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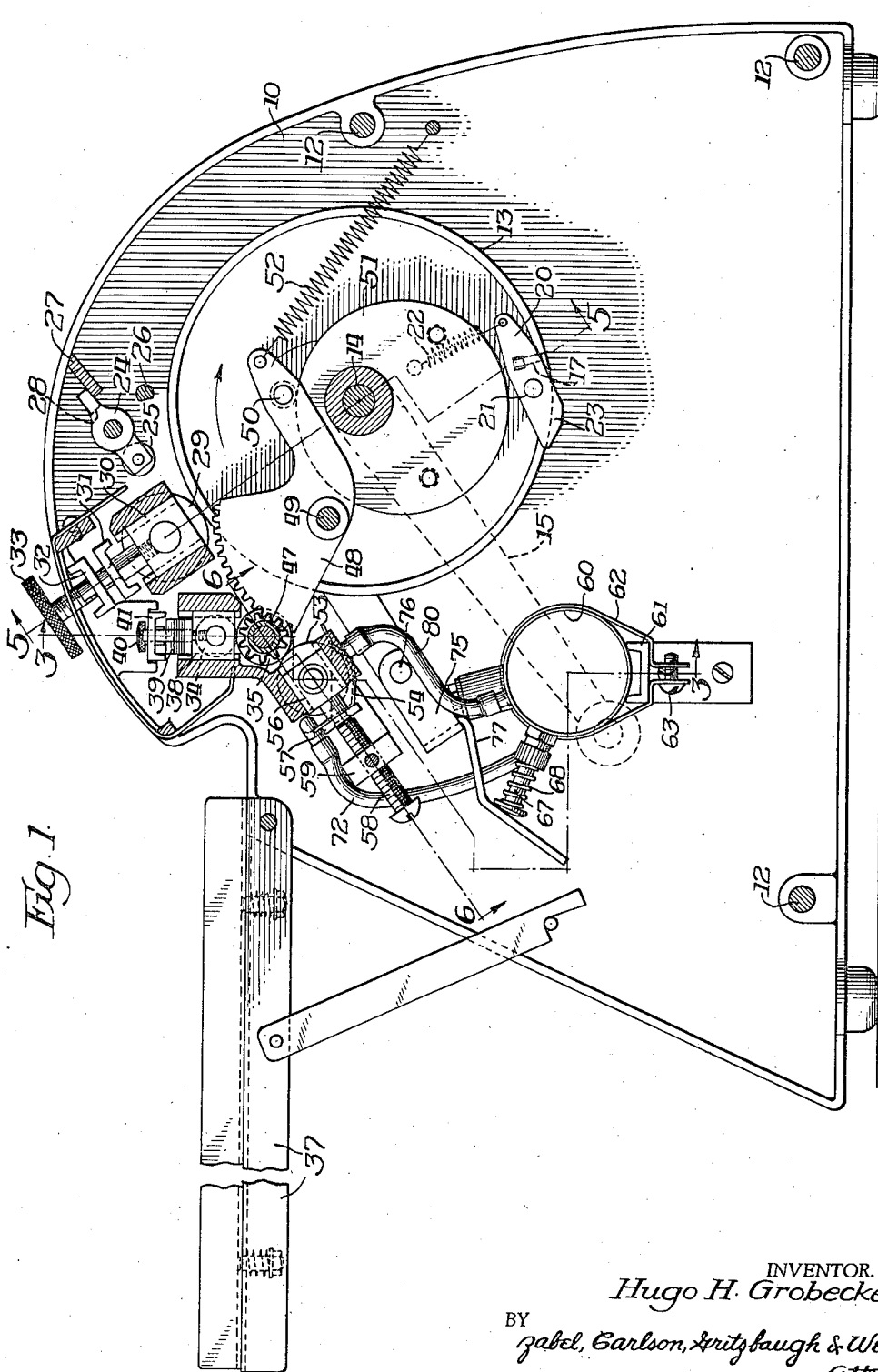
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MOISTENING MEANS FOR DUPLICATING APPARATUS

Filed Feb. 27, 1941

4 Sheets-Sheet 1



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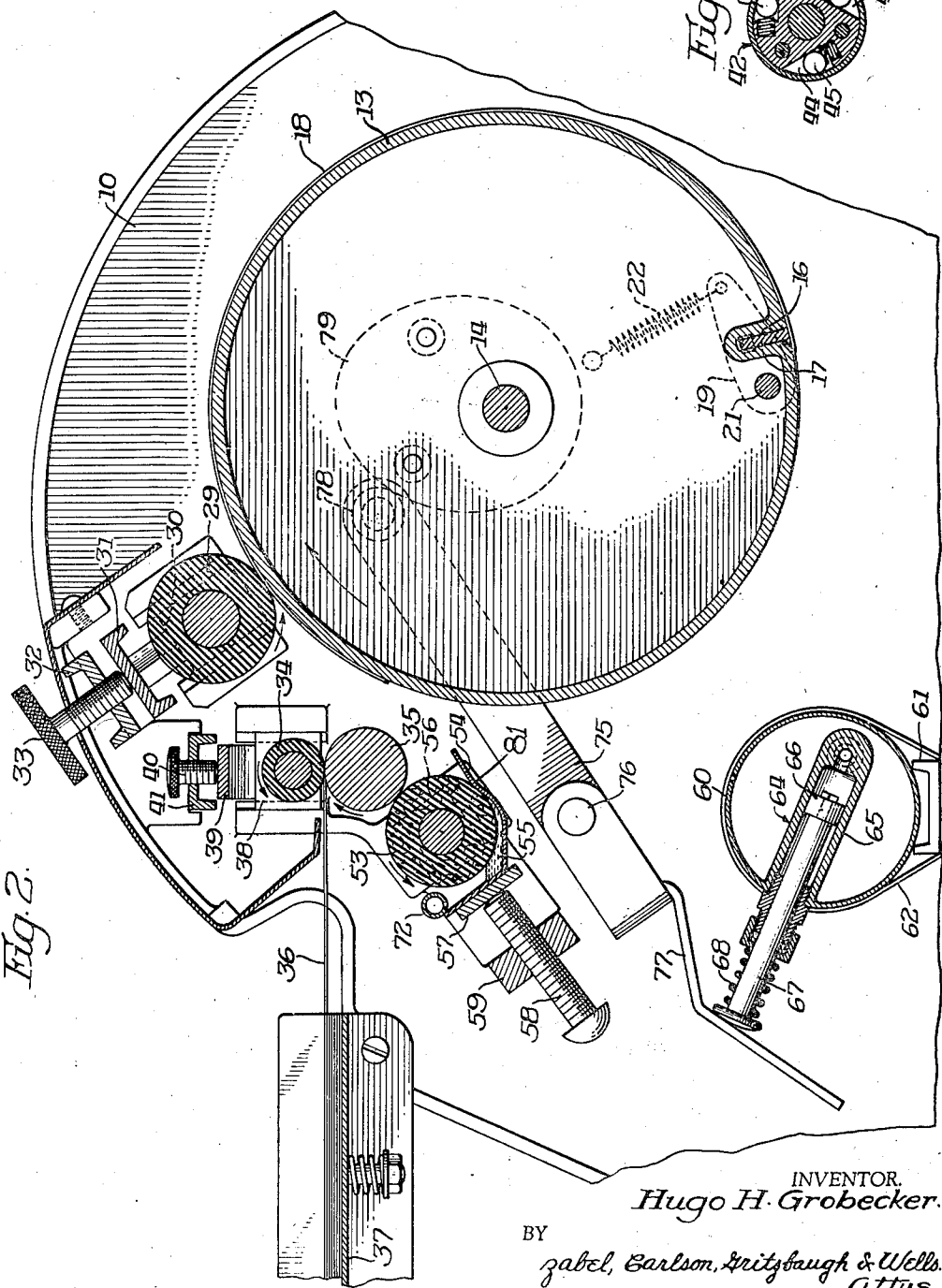
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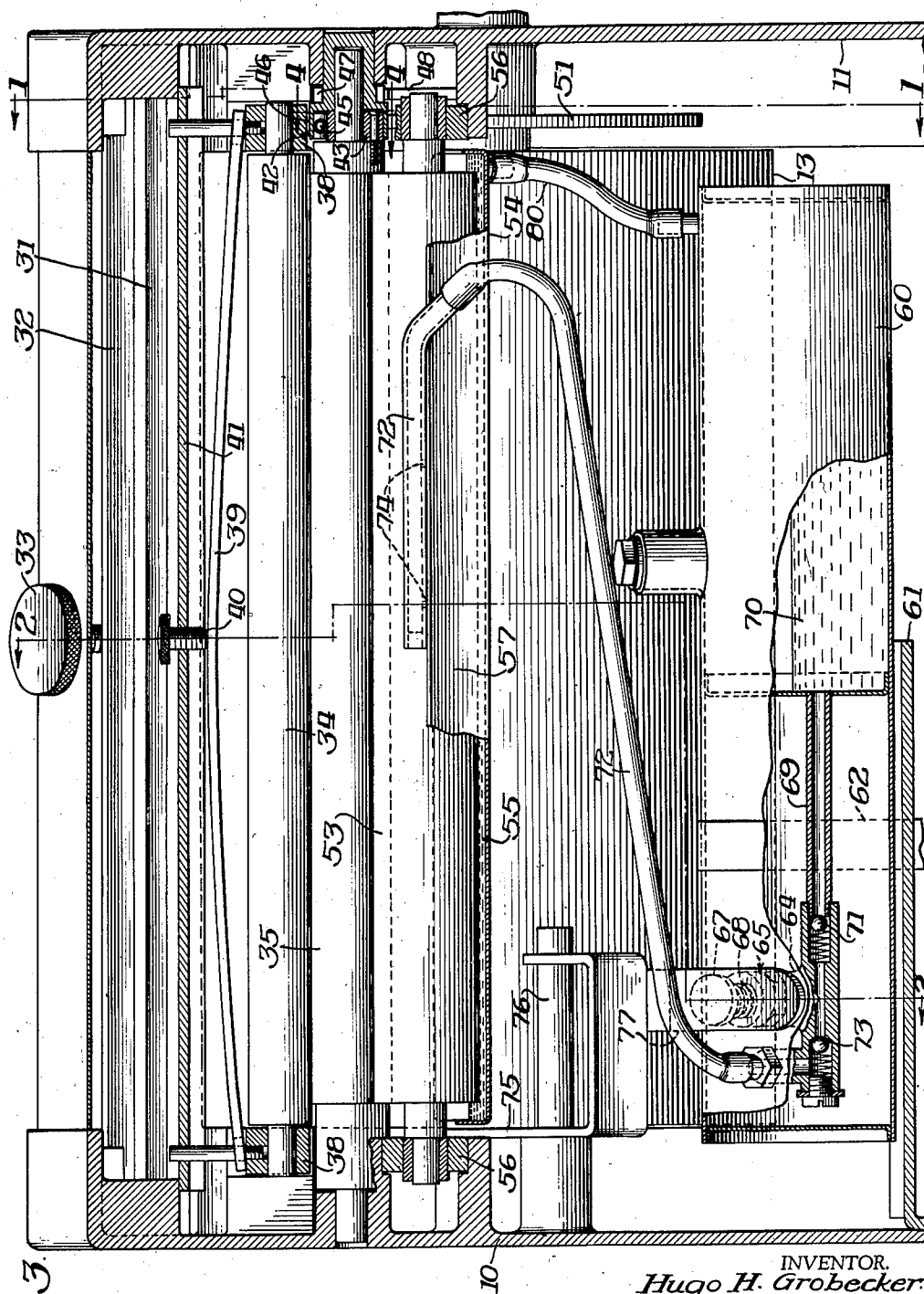
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4 Sheets-Sheet 4

Fig. 5.

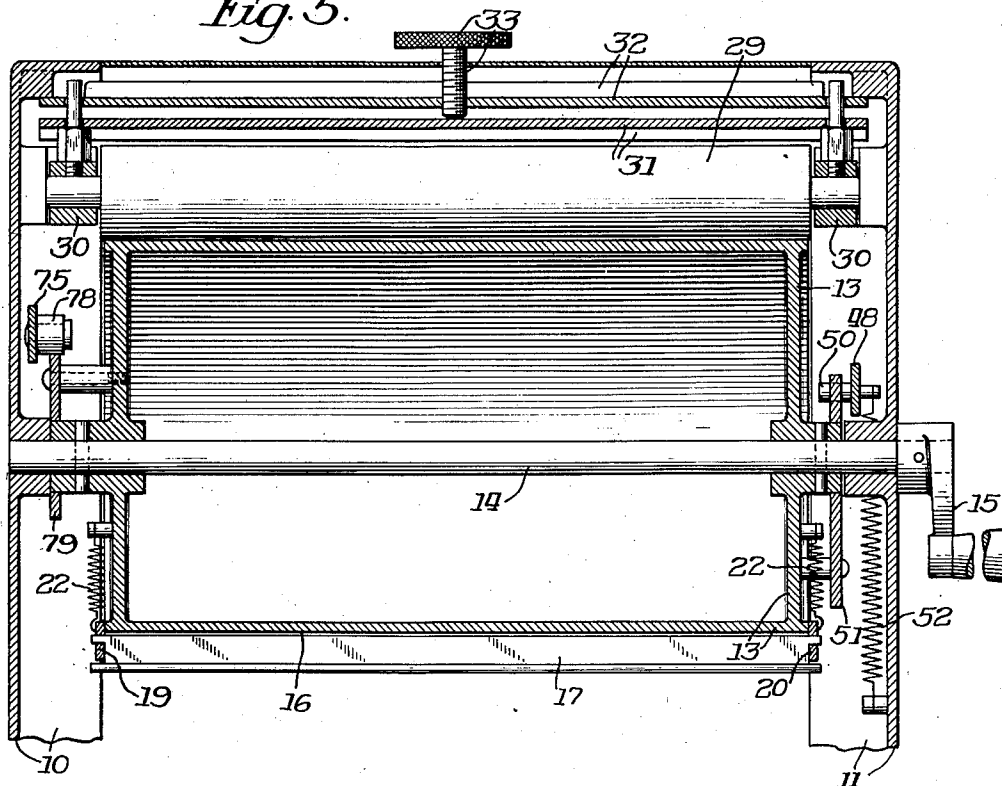
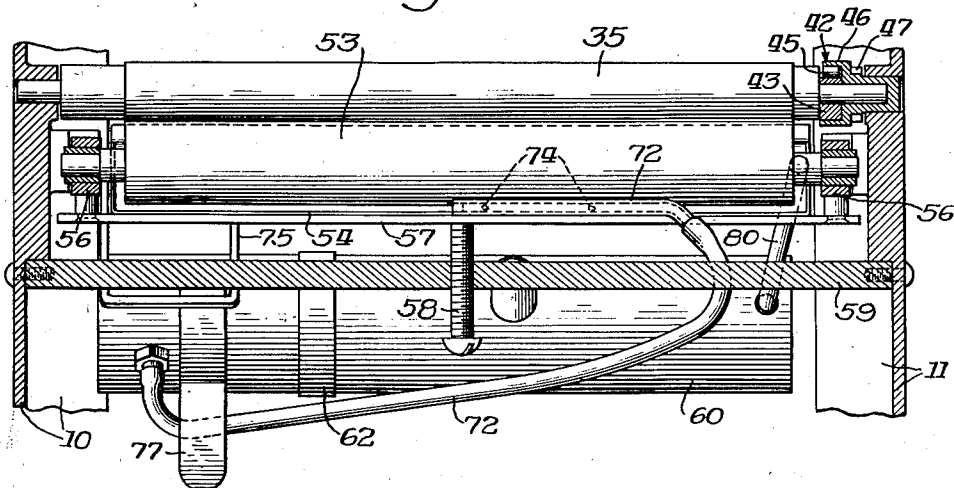


Fig. 6.



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UNITED STATES PATENT OFFICE

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MOISTENING MEANS FOR DUPLICATING APPARATUS

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7 Claims. (Cl. 91—50)

My invention relates to moistening means for duplicating apparatus of the liquid process type, and it has for its object the provision of a new and improved form and arrangement of parts by which a thin even film of liquid may be applied to the face of a copy sheet on its way into printing position in the apparatus.

In carrying out my invention in connection with a well-known type of duplicating machine in which a master sheet inked in reverse is removably mounted on a rotary drum to the upper face of which the copy sheets are fed one at a time, I have provided two forwarding rollers adjacent to the drum rotating in engagement with each other for feeding sheets forwardly, together with a novel arrangement of means for applying solvent to the lower roller for transfer to the bottom face of a copy sheet. The preferred arrangement for applying the solvent comprises a receptacle in which a pick-up roller is rotatably mounted so as to extend downwardly into a supply of solvent in the receptacle, such pick-up roller being in rolling engagement with the lower one of the two forwarding rollers. Means is provided for feeding solvent to the receptacle periodically during the operation of the machine, an overflow pipe being provided for draining away surplus solvent from the receptacle. Means is provided for applying an adjustable yielding pressure on the pick-up roller for moving it toward the lower forwarding roller so as to control the thickness of the film of solvent applied to said lower forwarding roller. The pick-up roller is preferably made of soft sponge rubber so as to be readily compressible and is preferably roughened on its peripheral surface so as to be adapted to pick up a substantial amount of the solvent.

It is another object of this invention to improve means 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 side view of a machine embodying the invention, with the side frame member removed at the near side of the machine, being substantially a sectional view taken at the line 1—1 of Fig. 3;

Fig. 2 is a longitudinal sectional view through the machine, being taken substantially at the line 2—2 of Fig. 3;

Fig. 3 is a transverse sectional view taken substantially at the line 3—3 of Fig. 1;

Fig. 4 is a vertical sectional view taken substantially at the line 4—4 of Fig. 3; and

Figs. 5 and 6 are sectional views taken substantially at the line 5—5 and the line 6—6, respectively, of Fig. 1.

Referring now to the several figures of the drawings, in which corresponding parts are indicated by the same reference characters, 10 and 11 indicate side frame members at opposite sides of the machine, connected together by a plurality of transversely extending bars 12 of any approved type as shown in Fig. 1. Between the frame standards 10 and 11, a drum 13 is rotatably mounted by means of a shaft 14 having at one end a crank handle 15 for rotating the drum in clockwise direction in Fig. 1, said crank handle being indicated diagrammatically in Fig. 1. At one side portion thereof, the drum 13 is provided with an outwardly open groove 16 in which a gripper bar 17 is movably mounted (see Figs. 2 and 5) so as to hold a master sheet 18 removably in position upon the drum, as is shown in said Fig. 2. At opposite ends of the drum, arms 19 and 20 are provided, rigidly mounted upon a shaft 21 carried by the drum so as to swing in unison with respect to the drum. The arms 19 and 20 are connected with the gripper bar 17 by an articulated connection so that when the arms are swung in clockwise direction in Fig. 2 the gripper bar is moved outwardly for releasing the master sheet 18. The bars 19 and 20 are normally held swung to their innermost positions by means of coiled springs 22.

The arm 20, as is clearly shown in Fig. 1, extends outwardly a short distance beyond the face of the drum 13 so as to provide a cam portion 23 for operating the gripper bar. As is clearly shown in Fig. 1, an arm or lever 24 is pivotally mounted upon the frame member 11 above the drum, being provided with a roller 25 at its inner end in position for engagement with the cam portion 23 of the arm 20 when the lever is swung in counterclockwise direction to the limit of its motion as shown in said Fig. 1, stops 26 and 27 being provided for limiting the movement of the lever 24. The lever 24 is provided with a handle portion 28 for giving the lever a movement manually into and out of the inoperative position as shown in Fig. 1.

When the lever 24 stands in the position as illustrated in Fig. 1, the drum 13 rotates entirely independently of the lever. When however the lever 24 is moved to the limit of its motion in counterclockwise direction, the cam portion 23 of the arm 20 is brought into engagement with the roller 25 upon rotation of the drum for moving the gripper bar 17 outwardly into position for

permitting the insertion of a master sheet in place.

Above the drum 13, a platen roller 29 is rotatably mounted in position for engaging the drum 13 and the master sheet carried thereby. The roller 29 is rotatably mounted in position in the arrangement shown by means of bearing blocks 30 slidable radially toward the axis of the drum, as is best shown in Figs. 2 and 5. Above the roller, a spring bar 31 is mounted with its end portions operatively engaging the blocks 30 for pressing the blocks and the roller 29 toward the drum 13. Above the bar 31, a second bar 32 is positioned, a set screw 33 being mounted by means of screw-threads in the bar 32 so as to engage the middle portion of the bar 31. The arrangement is such that the set screw 33 is capable of being adjusted inwardly for applying the desired pressure upon the platen roller 29.

Immediately in rear of the drum 13 and the platen roller 29, there are two cooperating forwarding rollers 34 and 35 adapted to grip and forward a copy sheet 36 as presented thereto from a tray or table 37, as is best shown in Fig. 2. In the arrangement shown, the roller 35 is mounted on a fixed axis between the frame members 10 and 11, as is best shown in Fig. 3, the roller 35 being preferably formed of brass with a smooth peripheral surface. The roller 34 is mounted upon a movable axis by means of bearing blocks 38 slidably mounted upon the frame members 10 and 11, as is clearly shown in Fig. 2. The roller 34 is normally pressed against the roller 35 by means of a curved spring bar 39 bearing on the upper faces of the blocks 38, with a set screw 40 adjustably mounted so as to engage the middle portion of the bar for pressing it downwardly. The set-screw 40 in the arrangement shown is mounted by means of screw-threads in a bar 41 extending across immediately above the spring bar 39. The roller 34 is preferably provided with an absorbent facing member made of any suitable material, such as felt, for example. The arrangement is such that the operator is able by a downward adjustment of the screw 40 to increase the pressure of the felt roller 34 against the brass roller 35 as may be desired.

The means for driving the forwarding rollers 34 and 35 comprises a one-way clutch 42 of any suitable type which in the arrangement shown includes a head member 43 fixedly mounted upon the roller 35 and having recesses 44 therein for the reception of driving rollers 45 which are held in place by a housing member 46 having a pinion 47 on its outer face. The arrangement is such that the pinion 47 and housing 46 are adapted to drive the forwarding roller 35 in clockwise direction in Fig. 4, while at the same time permitting said roller 35 to rotate freely in clockwise direction in said figure independently of the application of power from said pinion 47.

In the construction illustrated, the pinion 47 meshes with the teeth of an arm 48 pivotally mounted on the frame member 11 by means of a pin 49 (see Fig. 1), such arm being provided with a lug or roller 50 in position to engage an eccentric member 51 mounted to rotate with the drum 13. A coiled spring 52 holds the arm 48 in position for engagement of the lug or roller 50 with the eccentric 51. The arrangement is such that upon each revolution of the drum the arm 48 is given a stroke in counterclockwise direction in Fig. 1 for driving the roller 35 in clockwise direction in said figure. Upon the return stroke of the arm 48, the clutch 42 yields for permit-

ting the roller to remain stationary except as the roller is driven in clockwise direction in Fig. 2 by the pull of a copy sheet thereon.

Means is provided as is usual in machines of this type for applying moisture to one of the forwarding rollers for transfer to a copy sheet on its way to the drum. My improved moistening means comprises a roller 53 rotatably mounted in a receptacle 54 adapted to contain a supply of liquid solvent 55 therein, the roller 53 being adapted to engage the lower forwarding roller 35 and to be in contact with the liquid in the receptacle. The roller 53 is preferably made of sponge rubber with a roughened peripheral face so as to be effective for picking up an ample supply of liquid from the receptacle. The roller 53 is normally driven by its frictional engagement with the forwarding roller 35.

The pick-up roller 53 is mounted upon a movable axis so as to be adjustable toward and from the forwarding roller 35, this result being effected by the use of slidably mounted bearing blocks 56 in which the roller is rotatably mounted, such bearing blocks being supported by engagement with a spring bar 57 extending across adjacent to the roller. The middle portion of the spring bar 57 is adjustably supported by means of a set screw 58 mounted by means of screw-threads in a cross bar 59 (see Figs. 2 and 6). The arrangement is such that by an adjustment of the set screw 58 the degree of pressure of the roller 53 against the roller 35 may be controlled for regulating the thickness of the film of liquid applied by the roller 53 to the roller 35.

The means illustrated for delivering liquid to the receptacle during operation of the machine comprises a tank 60 mounted below the receptacle 54. In the arrangement shown, the tank 60 is supported by a transversely extending bar 61 to which the tank is adjustably secured by one or more clamping bands 62 the lower ends of which are connected by means of a set screw 63, as is shown in Fig. 1. Within the tank 60, a pump 64 is mounted comprising a cylinder 65 having a piston 66 operating therein by means of a piston rod 67 normally held in extended position by means of a coiled spring 68, see Fig. 2. The lower end portion of the cylinder 65 communicates by means of a tube 69 with a supply of liquid 70 in the tank 60, a check valve 71 being provided in connection with the tube 69 for preventing movement of liquid toward the right therein in Fig. 3. The cylinder 65 is also in communication with a pipe or tube 72 by means comprising a check valve 73 which also prevents movement of liquid toward the right in Fig. 3. The tube 72 extends upwardly to the receptacle 54 so as to empty thereinto through suitable openings 74 through the wall of the tube. The arrangement is such that upon upward movement of the piston rod 67 liquid is drawn into the cylinder 65 and that upon downward movement of the piston liquid is forced out through the tube 72 and the openings 74.

The means provided for operating the pump 64 comprises a lever 75 pivotally mounted upon a pin 76 extending inwardly from the frame member 10, as is shown in Fig. 3. The lever 75 is provided at its lower end portion with an obliquely disposed operating arm 77 in position to engage the piston rod 67. When the lever 75 is swung in counterclockwise direction in Fig. 2, the piston rod 67 is moved downwardly, and when the lever 75 swings in clockwise direction the piston rod is moved upwardly by the spring

68. The lever 75 is provided at its upper end with a roller 78 in position to engage a cam 79 fixedly mounted upon the drum 13. The arrangement is such that upon each revolution of the drum 13 the lever 75 is given an operative stroke for forcing a small amount of liquid from the tank 60 into the receptacle 54. An overflow pipe 80 connects the receptacle 54 with the tank 60, as is best shown in Fig. 3, for permitting excess liquid to return to the tank.

In the arrangement illustrated, the solvent in the receptacle 54 is picked up by the roughened roller 53 for transfer to the lower forwarding roller 35, the thickness of the film of liquid so applied being controlled by the degree of spring pressure applied through the bar 57 upon the roller 53. With the upwardly moving face portion of the roller 53 engaging the upwardly moving face portion of the roller 35, the solvent is carried quickly and directly from the receptacle for application to the bottom face of a copy sheet 36. The arrangement is such that the amount of solvent applied through the medium of the rollers 53 and 35 is controlled so as to prevent the travel of any surplus liquid to the face of the copy sheet. In case a surplus supply of solvent is picked up by the roller 53, such surplus is removed from said roller by engagement with an inwardly bent wall portion of the receptacle 54 as shown at 81 in Fig. 2, such wall portion serving effectively as a wiper for preventing the presentation of excessive solvent to the roller 35. With the film of liquid on the roller 53 acted upon first by the wiper at 81 and then gauged by the pressure effect between the rollers 53 and 35, the film of liquid as carried upwardly by the roller 35 is kept substantially uniform throughout the length of the roller and substantially uniform about its periphery.

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

I claim:

1. In a moistening apparatus for a liquid process duplicating machine, the combination of two cooperating rollers one above the other for forwarding a copy sheet between them, one of said rollers being mounted on a fixed axis, a receptacle adjacent to said one roller adapted to hold a supply of solvent, a pick-up roller rotatably mounted on a movable axis in said receptacle in engagement with said one forwarding roller and in position to contact a supply of solvent in the receptacle for applying a film of the solvent to said forwarding roller, a spring bar operatively engaging said pick-up roller at its end portions, and means for applying pressure at an intermediate portion of said bar for pressing said pick-up roller yieldingly toward said forwarding roller for gauging the thickness of the film of solvent applied thereto.

2. In a moistening apparatus for a liquid process duplicating machine, the combination of two cooperating rollers one above the other for forwarding a copy sheet between them, the lower one of said rollers being mounted on a fixed axis, a receptacle below said lower forwarding roller adapted to hold a supply of solvent, a pick-up roller rotatably mounted in said receptacle in engagement with said lower forwarding

roller and in position to contact a supply of solvent in the receptacle for applying a film of the solvent to said lower forwarding roller, said pick-up roller being mounted in bearing blocks slidable toward and from said lower forwarding roller, a spring bar extending across the machine and engaging said bearing blocks at its end portions, and means for applying pressure at about the middle portion of said spring bar for pressing said pick-up roller yieldingly toward said lower forwarding roller for gauging the thickness of the film of solvent applied thereto.

3. In a moistening apparatus for a liquid process duplicating machine, the combination of two cooperating rollers one above the other for forwarding a copy sheet between them, a receptacle below the lower one of said two forwarding rollers adapted to hold a supply of solvent, and a pick-up roller formed of soft sponge rubber having a roughened peripheral surface rotatably mounted in said receptacle in engagement with said lower forwarding roller and in position to contact a supply of solvent in the receptacle for applying a film of the solvent to said lower roller.

4. In a moistening apparatus for a liquid process duplicating machine, the combination of an absorbent roller, bearing blocks slidably mounted in position for supporting said roller on a movable axis, a second roller rotatably mounted on a fixed axis in engagement with said first-named roller so as to cooperate therewith for forwarding a copy sheet, said second roller having a smooth non-absorbent peripheral surface, a spring bar extending along said first-named roller and engaging said bearing blocks, adjustable pressure means engaging an intermediate portion of said spring bar for causing the bar to apply adjustable yielding pressure on said first-named roller for movement toward said second roller, a receptacle adjacent to said second roller adapted to hold a supply of solvent, a comparatively very soft pick-up roller rotatably mounted on a movable axis in said receptacle in engagement with said second forwarding roller and in position to contact a supply of solvent in the receptacle for applying a film of the solvent to said second forwarding roller, and means for pressing said pick-up roller yieldingly against said comparatively solid forwarding roller so as to increase the surface contact of the pick-up roller with said forwarding roller for gauging the thickness of the film of solvent applied to said forwarding roller.

5. In a moistening apparatus for a liquid process duplicating machine, the combination of two cooperating rollers one above the other, means for rotating said rollers in the direction for forwarding a copy sheet between them, the lower one of said rollers being substantially solid and having a smooth peripheral surface, a receptacle adjacent to said lower roller adapted to hold liquid, and a comparatively very soft pick-up roller rotatably mounted in said receptacle and positioned backwardly and downwardly relative to said first-named two rollers with its upwardly moving face portion engaging the upwardly moving face portion of said lower roller and in position for contacting a supply of liquid in the receptacle so as to apply a gauged film of the liquid to said lower forwarding roller.

6. In a moistening apparatus for a liquid process duplicating machine, the combination of two cooperating rollers one above the other for forwarding a copy sheet between them, a receptacle adjacent to one of said two forwarding rollers adapted to hold a supply of solvent, a pick-up

roller rotatably mounted in said receptacle in engagement with the adjacent forwarding roller and in position to contact a supply of solvent in said receptacle for applying a film of the solvent to said adjacent forwarding roller, and a wiper in said receptacle comprising an inwardly projecting portion of the wall of the receptacle adapted by engagement with the upwardly moving face portion of said pick-up roller to remove solvent from the roller for limiting the amount of solvent presented to said forwarding roller. 10

7. In a moistening apparatus for a liquid process duplicating machine, the combination of two cooperating rollers one above the other for forwarding a copy sheet between them, a receptacle 15

formed at least partially of sheet material located adjacent to one of said two forwarding rollers adapted to hold a supply of solvent, and a pick-up roller rotatably mounted in said receptacle in engagement with the adjacent forwarding roller and in position to contact a supply of solvent in said receptacle for applying a film of the solvent to said adjacent forwarding roller, a portion of the wall of said receptacle being pressed inwardly into position to engage the upwardly moving face of said pick-up roller throughout the length of said roller for removing surplus solvent from the roller so as to limit the amount of solvent presented to said forwarding roller.

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