

June 2, 1942.

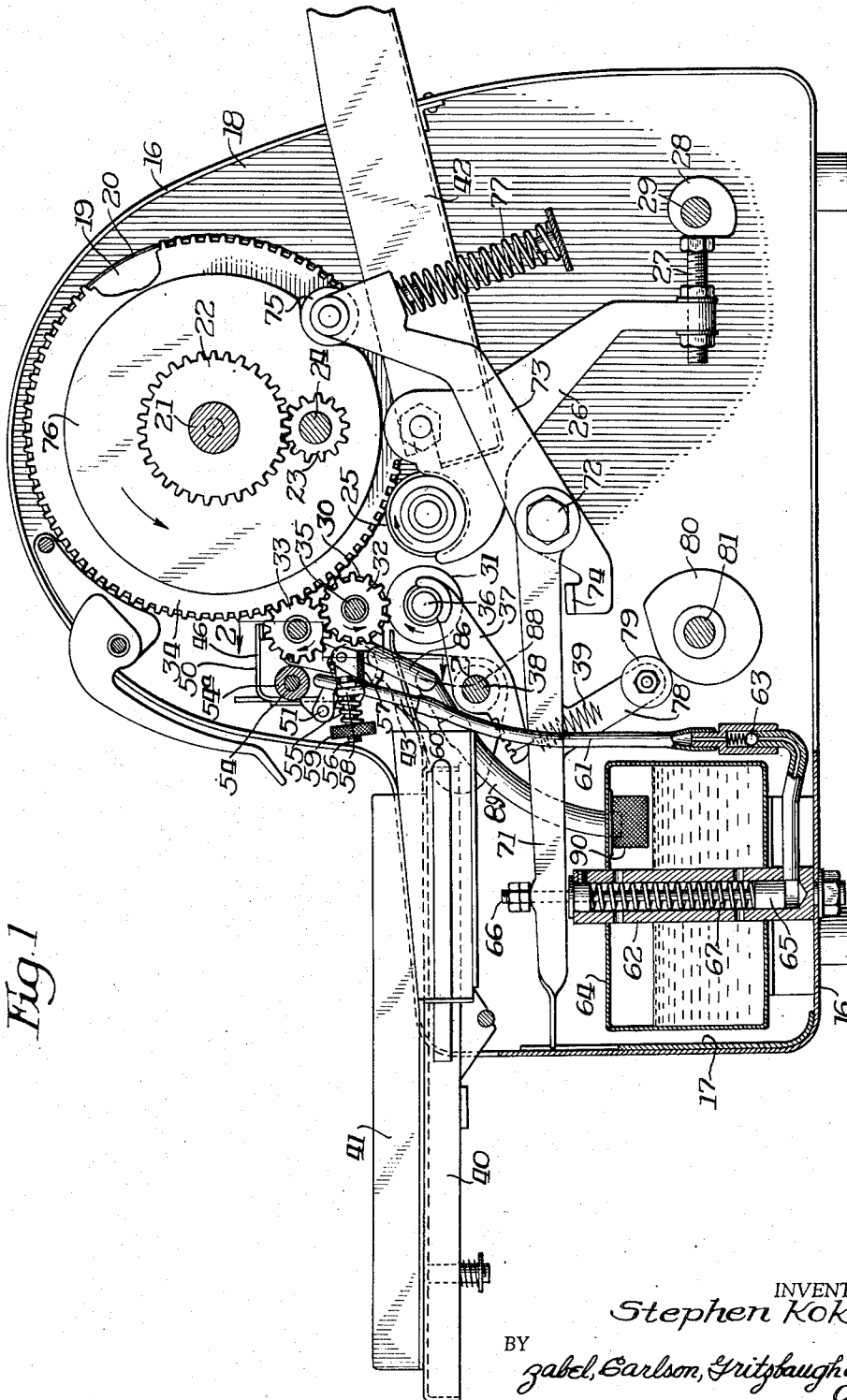
S. KOKAY

2,284,874

MOISTENING APPARATUS FOR DUPLICATING MACHINES

Filed Dec. 14, 1940

3 Sheets-Sheet 1



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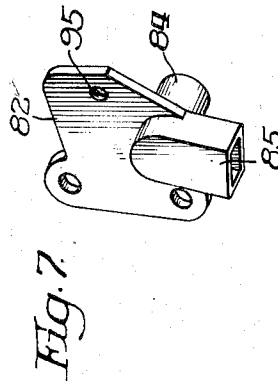
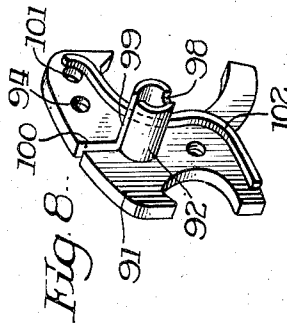
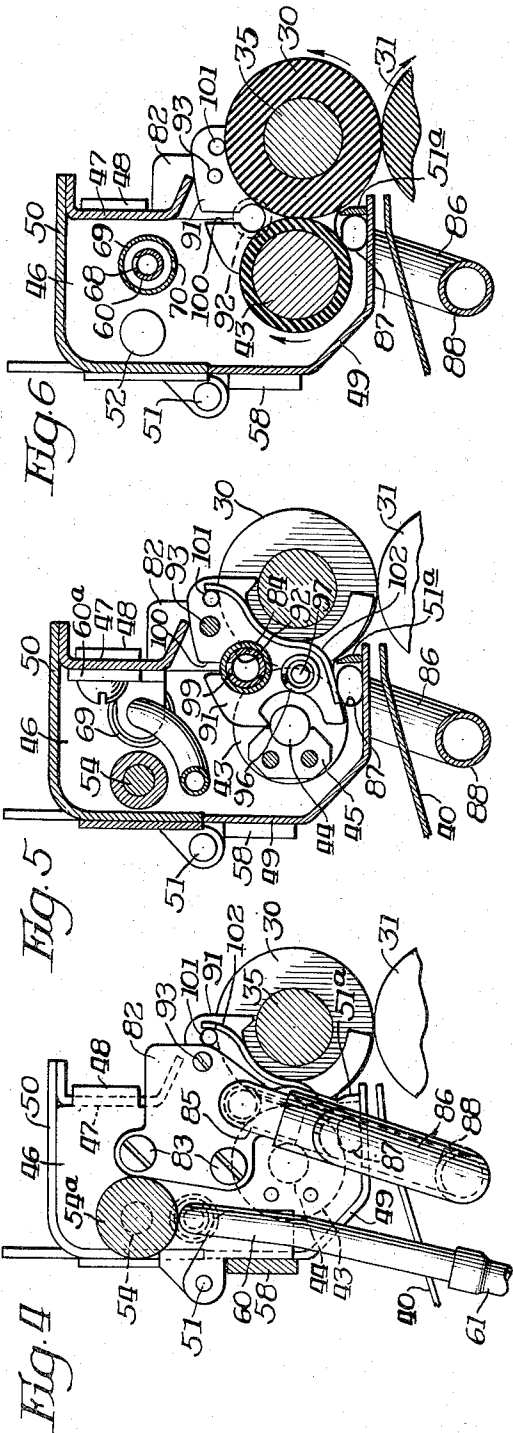
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3 Sheets-Sheet 3



INVENTOR.
Stephen Kokay.
BY
Jabel, Carlson, Britzbaugh & Wells
Attys.

UNITED STATES PATENT OFFICE

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MOISTENING APPARATUS FOR DUPLICATING MACHINES

Stephen Kokay, Chicago, Ill., assignor to Ditto, Incorporated, Chicago, Ill., a corporation of West Virginia

Application December 14, 1940, Serial No. 370,153

14 Claims. (Cl. 91—48)

This invention relates to moistening apparatus for duplicating machines of the liquid process type, in which liquid is delivered into position in the bight between two rotating rollers mounted side by side upon the machine, and it has for its object the provision of a new and improved form and arrangement of parts by which the liquid may be better controlled so as to prevent the collection of excess liquid at any point from which it can pass out of control onto the face of a copy sheet and from there onto the face of the master sheet. In the operation of a machine of this type, any application of solvent to the face of the master sheet in excessive amounts serves quickly and surely to damage the master sheet or even to destroy completely its effectiveness for producing clean and attractive copies, with the result that the control of the solvent is perhaps the most important single factor in the operation of the machine.

It has been found in the operation of a machine of the type specified, as shown in my co-pending application Serial No. 307,246, in which the solvent is sprayed on the top face of a spreader roller directly in rear of the combination moistening and forwarding roller, that during a priming operation or when the machine is operating at high speed there may be an excessive accumulation of the liquid in the bight of the spreader roller and the combination moistening and forwarding roller, especially at the point of juncture between the rollers and the end seals. While the rollers are in rotation, this liquid will stay in the trough formed by these rollers and the end seals, and it will cling to the spreader roller even as far back as its rear face, which is probably due to the fact that the rotation of the roller acts as a counterforce to offset the natural tendency for the solvent to overflow over the rear face of the spreader roller into the catch basin of the housing.

It has been found, however, that the instant the rotation of the rollers is stopped this excess liquid which has been held in suspension will surge backwardly over the rear face of the spreader roller and rush into the limited space between the bottom of the spreader roller and the housing. Under these circumstances, it is highly important that an arrangement be provided for preventing the solvent from running or splashing over the front plate portion of the housing beneath the combination moistening and forwarding roller so as to run down the closely adjacent rear face of the upper forwarding roller and lodge in the bight of the upper

and lower forwarding rollers, since such solvent would overmoisten the first copy sheet upon renewed operation of the machine and would be likely to spoil the master sheet. It is important also to provide an arrangement for preventing the solvent from surging forwardly over the top of the upper forwarding roller when the operation of the machine is stopped, since such solvent would be likely to find its way between the end seals and the upper forwarding roller and to work its way gradually to the bight between the upper forwarding roller and the spreader roller at their bottom faces, from which point the solvent would normally be carried into contact with the copy sheet and from thence into contact with the master sheet so as to ruin the master sheet.

It is desirable that a limited amount of solvent be retained in the bight of the two rollers under controlled conditions when the operation of the machine is discontinued temporarily, but it is highly undesirable that there be a great quantity of the solvent at this point such as might overflow and escape from control in the manner as heretofore stated.

It has been accordingly one of the objects of the present invention to provide improved means for promptly and quickly draining the solvent from the bight of the rollers down to a predetermined point therein, and for carrying such drained solvent definitely away from any and all points from which it could through splashing, capillary action, or in any other manner work its way to a point at which it might overmoisten a copy sheet and thus spoil a master.

For attaining this object, an improved construction of sealing and drainage means has been provided at the ends of the spreader roller and the adjacent forwarding roller, arranged for permitting the escape of the excess solvent through the seal and from the bottom of the housing about the rollers into a conduit of ample size by which the solvent is conducted away from the housing so as to avoid any possibility of some of this solvent reaching a point where it might spoil a master sheet through the overmoistening of a clear sheet.

The aforesaid seal and drainage means is provided further with an additional opening there-through at a point adjacent to the uppermost face portion of the combined feed and moistener roller, together with means on the outer face of the sealing and drainage means for conducting any liquid, which may have worked its way to this point, back to the housing for return to the

receptacle from which the supply of solvent is drawn. This opening and the conducting means on the outer face of the sealing and drainage unit take care of the creepage of the liquid at the point where the seal and the upper combined feed and moistener roller meet. The starting and stopping of the machine create a slight jolt which is sufficient to cause a slight movement of the liquid at the point of contact between the roller and the seal, and this slight initial movement of the liquid provides a runway for the movement of additional small amounts of the liquid which keep moving by capillary action and which finally build up to such a volume as to be adapted to drain away. By the provision of the opening through the seal plate at the critical point at which the solvent is thus collected, the drainage of such solvent takes place through the opening so as to cause the solvent to be conducted back to the drainage housing, thus preventing the solvent from finding its way to the bight of the rollers so as to overmoisten the copy sheet and thus crash the master sheet.

It is another object of the invention to improve apparatus of this type in sundry details hereinafter pointed out. The preferred means by which the several objects have been attained are illustrated in the accompanying drawings, in which—

Fig. 1 is a longitudinal vertical sectional view through a duplicating machine taken partially at the line 1—1 of Fig. 2;

Fig. 2 is a vertical cross sectional view taken on an enlarged scale at the line 2—2 of Fig. 1;

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

Figs. 4, 5 and 6 are vertical sectional views taken respectively at the line 4—4, the line 5—5, and the line 6—6 of Fig. 2;

Fig. 7 is a perspective view of an end plate member forming part of the end wall of the housing in which the spreader roller upon which the liquid is sprayed is rotatably mounted; and

Fig. 8 is a perspective view of one of the improved seal plate members which bear on the end of the moistening roller and the spreader roller.

Referring now to the several figures of the drawings, in which corresponding parts are indicated by the same reference characters, 15 and 16 indicate standards of sheet metal pressed into dished form and arranged at opposite sides of the machine and connected rigidly together by means including a cross bar 17 as shown in Fig. 1. Each of the standards 15 and 16 is provided with a heavy reinforcing plate 18 on its inner face, as is best shown in Fig. 2.

Between the standards 15 and 16 there is mounted a duplicating drum 19 of any approved construction having a master sheet 20 detachably mounted thereon as usual. In the construction illustrated, the drum is rotatably mounted in position by means of a heavy shaft 21 provided at one end portion with a gear 22 by which the drum is driven through the medium of a pinion 23 rotatably mounted on the standard 16 by means of a short shaft 24 to which power is applied from any suitable source.

Below the drum 19, an impression roller 25 is rotatably mounted between two bellcrank levers 26, only one of which is shown, the longer arms of said two levers being provided with screw-threaded pins 27 adjustably mounted therein and engaging at their forward ends cams 28 fixedly mounted on a shaft 29 by the rotation of

which the levers 26 can be given swinging movements in clockwise direction in Fig. 1 for causing the impression roller 25 to press with the desired degree of pressure against the face of the drum 19.

Immediately in rear of the impression roller 25, two forwarding rollers 30 and 31 are mounted in cooperative relation to each other for forwarding a copy sheet between them toward the right in Fig. 1 so as to be presented into the bite of the drum 19 and the impression roller 25. Means is provided for driving the upper roller 30 in counter clockwise direction in Fig. 1, comprising a pinion 32 mounted on the roller and meshing with an idler pinion 33 which in turn meshes with a large gear 34 rotating with the drum 19. As is clearly shown in Fig. 3, the upper roller 30 is rotatably mounted between the standards 15 and 16 by means of a shaft 35 journaled on said standards. The roller 31 (see Fig. 1) is rotatably mounted by means of a shaft 36 supported by arms or levers 37 pivotally mounted by machine screws 38 threaded into the standards 15 and 16. The rear end portions of the levers 37 are connected by coiled springs 39 with suitable portions of the framework below the levers for holding the roller 31 yieldingly in contact with the bottom face of the roller 30.

In rear of the forwarding rollers 30 and 31, a table or tray 40 is provided for supporting a pile of copy sheets in position to be fed to the forwarding rollers. Side margin plates 41 are provided on the table for controlling the position of the pile of sheets thereon. In front of the impression roller 25, a receiving tray 42 is mounted for receiving the copy sheets after they have passed forwardly between the drum and the impression roller.

As is usual in machines of this type, the upper forwarding roller is utilized for applying a film of solvent to the upper faces of the copy sheets in turn as they pass forwardly between the rollers 30 and 31. In the present construction the solvent is sprayed upon a spreader roller 43 mounted in pressure relationship to the upper roller 30, as is best shown in Fig. 6, the pressure of the roller 43 against the roller 30 serving to control the thickness of the film of solvent transferred to said roller 30. In the arrangement shown, the roller 43 is rotatably mounted in position by means of trunnions 44 at its ends bearing in blocks 45, as is best shown in Fig. 5, the blocks 45 being carried by the end plates 46 of a housing for said roller extending across above and behind the roller 30.

As is best shown in Figs. 4, 5 and 6, the housing comprises a front plate portion 47 rigidly connected between the end plates 46 by means of lugs 48, a combination back and bottom wall plate portion 49, and a cover plate member 50 pivotally mounted in position by suitable rivets 51 so as to be adapted to open upwardly and backwardly for affording access to the interior of the housing. A narrow front plate portion 51a is provided at the bottom of the housing extending into the lower bight between the rollers 30 and 43.

In the construction illustrated, the housing comprising the end plates 46 is pivotally mounted in position by means of a trunnion 52 at one side of the machine extending into a suitable socket in an inwardly projecting lug 53 carried by the standard 16 and a machine screw 54 at the opposite side of the machine extend-

ing into a lug 54a carried by the standard 15. The housing is pressed in counterclockwise direction in Fig. 4 by springs 55 mounted on links 56 pivotally connected with brackets 57 carried by the standards 15 and 16 (see Fig. 3), such springs bearing at their forward ends on arms 58 extending from the end portions of the housing and bearing at their rear ends on thumb nuts 59 mounted by means of screw-threads on said links. The arrangement is such that the springs 55 press the roller 43 carried by the housing yieldingly against the rear face of the roller 30, the degree of pressure being controlled by the adjustment of the nuts 59 on the links 56.

The means for spraying solvent on the roller 43 comprises a metal pipe 60 extending across the machine above the roller within the pivotally mounted housing surrounding the roller and supported in position by a bracket 60a at one end of the housing, one end portion of said pipe being bent downwardly for connection with a flexible tube 61 which in turn is connected at its lower end with a pump 62, an upwardly opening check valve 63 being interposed in the connection between the pump and the pipe 60. The pump is located inside of a receptacle 64 adapted to hold a supply of solvent, the arrangement being such that upon upward movement of a piston 65 actuated by a piston rod 66 against the action of a spring 67 solvent is drawn into the pump and that upon a downward stroke of the piston the solvent is discharged upwardly through the tube 61 and an opening 68 in the top wall of the pipe 60. A second metal pipe 69 is mounted in position about the pipe 60, having a series of openings 70 in the bottom face adjacent to the roller 43, as is clearly shown in Fig. 2, so as to cause solvent delivered under pressure through the pipe 60 to be deposited as a spray on the top face of the roller. As is best shown in Figs. 5 and 6, the plate 47 extends downwardly in front of the pipes 60 and 69, with its lower edge portion angled forwardly over the roller 30. In this position the plate 47 is effective for preventing splashing of the solvent onto the roller 30 or onto either the master sheet or the copy sheet.

The means for actuating the piston rod 66 of the pump comprises a lever 71 pivotally mounted at 72 on the frame standard 15 and suitably connected with said rod. The lever 71 is operated by a second lever 73 also pivotally mounted at 72, with a lug 74 thereon underlying the lever 71 so that upon a downward stroke of the lever 73 the lever 71 is caused to swing upwardly. The lever 73 in turn is operated by a roller 75 engaging a cam 76 constrained to rotate with the drum 19 so as to give the lever 73 a downward stroke against the action of a spring 77 upon every complete revolution of the drum. Means is provided for varying the operative stroke of the lever 71, comprising an arm 78 extending downwardly from the lever 71, having a roller 79 on its lower end in position to engage a cam 80 fixedly mounted on a shaft 81 extending between the standards 15 and 16. The arrangement is such that the downward stroke of the lever 71 is limited by the cam 80 for controlling the length of the stroke of the piston rod 66 and thus controlling the amount of the solvent delivered by the pump. The lever 71 extends backwardly beyond the piston rod 66 for affording access thereto for manual operation of the lever independently of rotation of the drum for deliv-

ering an initial supply of solvent to the rollers at the start of a duplicating operation.

For simplifying the construction, an auxiliary end plate member 82 is provided at each end of the housing, held in position by screws 83, as is best shown in Fig. 4. As is clearly shown in Fig. 7, each of the auxiliary end plate members 82 is provided with a tubular projection 84 on its inner face and with an obliquely positioned duct portion 85 on its outer face extending downwardly and backwardly, the tube 84 and the duct 85 being in communication with each other through the plate, as is best indicated by Figs. 2 and 3. Below the duct 85 at each side of the machine, a drain pipe 86 is provided, fitted about the duct so as to have free communication therewith and so as to have free communication also with an opening 87 through the end wall 46 at the lowermost point within the housing. The drain pipes 86 are connected in turn with a transversely extending drain pipe 88 (see Fig. 2) which is connected preferably with the receptacle 64 by means of a pipe 89, as shown in Fig. 1, a screen 90 of any suitable type being provided preferably about the lower end of the pipe 89 for preventing the passage of lint or the like into the body of solvent in the receptacle.

The control means for the solvent comprises further seal plates 91 bearing on opposite ends of the rollers 30 and 43 inside of the housing. The lower portion of the housing serves as a drain pan for catching any liquid dripping from the rollers. Each of the seal plates, as is best shown in Fig. 8, is provided with a tubular projection 92 on its outer face which has a working fit in the tube 84 of the auxiliary end plate member 82, as is clearly shown in Figs. 2 and 3, so as to be slidable freely therein. The plate 91 is held in normal angular position with respect to the housing by means of a pin 93 secured by screw-threads in an opening 94 in said plate 91 and working in an opening 95 through the auxiliary end plate member 82. Coiled springs 96 are mounted in position on pins 97 between the seal plates 91 and the end plates 46 of the housing, as is best shown in Figs. 2 and 5, such springs serving to hold the seal plates pressed evenly against the ends of the rollers 30 and 43.

As is best shown in Fig. 3, the bottom wall of the tube 92 is provided with a notch 98 therein for expediting the escape of solvent from the tube to the duct 85. Each of the tubes 92 is also split along its upper face portion throughout its length providing a slot 99 in communication with a deep notch or slot 100 in the top edge of the plate 91, as is best shown in Figs. 6 and 8. The tubes 92 serve as troughs for conducting liquid to and through the tubes 84 of the end plates of the housing and to the ducts 85 and drain pipes 86 for flow away from the moistening mechanism back to the receptacle 64.

The seal plates 91 are also provided with openings 101 therethrough adjacent to the uppermost face portion of the combination moistening and forwarding roller 30, as is best shown in Fig. 6, the outer faces of the plates being provided with ribs 102 thereon below said openings 101 for causing any solvent escaping through said openings to move downwardly along the faces of the plates 91 so as to be delivered into the housing adjacent to the drain openings 87.

In the operation of the machine, with the spreader roller 43 rotating in clockwise direction in Fig. 6, solvent is sprayed into position on the top face of said roller so as to pass into the light

of the rollers 30 and 43 above the line of contact of said rollers so as to provide a pool of the solvent between the rollers. The open ends of the tubes 92 are of such size and arrangement that during the continued operation of the machine sufficient solvent is drawn off from between the rollers for keeping the top surface of the solvent in the pool at the desired level, and that when the operation of the machine is terminated the solvent flows off so rapidly as to prevent the formation of any excessively large or deep pool. This result is attained in part by reason of the provision of the slots 99 and 100. When the rotation of the roller 43 ceases and the delivery of solvent into the bight of the rollers 30 and 43 is terminated, the solvent running downwardly from the back face of the roller 43 escapes through the opening 87 into the duct 85 without danger of flowing over the front plate portion 51a of the housing. At the same time, the solvent which has piled up between the rollers 30 and 43 during their rotation in opposite directions escapes through the telescoped tubes 92 and 84 into the duct 85, the slots 99 and 100 and the notch 98 serving to expedite the entrance of the solvent into the duct 85 for escape. With the solvent carried by the pipe 86 away from the moistening mechanism instead of being delivered again to the housing for possible contact again with the roller 43, the surplus liquid is very quickly and effectually brought under control and removed from any position from which it is likely to work its way to the master sheet. In case any small amount of the solvent should work its way up between the seal plate 91 and the end of the roller 30, the rotation of the roller in counterclockwise direction in Fig. 6 makes it difficult for the solvent to continue its forward movement past the edge of the seal plate while at the same time the solvent is free to pass without opposition through the comparatively large opening 101 in the seal plate and to run down along the rib 102 for delivery again to the housing.

In extensive use of my improved construction, I have found that highly satisfactory results have been attained. The arrangement is such that the danger of spoiling a master sheet by contact of the solvent therewith during either the normal operation of the machine or the preliminary priming operation in preparation for the production of copies is practically eliminated, even in cases where an excess of solvent is delivered quickly to the moistening mechanism. The arrangement is such that when care is used for preventing the delivery of excess solvent during the priming operation the danger of spoiling a master sheet by such operation may be left entirely out of consideration.

While I prefer to employ the form and arrangement of parts as shown by the drawings and as above described, the invention is not to be limited to such form and arrangement except so far as the claims may be so limited, it being understood that changes might well be made without departing from the spirit of the invention.

I claim:

1. In a moistening mechanism for a liquid process duplicating machine, the combination of a rotatably mounted roller, means cooperating with said roller for forwarding a copy sheet in contact with the roller, a spreader roller rotatably mounted in pressure relationship to said first-named roller, a drain pan positioned below

said spreader roller and extending underneath the line of contact of said two rollers, means for delivering liquid into the bight of the said two rollers above their line of contact with each other, seal plates bearing on the ends of said two rollers above said drain pan and having openings therethrough at points well above the line of contact of the rollers and well below the uppermost face portions of the rollers, and troughs on the outer faces of said seal plates below said openings through the plates adapted to carry excess liquid away from said rollers and away from said drain pan.

2. In a moistening mechanism for a liquid process duplicating machine, the combination of a rotatably mounted roller, means cooperating with said roller for forwarding a copy sheet in contact with the bottom face of the roller, a spreader roller rotatably mounted in rear of said first-named roller in pressure relationship thereto so as to cause its uppermost face portion to move toward said first-named roller on the rotation of the rollers and with such uppermost face portion at a lower level than that of the uppermost face portion of said first-named roller, means for delivering liquid into the bight of said two rollers above their line of contact with each other, a drain pan positioned below said spreader roller and extending underneath the line of contact of said two rollers, seal plates bearing on the ends of said two rollers above said drain pan and having openings therethrough at points above the line of contact of the rollers and below the uppermost face portion of the spreader roller, and troughs on the outer faces of said seal plates below said openings through the plates adapted to carry excess liquid away from said rollers and away from said drain pan.

3. In a moistening mechanism for a liquid process duplicating machine, the combination of a rotatably mounted roller, means cooperating with said roller for forwarding a copy sheet in contact with the roller, a spreader roller rotatably mounted in pressure relationship to said first-named roller, means for delivering liquid into the bight of said two rollers above their line of contact with each other, a drain pan positioned below said spreader roller and extending underneath the line of contact of said two rollers, seal plates bearing on the ends of said two rollers serving to maintain a pool of liquid between the rollers, tubular projections on the outer faces of said seal plates opening through the plates to the space between the rollers for carrying excess liquid out of the bight of the rollers, other tubular members in fixed position beyond the ends of the rollers having telescopic connection with said first-named tubular members, and drain pipe means connected with said other tubular members for carrying the excess liquid away from the moistening mechanism.

4. In a moistening mechanism for a liquid process duplicating machine, the combination of a rotatably mounted roller, means cooperating with said roller for forwarding a copy sheet in contact with the roller, a spreader roller rotatably mounted in pressure relationship to said first-named roller, means for delivering liquid into the bight of said two rollers above their line of contact with each other, a drain pan positioned below said spreader roller and extending underneath the line of contact of said two rollers, seal plates bearing on the ends of said two rollers serving to maintain a pool of

liquid between the rollers, tubular projections on the outer faces of said seal plates opening through the plates to the space between the rollers for carrying excess liquid out of the bight of the rollers, other tubular members in fixed position beyond the ends of the rollers having telescopic connection with said first-named tubular members, duct means formed integrally with said other tubular members and leading downwardly from their outer ends, and drain pipe means connected with said duct means for carrying the excess liquid away from the moistening mechanism.

5. In a moistening mechanism for a liquid process duplicating machine, the combination of a rotatably mounted roller, means cooperating with said roller for forwarding a copy sheet in contact with the roller, a spreader roller rotatably mounted in pressure relationship to said first-named roller, means for delivering liquid into the bight of said two rollers above their line of contact with each other, a drain pan positioned below said spreader roller and extending underneath the line of contact of said two rollers, end plate members extending upwardly at the end portions of said drain pan, tubular projections on the inner faces of said end plate members opening through the plates, duct means on the outer faces of said end plate members communicating with said tubular projections and extending downwardly therefrom, seal plates bearing on the ends of said two rollers in inwardly spaced relation to said end plate members and adapted to maintain a pool of liquid between the rollers, tubular projections on the outer faces of said seal plates opening through the plates to the space between the rollers and telescoped at their outer ends with the tubular projections on said end plate members so as to carry excess liquid out of the bight of the rollers, and drain pipe connections with said duct means for carrying the excess liquid away from the moistening mechanism.

6. In a moistening mechanism for a liquid process duplicating machine, the combination of a rotatably mounted roller, means cooperating with said roller for forwarding a copy sheet in contact with the roller, a spreader roller rotatably mounted in pressure relationship to said first-named roller, means for delivering liquid into the bight of said two rollers above their line of contact with each other, a drain pan positioned below said spreader roller and extending underneath the line of contact of said two rollers, vertically positioned plates in fixed position in outwardly spaced relation to said rollers, tubular projections formed integrally with said plates on their inner faces opening through the plates, duct means formed integrally with said plates on their outer faces communicating with said tubular projections and extending downwardly therefrom, seal plates bearing on the ends of said two rollers so as to maintain a pool of liquid between the rollers, tubular projections on the outer faces of said seal plates opening through the plates to the space between the rollers and telescoped at their outer ends with the tubular projections on said first-named plates so as to carry excess liquid out of the bight of the rollers, and drain pipe connections with said duct means for carrying the excess liquid away from the moistening mechanism.

7. In a moistening mechanism for a liquid process duplicating machine, the combination of a rotatably mounted roller, means cooperating

with said roller for forwarding a copy sheet in contact with the bottom face portion of the roller, a spreader roller rotatably mounted in pressure relationship to said first-named roller, means for delivering liquid into the bight of said two rollers above their line of contact with each other, seal plates bearing on the ends of said two rollers so as to maintain a pool of liquid between the rollers and having openings there-through at points above the line of contact of the rollers and below the uppermost face portion of the spreader roller, and tubular projections on the outer faces of said seal plates opposite to the openings therethrough for carrying excess liquid away from the rollers, the upper face portions of said tubular projections being slotted longitudinally thereof and the seal plates being provided with slots therein leading downwardly into the openings at said projections.

8. In a moistening mechanism for a liquid process duplicating machine, the combination of a rotatably mounted roller, means cooperating with said roller for forwarding a copy sheet in contact with the bottom face of the roller, a spreader roller rotatably mounted in rear of said first-named roller in pressure relationship thereto so as to cause its uppermost face portion to move toward said first-named roller on the rotation of the rollers and with such uppermost face portion at a lower level than that of the uppermost face portion of said first-named roller, means for delivering liquid into the bight of said two rollers above their line of contact with each other, a drain pan positioned below said spreader roller and extending underneath the line of contact of said two rollers, seal plates bearing on the ends of said two rollers above said drain pan and having openings therethrough at points above the line of contact of the rollers and below the uppermost face portion of the spreader roller, and tubular projections on the outer faces of said seal plates opposite to the openings therethrough for carrying excess liquid away from the rollers, the upper face portions of said tubular projections being slotted longitudinally thereof and the seal plates being provided with slots therein leading downwardly into the openings at said projections.

9. In a moistening mechanism for a liquid process duplicating machine, the combination of a rotatably mounted roller, means cooperating with said roller for forwarding a copy sheet in contact with the roller, a spreader roller rotatably mounted in pressure relationship to said first-named roller, a drain pan positioned below said spreader roller and extending underneath the line of contact of said two rollers, means for delivering liquid into the bight of said two rollers above their line of contact with each other, seal plates bearing on the ends of said two rollers above said drain pan and having openings therethrough at points well above the line of contact of the rollers and well below the uppermost face portions of the rollers, drain pipe means connected with said openings through the seal plates at the outer faces of the plates for carrying excess liquid away from the rollers, and connections between said drain pipe means and the lowermost part of said drain pan for carrying excess liquid away from the pan.

10. In a moistening mechanism for a liquid process duplicating machine, the combination of a rotatably mounted roller, means cooperating with said roller for forwarding a copy sheet in contact with the bottom face portion of the roll-

er, a spreader roller rotatably mounted in pressure relationship to said first-named roller, means for delivering liquid into the bight of said two rollers above their line of contact with each other, seal plates bearing on the ends of said two rollers so as to maintain a pool of liquid between the rollers and having openings therethrough at points above the line of contact of the rollers and below the uppermost face portion of the spreader roller, drain pipe means connected with said openings through the seal plates at the outer faces of the plates for carrying excess liquid away from the rollers, and other means on the outer faces of said seal plates for directing downwardly across the ends of the roller any liquid passing through openings through the plates adjacent to the uppermost face portions of said first-named roller.

11. In a moistening mechanism for a liquid process duplicating machine, the combination of a rotatably mounted roller, means cooperating with said roller for forwarding a copy sheet in contact with the bottom face portion of the roller, a spreader roller rotatably mounted in pressure relationship to said first-named roller, means for delivering liquid into the bight of said two rollers above their line of contact with each other, seal plates bearing on the ends of said two rollers so as to maintain a pool of liquid between the rollers and having openings therethrough at points above the line of contact of the rollers and below the uppermost face portion of the spreader roller, drain pipe means connected with said openings through the seal plates at the outer faces of the plates for carrying excess liquid away from the rollers, ribs in substantially oblique position on the outer faces of said seal plates with their upper end portions positioned beneath openings through the seal plates adjacent to the uppermost face portion of said first-named roller adapted to cause liquid escaping through said last-named openings to pass downwardly on the outer faces of the plates to points below the line of contact of said rollers, and means for receiving liquid from said ribs and directing it away from the moistening mechanism.

12. In a moistening mechanism for a liquid process duplicating machine, the combination of a rotatably mounted roller, means cooperating with said roller for forwarding a copy sheet in contact with the roller, a spreader roller rotatably mounted in pressure relationship to said first-named roller, means for delivering liquid into the bight of said two rollers above their line of contact with each other, a drain pan positioned below said spreader roller and extending underneath the line of contact of said two rollers, seal plates bearing on the ends of said two rollers so as to maintain a pool of liquid between the rollers and having openings therethrough at

points above the line of contact of the rollers and below the uppermost face portion of the spreader roller, drain pipe means connected with said openings through the seal plates at the outer faces of the plates for carrying excess liquid away from the rollers, and ribs in substantially oblique position on the outer faces of said seal plates with their upper end portions positioned beneath openings through the seal plates adjacent to the uppermost face portion of said first-named roller adapted to cause liquid escaping through said last-named openings to pass downwardly on the outer faces of the plates into said drain pan.

13. In a moistening mechanism for a liquid process duplicating machine, the combination of a rotatably mounted roller, means cooperating with said roller for forwarding a copy sheet in contact with the roller, a spreader roller rotatably mounted in pressure relationship to said first-named roller, a pipe extending across in upwardly spaced relation to said spreader roller having a series of openings in its lower face portion for spraying liquid under pressure on said spreader roller, and a plate extending across a short distance in front of said pipe with its upper portion positioned substantially vertically and with its lower portion extended obliquely forwardly and downwardly toward said first-named roller serving to prevent splashing of the liquid onto said first-mentioned roller.

14. In a moistening mechanism for a liquid process duplicating machine, the combination of a rotatably mounted roller, means cooperating with said roller for forwarding a copy sheet in contact with the bottom face of the roller, a spreader roller rotatably mounted in rear of said first-named roller in pressure relationship thereto so as to cause its uppermost face portion to move toward said first-named roller on the rotation of the rollers and with such uppermost face portion at a lower level than that of the uppermost face portion of said first-named roller, means for delivering liquid into the bight of said two rollers above their line of contact with each other, a drain pan positioned below said spreader roller and extending underneath the line of contact of said two rollers, seal plates bearing on the ends of said two rollers above said drain pan and having openings, therethrough at points above the line of contact of the rollers and below the uppermost face portion of the spreader roller for permitting surplus liquid to escape from between the rollers, and means adapted to receive and carry away the surplus liquid flowing out through the openings in said seal plates independently of said drain pan so as to prevent such surplus liquid from contacting the rollers or the copy sheets.

STEPHEN KOKAY.