

**Jan. 2, 1951**

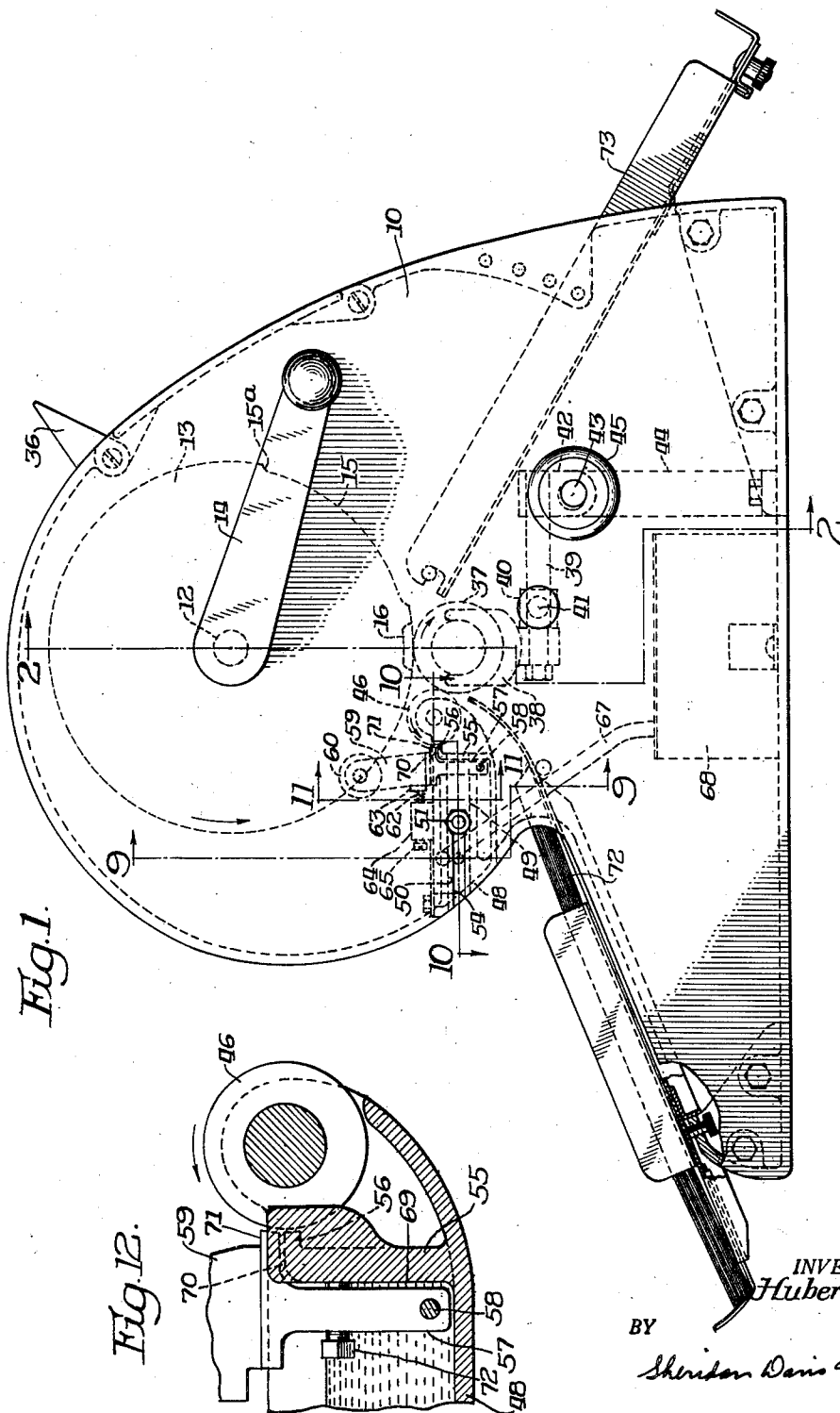
H. JAGGER

**2,536,604**

# MOISTENING DEVICE FOR DUPLICATING MACHINES

Filed Aug. 17, 1945

4 Sheets-Sheet 1



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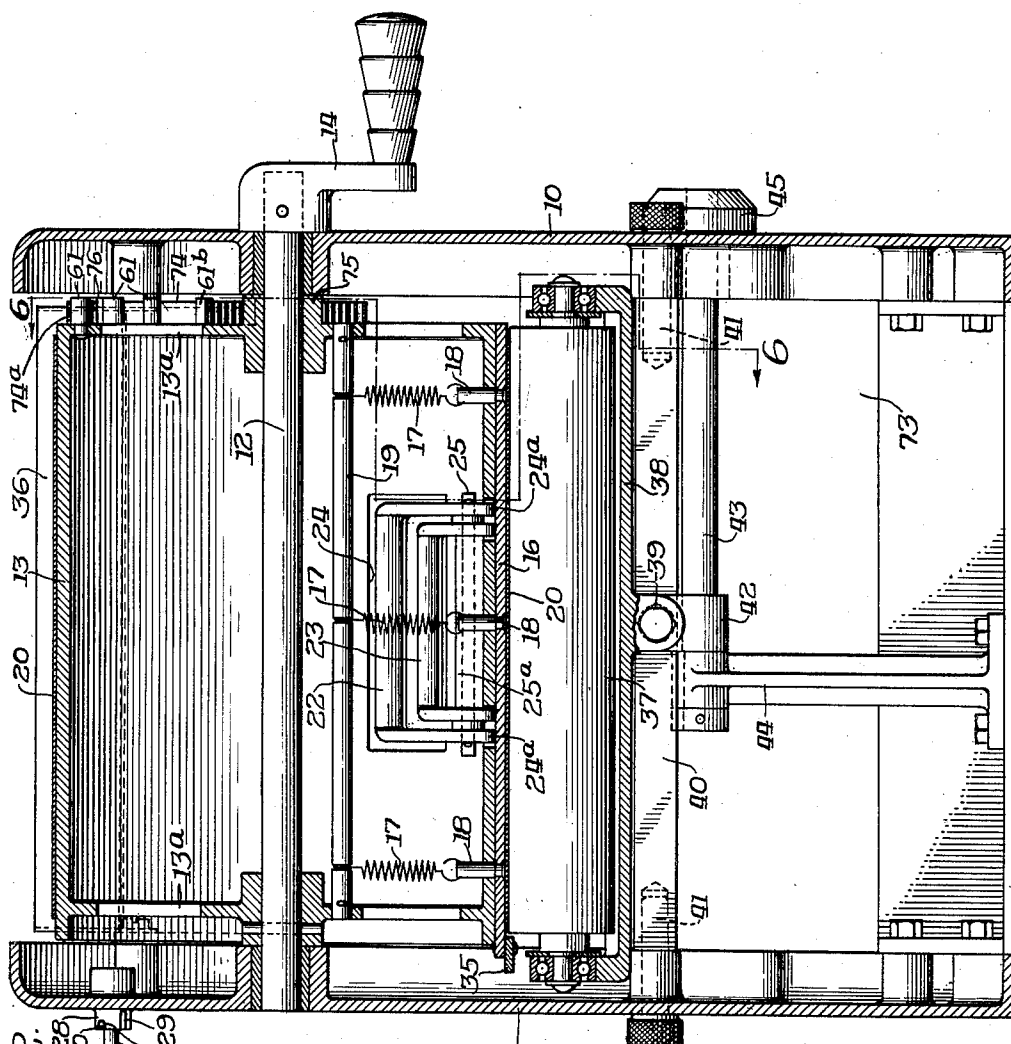
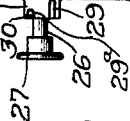
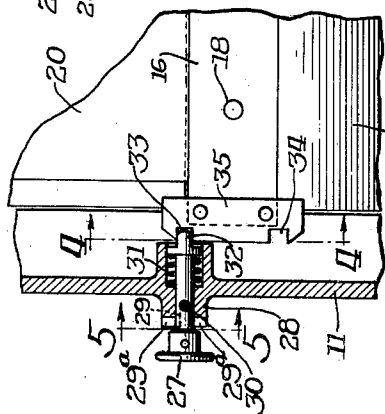
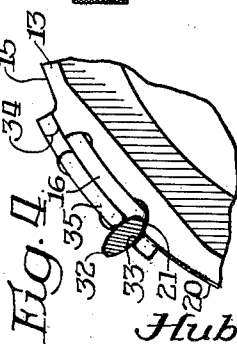
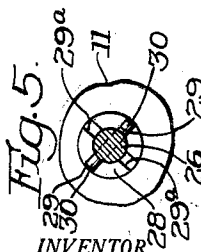
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# MOISTENING DEVICE FOR DUPLICATING MACHINES

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4 Sheets-Sheet 2



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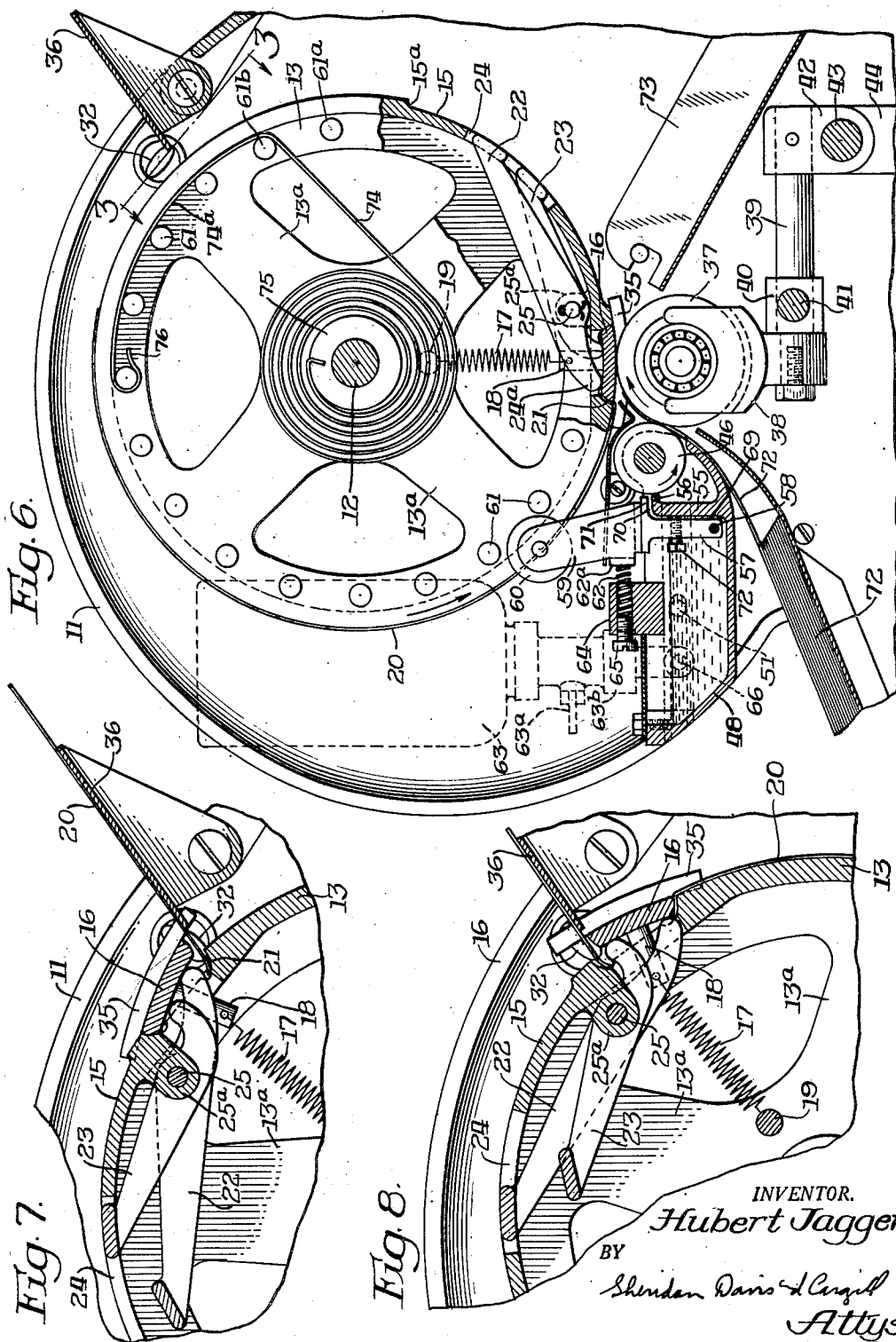
H. JAGGER

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MOISTENING DEVICE FOR DUPLICATING MACHINES

Filed Aug. 17, 1945

4 Sheets-Sheet 3



Jan. 2, 1951

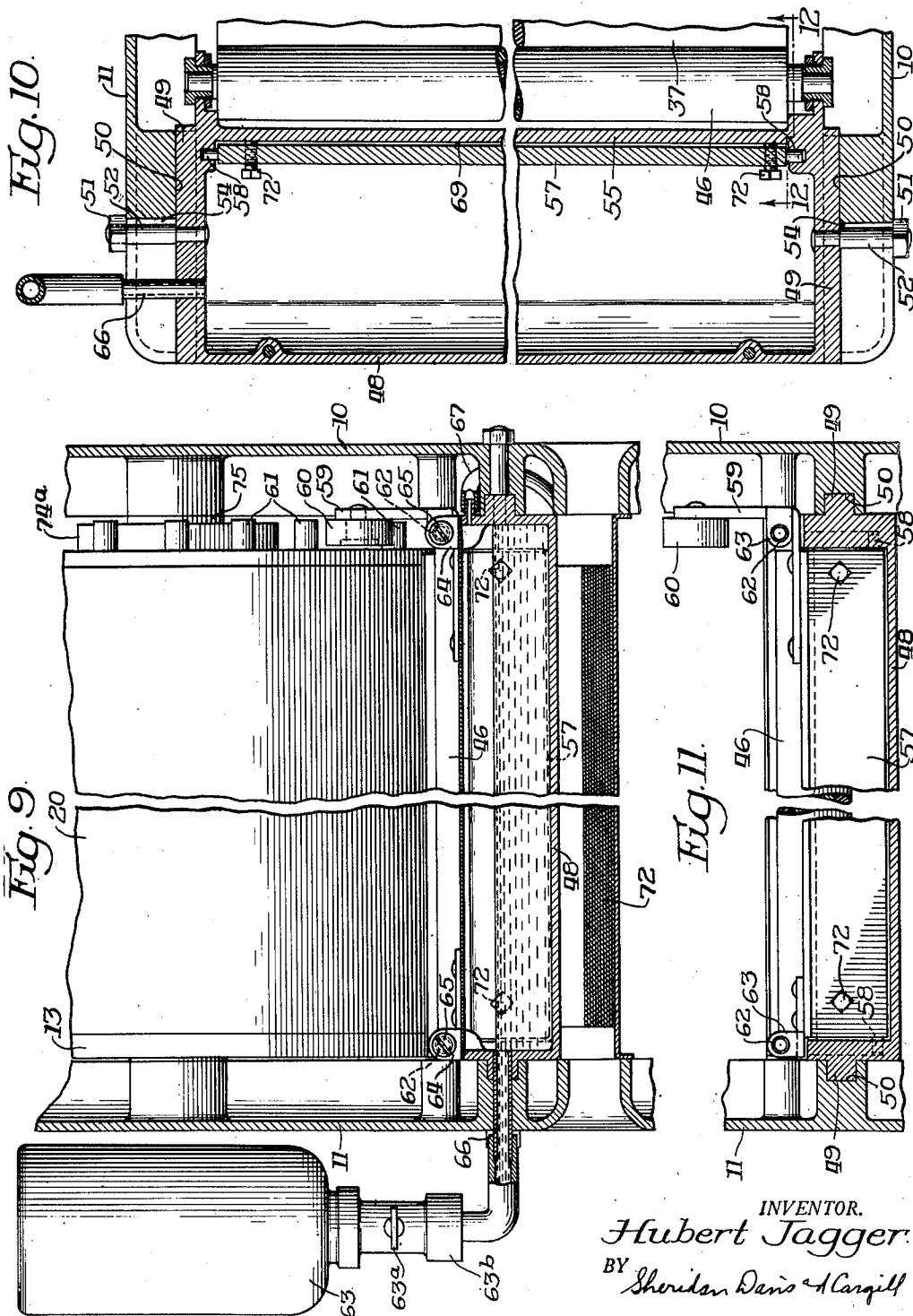
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2,536,604

MOISTENING DEVICE FOR DUPLICATING MACHINES

Filed Aug. 17, 1945

4 Sheets-Sheet 4



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## UNITED STATES PATENT OFFICE

2,536,604

## MOISTENING DEVICE FOR DUPLICATING MACHINES

Hubert Jagger, Maywood, Ill.

Application August 17, 1945, Serial No. 610,947

9 Claims. (Cl. 101—132.5)

1

This invention relates to improvements in duplicating machines.

One object of the invention is to provide a liquid type duplicating machine having improved means for supplying liquid from a source thereof for application to copy sheets as the latter move into contact with an original or master sheet.

Another object of the invention is to provide an improved duplicator comprising a liquid pump and liquid distributor mechanism which, upon actuation during use of the machine, elevates liquid from a tank or reservoir and effects distribution of the same to the surface of a moistening roll for application thereby to copy sheets.

A further object of the invention is to provide improved means for actuating a pump of a liquid type duplicating machine and means associated with the actuating means whereby operation of the pump can be synchronized with respect to a maximum or minimum portion of each cycle of rotation of a master-carrying rotary drum, or with respect to the passage of copy sheets through the machine.

Another object of the invention is to provide an improved clamp bar for a rotary drum of a duplicating machine providing means whereby two sheets may be retained on the drum during operation thereof, when required, such as a master sheet and a block-out sheet for example.

An additional object of the invention is to provide means for latching a rotary drum of a duplicator in position for retaining one edge or the other of a clamping bar in registration with a sheet guide for convenience in inserting a master sheet or a block-out sheet or the like into operative position on the drum.

Other objects of the invention relate to various features of construction and arrangement of parts which will be apparent from a consideration of the following specification and accompanying drawings wherein

Fig. 1 is a side elevation of a liquid type duplicating machine which is illustrative of the present invention.

Fig. 2 is an enlarged sectional view taken on line 2—2 of Fig. 1.

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

Fig. 4 is a broken sectional view taken on line 4—4 of Fig. 3.

Fig. 5 is a sectional view taken on line 5—5 of Fig. 3.

Fig. 6 is a sectional view taken on line 6—6 of Fig. 2.

Fig. 7 is an enlarged broken sectional view on a vertical plane longitudinally of the casing illus-

2

trating the drum in locked position and with the clamp bar elevated for receiving a master copy.

Fig. 8 is a similar view showing the drum with the clamp bar elevated for receiving a block-out sheet in clamping position.

Fig. 9 is an enlarged sectional view taken on line 9—9 of Fig. 1.

Fig. 10 is an enlarged sectional view taken on line 10—10 of Fig. 1.

Fig. 11 is an enlarged sectional view taken on line 11—11 of Fig. 1.

Fig. 12 is an enlarged broken sectional view taken on line 12—12 of Fig. 10.

In the drawings, the duplicating machine therein shown for the purposes of illustration comprises a pair of side frame members 10 and 11 which are retained together in a spaced apart relation and within which is journaled a shaft 12 upon which a rotary drum 13 is mounted for rotation by any suitable means. For the sake of simplicity the drum of the drawings is shown as being rotatable by means of a hand crank 14 although it will be apparent that suitable power driving mechanism may be utilized when desired.

The drum 13 has a cylindrical working surface which is provided with an inwardly disposed or reentrant portion 15. Adjacent the trailing edge of the portion 15 the drum is provided, in the outer cylindrical surface thereof, with a longitudinal recess for receiving a clamp bar 16 beneath either edge of which may be clamped a sheet which is to overlie a portion of the surface of the drum during the operation of the machine. The clamp bar 16 is adjustably retained in its seat in the surface of the drum by means of springs 17 (see Fig. 2) which are secured at one end of each to a stud 18 and at the other end to a rod 19. The springs are under suitable tension and hence while they tend to retain the clamp bar with the outer surface thereof disposed in conformity with the outer cylindrical surface of the drum, permit the clamp bar to be rocked or tilted outwardly at either edge, the opposite edge serving as the fulcrum for the tilting movement.

In Fig. 6 of the drawings a master sheet 20 is shown lying in contact with a portion of the cylindrical surface of the drum. The forward edge of the sheet 20 as indicated at 21 is disposed between the adjacent edge of the clamp bar 16 and the adjacent wall of the clamp bar receiving recess. For the purpose of facilitating the insertion of a sheet under either edge of the clamp bar, two clamp bar operating members are provided. These members are in the form of U-shaped levers, one designated by numeral 22 and the other by numeral 23. The outer ends of the U-shaped

levers are available for manual operation through a recess 24 provided in the reentrant portion 15 of the drum surface as shown in Fig. 6. The levers are pivoted upon a pin 25 carried by suitable lugs 25a on the inner surface of the drum. Lever 22 has a forward end 24a disposed adjacent the trailing edge of the clamp bar 16 whereby inward depression of the opposite end of the lever will tilt the trailing edge of the clamp bar outwardly about the forward edge of the clamp bar as a fulcrum. While the clamp bar is in such outwardly tilted position, a master sheet, such as sheet 20, may conveniently be removed from engaged position or a different master may readily be inserted. Similar operation of lever 23 will cause the end 23a thereof to swing the forward or advancing edge of clamp bar 16 outwardly whereby a sheet may be inserted in position for engagement by such forward edge and without releasing a master sheet previously positioned on the drum. The clamping facility of the forward edge of the clamp bar generally is utilized for clamping a sheet to the drum which is arranged to extend clockwise from the engaged end for overlying a portion of a master sheet and may be provided with cut-outs which permit reproduction of a portion only of the written, typed or printed material that appears on the master.

For convenience in inserting a master sheet or a block-out sheet in position upon the drum 13 a stop means comprising a spring actuated plunger 26 is provided in the frame member 11 (see Fig. 3). The plunger 26 is provided with a finger grip 27 at its outer end and extends through a boss 28 provided on the outer surface of the casing member 11. The end of the boss 28 is provided with notches 29 and 29a each for receiving a pin 30 carried by the plunger. The notch 29 as viewed in Fig. 3 is deeper than the notch 29a and when the pin is disposed in the deeper of the two notches, a spring 31 forces the inner end of the plunger inwardly the maximum extent, whereas if the plunger is turned while in fully retracted position for causing the pin 30 to engage the shallower notch 29a, which is disposed at right angles to notch 29, the inner end of the plunger will be retained in an inward or inoperative position. The inner end of the plunger, indicated by the numeral 32, as shown in Fig. 4, is substantially of oval shape in cross section or end view. When the end 32 is in the position shown in Fig. 3 it is adapted to cooperate with a notch 33 or a notch 34 carried by a cross head or plate 35 which is secured to the clamp bar 16.

In Fig. 3 the end 32 of the plunger is shown in latching relation within the notch 33 of the head 35 and hence will retain the drum 13 against rotation. While in such latched relation, the trailing edge of the clamp bar 16 may be swung outwardly by the inward depression of the end of the lever 32 that is accessible for operation within the recess 24 of the drum. The oval shape of the latching end 32 of the plunger avoids binding within the notch 33 during the outward swinging of the clamp bar as above described.

Manual withdrawal of the plunger 26 effects release of the end 32 and by rotation through an arc of 90 degrees, the cross pin 33 can be caused to seat in the shallower of the two notches 29a for retaining the end 32 in a non-obstructing relation with reference to the head 35 during rotation of the drum.

Secured to the frame members of the machine is a sheet guide 36 as shown in Fig. 6 which as shown in Fig. 7 is adapted to assist in guiding

a master sheet 20 into position for engagement by the clamp bar when the latter has been swung outwardly as described.

When the drum has been adjusted for engagement of the latch 32 of the plunger within recess 34, the other longitudinal edge of the clamp bar will be in registration with the sheet guide 36 as shown in Fig. 8 for facilitating the insertion of a sheet into clamping relation with reference to the other edge of the clamp bar 16 when lever 23 has been depressed.

For cooperation with the drum 13, there is provided a platen roll 37 which is rotatably journaled at its ends in a bearing-support 38 which in turn is pivotally mounted at its center upon a shaft 39 as shown in Figs. 2 and 6. The shaft 39 extends through a bar 40 which at its ends is pivotally mounted on studs 41 which are supported by the respective frame members 10 and 11. The bar 40 thus constitutes a pivotal axis about which the shaft 39 may be rocked slightly in a vertical plane as viewed in Fig. 6. The right end of the shaft 39, as viewed in Fig. 6, is provided with a bracket 42 through which extends a rotatable shaft 43. The shaft 43 is supported at the inner end in a bracket 44 and at the opposite end in the frame member 10. The intermediate portion of the shaft 43 is eccentric with reference to the journaled end portions and hence rotation of the shaft in one direction or the other produces a rocking movement of the arm 39 and hence the raising or lowering of the platen 37 whereby the latter can be adjusted for exerting proper pressure against the cylindrical surface of the drum 13 as shown in Fig. 1. The outer end of the shaft 43 is provided with an operating knob or handle 45 which may be provided with graduations for indicating positions of the adjustment thereof as disclosed in my co-pending application, Serial Number 605,659, filed July 18, 1945, for Duplicating Machines.

A moistener roll 46 is provided for applying liquid to copy sheets and for cooperation with the platen in feeding the same into position for engagement by the coaction of the cylindrical surface of the drum with the surface of the platen roll 37. The roll 46 is journaled in the end walls of a tank structure, indicated generally by the numeral 48, as shown in Fig. 10. The tank 48 is disposed between the end walls 10 and 11 and is retained in horizontal relation by means of longitudinal ribs 49 provided on the end walls of the tank which slide within correspondingly shaped channels 50 provided in the frame members 10 and 11 (see Fig. 11).

The tank can be moved horizontally for adjusting the moistening roll 46 with reference to the platen roll 37 and is retained in the adjusted position by means of nuts 51 carried on the outwardly extending ends of studs 52 which at their inner ends are secured to the end walls of tank 48 and which studs are slidable within recess 54 provided in the walls of the frame members 10 and 11. By tightening the nuts 51 the tank 48 may be retained in the horizontally adjusted position wherein proper driving contact between the roll 46 and the platen 37 is afforded.

The tank 48 is provided with a forward vertical wall 55 (see Fig. 6) which at its upper edge terminates in a forwardly extending lip 56. Adjacent the wall 55 is a swingable or oscillatable piston 57 which is pivotally supported by pins 58 disposed on the lower end walls of slots 48a provided in the side walls of the tank. Secured to the upper end of the piston 57 is an arm 59 which

carries a roller 60 at its upper end. The roller 60 is disposed adjacent the end wall 13a of the drum 13 and is arranged to be engaged during the rotation of the drum by successive studs or pins 61 positioned adjacent the outer periphery of the end wall 13a. Spring 62 at the forward ends press against spring seats 62a and extend into recesses provided in spring seats 64 which may be attached to or formed as a part of the adjacent end walls of the tank 48. Adjusting screws 65 are provided for varying the compression of the springs 62 for urging the piston forwardly or in a clockwise direction as viewed in Fig. 6, that is, in a direction for causing the desired contact of the roller 60 with the studs 61 during rotation of the drum. It will be seen, as viewed in Fig. 6 that as the drum 13 is rotated counter-clockwise the piston 57 will be moved rearwardly or counter-clockwise as the pins 61 in succession engage the roller 60. Hence the piston 57 is actuated counter-clockwise as viewed in Fig. 6 by the coaction of roller 60 and pins 61 and is moved in the opposite direction or clockwise by the springs 62.

Means are provided for supplying liquid to the tank 48, the liquid usually being an aqueous-alcohol solution. The means for supplying the liquid to the tank and maintaining the liquid at a constant level within the tank may be a reservoir in the form of bottle 53 mounted upon a member 53b (see Fig. 9) preferably provided with a pet cock 53a. Liquid from the reservoir 53, when the pet cock is open, flows through a tube 55 into the tank and continues to flow so long as the inner end of the tube 55 is uncovered by the liquid within the tank. The operation of such feeding devices is well-known. An overflow duct 67 is provided (see Fig. 1) for carrying surplus liquid into an overflow tank 68, should for any reason the liquid feeding apparatus not function as intended. The liquid in tank 48 is thus maintained at a constant level.

Liquid within the tank flows around the ends of the piston and beneath the same into the space 69 constituting a pump chamber between the piston 57 and the adjacent face of the end wall 55. Oscillation of the piston 57 about its pivot 52 forces some of the liquid within the space 69 upwardly through an outlet 70 which is provided between the upper longitudinal edge of the wall 55 and an adjacent longitudinal edge 71 of the piston. Each clockwise stroke of the piston as viewed in Fig. 6 forces liquid upwardly through the outlet 71 against the surface of the moistening roll 46. The outlet 71 is coextensive with the length of the roll 46 and the latter is closely spaced from the edge of the lip 56 whereby, at each working stroke of the piston, the moistener roll is supplied with liquid throughout its length without loss or appreciable loss of liquid downwardly from the lip or at the ends of the lip due to the forwardly extending portions of the side walls of the tank as illustrated. The piston 57 is provided with a pair of set screws 72 for limiting the forward or power stroke of the piston under the action of the spring 62 and hence the quantity of liquid that is delivered to the outlet 71 on each stroke of the piston can be controlled whereby sufficient liquid will be delivered to the outlet 71 by the rapidly operating piston to effect the uniform wetting of the roll while avoiding flooding of the roll as well as the intermittent application of liquid to the roll only.

As the drum 13 is rotated counter-clockwise, as viewed in Fig. 6, it effects rotation of the platen

37 during the portion of each rotative cycle of the drum that the cylindrical surface thereof is in engagement with the surface of the platen. The reentrant portion 15 of the drum surface effects no driving of the platen 37. The moistener roll 46 is in turn driven by contact with the platen 37. As the drum is rotated counter-clockwise, the platen will rotate clockwise and the moistener roll 46 will be operated counter-clockwise. The rotation of the drum brings successive pins 61 into contact with the pump actuating roller 60 and thus delivers liquid to the outlet 71 where it is picked up by the roll 46 and is applied to the adjacent surface of copy sheets 72 as the same pass in succession upwardly between the platen 37 and roll 46 into engagement between the platen 37 and the contacting surface portion of the drum 13.

As a copy sheet 72 is fed upwardly between the platen 37 and roll 46, either manually or by automatic feeding means, it is gripped by the cooperation of the platen and moistening roll and advanced upwardly into position for engagement by the platen and the drum and is pressed by cooperation of the platen and the drum into contact with a master 29 on the drum. As the copy sheet passes between the platen and the drum the moistened surface of the copy sheet contacts the master sheet and receives an impression of the written or printed matter thereon, the matter being in copyable or hectograph ink. Each copy sheet as it passes over the platen drops into a receiving tray 73.

It is desirable that the period of operation of the pump during the passage of each copy sheet through the machine be correlated with respect to the length of the copy sheet so that liquid from the tank 48 will not be applied needlessly to the moistener roll 46 except as such moisture will be transferred to a copy sheet. For the purpose of correlating the operation of the pump to the length of copy sheets to be used, a flexible tape 74 is provided upon a holder or spool 75 carried upon the end 13a of the drum. The spool 75 may be of the type such as is used for roll-up measuring tapes whereby the tape 74 may be pulled from the spool against the take-up action of a spring. As shown in Fig. 6 the outer end portion of the tape lies along the peripheries of a number of adjacent pins 61. The outer end of the tape is provided with a hook 76 which is adapted to engage over one of the pins. Viewing Fig. 6, it will be seen that as the drum is rotated counter-clockwise from the position shown in said figure, the pins uncovered by the tape 74 will effect actuation of the pump but when the advancing end of the tape 74 contacts the roller 60, the pumping action will cease due to the fact that the arcuate tape section 74a affords a track along which the roller 60 will roll, thus interrupting the action of the pump. By extending the tape 74 over the requisite number of pins 61, it is possible readily to effect interruption of the action of the pump as desired and thereby avoid needless application of liquid to the moistener roll 46.

In the event that the machine is left inactive for a period of time or until the liquid has evaporated from the surface of the moistener roll 46, it is desirable that the roll be pre-moistened before the first sheet of the next batch is fed into the machine. Hence it generally is desirable that the drum 13 be stopped in a position 180 degrees removed from the position shown in Fig. 6. If stopped in such position, the arcuate por-

tion of the tape 74a will be in contact with roller 60 holding the same outwardly. As the drum is rotated from that assumed position an end pin indicated by the numeral 61a will engage the roller 60 after the arcuate portion of the tape has passed from contact with the roller 60 and will effect a pumping action during the short interval that the cylindrical surface of the drum, corresponding to the distance between pin 61b and the adjacent edge of the reentrant portion 15, is driving the platen 37. The length of the arcuate portion just mentioned, that is approximately from pin 61b to the leading edge of the re-entrant portion marked 15a, is substantially equal to one-half the circumference of the roll 46. Hence in starting the machine with the roll 46 dry, moisture will be applied to one-half of the surface of roll 46 as viewed in Fig. 6 and thus liquid is carried up into the bight between the roll 46 and platen 37 whereby the upper portion of the first copy sheet 72 of the assumed fresh batch of copy sheets will receive liquid from the machine. The sheets are fed into the machine during that portion of the rotation of the drum when the re-entrant portion 15 is in registration with the platen 37, that is, during the portion of each rotation when the platen is inactive.

It will be seen that by extending the tape 74 over a greater number of pins 61 than those shown in Fig. 6, or a lesser number, the period of operation of the pump during each rotative cycle of the drum can be controlled whereby liquid can be applied to short copy sheets or long copy sheets as desired. In some instances where long copy sheets are used, it may be desirable to moisten only a portion of the same in which case desired pump action can be obtained by the proper adjustment of the tape with respect to the pin 61.

While I have shown and described a structure that is illustrative of my improvements it will be apparent that variations of the structure may be utilized within the spirit of the invention.

**I claim:**

1. In a duplicating machine, a rotary master-carrying drum, a rotary platen cooperating with said drum for pressing copy sheets against a master sheet on the drum, a moistener roll operable by said platen, a liquid-holding tank having an end wall terminating in a discharge lip at the upper edge thereof and disposed in close proximity to the periphery of said roll, an operable pump member mounted within said tank for cooperation with said end wall for effecting the discharge of liquid from said tank over said lip into contact with said roll during each working stroke of said pump, the pump operating member extending from the pump to a position adjacent the periphery of the drum, and means comprising a series of spaced members on the drum positioned for cooperative engagement with and adapted successively to engage said operating member as the drum rotates for effecting actuation of said pump.

2. In a liquid type duplicating machine, a rotary drum provided with an arcuate row of pump actuating members, a sheet moistener member located adjacent a wall of a liquid holding tank and adapted to apply liquid to copy sheets as the same are moved into copying relation within the machine, a liquid-holding tank, an operable pump member in the tank arranged for cooperation with said wall thereof for effecting the discharge of liquid from the tank to said sheet moistener member, and a pump operating arm carried by said pump member and biased for

movement into the path of said pump actuating members for actuation successively thereby for effecting operation of said pump member.

3. In a duplicating machine, a rotary drum provided with a plurality of arcuately arranged pump actuating members, a sheet moistener member adapted to apply liquid to copy sheets as the same are moved into copying relation within the machine, a liquid-holding tank having a wall provided with a liquid discharge lip coextensive in length with the length of said moistener member, an operable pump member mounted in said tank adjacent said wall for cooperation therewith in effecting the discharge of liquid from the tank over said lip and upon said moistener member, and means comprising an operating arm projecting from said pump member into the path of movement of said pump actuating members for actuation successively by said actuating members for effecting operation of said pump member.

4. In a duplicating machine, copying means comprising a rotary drum, a sheet moistener comprising a roller adapted to apply liquid to copy sheets as the same are moved into copying relation within the machine, a liquid-holding tank provided with a liquid discharge lip disposed closely adjacent the periphery of said roller, a pump arranged to transfer successive charges of liquid from the tank over said lip to said moistener, an actuator extending from the pump adjacent the outer periphery of said drum, and means comprising a plurality of members spaced circumferentially on said drum and arranged for movement in a path for successively contacting said pump actuator during the rotation of the drum for effecting the operation of the pump.

5. In a duplicating machine, copying means comprising a rotary drum, a sheet moistener comprising a roller adapted to apply liquid to copy sheets as the same move into copying relation within the machine, a liquid-holding tank provided with a wall terminating in an outwardly directed lip closely adjacent the periphery of said roller, a pump comprising an oscillatable blade arranged for cooperation with said wall of said tank for delivering successive charges of liquid from the tank over said lip to said moistener, means biasing said blade for operation in one direction, said blade being provided with an operating arm, and means comprising a plurality of arcuately disposed members on said drum extending into co-acting relationship with said arm for effecting successive strokes of said blade in opposition to the action of said biasing means.

6. In a duplicating machine, means for impressing successive copy sheets against a master sheet comprising a rotary drum, a moistener arranged to apply liquid to said copy sheets as the same are moved into copying relation during successive rotations of the drum, liquid-holding means, a pump comprising an oscillatable member for delivering liquid from said holding means to said moistener, said pump member being provided with an operating arm, means for operating said pump comprising an arcuate row of spaced members carried by said drum in a rotary path for engaging successively said arm for operating the same during rotation of the drum, and adjustable means for retaining said arm out of operating engagement with selected spaced members of said row to render said members ineffectual for operating said pump

for correlating the duration of operation of the pump to the length of the copy sheets during each rotation of the drum.

7. In a duplicating machine, means for impressing successive copy sheets against a master sheet comprising a rotary drum, a moistener arranged to apply liquid to said copy sheets as the same are moved into copying relation during successive rotations of the drum, liquid-holding means, a pump comprising a reciprocable member for delivering liquid from said holding means to said moistener, said member being provided with an operating arm, means for operating said pump comprising an arcuate row of spaced members carried by said drum and projecting into positions for operatively engaging said arm during rotation of the drum, and adjustable means comprising a flexible member adapted to be positioned over a selected group of said spaced members for retaining the arm out of contact with said selected spaced members for rendering the same ineffectual for operating said pump for correlating the duration of operation of the pump to the length of the copy sheets during each rotation of the drum.

8. In a duplicating machine, means for impressing successive copy sheets against a master sheet comprising a rotary drum, a moistener arranged to apply liquid to said copy sheets as the same are moved into copying relation during successive rotations of the drum, liquid-holding means, a pump for delivering liquid from said holding means to said moistener, said pump being provided with an actuating member, means for operating said pump comprising an arcuate row of spaced members carried by said drum in a rotary path for successive engagement with said pump actuating member, and adjustable means comprising an extensible member adapted to be disposed over a portion of said row of spaced members for holding said actuating member out of engagement with selected spaced members of said row for rendering the same ineffectual for operating said pump for correlating the duration of operation of the pump to the length of the copy sheets during each rotation of the drum.

9. In a duplicating machine, means for impressing successive copy sheets against a master sheet comprising a rotary drum, a moistener arranged to apply liquid to said copy sheets as the same are moved into copying relation during successive rotations of the drum, liquid-holding means, a pump for delivering liquid from said holding means to said moistener, said pump being provided with an oscillatable actuating arm, means for operating said pump comprising an arcuate row of spaced members carried by said drum and projecting into positions for successively engaging said arm for actuating the same during rotation of the drum, and adjustable means comprising an extensible member carried by said drum and adapted to provide an arcuate track closing the spaces between selected adjacent spaced members for retaining said arm out of contact with said selected members for rendering said selected members ineffectual for operating said pump for correlating the duration of operation of the pump to the length of the copy sheets during each rotation of the drum.

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