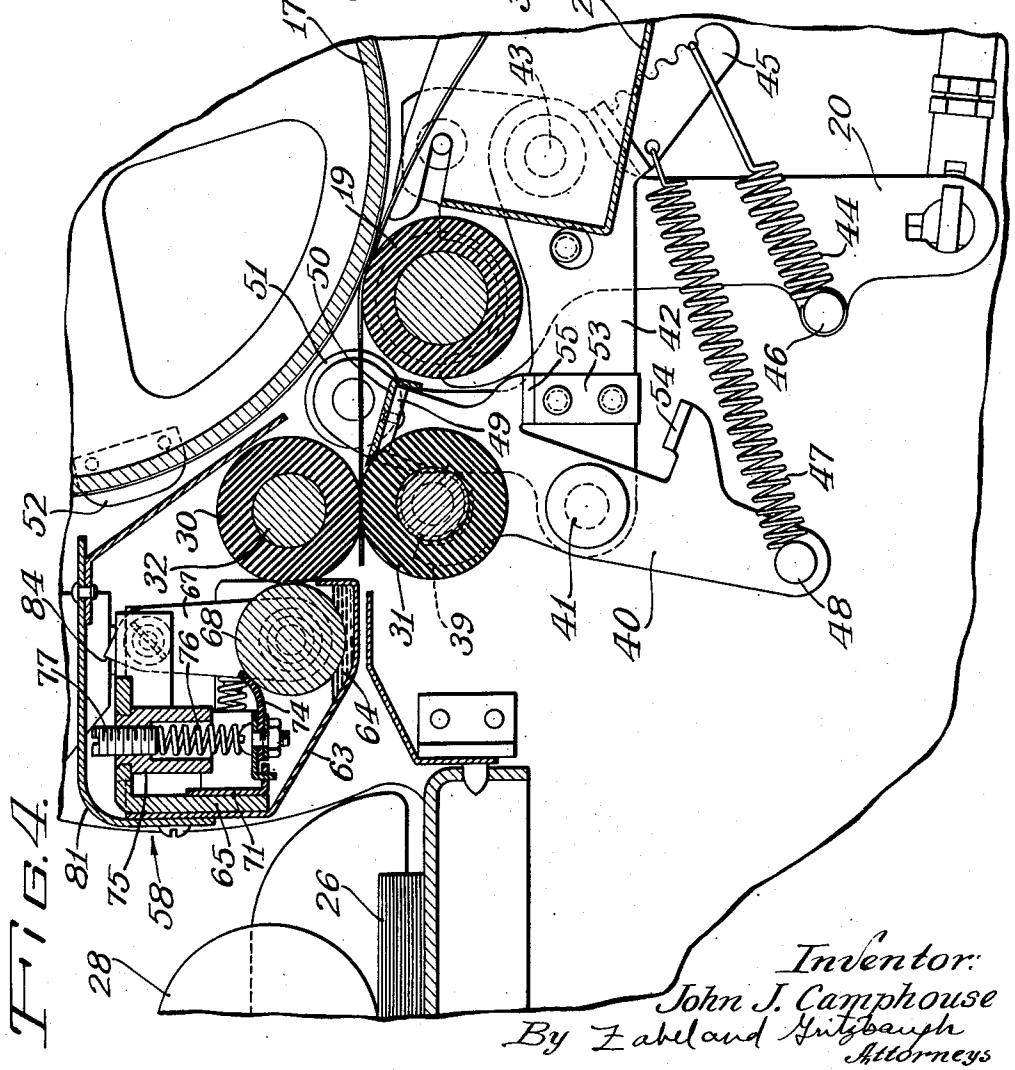


Fig. 4.



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SHEET POSITIONING DEVICE FOR DUPLICATING MACHINES

Filed Sept. 17, 1945 6 Sheets-Sheet 4

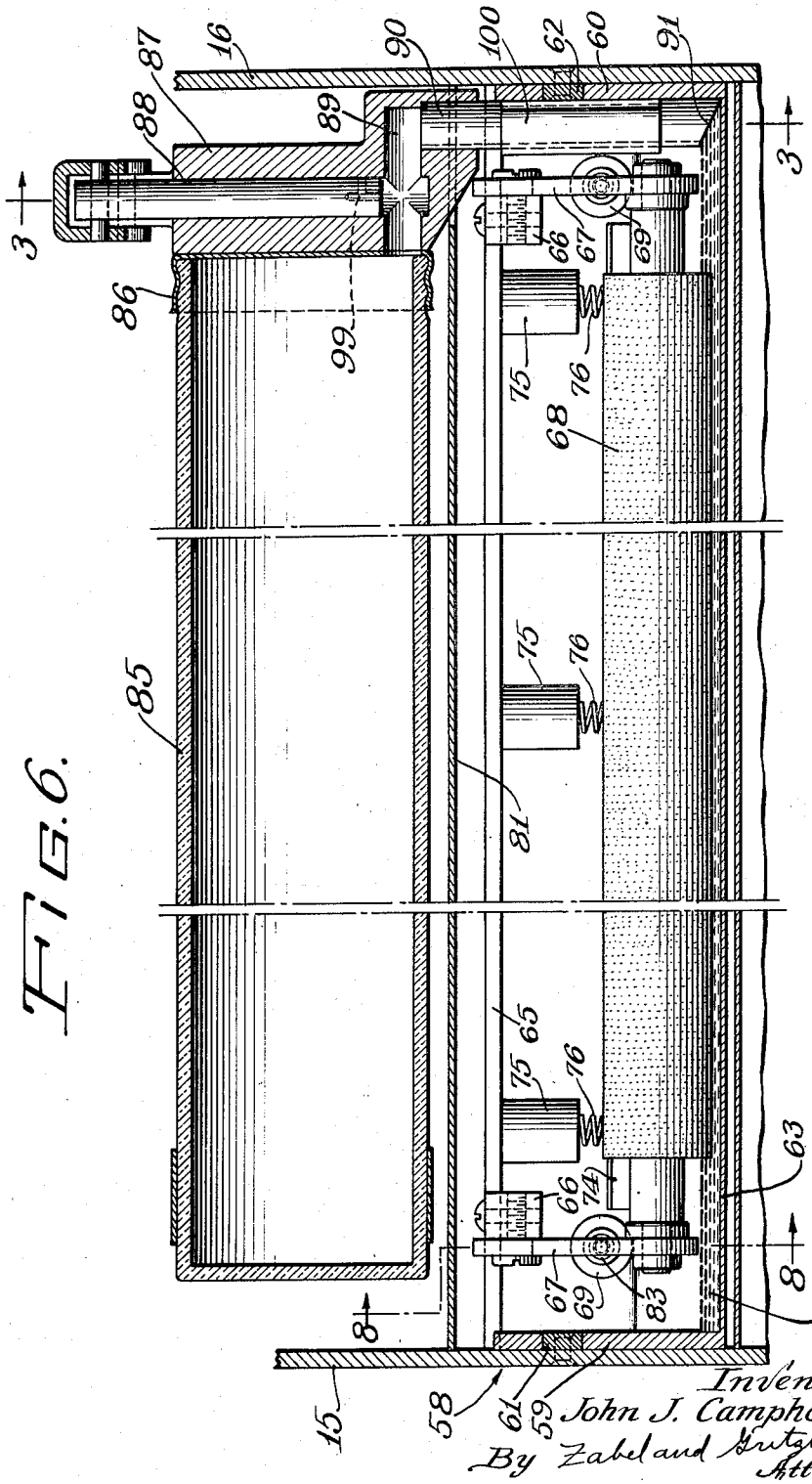


FIG. 6.

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SHEET POSITIONING DEVICE FOR DUPLICATING MACHINES

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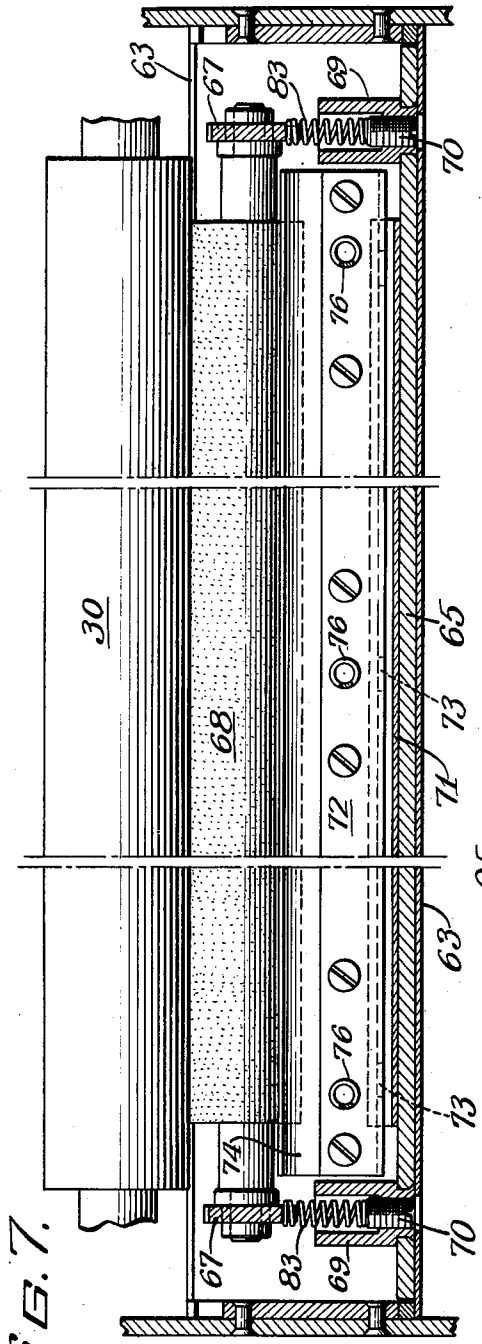


Fig. 7.

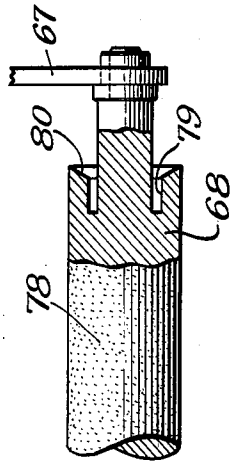


Fig. 9.

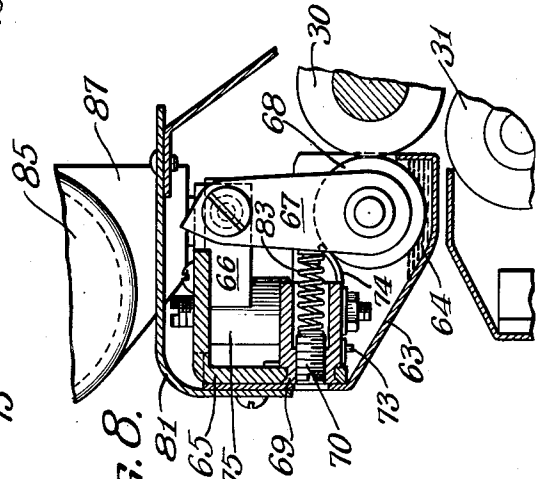


Fig. 8.

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Fig. 10.

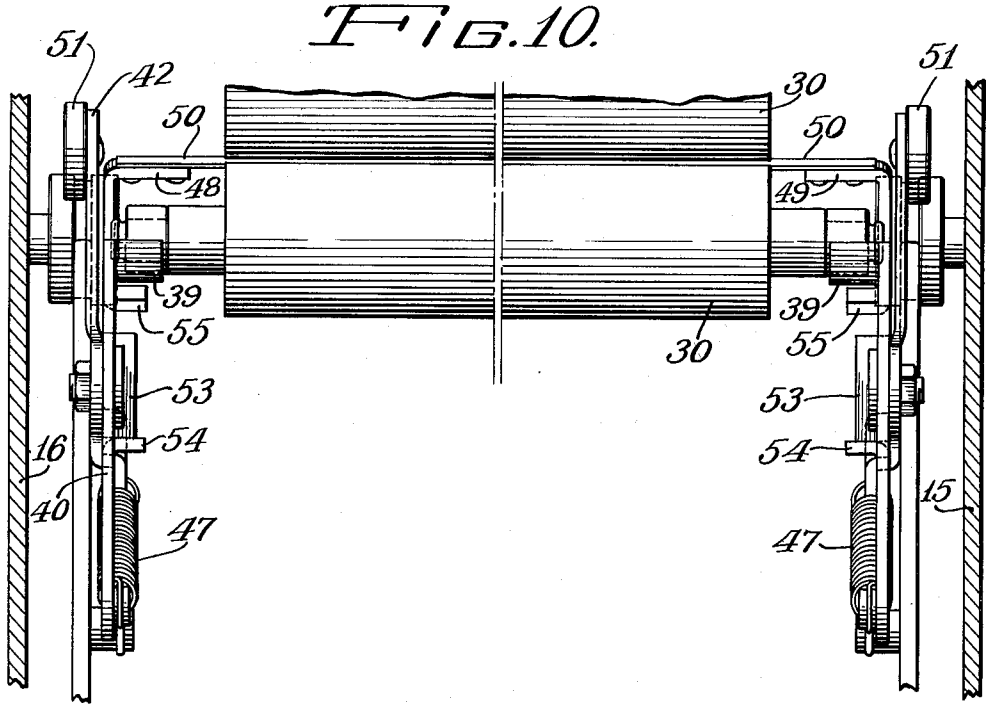
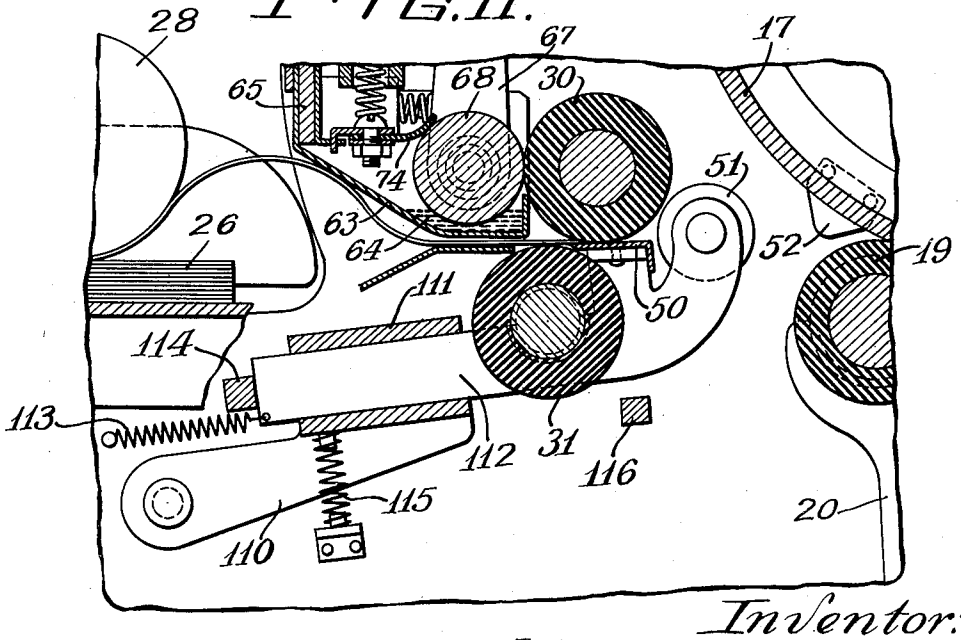


Fig. 11.



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Patented Aug. 8, 1950 2,518,221

UNITED STATES PATENT OFFICE

2,518,221

SHEET POSITIONING DEVICE FOR DUPLICATING MACHINES

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Application September 17, 1945, Serial No. 616,665

9 Claims. (Cl. 101—132.5)

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This invention relates to duplicating machines of the wet process type.

It is one of the objects of this invention to provide an improved and novel type of combined moistening and feeding means, which also serves to position the leading edge of a copy sheet, to the end that the copy sheet may be fed into pressure contact with a master sheet in the desired position.

In previous devices of this general type, it has been the practice to position the leading edge of a copy sheet within the bite between the cooperating feed rolls at such times as they are stationary. However, when one of the feed rolls also serves as a moistening roll, a certain amount of moisture will be transferred to the feed rolls. This occurs along the end portions of the rolls and beyond the margin of the copy sheet, and it also occurs at the central portion of the roll if there is any rotation of the rolls after the trailing edge of the copy sheet is passed through. This transfer of the solvent to the nonmoistening feed roll is objectionable for the reason that when the rolls are stationary, a bead of solvent collects along the bite of the rolls which will saturate the leading edge of the copy sheet which is positioned in that bite. This saturated portion of the copy sheet will damage or "crash" the master sheet.

Various expedients have been adopted to minimize this effect, one of which constitutes the use of an absorbent material on the surface of the nonmoistening roll. However, even this is not entirely satisfactory for the reason that the absorbent capacity of the roll is limited, and the pressure between the two rolls will cause a certain amount of the solvent to be squeezed out at the bite.

My invention contemplates the provision of means for withdrawing the nonmoistening roll from contact with the moistening roll at such times as the parts are stationary, together with the provision of a plate which is brought into contact with the moistening feed roll at this time, so that the leading edge of the copy sheet may be positioned between the plate and the moistening roll. Thus, a dry surface is provided and the disadvantages of the prior art overcome.

Another disadvantage of the prior art is that the absorbent, nonmoistening roll, being softer, is flattened considerably when the two feed rolls are maintained in pressure engagement with each other, the amount of flattening varying with the pressure of the rolls against each other. This flattening causes a variation in the position of

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the leading edge with respect to the lines connecting the centers of the two feeding rollers, with the result that uniform positioning of the copy sheet is not always obtained.

A further object of this invention is to provide an improved moistening unit for applying moisture in a thin and uniform film to one of the combined moistening and feeding rollers.

A still further object is to provide a moistening unit which is readily removable from the duplicating apparatus, and which includes an easily refillable reservoir.

Other objects are to provide moistening means which include a gravity feed from the reservoir to the moistener proper, thereby dispensing with the pumps which have been previously used, and also to provide a valve for automatically cutting off the solvent supplied when the reservoir is removed for refilling.

Other objects, features and advantages will become apparent as the description proceeds.

With reference now to the drawings, in which like reference numerals designate like parts—

Fig. 1 is an elevation of a duplicating machine embodying a preferred embodiment of my invention, a portion of the housing being broken away;

Fig. 2 is an enlarged vertical sectional view showing the moistening and feeding means;

Fig. 3 is a sectional view taken along line 3—3 of Fig. 6;

Fig. 4 is a vertical sectional view similar to Fig. 2, but showing the parts in a changed position;

Fig. 5 is a view similar to Figs. 2 and 4, but showing the parts in still another position;

Fig. 6 is a vertical sectional view taken along line 6—6 of Fig. 1, showing the moistening unit;

Fig. 7 is a plan sectional view taken along line 7—7 of Fig. 2;

Fig. 8 is a vertical sectional view taken along line 8—8 of Fig. 6;

Fig. 9 is a detailed view, partly in section, of a portion of the supply roller;

Fig. 10 is a vertical transverse section taken along line 10—10 of Fig. 2; and

Fig. 11 is a view similar to Fig. 2, but showing a modified form of my invention.

With reference now to Figs. 1, 4 and 10, the duplicating machine comprises a pair of side frames 15 and 16, between which a drum 17 is mounted on a shaft 18. A pressure roll 19 is disposed beneath the drum and is urged into pressure contact therewith by suitable means, not shown herein, the pressure roll being mounted on arms 20.

A crank 21 is disposed at the exterior of side frame 15 for rotating the shaft 18. The drum is provided with the usual gripper 23 which grips the leading edge of a master sheet 24.

The operation of the device is such that when a moistened copy sheet passes through the bite of the drum 17 and pressure roll 19, it is urged into contact with the master sheet 24. The surface of the master sheet is provided with the usual inked characters, and the nature of the solvent is such that a small amount of the ink is dissolved each time a copy sheet is pressed against the master sheet, the dissolved ink being transferred to the surface of the copy sheet. After the copy sheets have passed through the bite of the drum and pressure roll, they drop into the usual receiving tray 25.

The duplicating machine is provided with a feed tray 27, upon which the copy sheets may rest in a stack 26, and a suitably driven feed roller 28 is provided to remove the top sheet from the stack at the proper intervals.

Between the stack 26 and the bite of the drum and pressure roll, are mounted a pair of feed rolls 30 and 31, the upper feed roll 30 also serving to apply a thin film of moisture to the surface of a copy sheet. The feed roll 30 is mounted on a shaft 32, there being a free wheeling connection between the two so as to permit unidirectional rotation of the feed roll. The shaft 32 may be driven in any suitable manner, as by a rack 33 mounted on a bell crank 34 which is pivoted on the side frame 16. The bell crank carries a cam follower 35 which engages a cam 36 mounted on the drum shaft 18 and rotating therewith. Rotation of the drum and of the cam 36 will cause reciprocation of the rack 33, thus driving the shaft 32 through a suitable pinion 37, and hence driving the feed roll 30.

The lower feed roll 31 is mounted in bearings 39, which in turn are carried by a pair of levers 40, these levers being pivotally mounted at 41 on a second pair of levers 42. Levers 42 are pivotally mounted on suitable studs 43 which extend inwardly from the side frames 15 and 16.

Springs 44 are disposed between the tails 45 of levers 42 and studs 46, also mounted in the side frames. The springs 44 urge the levers 42 in a clockwise direction, thereby urging levers 40 and the lower feed roll 31 upwardly.

As shown in Fig. 10, the parts above described, are duplicated on both sides of the machine; however, the construction of the parts on one side are substantially identical to the construction of the parts at the other side of the machine, and hence, the same reference numerals are used for both.

Springs 47 are disposed between tails 45 of levers 42 and the tails 48 of levers 40. These springs urge levers 40 in the counterclockwise direction into the position shown in Fig. 2, wherein the center line of the lower feed roll 31 is displaced rearwardly of the vertical plane which passes through the center line of the upper feed roll 30.

The upper ends 49 of levers 40 are bent inwardly and a transversely disposed plate 50 is secured thereto. The position of plate 50 is shown in Figs. 2 and 4, and the operation of the device is such that the parts above described can assume either the position shown in Fig. 2, in which the feeding rolls 30 and 31 are separated, or the position shown in Fig. 4, in which they contact each other in operative relationship. The upper ends of levers 42 are provided with cam rollers 51 which extend into the paths of cams 52 on drum 17.

The operation of the device is such that when the parts are at rest, the plate 50 is urged by springs 44 upwardly against the under surface of the feeding roll 30. Thus, when the leading edge of the copy sheet 38 is pushed up between the rolls 30 and 31, its position will be limited by the V or bite which is formed between the plate 50 and the feed roll 30. After the feed roll 30 is caused to rotate, however, as by the operation of the cam 36, the bell crank 34, and the rack 33, the copy sheet and the plate 50 will be displaced forwardly, thereby bringing the lower feed roll 31 into contacting relationship with the feed roll 30, as shown in Fig. 4. At the same time, the plate is depressed somewhat beneath the path of the copy sheet, due to its pivotal mounting.

The timing of the rack 33 is such that the feed roll 30 starts to rotate as the drum passes through a given angular position, and the throw of the rack is such that the leading edge of the copy sheet will be advanced a sufficient distance so that it will engage the master sheet on the drum in the desired registry. After the leading edge of the copy sheet has been engaged by the bite of the drum 17, and the pressure roll 19, the pull of the copy sheet causes the continued rotation of the feed rolls 30 and 31, even though there is no driving connection between the shaft 32 and the feed roll 30, due to the free wheeling connection.

The motion of the levers 40 and their associated parts are limited by a pair of abutments 54 and 55 which engage the opposite sides of stop blocks 53, which are mounted on levers 42. The stop blocks 53, as shown in Figs. 2, 4 and 10, are preferably made of a shock absorbing material, such as rubber. Abutments 54 engage the lower surface of the stop block to define the Fig. 2 position, and the abutments 55 engage the upper surfaces of the stop blocks 53 to define the Fig. 4, or operating position. It will be noted that in the last mentioned position, the axis of the lower feed roll 31 is disposed slightly forwardly of a vertical line drawn through the axis of the feed roll 30. This overcenter position of the parts in operating position assists in maintaining the parts in that position during that portion of the cycle of the machine in which the feed roll 30 is not being driven by the rack 33.

At a predetermined point in the cycle of operation, the cam rollers 51 will be engaged by the cams 52, as shown in Fig. 5. Thus, the levers 42 are rotated against the tension of springs 44, to depress the whole lower feed roll assembly. Thus, the lower feed roll 31 is released from its overcenter position, and the springs 47 will cause the parts to return to the position shown in Fig. 2.

A thin film of suitable solvent is applied to the surface of the upper feed roll 30 by a moistening unit, designated generally by reference numeral 58, and which is mounted adjacent the feed roll 30. The moistening unit comprises a pair of slotted end members 59 and 60, which are slidably mounted on strips 61 and 62, which are attached to the side frames 15 and 16, as shown in Fig. 6. Thus, the moistening unit as a whole, may be removed from the machine.

A transverse member 63, suitably formed from sheet metal, connects the end members 59 and 60, and also forms a bottom and side wall of the moistening unit. The forward edge of the transverse member 63 is turned up, as indicated in Fig. 8, to form a trough 64 for the reception of liquid. An angle plate 65 also extends between the end members 59 and 60, and is secured thereto, and cooperates with the transverse member

63 to form a substantially rigid structure. As shown in Figs. 6 and 8, blocks 66 are suitably secured to the horizontal portion of the plate 65, and levers 67 are pivotally mounted on said blocks. A supply roll 68 is journaled in the lower end of the lever 67.

Means are provided to urge the assembly, comprising the supply roll 68 and the lever 67, forwardly and into contact with the feed roll 30. These means comprise a pair of threaded collars 69 which are stacked to the vertical portion of the plate 65. Set screws 70 are disposed within the threaded collars and bear against springs 83, the forward end of the springs engaging the levers 67 to urge them forwardly. The tension on the springs, and hence the contact between the rolls 68 and 30, may be regulated by the set screws 70. It will be seen that the solvent which is picked up by the supply roll 68 is thereby transferred to the roll 30.

Wiping means are provided to limit the amount of solvent which is transferred by the supply roll 68 to the feed roll 30. Such wiping means are mounted on a bracket 71, which, as shown in Figs. 4 and 7, is suitably secured to the vertical portion of the angle plate 65. A wiper plate 72 is provided with a plurality of downwardly extending lugs 73 which fit into suitable apertures formed in the bracket 71. To the wiper plate is suitably secured a forwardly projecting rubber wiper 74 which is adapted to engage the surface of supply roll 68. It will be seen that the wiper assembly is supported at the rear end by the bracket 71, and at the forward end, by the contact of the wiper 74 against the roll 68. Of course the wiper may be made of other suitable materials than rubber. However, it desirably is of sufficient stiffness to perform the supporting function herein referred to.

Adjustable means are provided to regulate the contact between the wiper 74 and the supply roll 68. These means include a plurality of vertically disposed threaded collars 75 which are staked to the horizontal portion of the angle plate 65, as shown in Figs. 4 and 8. Springs 76 are disposed within the collar 75 and bear against the wiper plate 72. Set screws 77 cooperate with the threaded collar 75, and bear against the upper ends of springs 76 to regulate their tension.

I have found that improved results are obtained by using a pitted supply roll, and as shown in Fig. 9, a series of pits 78 or depressions are provided in the surface thereof. Furthermore, I have found it desirable to under-cut the end of the roll 68, as indicated by the reference numeral 79, and also to provide an annular slot 80 in the dished end surface which is formed by the undercut. This construction assists in preventing an undue accumulation of solvent at the ends of the supply roll, which might otherwise result in a non-uniform film of solvent on the surface of the feed roll 30.

A cover 81 is suitably secured to the transverse member 63 to enclose the moistening unit, and to the forward edge of the cover is secured a guard plate 82 which serves to prevent inadvertent contact of the master sheet with the feed roll 30.

Projections or dogs 84 are provided on levers 67, which are adapted to engage the edge portion of the angle plate 65 to limit the forward movement of the supply roll 68 as the moistening unit 58 is removed from the machine.

Solvent is supplied to the trough 64 by means of a reservoir assembly which comprises a bottle

85, and a mounting block 87, shown in Fig. 6. Secured to the block 87 is a cup or threaded socket 86 which is adapted to receive the threaded end of the bottle 85, and to support the same. Intersecting bores 88 and 89 are provided in the block 87, and a tube 90 is inserted into the block and provides communication with the bore 89. The tube 90 is received within a U-shaped plate 100 which is welded or otherwise secured to the end member 60, the tube resting on the bottom of the trough 64, and the arrangement being such that the whole reservoir assembly, including the block 87, bottle 85, and tube 90, are swivelly supported by the U-plate 100.

It will be noted that the lower end of the tube 90 is diagonally cut as indicated by the reference numeral 91, to provide a lateral opening which determines the level of the liquid within the trough 64.

A clip 101, as shown in Fig. 1, is mounted on a plate 102, which in turn is secured to the side frame 15. This clip supports the bottle 85 when the bottle is in operative position, that is, when its longitudinal axis is transverse to the machine, as shown in Figs. 6 and 1. When it is desired to remove the bottle for refilling, the end of the bottle which is toward the observer in Fig. 1, is swung backwardly, around an axis concentric with the tube 90, in order to disengage the bottle from the clip 102. Then the reservoir assembly, which includes the bottle 85, the block 87, and the tube 90, is lifted upwardly, disengaging the tube from the U-plate 100. The reservoir assembly may then be tipped so that the bottle is in upright position, and the bottle unscrewed from the socket 86, in order that the bottle may be refilled.

Means are provided to automatically shut off communication between the bottle and the tube 90 when the reservoir assembly is removed from the moistening unit. Thus, the solvent will not continue to flow out of the tube into the trough 64, nor will it otherwise spill solvent over the machine. These means include a lug 92 which is mounted at the rear portion of the block 87, and a lever 93, which is pivotally mounted on said lug, as shown in Figs. 1 and 6. A plunger 94 is pivotally mounted on the lever 93 and extends into the bore 88, to serve as a valve. When the lever 93 is depressed, the plunger will block the passage of solvent through the bore 89. It will be noted that the vertical bore 88 extends below the horizontal bore 89 a slight extent. A by-pass 99 is provided in the lower end of plunger 94 to provide for the escape of solvent from this latter mentioned portion of the bore 88, thereby permitting the plunger to be depressed to the limit of its movement.

A spring 96 is tensioned between the lever 93 and the block 87, and serves to bias the lever 93 into valve closing position. The forward end 97 of lever 93 is arranged to engage a bracket 98 on the side frame 16 to maintain the lever in elevated, valve opening position. It will be seen that as the reservoir assembly is pivoted around the vertical axis or tube 90 preparatory to removal thereof, the end 97 will slip off of the bracket and automatically close the valve. Similarly, when replacing the reservoir assembly, the valve will be maintained in closed position until such time as the tube 90 engages the bottom of the trough. Then, as the reservoir assembly is swung into its operative position, the operator can manually raise the end 97 of the lever 93

against the tension of spring 96 in order that it may be properly seated on the bracket 98.

The operation of the machine has been described in detail in connection with the operation of the separate parts. In general, it will be seen that as a copy sheet 38 is fed, either manually or by feeding means 28, from the top of the stack 26, when the drum and its associated parts are stationary in their home position, the leading edge of the copy sheet will be positioned between the plate 50 and the upper feed roll 30. Since the upper feed roll is generally of a comparatively hard material, such as neoprene, the line of contact between the roll and the plate will be comparatively narrow, thereby providing a more definite position for the leading edge of the copy sheet. As the crank 21 is then turned, the upper feed roll 30 will commence its rotation at the proper time and feed the leading edge of the copy sheet into the bite of the drum 17 and the pressure roll 19 to provide the desired registry as the roll 30 is being rotated, it will displace the plate 50 forwardly and bring the lower feed roll 31 into operative engagement with the upper feed roll, the copy sheet, of course, being disposed between the two. Continued rotation of the drum will cause the rolls 30 and 31 to be dragged by the copy sheet, after the movement of the rack 33 has been completed. Toward the end of the cycle of operation, the cam 52 will cause the lower feed roll assembly to become disengaged from its over center position, thereby permitting the springs 47 to return the parts to their initial position.

The contact between the upper feed roll 30 and the supply roll 68 will cause the latter to be rotated, thereby transferring solvent from the trough 64 into which the supply roll dips, to the surface of feed roll 30. The pressure of the wiper 74 on the supply roll 68, and the pressure which supply roll 68 exerts against the feed roll 30 may both be regulated, thereby providing means for controlling the thickness of the fi'm on the feed roll and the amount of solvent supplied to the copy sheets.

A modified form of my invention is shown in Fig. 11, in which the lower feed roll 31 and the plate 50, instead of being pivotally supported on a pair of levers, are slidably mounted in a pair of levers 110. Each lever 110 carries a sleeve 111, in which sleeve is disposed a sliding arm 112, a feed roll 31 being journaled in sliding arms 112. The plate 50 is also mounted on sliding arms 112, as also are the cam rollers 51.

A spring 113 serves to retract the sliding assembly into the position shown in Fig. 11, in which the plate 50 engages the moistening and feed roll 30. A cross bar 114 is provided to limit the backward movement of the sliding assembly. A spring 115 urges the whole assembly, including the levers 110 and the sliding assembly, upwardly so that the plate 50 and the feed roll 31 will be in operative contact with the feed roll 30. A cross bar 116 serves as a stop to limit the pivotal movement of the parts when the cam rollers 51 are engaged.

The operation of this device is substantially the same as that of the preceding figures, with the exception that the assembly, including the feed roll 31 and the plate 50, slides in and out of its respective positions.

Although I have shown and described only preferred embodiments of my invention, it will be understood that various modifications and changes may be made therein without departing from the spirit of my invention as defined by the appended claims.

I claim:

1. In a duplicating machine, a rotatable drum for holding a master sheet, a cooperative pressure roll, a pair of feed rolls disposed one above the other, means for laterally shifting one of said feed rolls into and out of cooperative engagement with the other, and a plate having a common support with said shiftable feed roll and laterally spaced therefrom so as to engage said non-shiftable feed roll alternatively with said shiftable feed roll.

2. In a duplicating machine, a rotatable drum for holding a master sheet, a cooperative pressure roll, a pair of feed rolls, means for intermittently driving one of said feed rolls, means for shifting the other of said feed rolls in a tangential direction into and out of cooperative engagement with the other, and a plate having a common support with said shiftable feed and spaced therefrom in said tangential direction roll, and adapted to engage said non-shiftable feed roll during such times that the latter is stationary.

3. In a duplicating machine, a rotatable drum for holding a master sheet, a cooperative pressure roll, a pair of feed rolls, means for intermittently driving one of said feed rolls, a laterally shiftable mounting for the other of said feed rolls, means for applying a film of moisture to the non shiftable feed roll, a laterally shiftable plate movable with said laterally shiftable mounting for contacting said non shiftable feed roll alternatively with the shiftable feed roll, and means for separating said feed rolls and for bringing said plate into contact with said non shiftable feed roll during at least a portion of the time that said feed rolls are not rotating.

4. In a duplicating machine, a feed roll, a laterally displaceable assembly comprising a plate and a second feed roll laterally spaced from each other and adapted for alternative engagement with said first mentioned feed roll, a drum, a driving connection between said drum and said first mentioned feed roll, and means to cause operation of said shiftable assembly from plate contacting position to roll contacting position during predetermined portions of the rotation of said drum.

5. In a duplicating machine, a feed roll, moistening means therefor, a laterally displaceable assembly comprising a plate and a second feed roll laterally spaced from each other and adapted for alternative engagement with said first mentioned feed roll, a drum, an intermittent driving connection between said drum and said first mentioned feed roll, and means to cause operation of said shiftable assembly from roll contacting position to plate contacting position when said rolls are stationary to permit the positioning of a copy sheet in the bite formed between said first mentioned feed roll and said plate.

6. In a duplicating machine, a frame, feeding means comprising a combined moistening and feeding roll journaled with respect to said frame, a pair of levers pivoted on said frame, a second pair of levers pivotally mounted on said first mentioned pair of levers, a second feed roll journaled in said second pair of levers at a point above said first pair of levers and adapted for pivoted movement with respect to said first pair of levers, said movement being in a lateral direction so that said second feed roll can move in and out of cooperative engagement with said first feed roll, a plate laterally spaced from said second feed roll and carried by said second pair of levers in a position such that it will engage said combined moistening and feed roll when said

second feed roll is in non-cooperative position to form a bite wherein a copy sheet may be positioned when said first feed roll is stationary, means to rotate said combined moistening and feed roll to cause said second pair of levers to be rotated in order to bring said second roll into cooperative engagement with said combined moistening and feed roll, and means operative during a predetermined portion of the cycle of operation of said duplicating machine to automatically depress said first pair of levers in order to permit the return of said second pair of levers to a position in which said plate will engage said combined moistening and feed roll.

7. In a duplicating machine, a first feed roll, means for intermittently driving said first feed roll, a laterally displaceable assembly carrying two feed roll engaging elements adapted for alternative engagement with said first feed roll, one of said elements comprising a plate having a surface cooperating with said first feed roll to form a bite wherein the leading edge of a copy sheet may be positioned when said first feed roll is stationary, and the other of said elements comprising a rotatably mounted second feed roll for cooperation with said first feed roll to hold a copy sheet against said first feed roll as said copy sheet is being fed forwardly, said plate being spaced forwardly of said second feed roll and being adapted to engage the same in driven relationship whereby rotation of said first feed roll, when engaged by said plate, will cause said plate and said assembly to be displaced forwardly so that said second feed roll will be brought into cooperative engagement with said first feed roll.

8. In a duplicating machine as claimed in claim 7, the combination of a resilient mounting for said displaceable assembly and a stop to limit the displacement of said assembly so that said second feed roll is maintained in an over-center position in cooperative engagement with said first feed roll.

9. In a duplicating machine as claimed in claim 8, the combination of means for depressing said resilient mounting to disengage said second feed roll from said over-center position, and means to return said displaceable assembly to plate contacting position.

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