

April 2, 1940.

A. MARCHEV

2,195,491

DUPLICATING DEVICE

Filed July 24, 1937

7 Sheets-Sheet 1

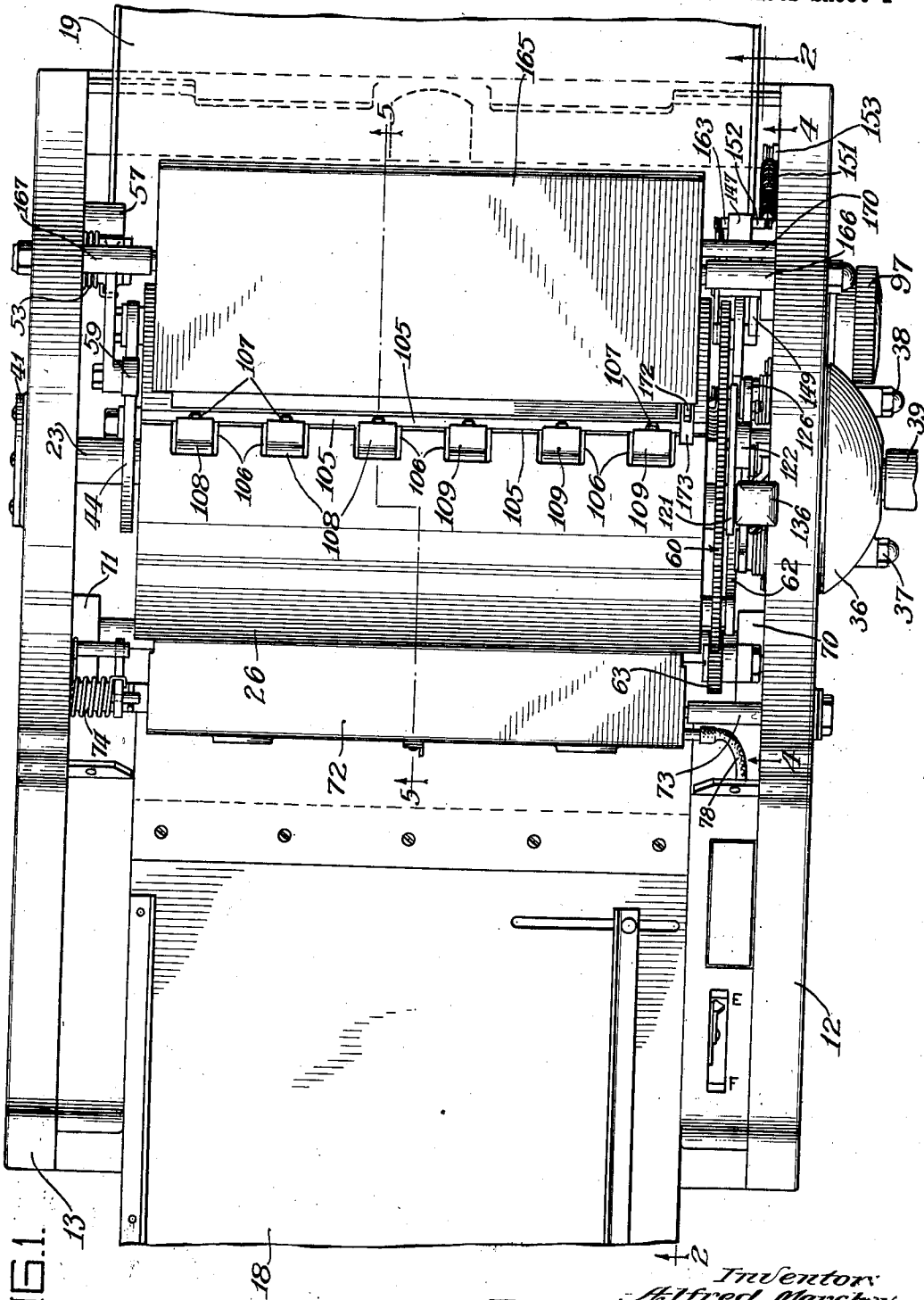


FIG. 1.

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April 2, 1940.

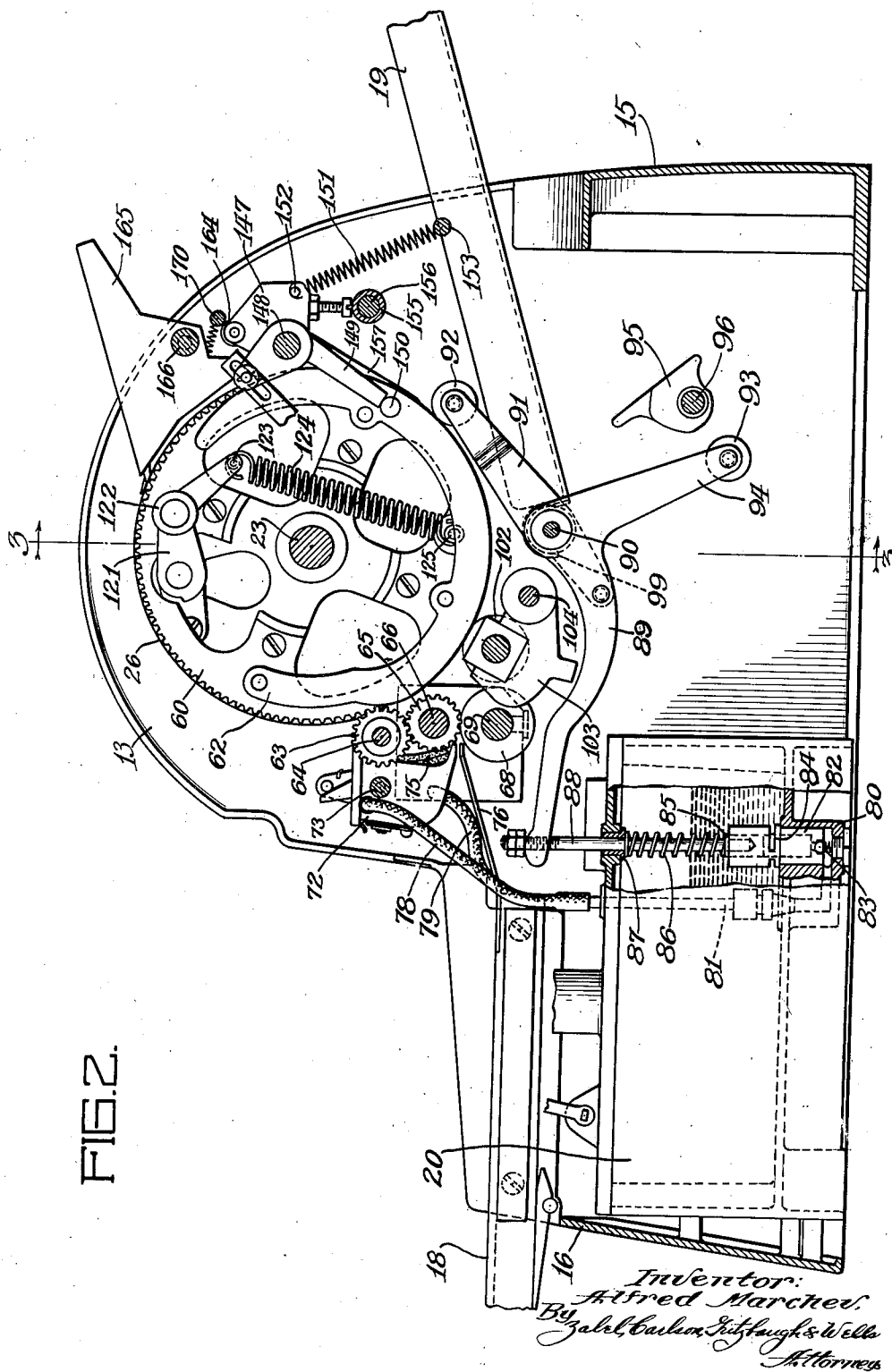
A. MARCHEV

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DUPLICATING DEVICE

Filed July 24, 1937

7 Sheets-Sheet 2



April 2, 1940.

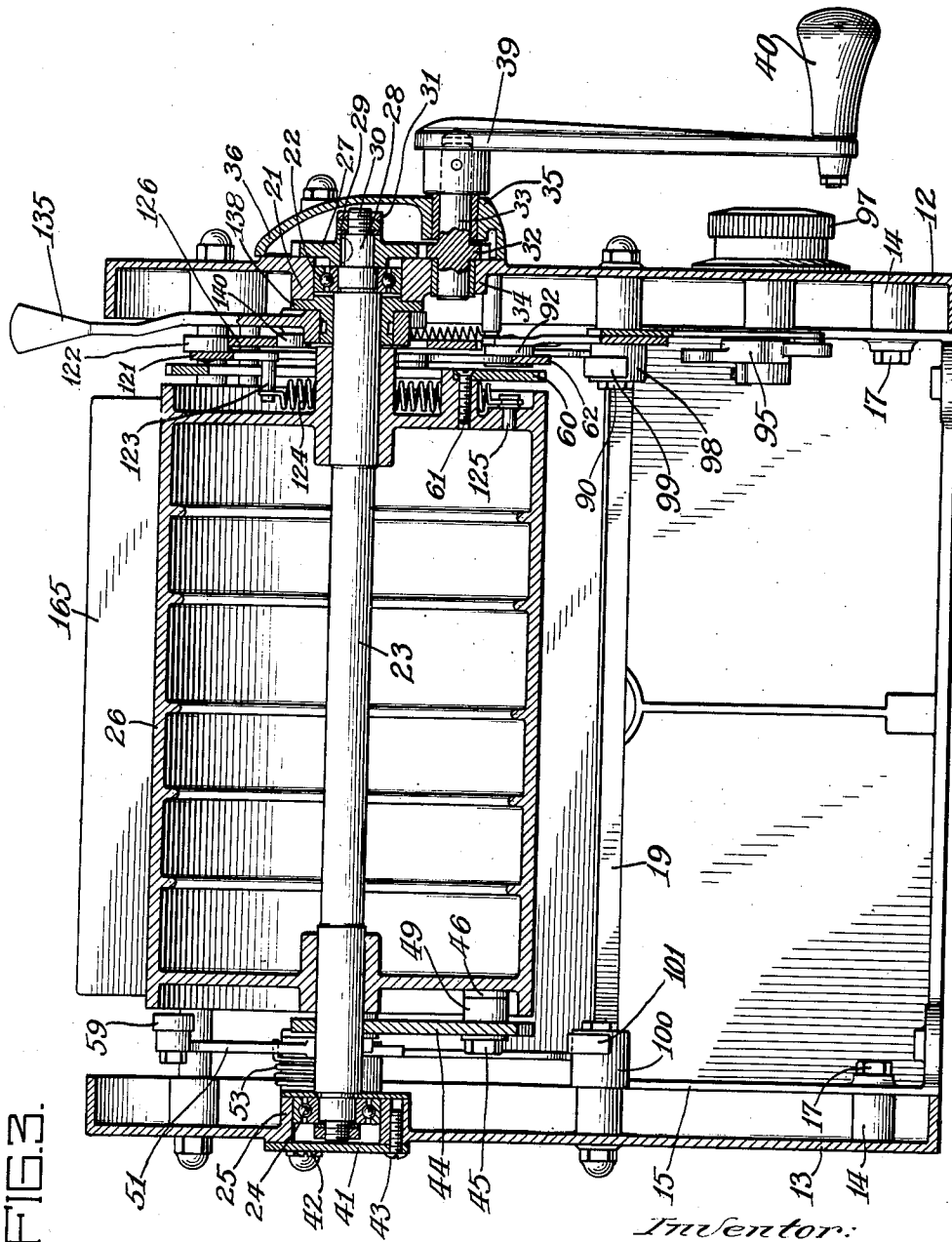
A. MARCHEV

2,195,491

DUPLICATING DEVICE

Filed July 24, 1937

7 Sheets-Sheet 3



In Witness whereof,
 Attest my hand and seal of the said Court,
 this 10th day of June, 1884.

By: *Isabel Carlson, Guit, Baugh & Wells*
 Attorneys.

April 2, 1940.

A. MARCHEV

2,195,491

DUPLICATING DEVICE

Filed July 24, 1937

7 Sheets-Sheet 4

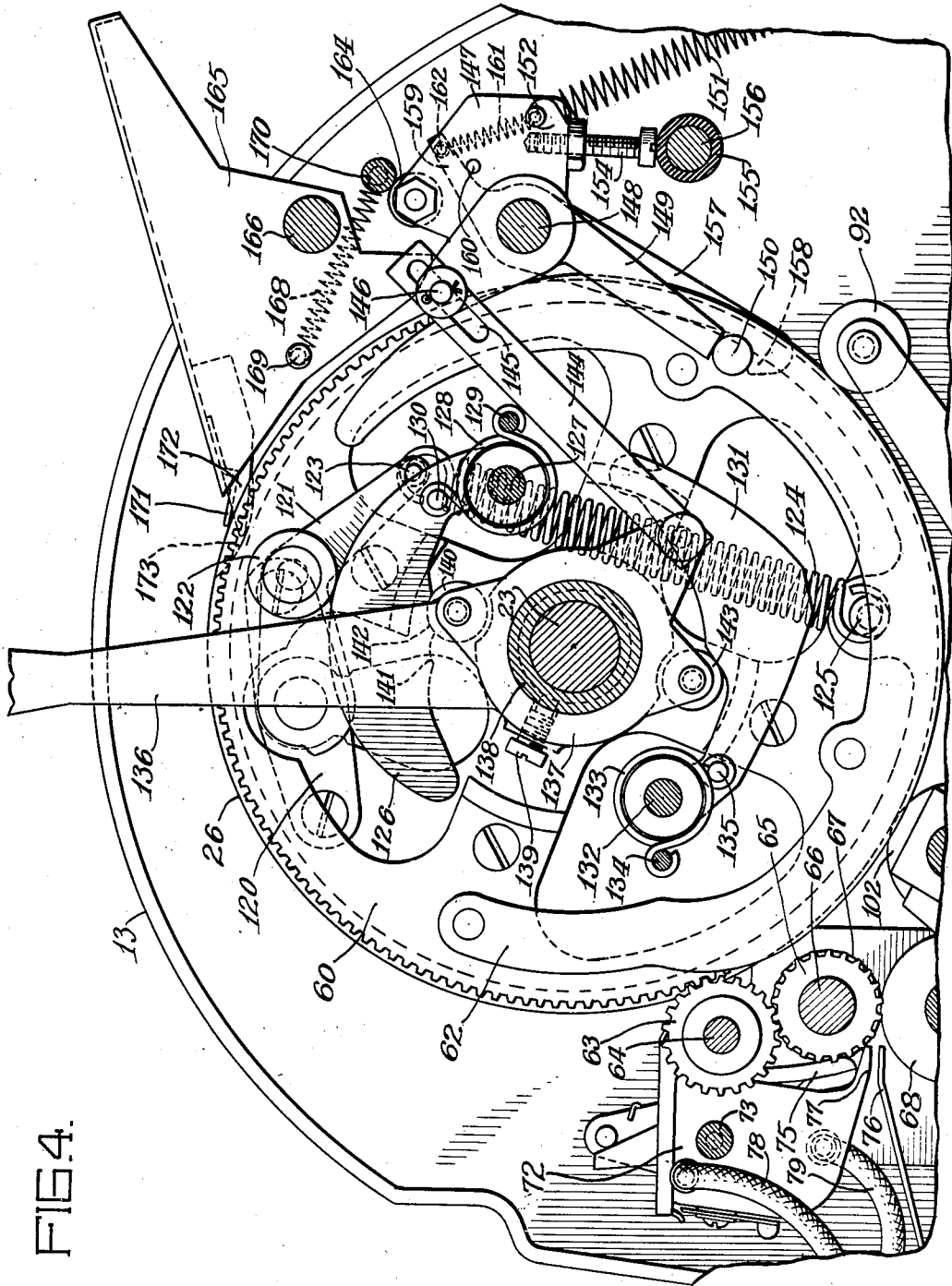


FIG. 4.

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DUPLICATING DEVICE

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7 Sheets-Sheet 5

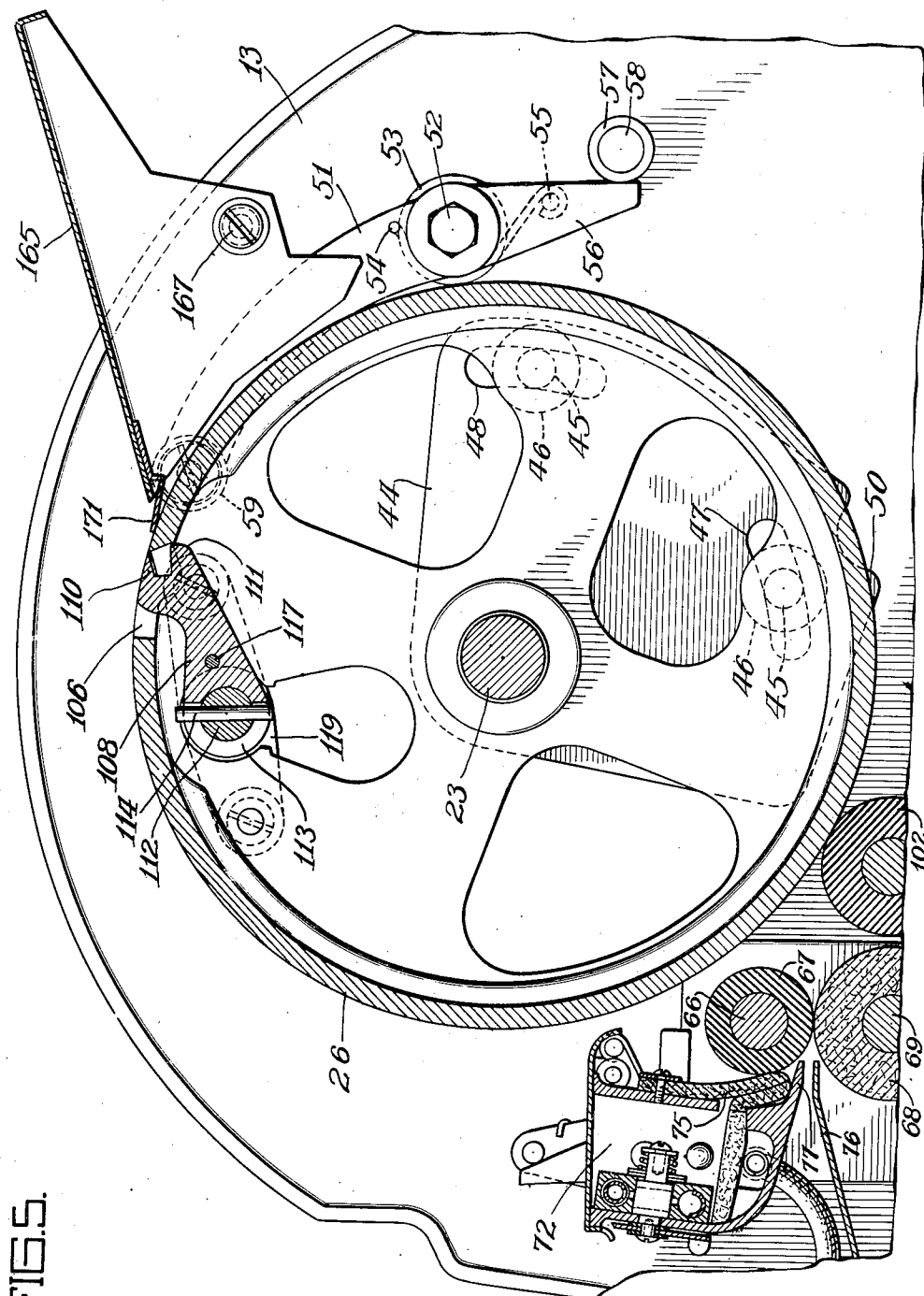


FIG. 5.

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DUPLICATING DEVICE

Filed July 24, 1937

7 Sheets-Sheet 6

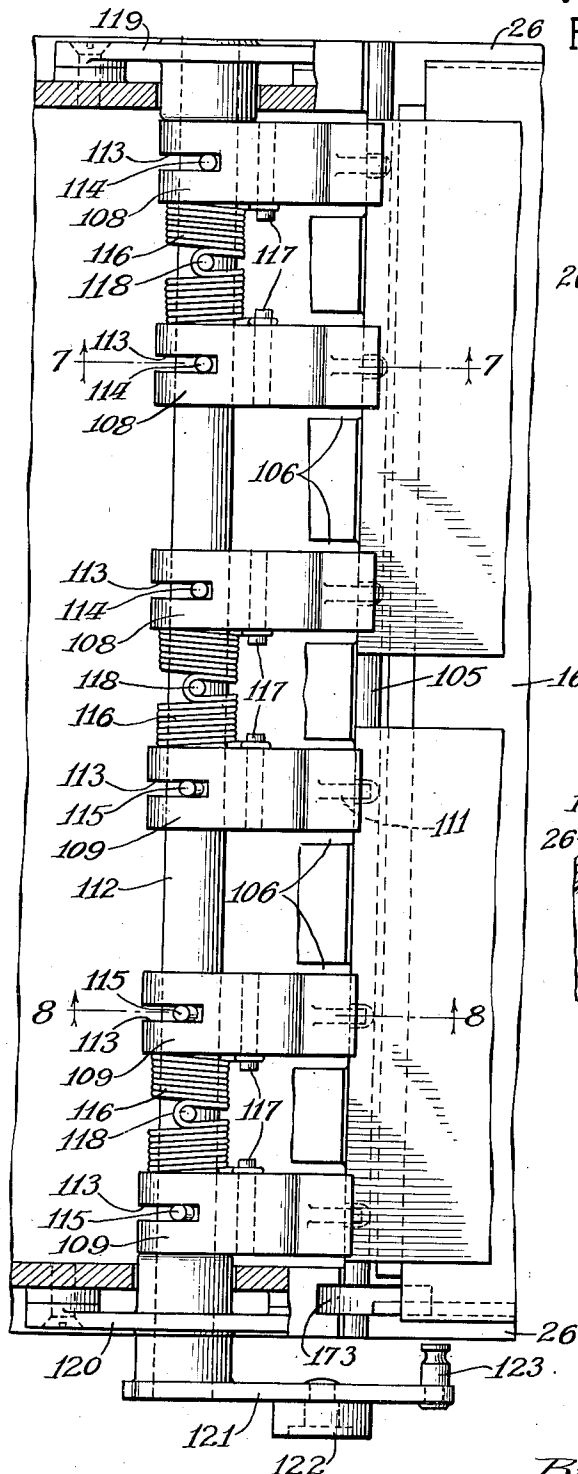


FIG. 6.

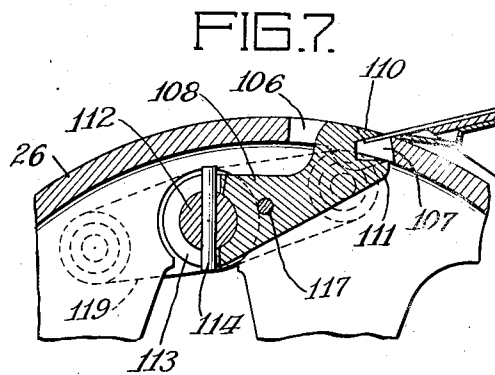


FIG. 7.

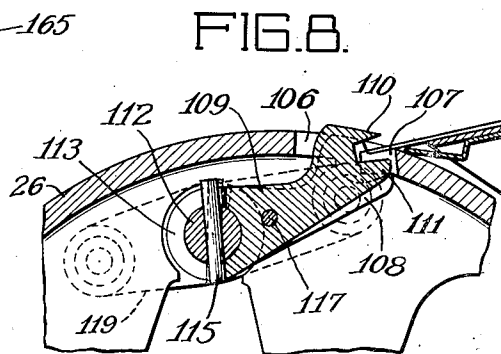


FIG. 8.

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April 2, 1940.

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2,195,491

DUPLICATING DEVICE

Filed July 24, 1937

7 Sheets-Sheet 7

FIG. 9.

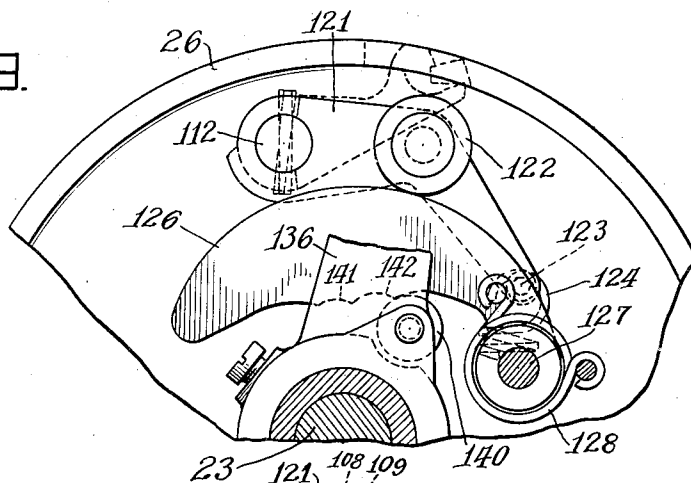


FIG. 10.

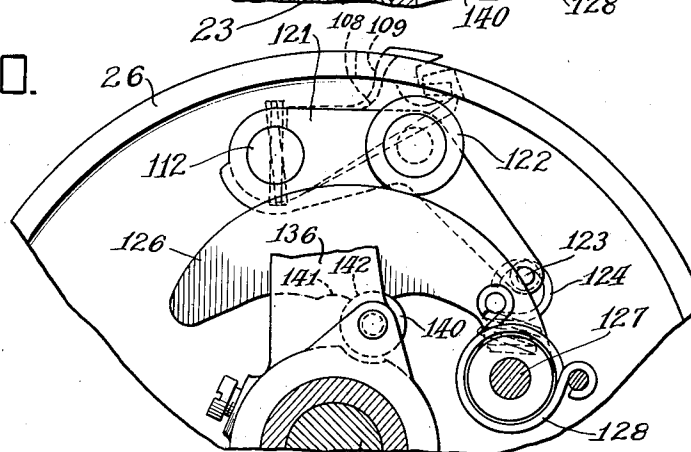
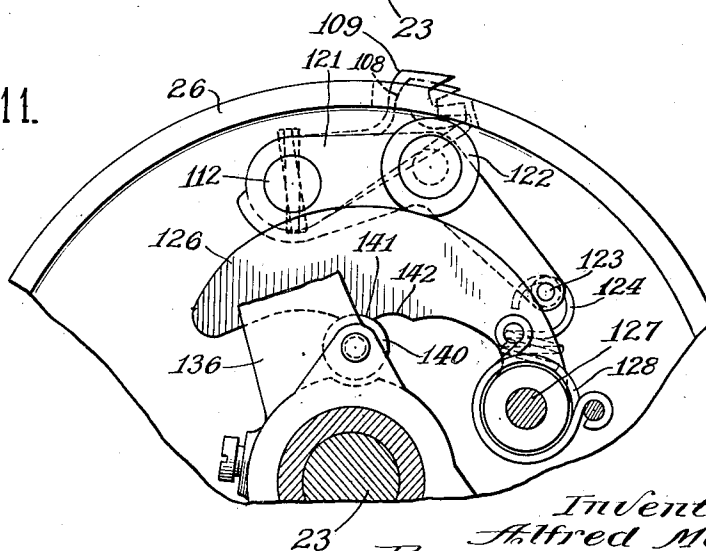


FIG. 11.



Inventor:
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UNITED STATES PATENT OFFICE

2,195,491

DUPLICATING DEVICE

Alfred Marchev, La Grange, Ill., assignor to Ditto,
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West Virginia

Application July 24, 1937, Serial No. 155,443

13 Claims. (Cl. 101—132.5)

The invention relates to duplicating apparatus and is particularly adapted to be embodied in duplicating machines of the type wherein master sheets having data written thereon in reverse are secured to a printing or duplicating drum and are brought into contact with copy sheets which have been previously moistened with a solvent for the ink on the master sheets. However, the invention is limited to this particular use only to the extent indicated in the appended claims.

An object of the invention is to provide a machine of the type described in which the novel construction and arrangement of the parts is such as to make the machine simple in construction, inexpensive to manufacture, and efficient in the use for which it is designed.

Another object of the invention is to provide improved means for clamping master sheets to the duplicating drum.

Other objects and advantages of the invention will appear more readily as the description proceeds reference being had to the accompanying drawings wherein a preferred embodiment of the invention is shown.

In the drawings—

Fig. 1 is a plan view of a duplicating machine embodying the invention;

Fig. 2 is a sectional view taken on the line 2—2 of Fig. 1;

Fig. 3 is a sectional view taken on the line 3—3 of Fig. 2;

Fig. 4 is a sectional view taken on the line 4—4 of Fig. 1;

Fig. 5 is a sectional view taken on the line 5—5 of Fig. 1;

Fig. 6 is an enlarged fragmentary plan view of the gripper mechanism by which master sheets are secured to the duplicating drum, certain parts of the drum being cut away for the sake of clearness;

Fig. 7 is a sectional view on the line 7—7 of Fig. 6;

Fig. 8 is a sectional view on the line 8—8 of Fig. 6;

Figs. 9, 10, and 11 are enlarged fragmentary sectional views taken substantially on the same line as Fig. 4, but with certain parts of the mechanism shown in Fig. 4 being removed for the sake of clearness, the three figures showing three different positions of the mechanism.

Referring now particularly to Figs. 1 to 5 inclusive which illustrate the general construction of the machine, it will be noted that the improved machine comprises two side frames

12 and 13 which are fixed to a rear end frame 15 and a front end frame 16 by bosses 14 and screw bolts 17 to provide a framework. A copy sheet feed tray 18 is mounted on the front of the machine, and a receiving tray 19 projects at the rear of the machine over the rear end frame 15. A moistening liquid supply tank 20 is mounted in the front of the machine and is supported by the side frames 12 and 13 and the front end frame 16. The side frame 12 has a boss 21 receiving a ball bearing 22 for a drum shaft 23 which extends to the side frame 13 and is there journaled in a ball bearing 24 that is mounted in a boss 25 of the side frame 13. The shaft 23 carries a duplicating drum 26 and is adapted to be rotated by means of a gear 27. The shaft 23 has a reduced end portion 28 projecting beyond the side frame 12 upon which the gear 27 is keyed. The gear 27 is held in place by a nut 29 screw threaded onto a reduced screw threaded end 30 of the shaft 23. A lock nut 31 is then applied to the end 30 of the shaft. The gear 27 is driven by a pinion 32 which is formed on a shaft 33, one end of which is journaled in a bearing 34 provided in the side frame 12, and the other end of which is journaled in a bearing 35 provided in a cover 36 that encloses the gear 27 and the pinion 32. The cover 36 is secured to the side frame 12 by a pair of bolts 37 and 38. The shaft 33 has a crank arm 39 fixed thereon by which the pinion 32 may be rotated. A handle 40 is provided on the crank arm 39. The other end of the shaft 23 is covered by a cover plate 41 which is secured in place by suitable screws such as 42 and 43.

At the left hand end of the drum, as shown in Fig. 3, a cam plate 44 is adjustably secured to the drum. The cam plate 44 fits over the shaft 23 and is secured by a pair of screw bolts 45 to suitable bosses 46 formed on the end of the drum 26. The cam plate 44 has slots 47 and 48 therein through which the bolts 45 extend so that the cam plate 44 can be angularly adjustable about the shaft 23 as a center (see Fig. 5). The cam plate 44 is spaced from the bosses 46 by suitable spacing collars 49 as indicated in Fig. 3. The cam plate 44 is provided with a recess 50 in the periphery thereof. A lever 51 is pivoted to the side frame 13 on a stub shaft 52. A spring 53 is coiled around the hub of the arm 51, one end of the spring being secured to the arm by passing the end thereof through an opening 54 in the arm, and the other end of the spring being secured to a pin 55

55 on the side frame 13. An arm 56 integral with the arm 51 extends in the opposite direction from the hub of the arm 51 and is adapted to engage a cushion ring 57 on a pin 58 secured to the side frame 13 to limit the movement of the arm 51 by the spring 53. The arm 51 carries a roller 59 which is adapted to engage in the recess 50 of the cam plate 44 to provide yielding stop for the drum at the end of each duplicating cycle.

At the right hand end of the drum 26, as shown in Fig. 3, a gear 60 is secured to the drum by suitable screws 61, and outside of the gear 60 a cam 62 is secured. The gear 60 meshes with an idle gear 63 secured upon a stub shaft 64. The gear 63 meshes with a gear 65 that is fixed upon a shaft 66 of a combined feed and moistening roller 67. Beneath the roller 67 an absorbent roller 68 is mounted on a shaft 69 in position to cooperate with the roller 67 in feeding sheets to the drum 26. The shafts 66 and 69 are journaled in suitable bearing blocks 70 and 71 (see Fig. 1) mounted on the side frames 12 and 13.

A moistening receptacle 72 is supported from the side frames 12 and 13 by a pin 73 extending in from the side frame 12 and a pin 74 on the side frame 13. The details of construction of this moistening receptacle are shown and described in the prior application of Stephen Kokay, Serial No. 58,522, filed January 10, 1936, and will not be described herein since they form no part of the present invention. The moistening receptacle provides means for supplying liquid to a moistening wick 75 which is in contact with the moistening roller 67 and serves to supply the solvent liquid to this roller for spreading upon a copy sheet being advanced to the drum by rollers 67 and 68. The feed table 18 is provided with a guide plate 76 that projects below a lip 77 on the moistening receptacle 72 for guiding copy sheets from the table into the bight of the rollers 67 and 68.

Liquid is supplied to the receptacle 72 through a flexible conduit 78 from the supply tank 20 in a manner which will presently be described, and excess liquid is drained off from the receptacle 72 by a flexible conduit 79 that empties into the supply tank 20. The liquid is supplied to the conduit 78 by means of a pump mechanism operated from the cam 62 in the following manner: In the bottom of the supply tank 20, a depending well 80 is provided, and a conduit 81 leads from this well upwardly through the supply tank 20 to the flexible conduit 78. Within the well 80, there is a pump cylinder 82 which has a check valve 83 controlling the outlet from the cylinder into the conduit 81 and preventing back flow from the conduit into the cylinder 82. The cylinder 82 is slotted as shown at 84 (see Fig. 2) to permit liquid in the tank 20 to enter the cylinder. A piston 85 is mounted in the cylinder and is urged downwardly by a spring 86 which is held between the top of the piston 85 and a bushing 87 around a piston rod 88 that is secured in the piston 85. The piston rod 88 is pulled upwardly against the force of the spring 86 by a crank arm 89 that is pivoted on a stub shaft 90 carried by the side frame 12. The crank arm 89 is connected to a second arm 91 which has a roller 92 thereon which rides on the cam 62. When the roller is riding on the high part of the cam 62, it holds the crank arm 89 in such position as to hold the piston 85 above the slot 84 and allow the lower part of the cyl-

inder 82 to be filled with liquid. When the roller 92 drops off the cam 62, the spring 86 forces the piston down an amount which is limited by a roller 93 on an extension 94 of the crank arm 89 striking a stop cam 95. The stop cam 95 is formed, as shown in Fig. 2, so that by turning this cam the limit of movement of the roller 93 may be varied to thus adjust the downward stroke of the piston 85. The cam 95 is mounted on a shaft 96 journaled in the side frame 12. This shaft at its outer end carries a knurled knob 97 for turning the cam 95.

The stub shaft 90 on which the crank arm 89 is pivoted projects through the crank arm and through the arm 91. A collar 98 is provided on the stub shaft 90 inwardly of the arms 89 and 91, and the receiving tray 19 has a hook 99 engaging the collar 98 for supporting the tray. At the opposite side of the machine, a stud 100 is mounted on the side frame 13 to provide a support for a hook 101 on the tray 19.

A platen roller 102 is mounted in a yoke 103 and is adapted to press copy sheets advanced by the rollers 67 and 68 against the drum 26. The yoke 103 is mounted upon a shaft 104.

The machine is provided with improved means to apply and clamp master sheets to the drum 26 and secure the master sheets. The drum is provided with a groove 105. Along the groove 105 a plurality of spaced openings 106 are cut through the wall of the drum. The openings 106 have narrow portions 107 which extend across the groove 105. Two sets of grippers 108 and 109 project through the openings 106. Each gripper has a clamping jaw 110 overlying the groove 105 and wider than the narrow portions 107 of the openings 106. Each gripper is also provided with a narrow ejecting jaw 111 which is adapted to move through the narrow portion 107 of the opening 106 when the grippers are raised to lift the clamping jaws from the groove 105.

The grippers 108 and 109 are carried by a shaft 112. The grippers have a limited rotation on the shaft 112. Each gripper is slotted with a slot 113 that extends in from the back of the gripper past the center of the shaft 112. The shaft has a plurality of pins 114 fixed therein and riding in the slots 113 of the grippers 108. As illustrated in Fig. 7, the pins 114 and the slots 113 permit a limited rotation of the grippers 108 on the shaft 112. The shaft 112 has a plurality of pins 115 fixed therein and riding in the slots 113 of the grippers 109 to permit a limited rotation of the grippers 109 on the shaft 112. The pins 115 are in a plane which is disposed at an angle to the plane of the pins 114. The angle, which one set of pins makes with the other, does not, however, exceed the limited angular movement of the grippers with respect to the shaft 112.

A plurality of springs 116 are coiled about the shaft 112 and connected to the grippers by a plurality of pins 117 mounted in the grippers and to the shaft by a plurality of pins 118. The springs 116 are so wound as to urge the grippers 108 and 109 toward the limit of their angular movement in a clockwise direction (as shown in Figs. 6, 7, and 8) about the shaft 112. The springs, therefore, tend to move the grippers 108 and 109 toward gripping position with their clamping jaws 110 holding sheets inserted in the groove 105. The pins 114 and 115 on the shaft 112 limit this movement in accordance with their angular positions. As the shaft 112 is turned

clockwise, the grippers 108 are first to reach clamping position. Then the grippers 109 will be lowered into clamping position upon further rotation of shaft 112 in clockwise direction. Thus, with both sets of grippers open (see Fig. 11), a sheet may first be inserted beneath the clamping jaws of the grippers 108 and the shaft 112 turned just enough to cause the grippers 108 to grip the sheet, and the grippers 109 can be held open (see Figs. 8 and 10) at this position of the shaft 112 until a second sheet is placed beneath the clamping jaws 110 of the grippers 109. Then, by turning the shaft 112 further in a clockwise direction, the grippers 109 will also be moved to clamping position as shown in Fig. 9. It is evident from an inspection of Fig. 6 that a plurality of master sheets may be arranged side by side on the drum 26, one master sheet being held by the grippers 108 and the other sheet being held by the grippers 109.

It will be evident of course that there may be more than two sets of grippers like 108 and 109 operated in the above manner.

Means are provided for adjusting the shaft 112 to operate the grippers 108 and 109. The shaft 112 is journaled in a pair of brackets 119 and 120 mounted on the ends of the drum 26. A lever arm 121 is fixed to one end of the shaft 112. A cam roller 122 is mounted on the arm 121. The arm 121 has a pin 123 at the end thereof. A spring 124 has one end secured to the pin 123 and the other end secured to a pin 125 mounted on the adjacent end of the drum 26. A cam 126 is pivoted on a stud 127 which is mounted on the side frame 12. A spring 128 is coiled around the hub of the cam 126. One end of the spring 128 is fixed to a pin 129 on the side frame 12. The other end of the spring 128 is secured to a pin 130 on the cam 126. A second cam 131 is pivoted on a stud 132 which is mounted on the side frame 12. A spring 133 is coiled around the hub of the cam 131 one end of the spring being secured to a pin 134 on the frame 12 and the other end being secured to a pin 135 on the cam 131.

The cams 126 and 131 are adapted to engage the roller 122 to open the grippers when they are moved out into its path against the pressure of their springs 128 and 133. A hand lever 136 has a hub 137 which is journaled on a sleeve 138 around the shaft 23. A screw 139 in the hub extends into a groove in the sleeve 138 to guide the hub 137. The hub 137 has a roller 140 engaging the cam 126 which has two shallow recesses 141 and 142 for receiving the roller 140. When the roller 140 rests in the recess 141, it raises the cam 126 slightly higher than it does when the roller 140 rests in the recess 142. The hub 137 also has a roller 143 which is adapted to engage the cam 131 and move it out into the path of the roller 122.

The hub 137 is connected to a link 144 which has a slot 145 receiving a pin 146. The pin 146 is mounted on a lock mechanism for holding the drum 26 stationary while master sheets are being inserted in the slot 105. The lock mechanism comprises a block 147 which is pivoted on a stud 148 mounted on the side frame 12. The block 147 has a stop arm 149 which is adapted to engage a pin 150 passing through the cam 62 and gear 60, which are fixed to the drum 26, when the block 147 is in the position shown in Fig. 4. A spring 151, one end of which is secured to a pin 152 and the other end of which is secured to a pin 153 on the side frame 12, holds the block 147 normally in this position with an adjustable

stop screw 154 carried by the block 147 engaging a rubber sleeve 155 upon a stop pin 156 on the side frame 12. On the stud 148 there is pivoted a latch bar 157 which has a hook portion 158 adapted to hook behind the pin 150 and prevent reverse rotation of the drum. The latch bar 157 has a portion 159 yieldingly held against a pin 160 on the block 147 by a spring 161 connecting a pin 162 on the portion 159 with a pin 163 (see Fig. 1) on the block 147.

The block 147 also carries a roller 164 which is used to hold a master sheet tray 165 away from the drum 26 when the lock mechanism is in normal inoperative position. The tray 165 is pivoted on two studs 166 and 167 on the side frames 12 and 13. A spring 168, one end of which is secured to a pin 169 on the tray 165 and the other end of which is secured to a pin 170 on the side frame 12, presses the tray 165 toward the drum 26. The tray 165 has a plate 171 thereon which projects forward from beneath the tray. The tray 165 also has a shoe 172 which rides on the drum surface and drops into a slot 173 in the drum when the plate 171 is aligned with the groove 105. This is the position when the lock mechanism is in position to cause the arms 149 and 157 to hold the pin 150 against movement in either direction. In this position, the operator may use the hand lever 136 to hold the grippers 108 and 109 open and after inserting master sheets therein to close the grippers on the sheets. The hand lever 136 is moved to bring the roller 140 into recess 141 for holding both sets of the grippers open. It is then moved to bring the roller 140 into the recess 142 to close the grippers 108 and to hold the grippers 109 open to receive a second master sheet. The hand lever 136 is then moved to bring the roller 140 in toward the hub of the cam 126 to close the grippers 109.

While certain embodiments of the invention have been shown and described, it is to be understood that it is capable of many modifications. Changes, therefore, in the construction and arrangement may be made without departing from the spirit and scope of the invention as disclosed in the appended claims in which it is the intention to claim all novelty inherent in the invention as broadly as possible in view of the prior art. Having thus described the invention, what is claimed as new and desired to secure by Letters Patent is:

1. In a duplicating machine of the character described, a rotatable drum, gripping means extending lengthwise of said drum and adapted to clamp master sheets to said drum, means to close a portion of said gripping means in advance of the remainder of said gripping means, and means to arrest action of said closing means with said portion closed and said remainder open whereby to grip a master sheet with said portion while a second master sheet is placed in position to be gripped.

2. In a duplicating machine of the character described, a frame, a duplicating drum rotatably journaled therein, a plurality of sets of grippers on said drum for clamping master sheets thereto, a manually operable lever, and means for holding said lever releasably in any one of a plurality of different set positions adapted in one position to hold all of said grippers open, in another position to close one of said sets upon a master sheet while the remainder of said grippers remain open, and in a third position to close all of said grippers.

3. In a duplicating machine of the character

described, a rotatable drum, gripping means extending lengthwise of said drum and adapted to clamp master sheets to said drum and comprising spaced grippers and a three position control means operable in one position to hold all said grippers open, said means being movable to a second position to cause part of the grippers to close while holding the others open and movable to a third position to cause all of the grippers to close.

4. In a duplicating machine of the character described, a frame, a duplicating drum rotatably journaled therein, means for locking said drum stationary in one position thereof, gripping means for clamping master sheets to said drum arranged in a plurality of sets one of which may be closed in advance of another, means for controlling the opening and closing of said sets of gripping means, said means being operable to hold the remainder of said gripping means open when said set is closed and to close the remainder of said gripping means at will, said controlling means and locking means being interconnected whereby the closing of all said gripping means releases the locking means.

5. In a duplicating machine of the character described, a frame, a duplicating drum of a length to accommodate at least two master sheets side by side rotatably journaled therein, a plurality of sets of grippers on said drum for clamping said master sheets thereto, a continuous shaft carrying said grippers and rotatably mounted in said drum, means securing said grippers on said shaft for limited rotation thereon, spring means urging said grippers to turn about said shaft toward closing position, said securing means being disposed to allow part of said grippers to turn farther than the others toward closing position, and means for adjusting said shaft to cause opening and closing of said grippers.

6. In a duplicating machine of the character described, a frame, a duplicating drum rotatably journaled therein, a plurality of sets of grippers on said drum for clamping master sheets thereto, a shaft carrying said grippers and rotatably mounted in said drum, means securing said grippers on said shaft for limited rotation thereon, spring means urging said grippers to turn about said shaft toward closing position, said securing means being disposed to allow part of said grippers to turn farther than the others toward closing position, and means for adjusting said shaft to cause opening and closing of said grippers, said last named means comprising a hand lever pivoted on the frame, and means controlled by said hand lever to lock the drum against rotation.

7. In a duplicating machine of the character described, a frame, a duplicating drum rotatably journaled therein, means to rotate said drum, a plurality of gripping means for clamping master sheets to said drum, a copy sheet moistening means for applying a solvent to copy sheets fed to said drum, means to press copy sheets against a master sheet on said drum, means for stopping said drum in position to feed copy sheets thereto, stop means for stopping said drum in position to feed master sheets thereto, and means to open a portion of said master sheet gripping means or all of said gripping means at will, said last means comprising a manually operable member connected to said last named stop means and adapted to release the stop means when all the gripping means are closed.

8. In a duplicating machine of the character described, a frame, a duplicating drum rotatably

journaled therein, means to rotate said drum, a plurality of gripping means for clamping master sheets to said drum, copy sheet moistening means for applying a solvent to copy sheets fed to said drum, means to press copy sheets against a master sheet on said drum, means for stopping said drum in position to feed copy sheets thereto, stop means for stopping said drum in position to feed master sheets thereto, and means to open a portion of said master sheet gripping means or all of said gripping means at will, said last means comprising a manually operable member connected to said last named stop means and adapted to release the stop means when all the gripping means are closed, said manually operable means including means to open the gripping means while the drum is rotating and before it reaches master sheet feed position.

9. In a duplicating machine of the character described, the combination of a frame, a duplicating drum rotatably mounted on said frame, a shaft rotatably mounted on said drum longitudinally of the drum, a set of grippers rotatably mounted on one end portion of said shaft, a second set of grippers rotatably mounted on the other end portion of said shaft, stop means effective at a predetermined point circumferentially of the shaft to stop a rotary movement of one set of grippers about the shaft toward gripping position, other stop means effective at a different point circumferentially of the shaft to stop the rotary movement of the other set of grippers about the shaft toward their gripping position, and means for rotating said shaft in the direction for carrying said grippers out of closing position and readily adjustable to different operative positions adapted in one position to permit both sets of grippers to stand closed, in a second position to hold one set of grippers open, and in a third position to hold both sets of grippers open.

10. In a duplicating machine of the character described, the combination of a frame, a duplicating drum rotatably mounted on said frame, a shaft rotatably mounted on said drum longitudinally of the drum, a plurality of grippers rotatably mounted on said shaft, spring means tending to rotate said grippers with respect to said shaft toward gripping position, other spring means tending to rotate the shaft in the direction for moving the grippers toward gripping position, means for turning said shaft against the action of said second named spring means, and means adapted by engagement successively with the several grippers upon rotary movement of the shaft against the action of said second named spring to move said grippers successively out of their operative gripping positions.

11. In a duplicating machine of the character described, the combination of a frame, a duplicating drum rotatably mounted on said frame, a shaft rotatably mounted on said drum longitudinally of the drum, a plurality of grippers rotatably mounted on said shaft, spring means tending to rotate said grippers with respect to said shaft toward gripping position, other spring means tending to rotate the shaft in the direction for moving the grippers toward gripping position, means adapted by engagement successively with the several grippers upon rotary movement of the shaft against the action of said second named spring means to move said grippers successively out of their operative gripping positions, and means comprising a hand lever for controlling the rotary position of said shaft ar-

5 ranged so that in the normal operating position of the lever all of said grippers stand in closed position and that upon successive steps of movement of the lever from said normal operating position said grippers are opened in succession until all of the grippers are standing open.

10 12. In a duplicating machine of the character described, the combination of a frame, a duplicating drum rotatably mounted on said frame, a shaft rotatably mounted on said drum longitudinally of the drum, a plurality of grippers rotatably mounted on said shaft, spring means tending to rotate said grippers with respect to said shaft toward gripping position, other spring means tending to rotate the shaft in the direction for moving the grippers toward gripping position, means for turning said shaft against the action of said second named spring means, and

pins carried by said shaft in angular relation to each other for causing the grippers to rotate with the shaft out of their gripping positions, varying amounts of play being provided between the grippers and the several pins so that said grippers are moved successively by the shaft so as to stand in staggered relation to each other in their open positions.

13. In a duplicating machine of the character described, a rotatable drum, gripping means individual to each thereof for gripping a plurality of master sheets side by side on said drum, manually operated means for causing actuation of the respective gripping means to gripping position in a definite order, and means to arrest said closing action between the gripping of successive sheets.

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