Oct. 18, 1938. R. F. MORRISON 2,133,630

DUPLICATING MACHINE

Filed June 19, 1937 9 Sheets-Sheet 1

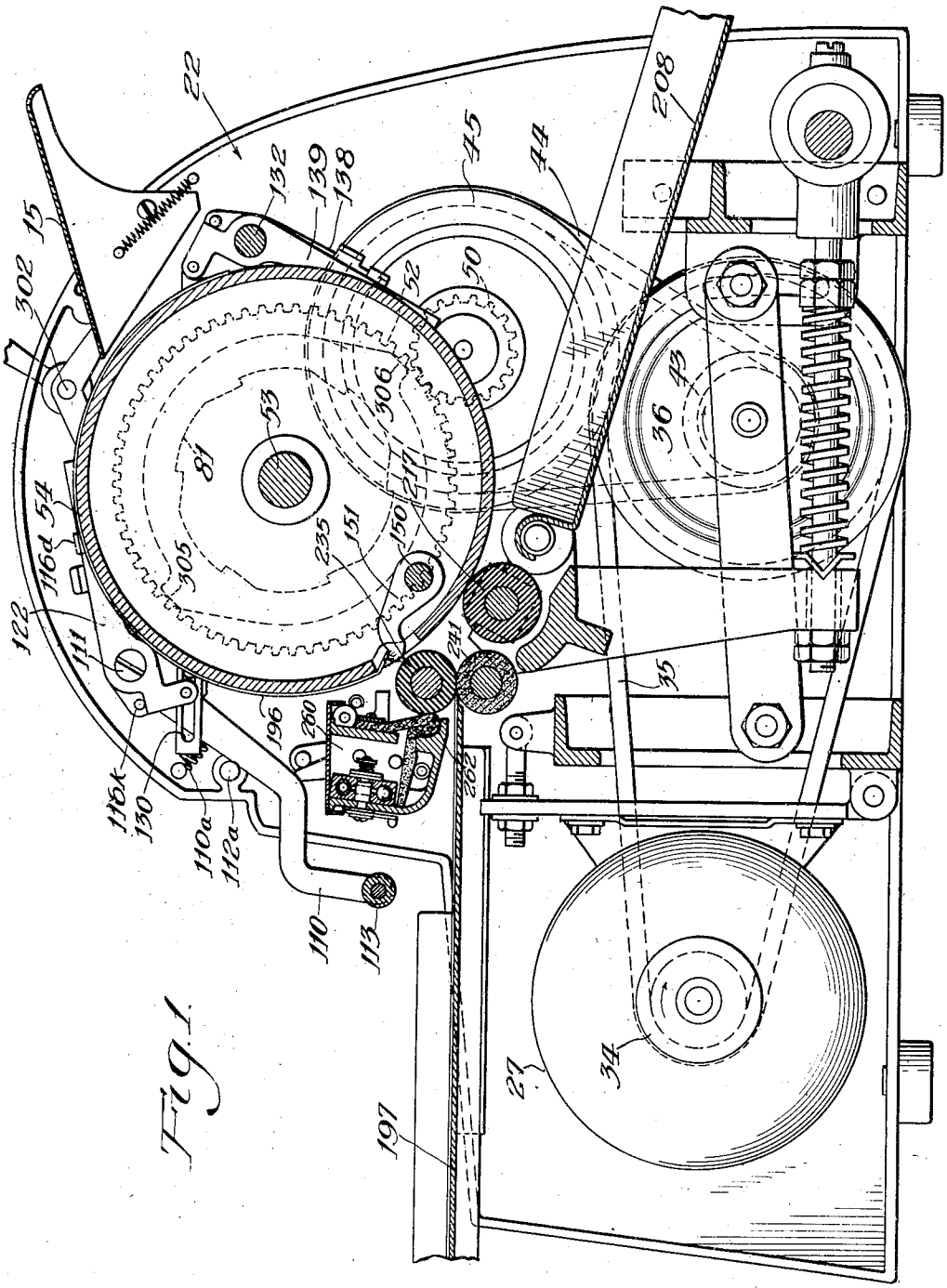


Fig. 1.

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Oct. 18, 1938. R. F. MORRISON 2,133,630

DUPLICATING MACHINE

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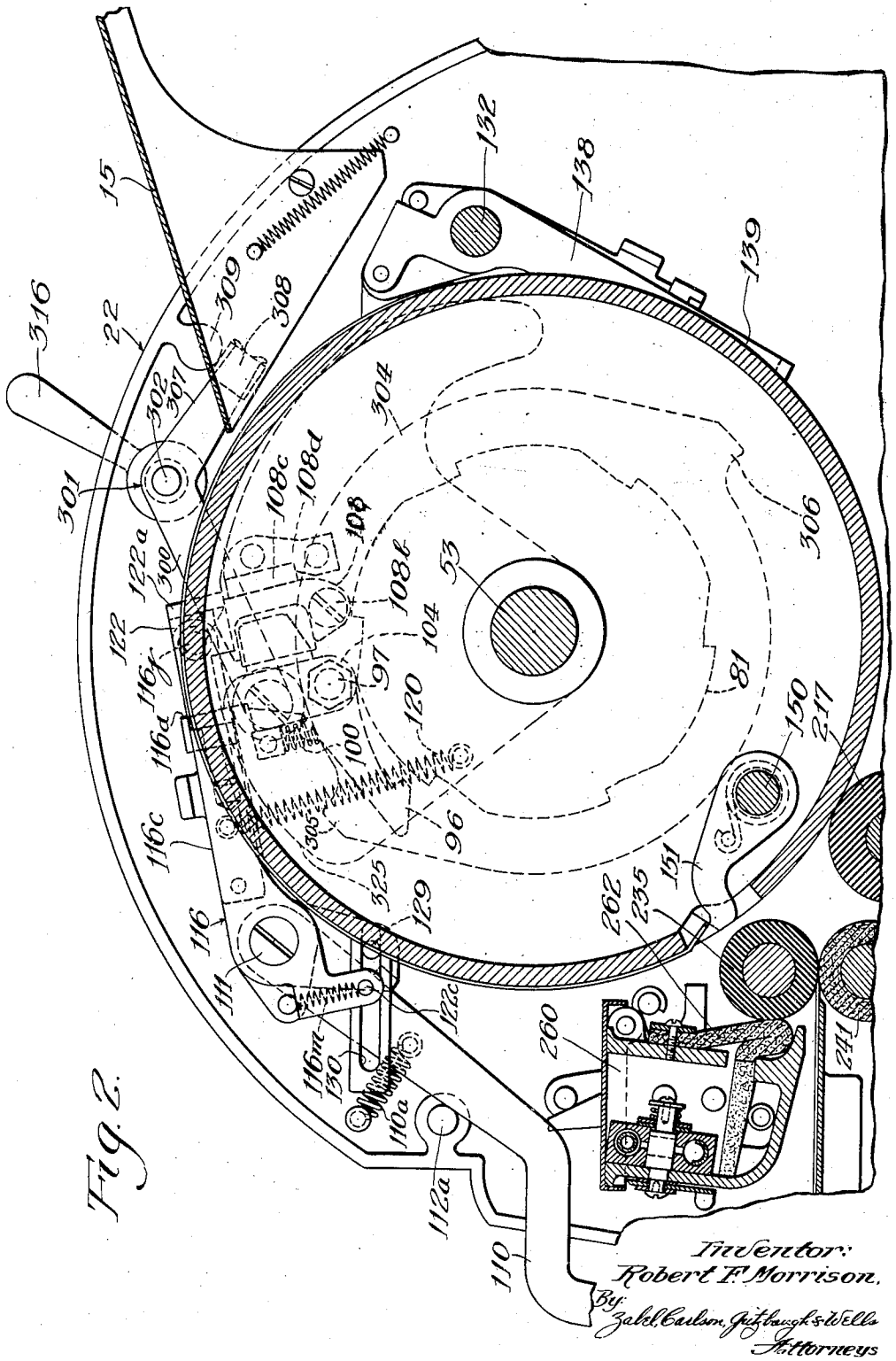


Fig. 2.

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Oct. 18, 1938. R. F. MORRISON 2,133,630

DUPLICATING MACHINE

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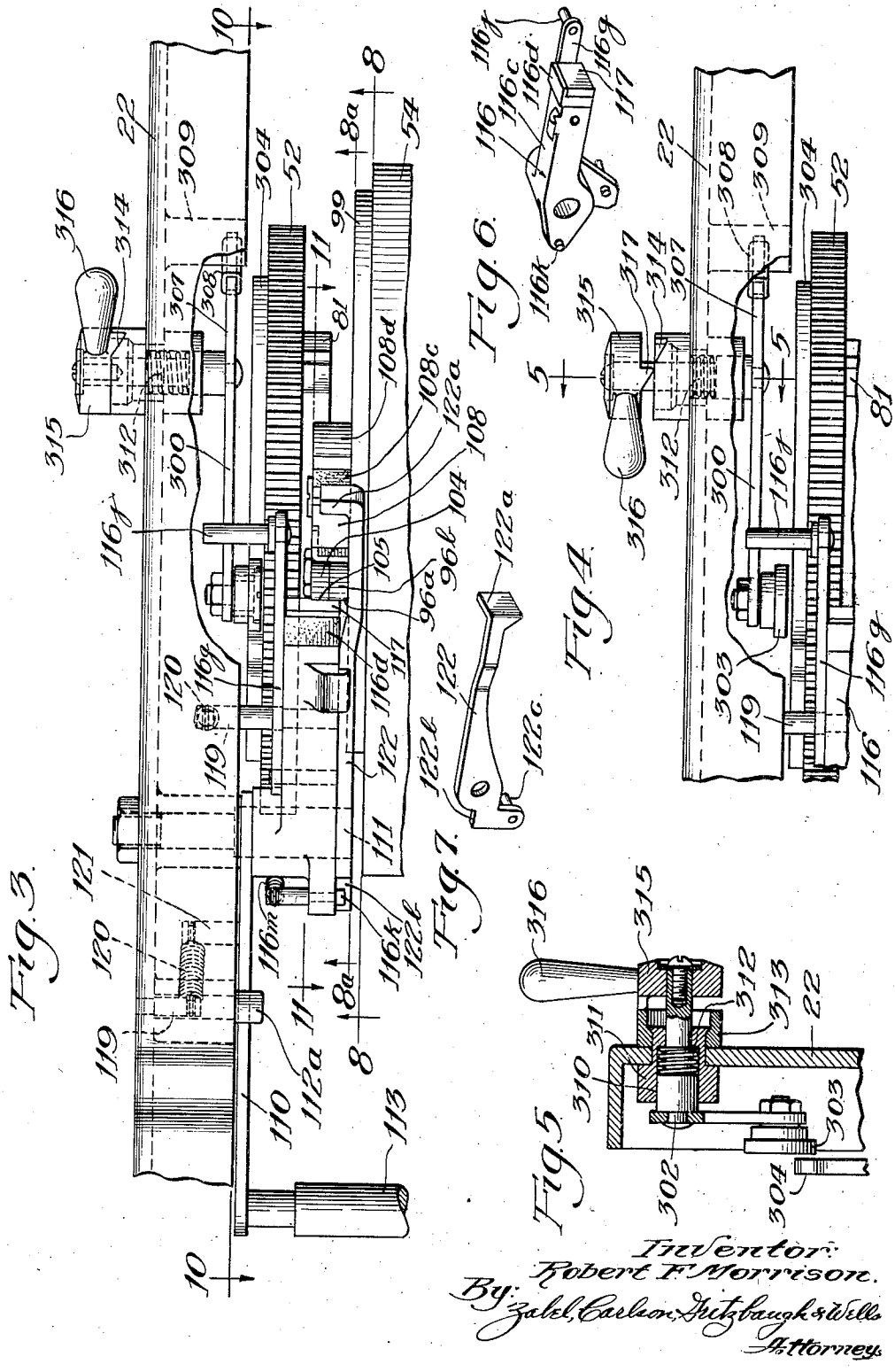


Fig. 3.

Fig. 6.

Fig. 4.

Fig. 7.

Fig. 5.

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Oct. 18, 1938. R. F. MORRISON 2,133,630

DUPLICATING MACHINE

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Fig. 8.

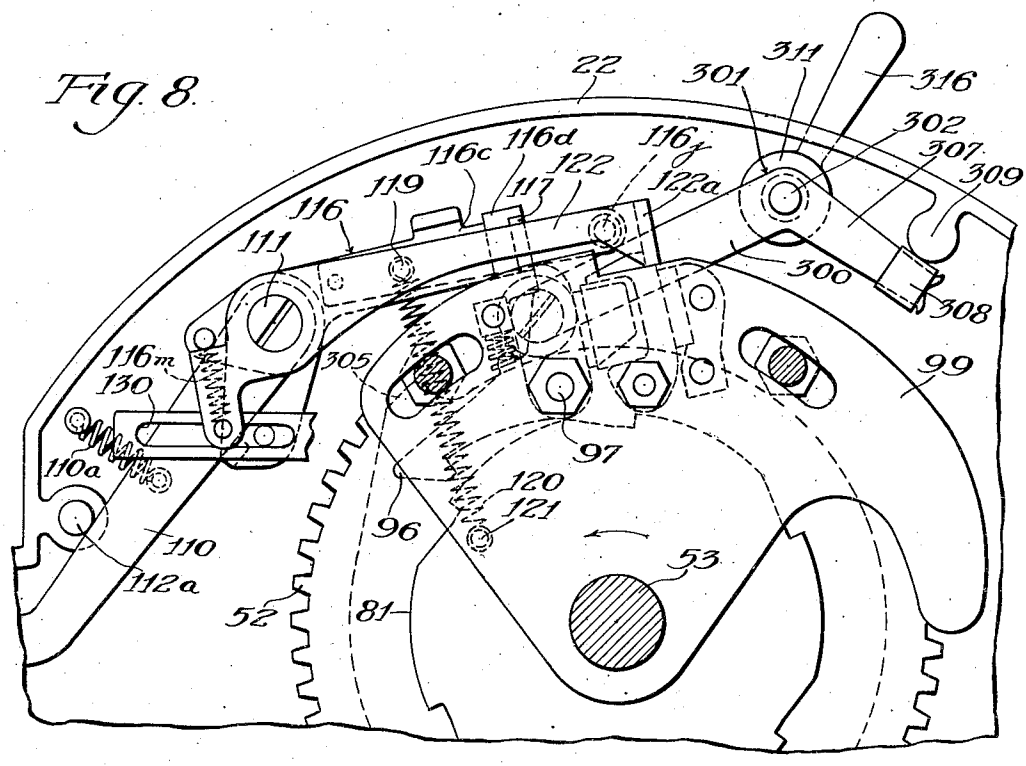
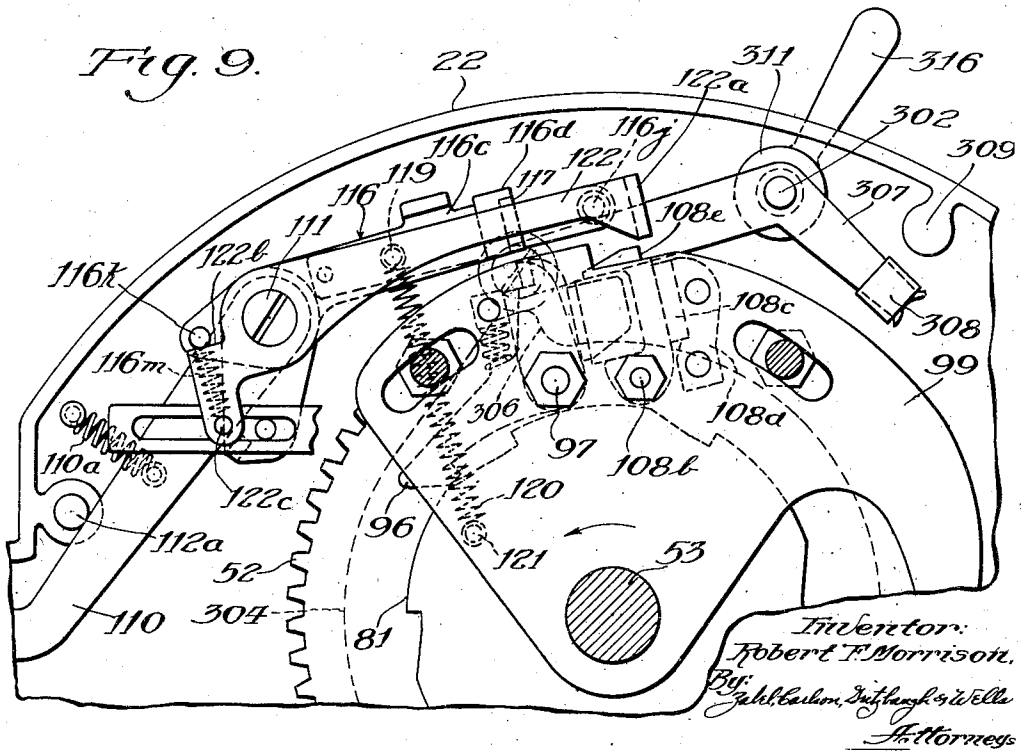


Fig. 9.



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DUPLICATING MACHINE

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Fig. 8A.

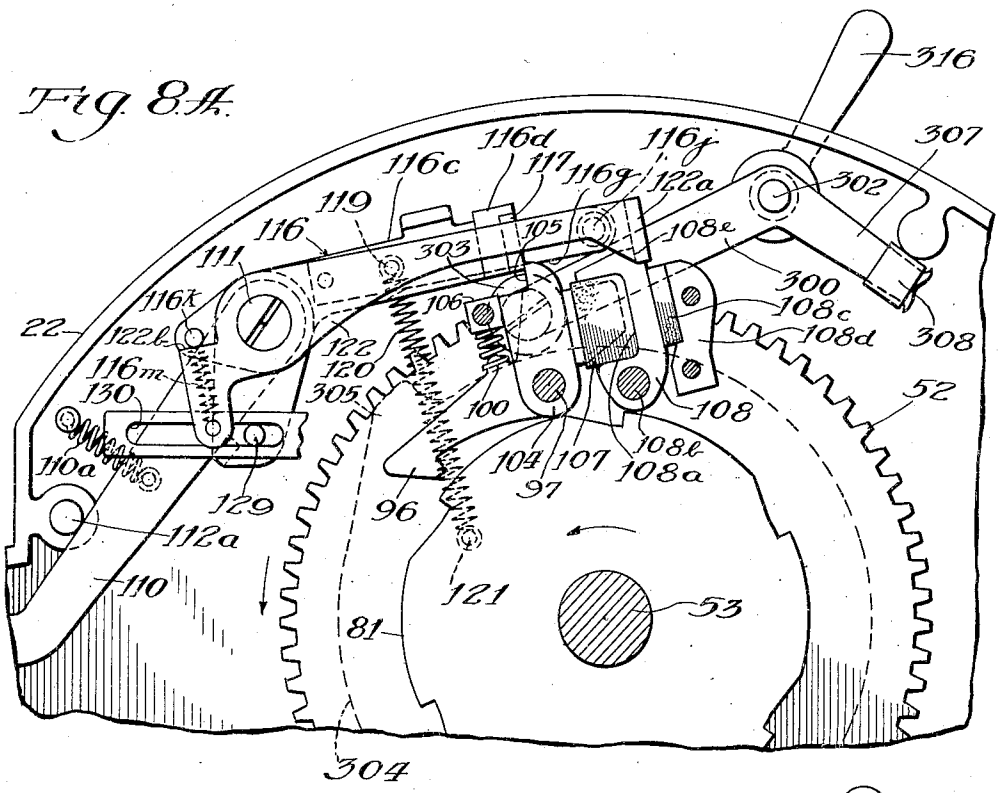
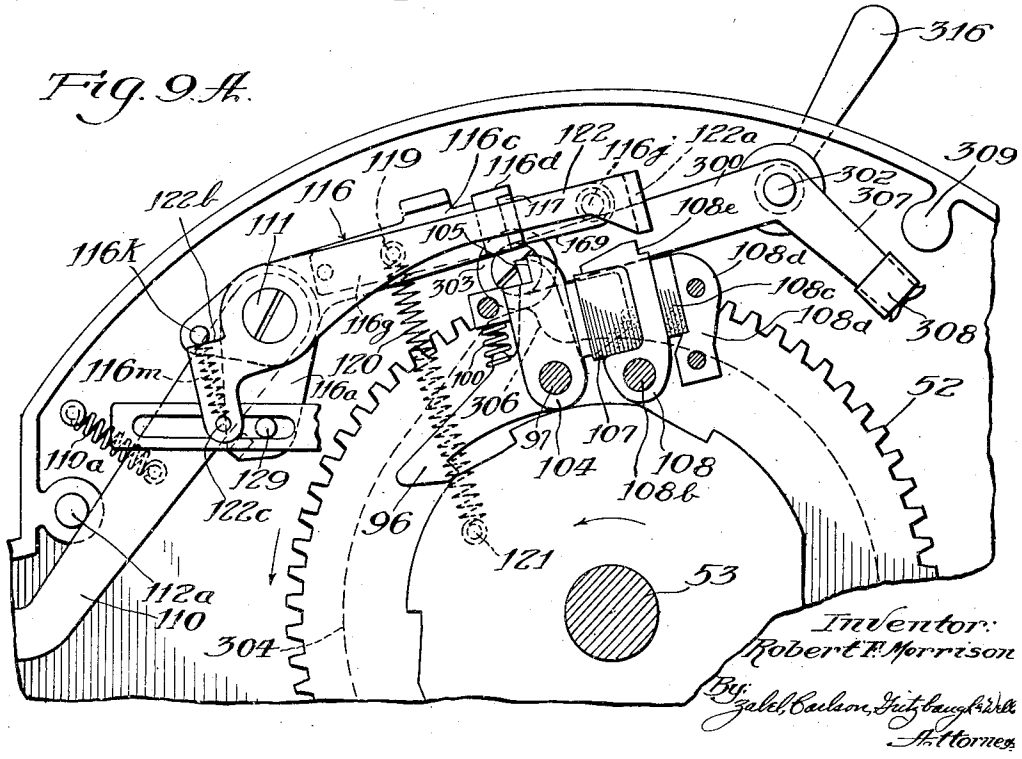


Fig. 9A.



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Oct. 18, 1938. R. F. MORRISON 2,133,630

DUPLICATING MACHINE

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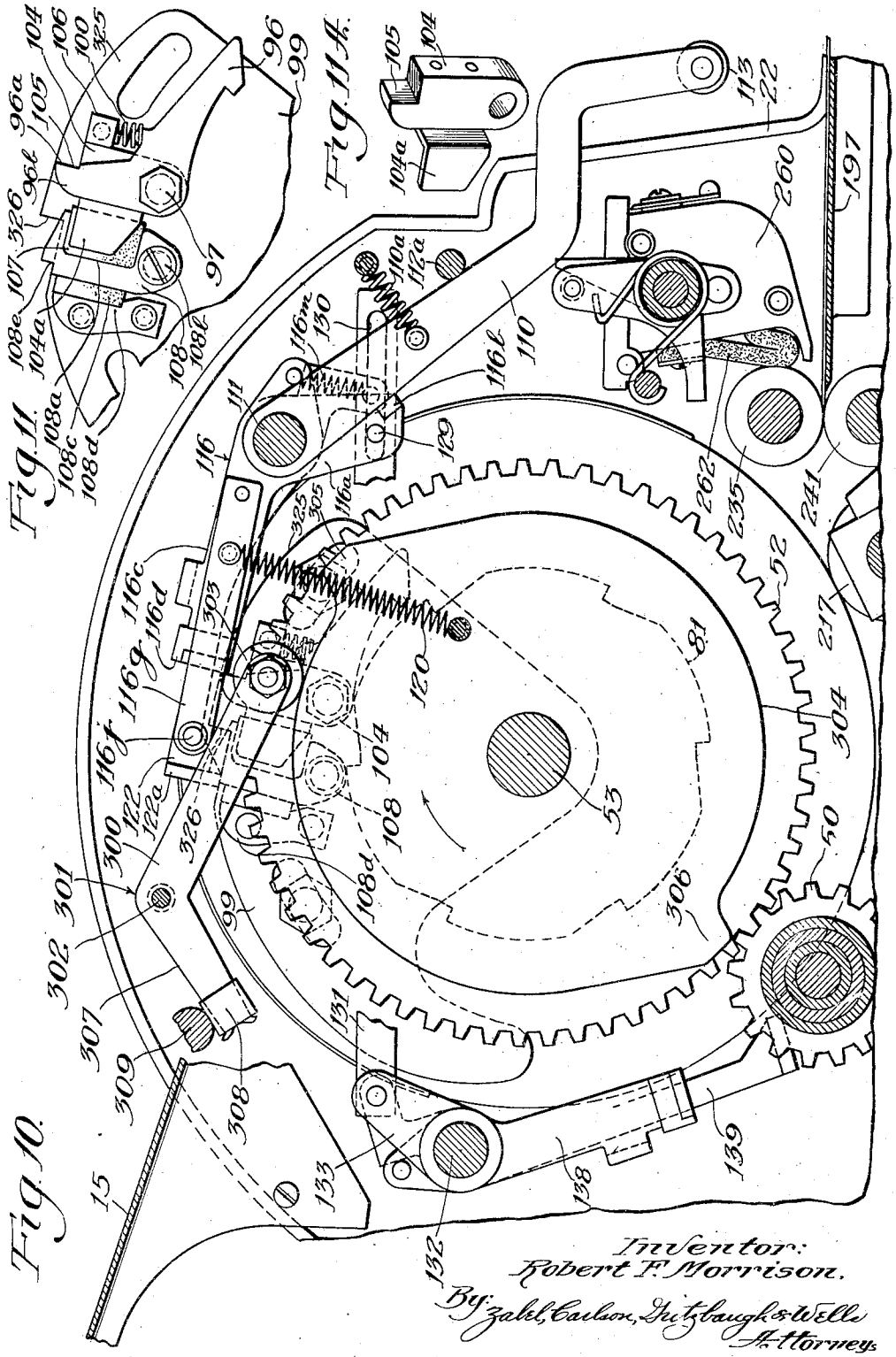


Fig. 10.

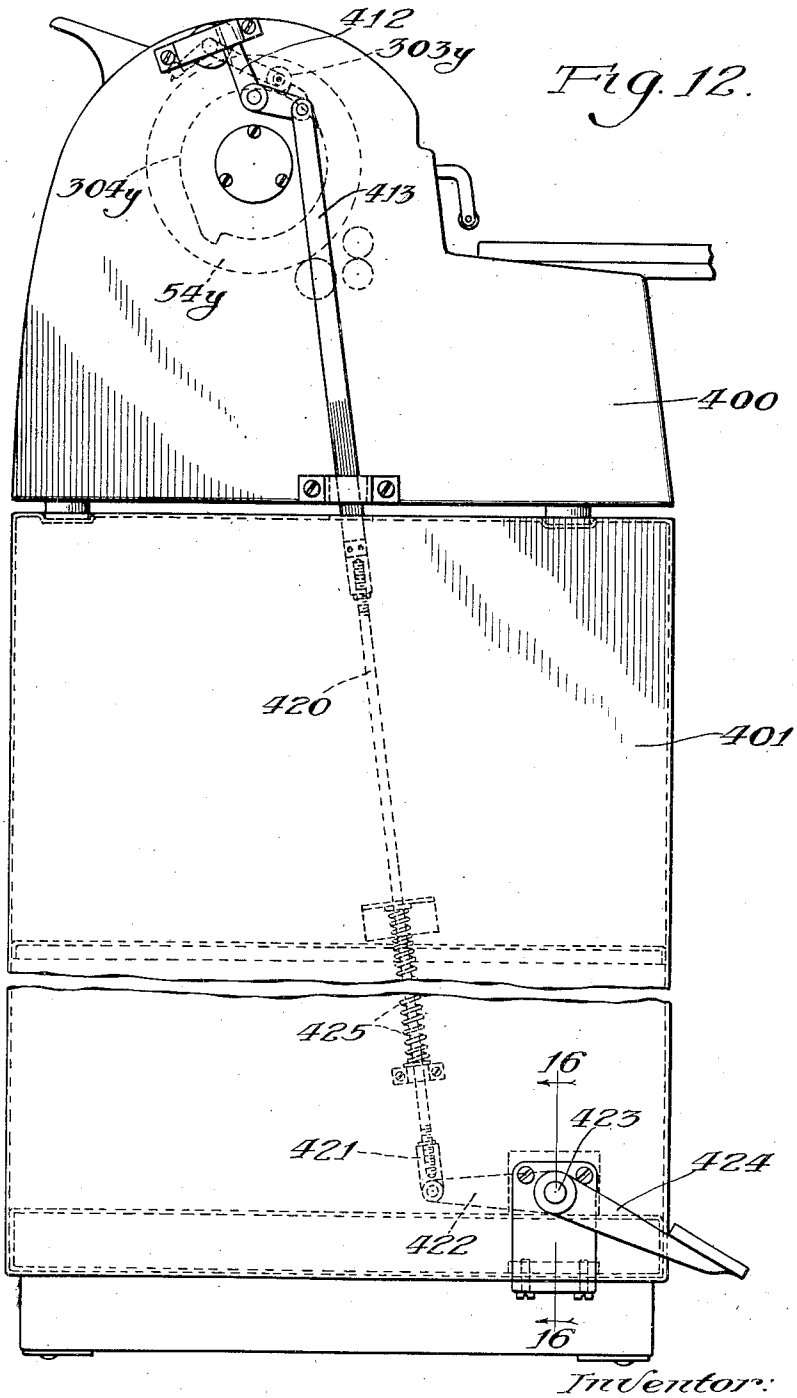
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DUPLICATING MACHINE

Filed June 19, 1937 9 Sheets-Sheet 7

Fig. 12.



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DUPLICATING MACHINE

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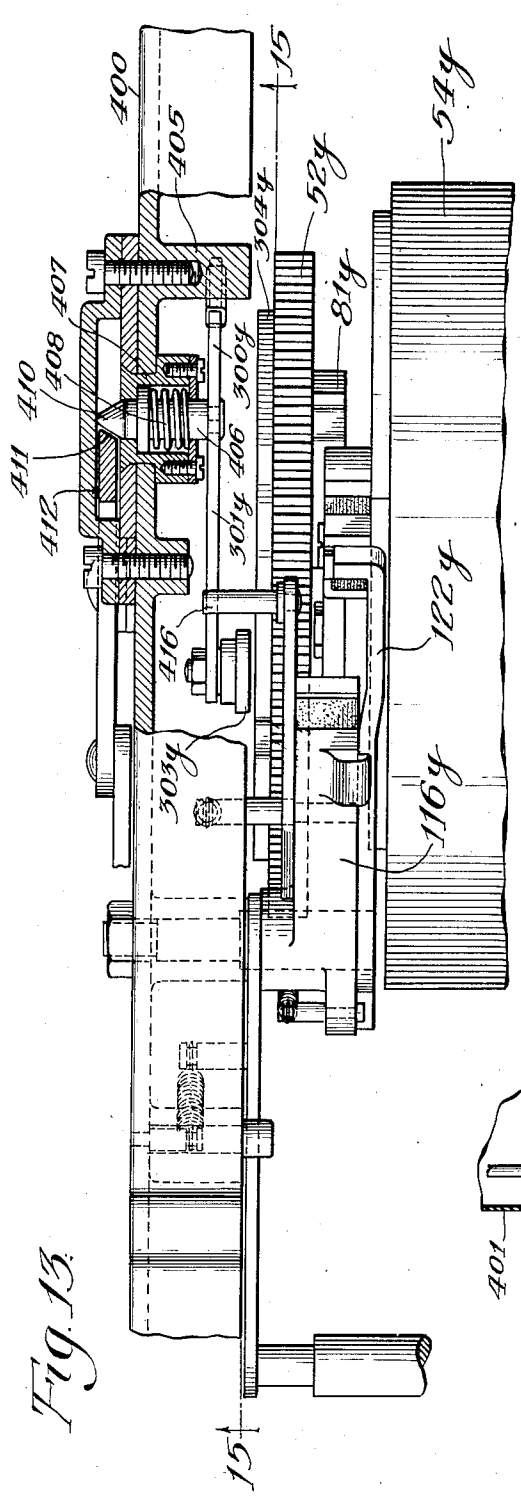


Fig. 15.

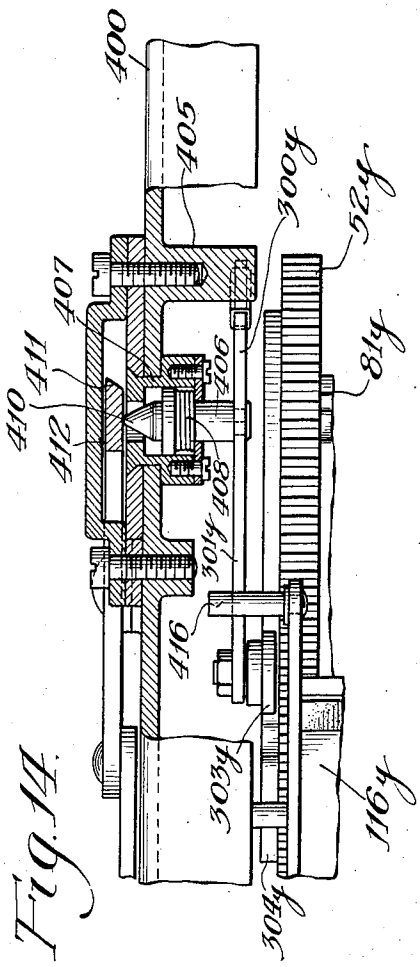


Fig. 14.

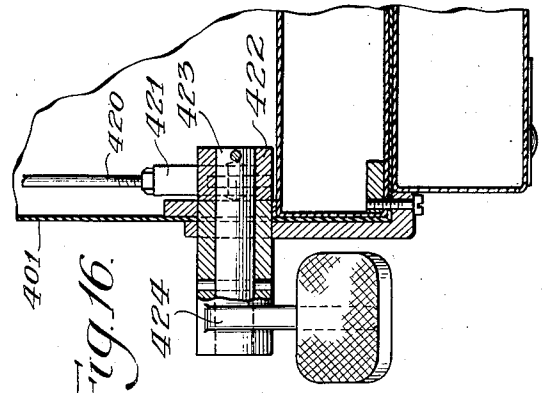


Fig. 16.

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Oct. 18, 1938. R. F. MORRISON 2,133,630

DUPLICATING MACHINE

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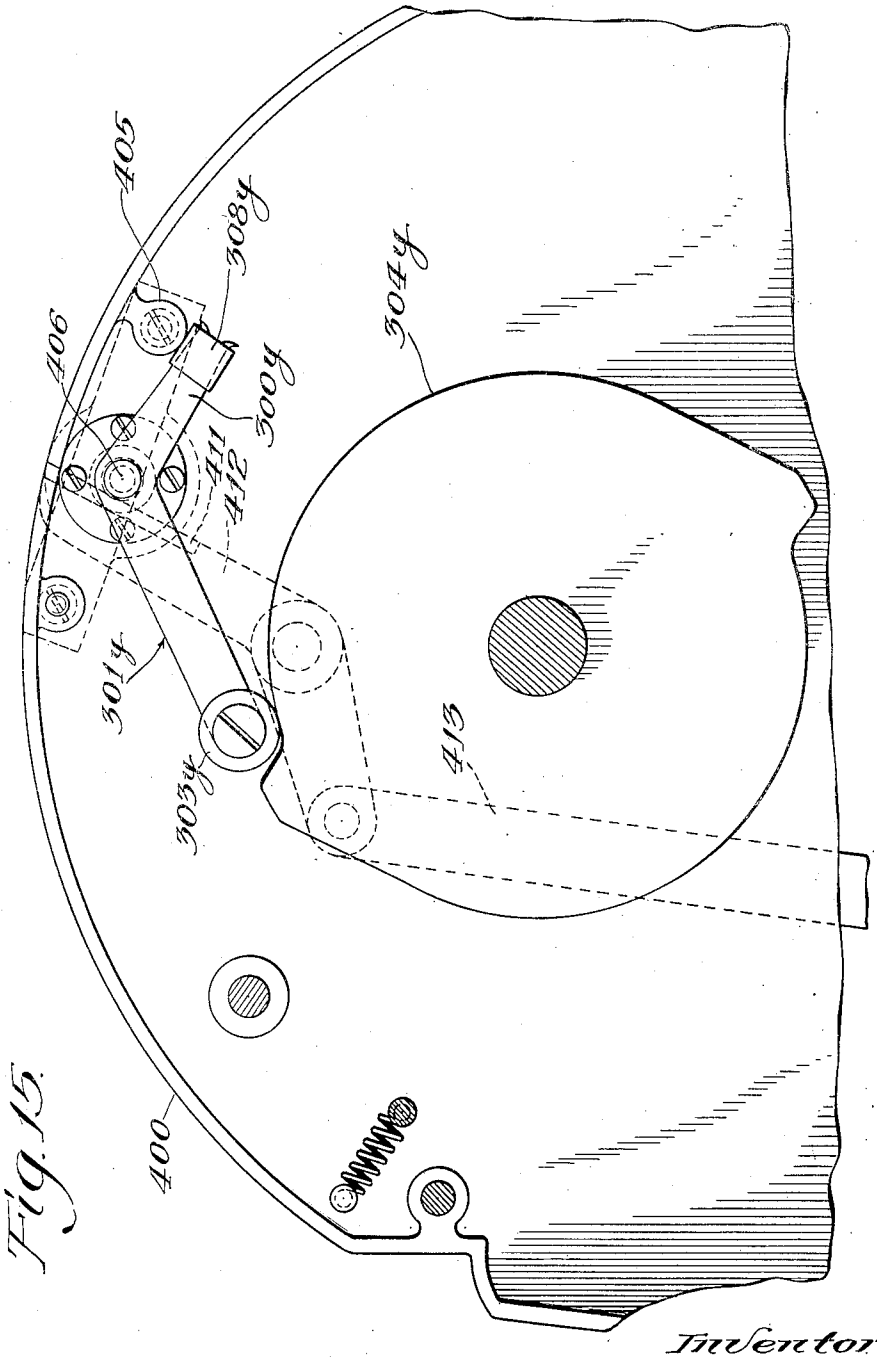


Fig. 15.

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Patented Oct. 18, 1938

2,133,630

UNITED STATES PATENT OFFICE

2,133,630

DUPLICATING MACHINE

Robert F. Morrison, Oak Park, Ill., assignor to Ditto, Incorporated, Chicago, Ill., a corporation of West Virginia

Application June 19, 1937, Serial No. 149,083

12 Claims. (Cl. 101—132)

The invention relates to duplicating machines and is particularly adapted to be embodied in a duplicating machine of the type wherein master sheets of paper are employed, the copy sheets being moistened with a suitable solvent for the ink or carbon on the master sheet and then brought into contact with the master sheet so that the data on the master sheet will be transferred to the copy sheets.

The master sheets have the data to be duplicated written or typewritten thereon in reverse so that when a portion of the carbon or ink is dissolved and transferred to the moistened surface of the copy sheet, it will appear in correct readable form.

One form of the invention is embodied in a machine of the type described which comprises a rotary drum having means for clamping master sheets thereto. Feeding and moistening rollers advance the copy sheets to the duplicating drum, and a platen roller presses the copy sheets against the master sheet during the duplicating operations. The machine comprises power driven means for rotating the duplicating drum and for operating the mechanism associated with the drum. The power driven means is controlled by the operator, and if it is so desired the machine comes to a complete stop at the end of each cycle of operations and will not proceed with the next cycle of operations until the operator has caused the power driven means to become functionally operative. Also, if the operator so desires, the power driven mechanism may be connected to the duplicating drum and the mechanism associated with it in such manner that the machine will come to a complete stop at the end of each cycle of operations, but will proceed with the next cycle of operations automatically after a short interval of time during which the operator may feed the necessary copy sheet to the feeding and moistening rollers. This permits the operator to concentrate on the feeding operation and results in less fatigue to the operator and a greater output of copies.

Other objects and advantages will become apparent as the following detailed description progresses, reference being had to the accompanying drawings in which—

Fig. 1 is a fragmentary vertical section taken through a duplicating machine which embodies the invention;

Fig. 2 is a fragmentary vertical section taken on substantially the same line as Fig. 1 but showing certain parts at a larger scale and in more detail;

Fig. 3 is a plan view of the mechanism shown in Fig. 2;

Fig. 4 is also a plan view of the mechanism shown in Fig. 2, certain parts of the mechanism being shown in changed position;

Fig. 5 is a section taken on line 5—5 of Fig. 4;

Fig. 6 is a perspective view of a trip lever forming part of the improved machine;

Fig. 7 is a perspective view of a latching lever forming part of the improved machine;

Fig. 8 is a fragmentary section taken on line 8—8 of Fig. 3;

Fig. 8A is a section taken on line 8A—8A of Fig. 3, the mechanism shown in Fig. 8A being in the same relative positions wherein they are shown in Fig. 8;

Fig. 9 is a fragmentary section taken on the same line as Fig. 8 but showing certain parts of the mechanism in changed positions;

Fig. 9A is a section taken on the same line as Fig. 8A but showing certain parts in changed positions to correspond with Fig. 9;

Fig. 10 is a section taken on line 10—10 of Fig. 3;

Fig. 11 is a view taken on line 11 of Fig. 3;

Fig. 11A is a perspective view of a block which forms part of the improved machine;

Fig. 12 is a side elevation, partly broken away, of a duplicating machine which embodies another form of the invention;

Fig. 13 is a fragmentary plan view, partly broken away, of the duplicating machine shown in Fig. 12;

Fig. 14 is a fragmentary plan view, partly broken away, of the duplicating machine shown in Fig. 12, certain parts being shown in changed positions with respect to the positions in which they are shown in Fig. 13;

Fig. 15 is a fragmentary section taken on line 15—15 of Fig. 13; and

Fig. 16 is an enlarged fragmentary section taken on line 16—16 of Fig. 12.

Referring to the drawings, and particularly to Figs. 1 to 11A inclusive, wherein a preferred form of the invention is embodied in a duplicating machine which closely resembles the duplicating machine described in application Serial No. 44,911, filed October 14, 1935, by John W. Hernlund, the reference character 22 designates generally the frame of the present machine, in which frame an electrical motor 27 is mounted and has a pulley 34 fixed to its drive shaft. A second pulley 36 is driven through an endless belt 35 by the pulley

34. A pulley 43 constrained to rotate with the pulley 36 is connected operatively by a belt 44 to a pulley 45 with which a pinion 50 is constrained to rotate. The pinion 50 meshes with a gear 52 rotatably journaled upon a shaft 53 which carries a duplicating drum 54. Obviously the gear 52 will rotate whenever the motor 27 is in operation.

The shaft 53 is rotatably journaled in the frame 22, and the drum 54 is constrained to rotate with the shaft. The gear 52 is rotatably mounted upon a bushing (not shown) disposed around the shaft 53.

Rotatably journaled in the end walls of the drum 54 and extending through the drum is a shaft 150 which carries a plurality of gripper units 151 adapted to grip the forward edge of a master sheet 196 (Fig. 1). The master sheet 196 carries the data to be duplicated, the data being typewritten or written in reverse upon the exposed side of the master sheet and being formed from ink or carbon which may be subjected to a solvent, so that when copy sheets are pressed into contact with the master sheet during the rotation of the drum 54, the data on the master sheet will be duplicated upon the copy sheets but not in reverse.

The means for pressing the copy sheets against the master sheet 196 is a platen or impression roller 217. The copy sheets are fed to the duplicating drum 54 and the platen roller 217 by combined feeding and moistening rollers 235 and 241. A feed table 197 is provided upon which a stack of copy sheets may be placed and advanced manually one by one to the rollers 235 and 241. The roller 235 is supplied with solvent by means comprising a felt strip 262 which projects from a container 260 holding a supply of the solvent. The solvent applied to the roller 235 is transferred to the upper surfaces of the copy sheets as they pass between the rollers 235 and 241. The roller 235 is driven by means (not shown) so that it rotates in synchronism with the drum 54. The roller 241 is driven by the roller 235.

As the copy sheets are pressed against the master sheet by the platen roller 217, they are discharged into a tray 208 detachably secured to the frame 22.

The machine is provided with a master sheet guide table 15 carried by the frame. When a master sheet is to be secured to the drum 54, the drum is brought to a stop, as hereinafter explained, with the gripper units 151 aligned with the guide table 15 and with the gripper units in their open positions so that the operator may slide the master sheet down over the guide table 15 until its forward edge may be gripped by the gripper units.

During each cycle of operation of the improved machine, the drum 54 is connected positively to the continuously rotating gear wheel 52 by a mechanism which comprises a ratchet wheel 81 constrained to rotate with the gear wheel 52. The ratchet wheel 81 is engageable by a pawl 96 (Figs. 8, 9 and 11) pivoted on a pin 97 which projects from a cam plate 99. The plate 99 is constrained to rotate with the drum 54. A compression spring 100 yieldingly urges the pawl 96 toward the ratchet 81. Pivoted on the pin 97 and disposed between the pawl 96 and the plate 99 is a block 104 which has a shoulder 105 aligned, in Fig. 11, with a shoulder 96*a* provided upon a tailpiece 96*b* of the pawl 96. On one side, the block 104 is engageable with a stop pin 106 on the plate 99. On its other side, the block 104 has a bracket 104*a* secured to it, which bracket 104*a* abuts against and holds in place a rubber cushion 107 which is seated in a recess 108*a* formed in a block 108 pivoted upon a pin 108*b* projecting from the plate 99. A rubber cushion 108*c* is secured to one side of the block 108 and abuts against a block 108*d* rigidly secured to the plate 99.

The pawl 96 and the block 104 are not connected to each other but both of them are pivoted on the pin 97.

There are two control mechanisms for effecting release of the drum 54 from driving connection with the ratchet wheel 81 on the drive gear 52. One of these mechanisms is operable to stop the drum in position for feeding a new copy sheet thereto, while the other mechanism is operable to stop the drum for applying a new master sheet thereon.

The mechanism for stopping the drum in position for feeding a new copy sheet thereto will be described first. This mechanism comprises a control lever 110 pivoted on a stub shaft 111 mounted in the frame 22. The control 110 supports at its free end one end of an operating bar 113. This operating bar is supported at its other end by a lever (not shown) resembling the lever 110 and having a pivotal axis coincident with the pivotal axis of the lever 110. A stop pin 112*a* projecting from the frame 22 limits movement of the lever 110 in a counter-clockwise direction (Fig. 10). Pivoted upon the stub shaft 111 is a trip lever 116 having an arm 116*a* provided with a lug 116*b* engageable with the lever 110. A pin 129 projects from the arm 116*a* for a purpose hereinafter described. It will be noted that if the lever 110 is displaced angularly in a clockwise direction (Fig. 10), the lever 116 will be displaced in the same direction through the same angle. However, it will also be noted that the lever 116 may be displaced angularly in a clockwise direction (Fig. 10) without causing similar displacement of the lever 110 to move it from its position against the stop 112*a*.

As best shown in Figs. 3, 4, 8A and 9A, the lever 116 also comprises an arm 116*c* which at its free end is provided with a rubber cushion 116*d*. The rubber cushion 116*d* is disposed between the free end of the arm 116*c* and a stop plate 117 which is carried by the arm 116*c*, and is free to move slightly toward and away from the free end of the arm 116*c*. The stop plate 117 is engageable with the shoulders 105 and 96*a* to stop the drum 54 in a position wherein a new copy sheet may be fed to it (Fig. 8A). A pin 119 projecting from the arm 116*c* is connected to a pin 121 by a spring 120. The pin 121 projects from the frame 22 and it is obvious that the spring 120 yieldingly urges the arm 116*c* in a clockwise direction (Figs. 8A and 9A). Rigidly secured to one side of the arm 116*c* is a bar 116*g* from which a pin 116*j* projects (see Figs. 3 and 10). The pin 116*j* is engageable by an arm 300 of a bell crank lever 301 which is pivoted on a pin 302. On the free end of the arm 300 is a roller 303 which rides upon a cam 304 which is constrained to rotate with the gear 52 so that it rotates continuously whenever the motor 27 is in operation. The cam 304 has diametrically disposed projections 305 and 306 engageable with the roller 303, it being obvious that when the roller 303 rides up on one of the projections 305 or 306, the bell crank lever 301 is displaced angularly in a counter-clockwise direction (Fig. 10) so that the arm 300 engages the pin 116*j* and displaces the bar 116*g* and the lever 116 in a clockwise direction (Fig. 10) against the action of the spring 120. It will be noted

that such displacement of the lever 116 does not effect angular displacement of the lever 110 as the lug 116b simply leaves the lever 110.

The bell crank lever 301 comprises a second arm 307 which is provided at its free end with a rubber bumper 308 engageable with a boss 309 projecting from the frame 22. The boss 309 limits angular displacement of the bell crank lever 301 in a clockwise direction (Fig. 10).

Pivoted upon the pin 111 is a latch lever 122 provided with a latching lug 122a at its free end. The lug 122a is engageable with a shoulder 108e provided upon the block 108 (Fig. 8A). As is best illustrated in Figs. 8A and 9A, the latch member 122 is disengaged from the shoulder 108e when the roller 303 rides up on one of the projections 305 or 306. To obtain this result, the latch lever 122 has a shoulder 122b which is engageable with a pin 116k projecting from the lever 116. A spring 116m has one of its ends secured to the pin 116k and has the other of its ends secured to a pin 122c projecting from the latch lever 122. The spring 116m yieldingly urges the shoulder 122b against the pin 116k. As explained above, the lever 116 is displaced in a counter-clockwise direction (Figs. 8A and 9A), when the roller 303 rides up on one of the projections 305 or 306. The pin 116k then pushes against the shoulder 122b and displaces the latch lever 122 through the same angular distance. This movement of the latch lever 122 disengages the lug 122a from the shoulder 108e. The pin 302 upon which the bell crank lever 301 is pivoted is slidably and rotatably journalled in a recess 310 formed in a tubular member 311 secured to the frame 22. A spring 312 disposed around the pin 302 and disposed in the recess 310 yieldingly urges the pin to the left (Fig. 5) to bring roller 303 into a position where it will ride upon the cam 304. The means for securing the tubular member 311 to the frame 22 comprises a second tubular member 313 which at its outer end is provided with a notch 314 (see Figs. 3, 4 and 5). Secured to the outer end of the pin 302 is a collar 315 provided with a handle 316, the collar 315 being provided also with a lug 317 adapted to rest in the notch 314 when the lug is aligned with the notch. Obviously, the spring 312 urges the pin 302 to the left (Fig. 5) whenever the lug 317 is aligned with the notch 314. However, if the collar 315 is displaced angularly around the longitudinal axis of the pin 302 to disengage the lug 317 from the notch 314, the pin 302 will be displaced to the right (Fig. 5) and the roller 303 will be brought into a position wherein it does not ride upon the cam 304. The purpose of this construction will presently appear.

The operation of the mechanism for stopping the drum in a position wherein a new copy sheet may be fed thereto and the operation of the mechanism for causing automatic rotation of the drum for another cycle of operation will now be described. If it is assumed that the mechanism illustrated in Figs. 8A and 9A is in the condition in which it is illustrated in Fig. 8A and if it is assumed that the motor 27 is in operation so that the gear 52 is rotating continuously, it will be readily understood that as long as the plate 117 engages the shoulders 96a and 105 of the tail piece 96b and the block 104, respectively, the drum 54 is held against rotation in a counter-clockwise direction (Fig. 8A). It will be noted that in Fig. 8A the latching lug 122a engages the shoulder 108e and prevents rotation of the drum 54 in a clockwise direction (Fig. 8A). It is understood, of course, that the latching member 122 and the lever 116 are carried by the frame 22 and do not rotate with the drum but that the mechanism mounted upon the plate 99 must rotate when the drum rotates. Now if it is assumed that the motor 27 is in operation so that the gear 52 is rotating continuously, it will be readily understood that the cam 304 and the ratchet 81 are also rotating continuously. As viewed in Fig. 8A, the gear 52 and the ratchet 81 are rotating continuously in a counter-clockwise direction and it will be noted that the roller 303 has just passed over the lug 305 of the cam 304. Now it will be readily understood that as the cam 304 continues to rotate in a counter-clockwise direction (Fig. 8A) the lug 306 will engage the roller 303 when the cam 304 has rotated about 180 degrees from the position wherein it is shown in Fig. 8A. The roller 303 will then ride up on the lug 306 as illustrated in Fig. 9A and the pin 116j will be engaged and raised by the arm 300 of the bell crank lever 301 so that the bar 116g and the lever 116 will be displaced angularly in a counter-clockwise direction (Fig. 9A) against the action of the spring 120 to disengage the plate 117 from the shoulders 96a and 105. Simultaneously, the pin 116k acting against the shoulder 122b, will displace the latching member 122 angularly in a counter-clockwise direction to disengage the latching lug 122a from the shoulder 108e. The mechanism will then be in the condition in which it is illustrated in Fig. 9A and the drum 54 will be free to rotate. The lever 116 cannot drop back to the position wherein it is shown in Fig. 8A as the pawl 96 has been displaced angularly so that when the lever tends to drop back it comes to rest on the pawl 96 as well as on the upper end of the block 104. When the plate 117 is disengaged from the shoulder 96a of the pawl 96, and the pawl 96, acting under the action of the spring 100, engages the ratchet 81, then the pawl 96 together with the plate 99 and the drum 54, are rotated through 360 degrees, or one complete revolution, and are then brought to a complete stop. The manner in which the drum 54 is brought to a complete stop is substantially as follows: It is understood, of course, that when the drum rotates, it rotates in unison with the cam 304 and therefore, during the initial movement of the cam 304 from the position wherein it is shown in Fig. 9A, the lug 306 will pass from beneath the roller 303 and the spring 120 will pull the lever 116 into the position wherein it is shown in Fig. 8A and the latching member 122 will also move into the position wherein it is shown in Fig. 8A under the action of the spring 116m. The plate 117 and the latching lug 122a are then in positions which will cause them to stop the drum 54 after it has completed one revolution. As the drum approaches the position wherein it is to be stopped, a cam surface 325 on the plate 99 engages the latching lug 122a and lifts it upwardly against the action of the spring 116m. When the drum 54 has completed, approximately, its single revolution, the latching lug 122a drops into a notch 326 in the plate 325 and drops behind the shoulder 108e. Substantially simultaneously the plate 117 engages the shoulders 96a and 105. The mechanism is then in the condition wherein it is illustrated in Fig. 8A except for the fact that the roller 303 has just passed over the lug 306 instead of the lug 305.

It will be understood that when the plate 117

and the latching lug 122 are disengaged from the cooperating shoulders as illustrated in Fig. 9A so that the pawl 96 engages the ratchet 81, the cam 304 rotates in unison with the drum 54 and the lug 306 passes from beneath the roller 303 to permit the lever 116 and the latching member 122 to drop under the action of the spring 120 as explained above. When the lug 305 engages the roller 303 after the drum 54 has made about half of a revolution, the lever 116 and the latching member 122 will be lifted momentarily but will drop back in their functionally operative positions as soon as the lug 305 has passed from beneath the roller 303.

When the drum 54 has made one complete revolution and the latching mechanism is again in the condition in which it is illustrated in Fig. 8A, the ratchet 81 and the cam 304 continue to rotate and when the lug 306 again passes underneath the roller 303, the cycle of operation described above occurs again. In other words, the drum 54 is rotated intermittently and each time it comes to a complete stop, the operator may advance a copy sheet to the combined feeding and moistening rolls 235 and 241 which are then not rotating but which rotate when the drum rotates and advance the copy sheet to the drum and the platen roller 217. Obviously, the machine then operates entirely automatically as far as the duplicating operations are concerned, it being only necessary to feed the copy sheets to the combined feeding and moistening rolls manually.

If it is so desired, the handle 316 may be manipulated to bring the roller 303 into the position wherein it is shown in Fig. 5 so that it does not ride upon the cam 304. The machine is operated in this manner: Each time the operator advances a copy sheet to the combined feeding and moistening rollers 235 and 241, the operator pushes against the bar 113 to displace the lever 110 in a clockwise direction (Fig. 10) so that the lever acting through the lug 116*b* angularly displaces the lever 116 in a clockwise direction (Fig. 10) against the action of the spring 120. The pin 116*k* pushing against the shoulder 122*b*, angularly displaces the latching member 122 in a clockwise direction (Fig. 10). This results in the movement of the lever 116 and the latching member 122 from the positions wherein they are shown in Fig. 8A, to the positions wherein they are shown in Fig. 9A. In other words, the same result is obtained as if the roller 303 had been lifted by one of the lugs 305 or 306. The drum then rotates through a complete revolution and a copy sheet is duplicated. When the drum 54 completes its single revolution the lever 116 and the latching member 122 function in the manner described above and lock the drum against movement in either direction.

The pin 129 projecting from the arm 116*a* rides in a slot 130 of a link 131. The link 131 connects the first control mechanism described above to the second control mechanism which is utilized to stop the drum 54 in a position wherein a new master sheet may be secured thereto. This second control mechanism is mounted upon a shaft 132 and is connected by a bifurcated arm 133 to the link 131. The shaft 132 is journalled in the frame 22 and extends across the machine. Means (not shown) is provided for rocking the shaft 132 from the position wherein it is shown in Fig. 10 to a position wherein the bifurcated arm 133 will have been displaced in a counter-clockwise direction (Fig. 10). Pivoted on the shaft 132 is a lever 138 which corresponds to the lever 116 described above and has a similar function in that it is engageable with the shoulders 96*a* and 105 to hold the drum 54 against rotation in a clockwise direction (Fig. 10). Also pivoted on the shaft 132 is a latching member 139 which has a function similar to that of the latching member 122 as it is engageable with the shoulder 108*e* to prevent rotation of the drum 54 in a counter-clockwise direction (Fig. 10). When the arm 133 is in the position wherein it is illustrated in Fig. 10, the lever 138 and the latching member 139 are in positions wherein they are not engageable with the shoulders 96*a* and 105 and the shoulder 108*e*, respectively. However, if the shaft 132 is displaced angularly by the above mentioned means (not shown) in a counter-clockwise direction (Fig. 10) the lever 138 and the latching member 139 will be moved into positions wherein they may co-operate with the mechanism carried by the plate 99 and the link 131 will be displaced to the left (Fig. 10) a sufficient distance to cause the link, acting through the pin 129, to lift the lever 116 and the latching member 122 into positions corresponding to the positions wherein they are shown in Fig. 9A. The latching member 122 and the lever 116 may then be functionally inoperative and the lever 138 and the latching member 139 will be functionally operative so that if the drum is rotated, it will come to a stop as soon as the shoulders 96*a* and 105 are engaged by the free end of the lever 138, which free end is preferably of the same construction as the front end of the lever 116. Then after a new master sheet has been applied to the drum 54, the shaft 132 is rotated in a clockwise direction (Fig. 10) to return the arm 133 and the link 131 to the positions wherein they are shown in Fig. 10 and to return the lever 138 and the latching member 139 to their functionally inoperative positions. Meanwhile, the lever 116 and the latching member 122 move into their functionally operative positions and the machine may be employed again to make copies of the new master sheet.

It will be noted that the mechanism carried by the shaft 132 does not co-operate with any mechanism resembling the lever 301 and the roller 303.

The mechanism carried by the shaft 132 is illustrated and described in some detail in the co-pending application, Serial No. 44,911.

It may be mentioned that the function of the resilient members 108*c* and 107 is to absorb the shock when the drum 54 is brought to a stop, by the mechanism carried on the plate 99.

Referring now to Figs. 12 to 16, inclusive, wherein a duplicating machine embodying another form of the invention is illustrated, the reference character 400 designates the frame of the machine generally, the frame 400 being mounted upon a cabinet 401 so that it is at a suitable height for the operator. The mechanism carried by the frame 400 is identical with the mechanism carried by the frame 22 described above, with the exception that different means is provided for mounting a bell crank lever 301*y* which corresponds to the bell crank lever 301 described above. Thus, as best shown in Fig. 13, the machine comprising the frame 400 is provided with a lever 116*y* and a latching member 122*y* which are identical with the lever 116 and the latch member 122 described above, respectively, and have the same functions. Also, the machine comprising the frame 400 has a gear 52*y*, a cam 304*y* and a ratchet 81*y* which are identical with the gear 52, cam 304 and the ratchet 81 described above. The functions are

the same. In the machine shown in Figs. 12 to 16, inclusive, the duplicating drum is designated 54y. Co-operating with the lever 116y and the latching member 122y is stop mechanism identical with the stop mechanism carried by the plate 99 described above. This stop mechanism co-operates with the lever 116y and the latching member 122y to stop the drum 54y after each revolution when the machine is adjusted for automatic intermittent operation.

The means for adjusting the means to bring it into condition for automatic intermittent operation comprises a roller 303y which is shown in the functionally inoperative position in Fig. 13 but which may be shifted into a position wherein it will ride upon the cam 304y. The roller 303y is carried by one arm of the bell crank lever 301y, the other arm of the bell crank lever 301y being designated 309y and being provided with a rubber bumper 308y which is engageable with a boss 405, projecting from the frame 400, to limit angular displacement of the bell crank lever 301y in a counter-clockwise direction (Fig. 15). The bell crank lever 301y is pivoted upon a pin 406 which is slidably and rotatably journalled in a bushing 407 carried by the frame 400. A spring 409 disposed around the pin 406 yieldingly urges it into a position wherein it will hold the bell crank lever 301y in a position wherein the roller 303y will not be aligned with the cam 304y. It will be noted that the pin 406 projects through the frame 400 and at its outer end is conical as at 410. Engageable with the conical surface 410 is a cam surface 411 formed on one arm of a bell crank lever 412, the other arm of the bell crank lever 412 having one end of a link 413 pivoted to it. The construction is such that if the bell crank lever 412 is displaced angularly in a counter-clockwise direction (Fig. 12) the cam surface 411 acting against the conical surface 410 will displace the pin 406 inwardly until the roller 303y is aligned with and rides upon the cam 304y. The bell crank lever 301y is engageable with a pin 416 which is identical with the pin 116y described above and has the same function. Obviously, when the roller 303y rides upon the cam 304y and the machine is in operation, the stop mechanism comprising the lever 116y and the latching member 122y will stop the drum 54 after each revolution and release it after a predetermined period so that it will rotate through another revolution. It may be mentioned that the machine comprising the frame 400 is provided with an electrical motor (not shown) which has the same function as the motor 27 described above.

The link 413 has one end of a rod 420 screw-threaded into it, the other end of the rod 420 being screw-threaded into a member 421 which is pivoted to the free end of a lever 422 fixed to a shaft 423 which is rotatably journalled in one wall of the cabinet 401. The shaft 423 projects through this wall of the cabinet and at its outer end has a foot pedal 424 fixed to it. When the operator wishes to have the machine operate in such manner that the drum 54y is automatically and intermittently rotated, the operator steps on the foot pedal 424 to displace the bell crank lever 412 in a counter-clockwise direction (Fig. 12) and retains the bell crank lever 412 in this position as long as it is desired to have the machine operate with the drum 54y stopping and starting automatically. The bell crank lever 412 is held normally in the position wherein it is shown in Fig. 12 by the action of a spring 425 disposed around the rod 420.

It will be readily understood that the machine shown in Figs. 12 to 16, inclusive, is identical with the machine shown in Figs. 1 to 11, inclusive, with the exception that in the machine shown in Figs. 12 to 16, inclusive, the mechanism for causing the drum 54y to start and stop automatically is controlled by the operator's foot instead of by manipulating a hand lever such as the hand lever 316.

With respect to the two forms of the invention disclosed above, it will be readily understood that a discussion of the function of the cam 304 will also be a discussion of the cam 304y. An examination of Figs. 8A and 9A will make it clear that each time the drum 54 is hooked to the ratchet 81, the drum and the cam 304 are constrained to rotate together and to make one complete revolution. The drum then remains stationary while the cam and the ratchet are rotated through approximately 180 degrees after which the drum, ratchet and cam rotate together through a complete revolution. This sequence of operations is continued as long as the motor 27 is in operation and the roller 303 rides upon the cam 304. Now it will be readily understood that additional lugs corresponding to the lugs 305 and 306 may be provided upon the cam 304 so as to make the period the drum remains stationary, shorter. Therefore, the cam 304 may be provided with three or more lugs, as desired, depending upon the speed at which the operator can advance the copy sheets to the combined feeding and moistening rolls. It has been found that an operator may at first be able only to feed to a machine provided with a cam 304 having two lugs but after the operator acquires experience, the cam may be changed for a cam having a larger number of lugs.

While I have shown and described certain embodiments of my invention, 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 my intention to claim all novelty inherent in my invention as broadly as permissible, in view of the prior art.

I claim:

1. In a duplicating machine, a duplicating drum, power driven means for rotating said drum, means actuated by said power driven means for intermittently and operatively connecting said drum to said power driven means whereby said drum comes to a full stop at the end of each cycle of operation and begins the next cycle of operation after a predetermined period of time has elapsed, means including a member which may be made functionally inoperative for controlling said connecting means, and means for actuating said connecting means manually while said member is functionally inoperative whereby the interval between two cycles of operation is controlled both by the operator and said connecting means.

2. In a duplicating machine, a duplicating drum, power driven means for rotating said drum, means actuated by said power driven means for intermittently and operatively connecting said drum to said power driven means whereby said drum makes a plurality of revolutions and comes to a stop at the end of each revolution, means including a member which may

be made functionally inoperative for controlling said connecting means, and means for actuating said connecting means manually while said member is functionally inoperative whereby the interval between two cycles of operation is controlled both by the operator and said connecting means.

3. In a duplicating machine, duplicating means, power driven means for actuating said duplicating means, means actuated by said power driven means for intermittently and operatively connecting said duplicating means to said power driven means whereby said duplicating means comes to a full stop at the end of each cycle of operation and begins the next cycle of operation after a predetermined period of time has elapsed, means including a member which may be made functionally inoperative for controlling said connecting means, and means for actuating said connecting means manually while said member is functionally inoperative whereby the interval between two cycles of operation is controlled both by the operator and said connecting means.

4. In a duplicating machine, a duplicating drum, power driven means for rotating said drum, means actuated by said power driven means for intermittently and operatively connecting said drum to said power driven means whereby said drum comes to a full stop at the end of each cycle of operation and begins the next cycle of operation after a predetermined period of time has elapsed, means for locking said drum against rotation in either direction during said predetermined period of time, means including a member which may be made functionally inoperative for controlling said connecting means, and means for actuating said connecting means manually while said member is functionally inoperative whereby the interval between two cycles of operation is controlled both by the operator and said connecting means.

5. In a duplicating machine, duplicating means, power driven means for actuating said duplicating means, means actuated by said power driven means for intermittently and operatively connecting said duplicating means to said power driven means whereby said duplicating means comes to a full stop at the end of each cycle of operation and begins the next cycle of operation after a predetermined period of time has elapsed, means for locking said duplicating means in a functionally inoperative condition during said predetermined period of time, means including a member which may be made functionally inoperative for controlling said connecting means, and means for actuating said connecting means manually while said member is functionally inoperative whereby the interval between two cycles of operation is controlled both by the operator and said connecting means.

6. In a duplicating machine the combination with a frame, a duplicating drum rotatably mounted thereon and having master sheet clamping means, a copy sheet table adjacent said drum, moistening means for moistening copy sheets before applying them to a master sheet on said drum, power driven means, and a continuously driven member actuated by said power driven means, of manually controlled means to intermittently rotate the drum from said continuously driven member, said manually controlled means comprising a spring pressed pawl on the drum adapted to engage said driven member, a stop member on the drum, a latching lever engaging shoulder on said drum adjacent said stop member, trip means on the frame and movable manually into the path of said pawl and stop member to first disengage the pawl from said continuously driven member and then stop the drum, and a latching lever engageable with said latching lever engaging shoulder; together with means controlled by the power driven means for moving said trip means into the path of said pawl and stop member to first disengage the pawl from said continuously driven member and then stop the drum, said means controlled by said power driven means being adapted to disengage said trip means from said pawl and to release the drum when a predetermined period of time has elapsed after the drum was stopped, and means for adjusting the machine so that it is controlled either by manual operation of the trip lever or by said means controlled by said power driven means.

7. In a duplicating machine the combination with a frame, a duplicating drum rotatably mounted thereon, power driven means, and a continuously driven member actuated by said power driven means; of manually controlled means to intermittently rotate the drum from said continuously driven member, said manually controlled means comprising a pawl on the drum adapted to engage said driven member, a stop member on the drum, a latching lever engaging shoulder on said drum adjacent said stop member, trip means on the frame and movable manually into the path of said pawl and stop member to first disengage the pawl from said continuously driven member and then stop the drum, and a latching lever engageable with said latching lever engaging shoulder; together with means controlled by the power driven means for moving said trip means into the path of said pawl and stop member to first disengage the pawl from said continuously driven member and then stop the drum, said means controlled by said power driven means being adapted to disengage said trip means from said pawl and to release the drum when a predetermined period of time has elapsed after the drum was stopped, and means for adjusting the machine so that it is controlled either by manual operation of the trip lever or by said means controlled by said power driven means.

8. In a duplicating machine the combination with a frame, a duplicating drum rotatably mounted thereon, power driven means, and a continuously driven member actuated by said power driven means; of manually controlled means to intermittently rotate the drum from said continuously driven member, said manually controlled means comprising a spring pressed pawl on the drum adapted to engage said driven member, a stop member on the drum, a latching lever engaging shoulder on said drum adjacent said stop member, a trip lever pivoted on the frame and movable manually into the path of said pawl and stop member to first disengage the pawl from said continuously driven member and then stop the drum, and a latching lever engageable with said latching lever engaging shoulder said latching lever having a pivotal axis coincident with the pivotal axis of said trip lever; together with means controlled by the power driven means for moving said trip lever into the path of said pawl and stop member to first disengage the pawl from said continuously driven member and then stop the drum, said means controlled by said power driven means being adapted to disengage said trip lever from said pawl and

to release the drum after a predetermined period of time has elapsed since the drum was stopped, and means for adjusting the machine so that it is controlled either by manual operation of the trip lever or by said means controlled by said power driven means.

9. In a duplicating machine the combination with a frame, a duplicating drum rotatably mounted thereon, power driven means, a member driven continuously by said power driven means, manually controlled means to rotate the drum intermittently from said continuously driven member, said manually controlled means comprising mechanism for connecting the drum to the driven member whereby to rotate said drum, and a pair of control members having means operable to secure said drum against rotation in either direction, one of said control members including means to release the connecting mechanism between the drum and the driven member, of mechanism actuated by said power driven means for actuating said control members to stop the drum and to release it for rotation after a predetermined interval of time, and means for adjusting the machine to have it either controlled by the operator through said manually controlled means or to have it controlled by said mechanism for actuating said control members.

10. In a duplicating machine, the combination with a frame, a duplicating drum rotatably mounted thereon and having means for securing a master sheet to itself, a copy sheet table mounted on the frame, means for moistening the copy sheets with a solvent, power driven means, a member driven continuously by said power driven means, manually controlled means to rotate the drum intermittently from said continuously driven member, said manually controlled means comprising mechanism for connecting the drum to the driven member whereby to rotate said drum, and a pair of control members having means operable to secure said drum against rotation in either direction, one of said control members including means to release the connecting mechanism between the drum and the driven member, of mechanism actuated by said power driven means for actuating said control members to stop the drum and to release it for rotation after a predetermined interval of time, and means for adjusting the machine to have it controlled by the operator either through said manually controlled means or to have it controlled by said mechanism for actuating said control members.

11. In a duplicating machine, a duplicating drum, power driven means for rotating said drum, means actuated by said power driven means for intermittently and operatively connecting said drum to said power driven means whereby said drum makes a plurality of revolutions and comes to a stop at the end of each revolution, a foot lever controlled by the operator for controlling connecting means, said means including a member which may be made functionally inoperative for controlling said connecting means, and means for actuating said connecting means manually while said member is functionally inoperative whereby the interval between two cycles of operation is controlled both by the operator and said connecting means.

12. In a duplicating machine, a duplicating drum, power driven means for rotating said drum, means actuated by said power driven means for intermittently and operatively connecting said drum to said power driven means whereby said drum comes to a full stop at the end of each cycle of operation and begins the next cycle of operation after a predetermined period of time has elapsed, a foot lever controlled by the operator for controlling said connecting means, means for locking said drum against rotation in either direction during predetermined period of time, said means including a member which may be made functionally inoperative for controlling said connecting means, and means for actuating said connecting means manually while said member is functionally inoperative whereby the interval between two cycles of operation is controlled in each instance both by the operator and said connecting means.

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