Jan. 5, 1943. E. WILDERSON 2,307,555

MOISTENING MEANS FOR DUPLICATING MACHINES

Filed Feb. 17, 1940 4 Sheets-Sheet 1

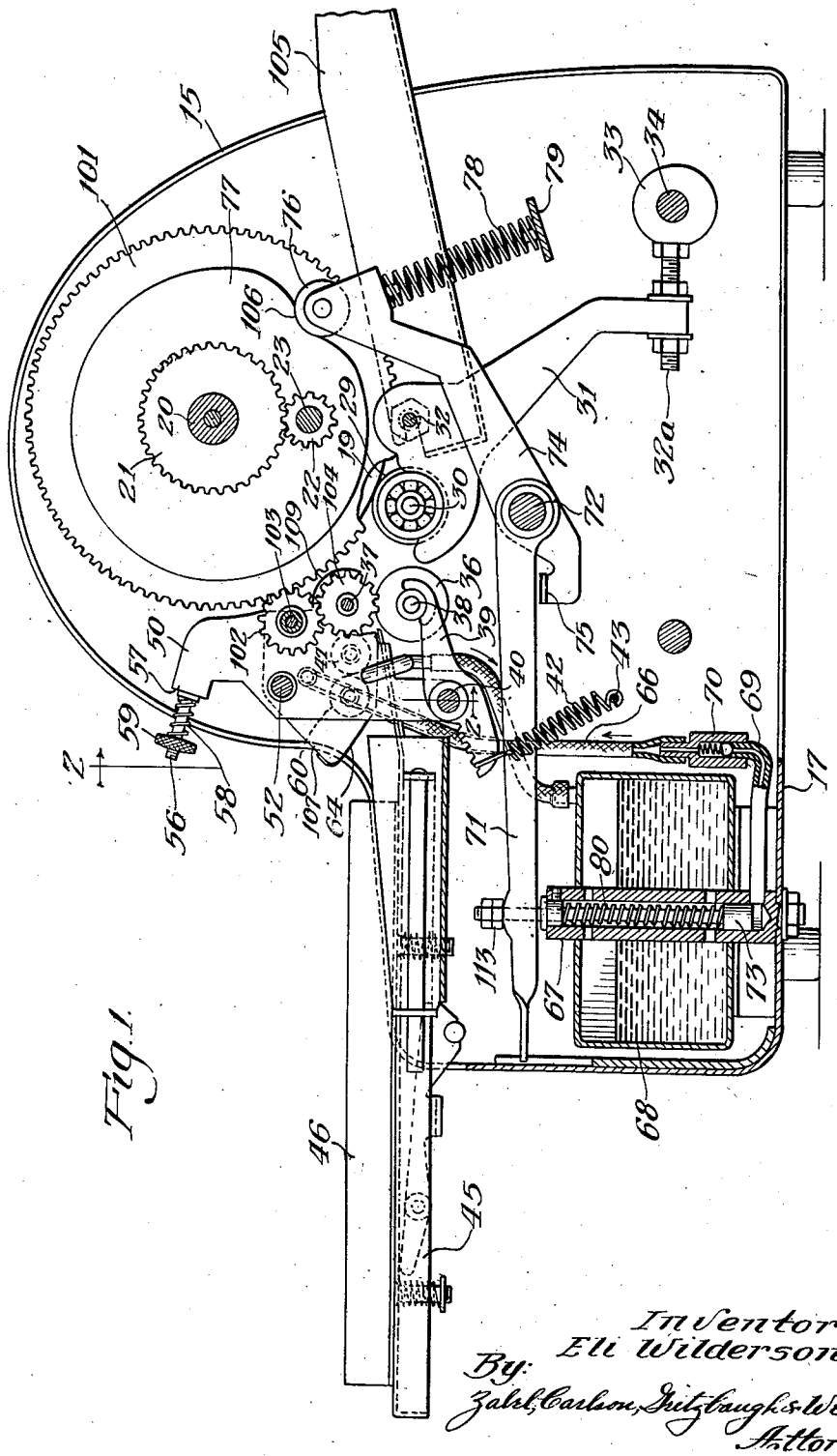


Fig. 1.

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MOISTENING MEANS FOR DUPLICATING MACHINES

Filed Feb. 17, 1940 4 Sheets-Sheet 2

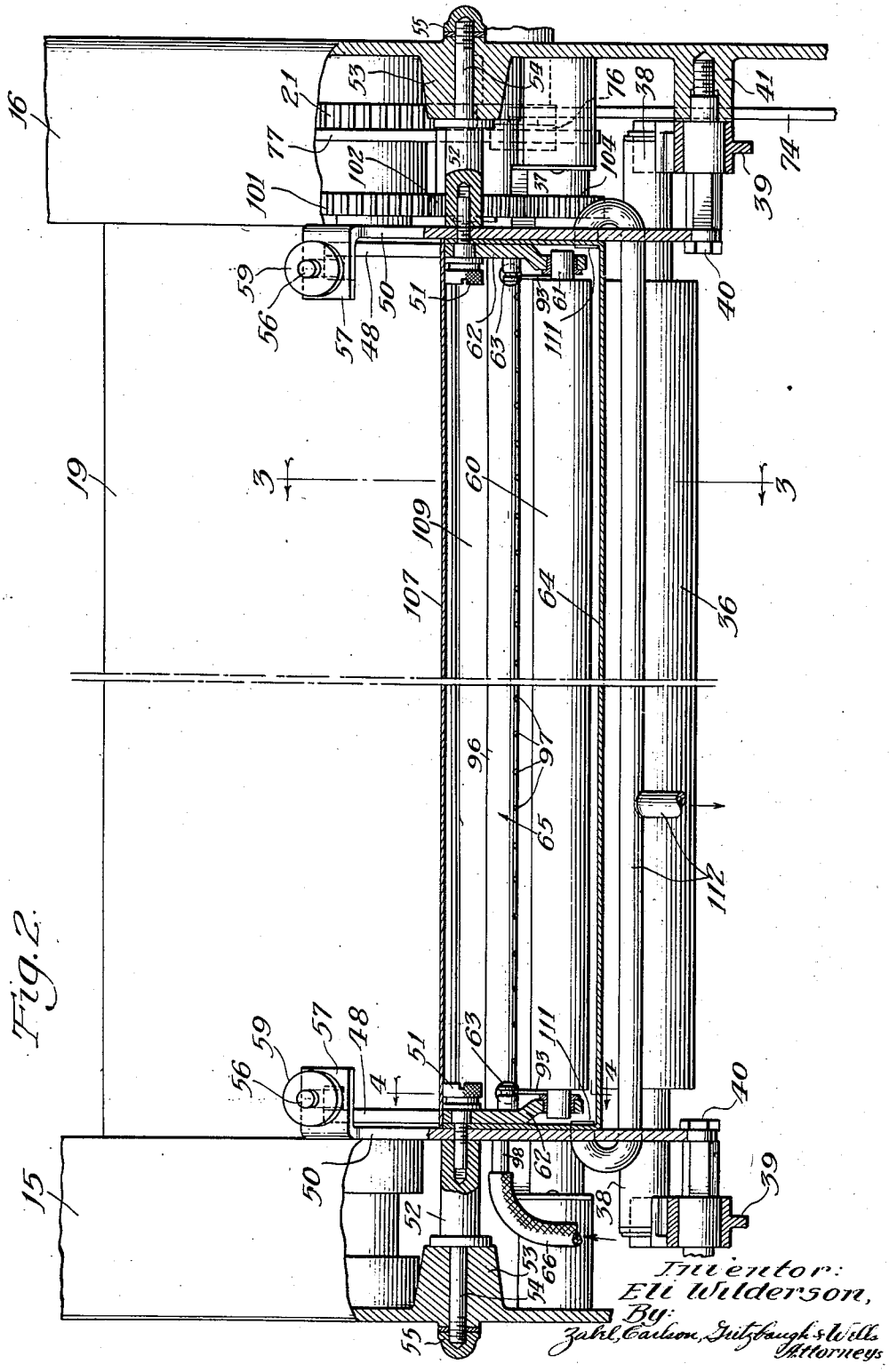


Fig. 2.

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MOISTENING MEANS FOR DUPLICATING MACHINES

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Fig. 3.

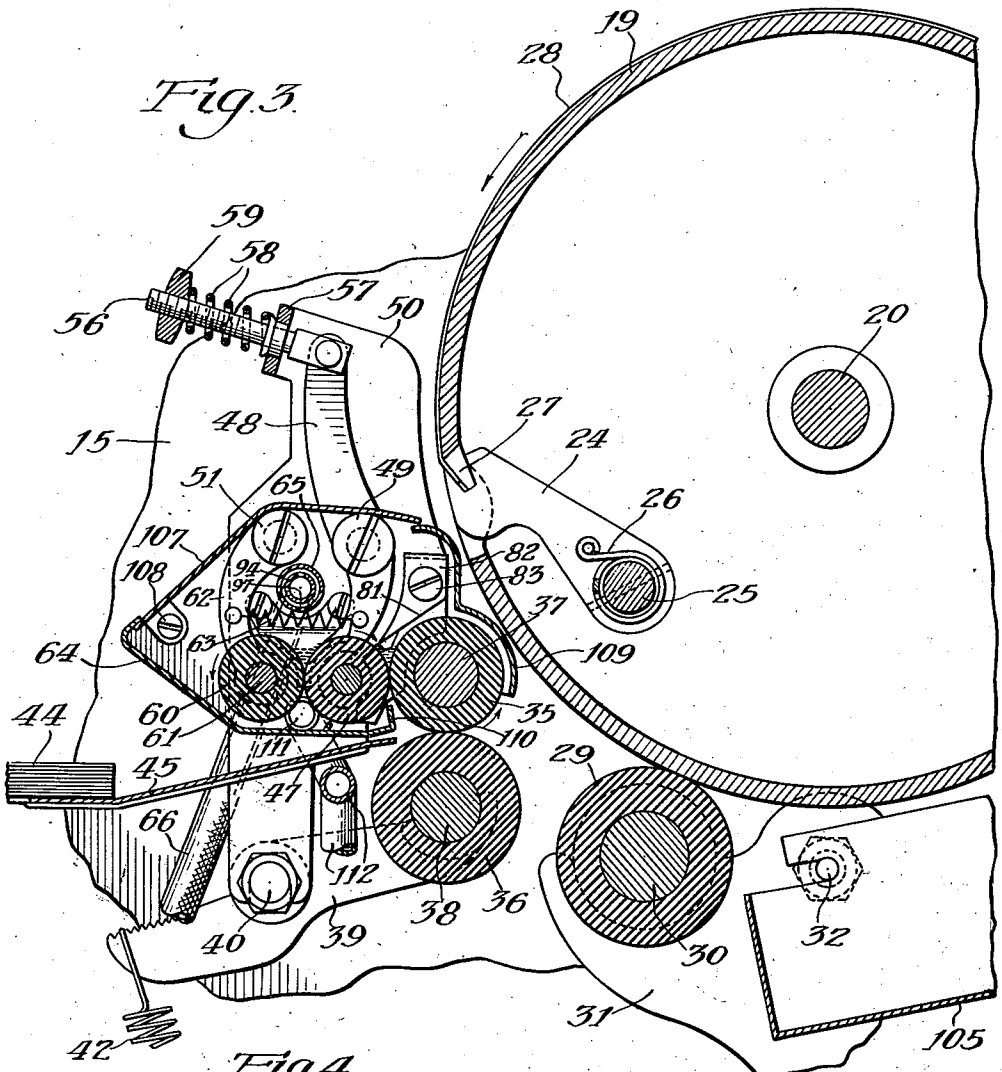


Fig. 4.

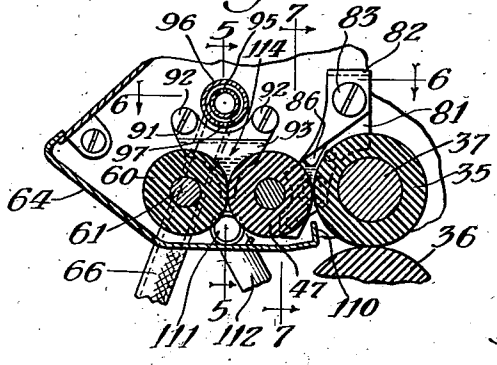
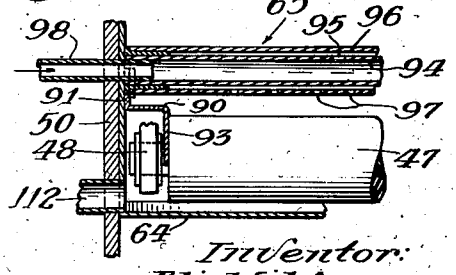


Fig. 5.



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MOISTENING MEANS FOR DUPLICATING MACHINES

Filed Feb. 17, 1940 4 Sheets-Sheet 4

Fig. 6.

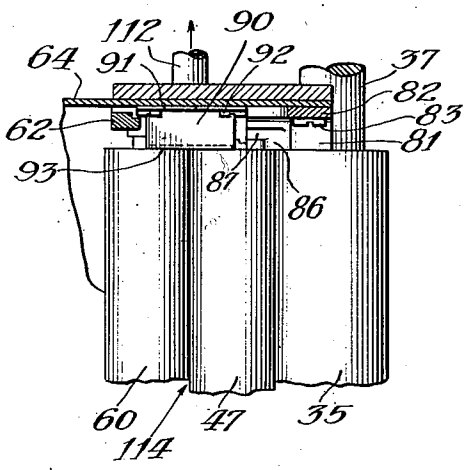


Fig. 7.

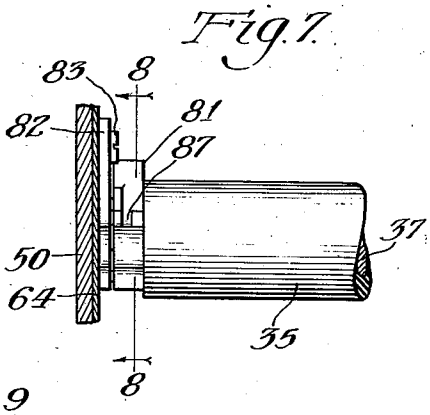


Fig. 8.

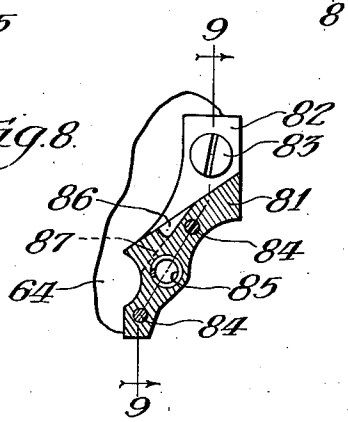


Fig. 9.

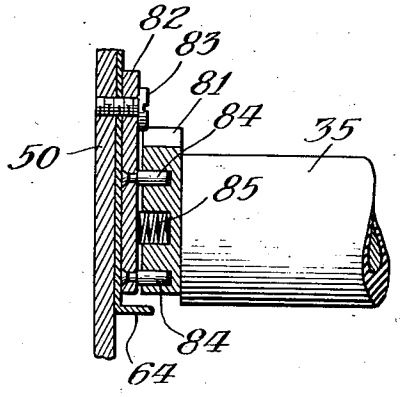
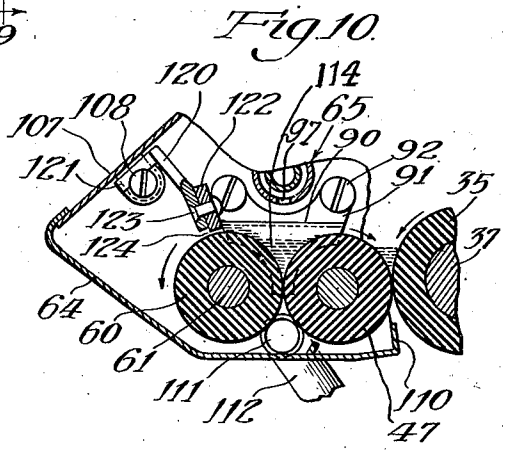


Fig. 10.



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Patented Jan. 5, 1943 2,307,555

UNITED STATES PATENT OFFICE

2,307,555

MOISTENING MEANS FOR DUPLICATING MACHINES

Eli Wilderson, Chicago, Ill., assignor to Ditto, Incorporated, Chicago, Ill., a corporation of West Virginia

Application February 17, 1940, Serial No. 319,455

8 Claims. (Cl. 91—50)

This invention relates to moistening means for wet process duplicating machines and in particular to a moistening means provided with a moistening means provided with a moistening roll which contacts each copy sheet as it is fed into engagement with the drum and transfers a thin film of moisture to the surface of said copy sheet.

It has been found desirable, in order to secure a thin film of solvent of controlled thickness on the surface of the moistening roll, to provide a supply roll which is urged into contact with the surface of the moistening roll so that the film may be transferred from the supply roll to the moistening roll. By means of regulating the pressure with which the supply roll contacts the moistening roll the thickness of the film can be controlled. The supply roll may receive its moisture by a variety of means, such as by contact with a wick, by dipping into a reservoir, or by a spray. The use of any one of these means entails certain disadvantages. For instance, a wick is slow acting and must be primed. A spray which is supplied by a pump also needs a certain amount of priming. When the supply roll dips into a reservoir it has been found that there is a considerable amount of splashing as the roll rotates through the liquid, this splashing often causing the solvent to be transferred to the copy sheet in undesirably large quantities, thus ruining the master sheet. Furthermore, it has been found that there is a tendency for solvent to accumulate at the under side of the bite between the moistening and the supply rolls when these rolls are stationary, this liquid presumably creeping upwardly from the reservoir along the under surface of the supply roll. When the machine is started after a period of non-use this accumulation of solvent is brought into contact with the copy sheet as the moistening roll rotates.

An object of my invention is to provide for a duplicating machine an improved moistening mechanism in which a film of solvent of controlled thickness may be applied to a copy sheet.

A further object of my invention is to provide an improved moistening construction which does not need priming after a short period of non-use and in which an accumulation of solvent at the bite of the supply and moistening rolls when said rolls are stationary will be prevented.

A further object of my invention is to provide an improved moistening mechanism for a duplicating machine in which undesirable splashing is eliminated.

In the preferred embodiment of my invention which is herein illustrated, a moistening roll and a supply roll are provided which are in contact with each other. Instead of providing a body of liquid beneath the supply roll, the reservoir from which the supply roll picks up its solvent for transfer to the moistening roll is located at another point on the surface of the roll. This reservoir is provided by means of a third roll which contacts the supply roll, the bite of these two rolls serving to hold a body of solvent. Means are also provided to supply solvent to the bite of the supply and the third rolls.

Referring now to the drawings which illustrate a preferred embodiment of my invention—

Fig. 1 is a sectional elevation through a duplicating machine;

Fig. 2 is a section on an enlarged scale taken along line 2—2 of Fig. 1;

Fig. 3 is an enlarged sectional elevation taken along line 3—3 of Fig. 2;

Fig. 4 is a detailed section taken along line 4—4 of Fig. 2, certain parts being omitted for the purpose of clarity;

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

Fig. 6 is a plan section taken along line 6—6 of Fig. 4;

Fig. 7 is a section taken along line 7—7 of Fig. 4;

Fig. 8 is a section taken along line 8—8 of Fig. 7;

Fig. 9 is a section taken along line 9—9 of Fig. 8; and

Fig. 10 is a view similar to Fig. 4 but showing a modified structure.

Referring now to the several figures of the drawings, in which corresponding parts are indicated by the same reference characters, 15 and 16 indicate frame members formed of sheet metal pressed into dished form and located at opposite sides of the machine, being connected together at their lower ends by transversely extending frame parts 17. A drum 19 of any approved type is rotatably mounted in position between the frame members 15 and 16 by means of a heavy shaft member 20 which is provided with a gear 21 meshing with a pinion 22 for giving the drum 19 the desired rotary movement, such rotary movement being effected preferably by means of a crank or the like (not shown) carried by a stub shaft 23 upon which the pinion 22 is fixedly mounted. As is best shown in Fig. 3, the drum 19 is provided with a series of grippers 24 mounted upon a shaft 25 and normally pressed by springs 26 into operative position with respect to bearings 27 on the drum for holding a

master sheet 28 releasably in position upon the face of the drum.

Underneath the drum 19, a platen roll 29 is mounted in position by means of a heavy shaft 30 between two levers 31 pivotally mounted upon pins 32 carried by the frame members 15 and 16. The lower ends of the levers 31 are provided with screw-threaded pins 32a which are rigidly mounted in position on the levers so as to bear at their forward ends against cams 33 rotatably mounted in position by means of a shaft 34. The arrangement is such that upon rotary movement of the shaft 34 the levers 31 are swung about the pins 32 for increasing or decreasing the effective pressure between the platen roll 29 and the drum 19.

The means for forwarding copy sheets into the bite of the drum 19 and the platen roll 29 comprises two rolls 35 and 36 rotatably mounted in position between the frame members 15 and 16 by means of shafts 37 and 38, respectively, such rolls being mounted in cooperative relation with respect to each other so as to move copy sheets forwardly toward the right in Fig. 3 into the bite of the drum and the platen roll 29.

In the construction illustrated, the shaft 38 for the roll 36 is supported by levers 39 at opposite sides of the machine pivotally mounted at intermediate points by means of machine screws 40 which take into lugs 41 carried by the frame members 15 and 16. Springs 42 are connected between the upper end portions of the levers 39 and pins 43 carried by the frame members 18 for pressing the roll 36 forcibly against the roll 35, the degree of pressure being controlled by the position at which the springs 42 are mounted upon the levers 39 (see Fig. 1).

For supporting a pile of copy sheets 44 in position in rear of the sheet forwarding rolls 35 and 36 for being fed forwardly toward the right in Fig. 3, a table 45 has been provided suitably supported in position with its forward edge portion extending into close proximity to the rolls 35 and 36, as is best shown in Fig. 3. Side bars 46 of any suitable type are adjustably mounted upon the table 45 for holding the sheets 44 in the desired adjusted position upon the table.

The means for applying solvent upon the moistening roll 35 for transfer to a copy sheet fed between the rolls 35 and 36 comprises a feeder roll 47 rotatably mounted between arms or levers 48 pivotally mounted by means of machine screws 49 taking into auxiliary frame plates 50 at opposite sides of the machine. In the arrangement shown, the auxiliary frame plates 50 are mounted upon the frame members 15 and 16 by having notched engagement with the machine screws 40 at their lower end portions, being further secured at their upper end portions by means of machine screws 51 secured in bearing blocks 52 which in turn are secured on lugs 53 by means of screw-threaded pins or bolts 54 having nuts 55 secured on their outer ends, as is clearly shown in Fig. 2. At their upper ends, the levers 48 are provided with screw-threaded bolts 56 (see Fig. 3) which are pivotally mounted upon the levers and extend rearwardly through perforated lugs 57 carried by the plates 50. Upon the rear end portions of the bolts 56 in rear of the lugs 57, coil springs 58 are mounted, such springs being pressed forwardly by means of thumb nuts 59 mounted by means of screw-threads on said bolts. The arrangement is such that the springs 58 serve to press the roll 47 forwardly toward the moistening roll 35 for controlling the pressure between said two rolls, the degree of pressure being dependent upon the position of the thumb nut 59 upon the bolts 56.

A third roll 60 is rotatably mounted in position by means of a shaft 61 which is journalled in arms or levers 62 pivotally mounted on the machine screws 51. Springs 63 connect the arms 62 with the arms 48 so as to urge the third roll 60 against the supply roll 47.

A receptacle 64 is provided in which the rolls 60 and 47 are located, the side walls of the receptacle being affixed to the auxiliary frame plates 50 and being suitably apertured to provide for the shaft 37 and the machine screws 49 and 51. A spray 65 is positioned within the receptacle above the bite of the rolls 60 and 47. The spray may be suitably affixed to the side walls of the receptacle 64 by means of brazing or welding for instance. Solvent is supplied to the spray by means of the pump 67, a pipe 69 leading from the lower portion of the pump to the flexible hose 66, the hose being in communication with the spray means 65. A check valve 70 is interposed in the supply line between the pipe 69 and the hose 66.

The pump 67 is operated by means of a lever 71 pivotally mounted on the frame of the machine by means of a machine screw 72, the lever 71 being adjustably connected with the piston rod 73 of the pump, as is clearly shown in Fig. 1. A second lever 74 is pivotally mounted by means of the machine screws 72, with a lug 75 thereon engaging the bottom face of the lever 71 so that downward movement of the lever 74 causes upward movement of the lever 71. A roller 76 carried by the lever 74 is actuated by a cam 77 carried by the drum 19 so that the lever 71 is given an upward stroke against the action of the spring 80 of the pump, followed by a downward stroke upon each revolution of the drum, the downward stroke of the lever 74 being effected against the action of a coil spring 78 mounted between the lever 74 and a bar 79. The arrangement is such that upon each operative stroke of the lever 71 solvent is delivered from the tank or receptacle 68 through the pipe 69, flexible hose 66 and to the spray 65. The amount of solvent delivered by each stroke of the pump may be regulated by taking up the screws 113 which secure the piston rod 73 to the lever 71. Additional means for regulating the length of the pump stroke may be provided if desired, such means being disclosed in Patent No. 2,145,729 issued to Alfred Marchev on January 31, 1939. Such means may comprise an arm extending downwardly from the lever 71 into contact with a manually adjustable cam suitably mounted on the frame of the machine to limit the downward movement of the piston rod 73.

At opposite ends of the rolls 35 and 47, wiper members 81 in the form of blocks are mounted so as to bear against the ends of the rolls for wiping surplus solvent therefrom and so as to partially close the space between the rolls 35 and 47. Each of the blocks 81 is mounted in position by means of a plate 82 secured at its upper end by machine screws 83. The blocks or wipers 81 may be slidably mounted on pins 84 as shown in Figs. 8 and 9, and a coil spring 85 may be interposed between the plate 82 and the blocks 81 to urge the surface of each block into contact with the ends of the rolls 47 and 35 so as to wipe from the end surfaces of the rolls any solvent which may be accumulated there. The wipers 81 also prevent any solvent which may accumulate at the bite of the rolls 35 and 47 from spilling over the ends thereof.

As indicated in Figs. 6, 7 and 8, each block is provided with a notched portion 86 which communicates with a groove 87 formed in the upper surface of each block. If too much solvent accumulates at the bite it will spill out through the notched and grooved portions into the bottom of the receptacle 64 without contacting the ends of the rolls 35 and 47.

Wiper members 90 are also provided at either end of the rolls 47 and 60, these members being offset (see Fig. 5) so as to provide an upper portion 91 which may be secured by means of machine screws 92 to the wall of the receptacle and to the auxiliary frame plates 50, and a lower portion 93 which contacts the end surfaces of the rolls 47 and 60. The wiper members 90 serve to wipe the moisture from the ends of the rolls, and also cooperate with the bite of the rolls to form a reservoir, designated generally as 114, from which solvent may be applied to the surface of the supply roll 47.

The spray 65 is positioned directly above the reservoir 114 and this spray, as shown in Fig. 5, comprises an inner pipe 94 which is provided with a plurality of perforations 95 in the upper portion thereof, together with an outer pipe 96 concentric with the inner pipe 94. The outer pipe is provided with a plurality of perforations 97 which are directed downwardly toward the bite of the rolls 47 and 60 so that solvent may be supplied to the reservoir 114 formed by the bite and by the wipers 90. A connecting conduit 98 extends through the auxiliary frame plate 50 and the side wall of the receptacle 64 to provide communication between the flexible hose 66 and the spray 65.

The solvent supplied to the reservoir 114, which is formed between the bite of the rolls 60 and 47 and the wipers 90, adheres to the surfaces of each of the rolls. That solvent adhering to roll 47 is transferred to the bite formed between the supply and the moistening rolls. In case a considerable amount of solvent accumulates in the latter bite, provision is made to allow the excess to run off through the notches 86 of the wiper blocks 81. The amount of solvent accumulated in this bite is determined by the pressure between the rolls 47 and 35 and also by the length of the pump stroke. When the pump stroke is shortened as above pointed out, the level of the liquid in the reservoir 114 will be lowered and hence less solvent will be carried over to the bite between the supply and moistening rolls because of the greater lift.

The means employed for rotating the moistening roll 35 comprises a large gear 101 fixedly mounted upon the shaft 20 so as to rotate with the drum 19, such gear meshing with a pinion 102 rotatably mounted in position upon a stud 103 carried by the framework, the pinion 102 in turn being in mesh with a pinion 104 carried by the shaft 37 of the moistening roll 35. The arrangement is such that when the drum is driven in counter-clockwise direction in Fig. 1, the roll 35 is driven also in counter-clockwise direction at substantially the same surface speed so as to carry a copy sheet forwardly toward the right in said Fig. 1 between the roll 35 and the cooperating roll 36. When a sheet is carried forward by the rolls 35 and 36, it is brought thereby into the bite of the drum 19 and the platen roll 29, the parts being driven in such timed relation as to cause the copy sheet to have the desired registration with the master sheet 28, as is well understood in mechanisms of this type. From the drum and the platen roll, the copy sheet passes forward into position in a tray 105. For effecting the desired registration of the copy sheet forwarded by the rolls 35 and 36 with the master sheet 28 on the drum, the cam 77 is provided with a recess 106 at one point in its periphery adapted by engagement with the roll 76 to give the operator a signal, calling for the stoppage of the rotation of the drum for the insertion of a copy sheet into the bite of the forwarding rolls 35 and 36.

The receptacle 64 may be provided with a cover 107 which is pivotally mounted on the pins 108 in the side walls of the receptacle. A shield 109 is suitably mounted toward the front portion of the receptacle to prevent any splashing onto the drum. It will be noted that the shield extends downwardly over the upper portion of the moistening roll. The bottom of the receptacle 64 is turned upwardly at the forward end to provide a baffle 110, this baffle serving to prevent any splashing onto the under side of the moistening roll. The baffle also prevents any solvent in the lower portion of the receptacle from running over onto the copy sheet.

The receptacle 64 is provided at either side with an outlet 111 and a drainpipe 112 is provided extending from each outlet down to the tank 68. It will be seen that the position of the outlet is such that the level of any solvent in the receptacle will be considerably below the bottom surfaces of the rolls 47 and 60. Consequently there will be none of the objectionable splashing which occurs when a wallower type roll is used.

All three of the rolls 35, 47 and 60 are made of a non-absorbent material. The rolls 35 and 60 are preferably formed of a resilient material such as rubber or neoprene, whereas the roll 47 may be of metal, hard rubber, plastic or other suitable hard material. The supply roll 47 may be either smooth or provided with serrations or pits, or it may be otherwise roughened.

A modification is shown in Fig. 10 wherein a transverse bar 120 is provided in the receptacle 64 extending from one side wall of said receptacle to the other. The bar may be suitably secured therein by lugs 121 provided at either end of the bar, which lugs are engaged by the screws 108 to hold the bar in place. A strip 122 of rubber or other suitable material is associated with the bar 120 by means of rivets 123, the strip 122 extending into close juxtaposition with the surface of the roll 60 so as to provide a small gap 124. It will be seen that the provision of the rubber strip or baffle 122 above the roll 60 will serve to raise the level of the solvent in the reservoir 114 so that more solvent will be transferred by the roll 47 to the bite between the rolls 47 and 35. Less solvent will run over roll 60 into the bottom of the receptacle.

In operation, the rotation of the drum 19 causes the moistening roll 35 and the co-acting roll 36 to rotate at the same peripheral speed as the drum rotates. The copy sheet may be manually fed to the bite of the rolls 35 and 36 and from this point on these rolls will feed the copy sheet to the drum. At the same time, a thin film of solvent is applied by the roll 35 to the upper face of the copy sheet. The amount of solvent supplied to the surface of the copy sheet may be regulated by adjusting the thumb nuts 59 which in turn regulate the pressure between rolls 47 and 35. The amount of solvent may also be regulated by regulating the length of the pump stroke.

The receptacle 64 and its associated cover 107 and shield 109 prevent any splashing onto the master sheet or the copy sheet. The level of any run-off solvent which has accumulated in the bottom of the receptacle 64 is maintained by means of the drain at a point below the level of the rolls 47 and 60 so that there will be no creepage of solvent along the under side of these rolls when they are stationary. After the machine has been stationary for a short time and is then started up there will be an accumulation of solvent in the reservoir 114 which will serve to moisten the moistening roll and copy sheet during the first few revolutions of the rolls until the pump supplies the desired amount of solvent to the reservoir. Consequently this moistening device will require no priming after short intervals of non-use.

It will be noted that in this device the rate of supply of solvent to the reservoir and thence to the copy sheet is proportional to the speed of the operation of the machine. Consequently when the machine is being run at higher speeds more solvent will be supplied to accommodate the greater number of copy sheets being moistened. This is effected by the use of a pump which is actuated by the cam 77 associated with the drum 19. The operation of the pump 67 is necessarily intermittent and for this reason the reservoir 114 is provided so as to insure a continuous supply of solvent for the supply roll. This avoids the necessity of using the bite between the rolls 35 and 47 as a reservoir, thus permitting the operator to adjust the pressure between these rolls to effect the proper film thickness without regard to the necessity of maintaining sufficient accumulated solvent in this bite to compensate for the intermittent operation of the pump.

While the form and arrangement of parts as shown in the drawings and as above described are preferred, the invention is not to be limited to such construction and 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 invention.

I claim:

1. Moistening means for duplicating machines, comprising a moistening roll, a supply roll in contact therewith, a third roll contacting said supply roll, means to supply solvent to the bite of said supply and third rolls, a receptacle positioned beneath said supply and third rolls to collect overflow solvent from said third roll, wipers engaging the end surfaces of said supply and moistening rolls at the bite thereof, said wipers being provided with outlets to drain excess solvent accumulated at the bite of said supply and moistening rolls into said receptacle, and drain means associated with said receptacle to maintain the level of the solvent therein below said supply and third rolls.

2. Moistening means for duplicating machines, comprising a moistening roll, a supply roll in contact therewith, a third roll contacting said supply roll, means engaging the end surfaces of said supply and third rolls and cooperating therewith to form a reservoir at their bite, means to supply solvent to said reservoir, and a baffle positioned above said third roll and having an edge extending into close proximity to the surface of said third roll.

3. Moistening mechanism for a duplicating machine, comprising a moistening roll, a supply roll, pressure means for urging said supply roll into contact with said moistening roll, a third roll contacting said supply roll, means contacting the ends of said third roll and said supply roll to form a reservoir at the bite of said rolls, means for supplying controlled amounts of solvent to said reservoir, means for regulating said pressure means to control the thickness of the film of solvent transferred to the said moistening roll, and means for limiting the accumulation of solvent at the bite of said moistening and supply rolls.

4. Moistening mechanism for a duplicating machine, comprising a moistening roll, a supply roll, means for supplying solvent to the surface of said supply roll, said means including a third roll contacting said supply roll, wiper means contacting the ends of said third roll and said supply roll to form a reservoir at the bite of said rolls, means for intermittently supplying solvent to said reservoir at a rate of speed proportional to the rate of operation of the duplicating machine, means for effecting transfer of solvent from the surface of said supply roll to the surface of said moistening roll in a film of controlled thickness, and wiper means engaging the ends of said moistening roll to prevent the wetting of the end surfaces thereof.

5. A moistening device for duplicating machines, comprising a series of three rolls rotating at substantially the same peripheral speed and cooperating with each other to form two bites, means to cause a copy sheet to contact the first roll and to receive a film of solvent therefrom, the bite of the middle roll and of the third roll forming a reservoir for the supply of solvent to the surface of said middle roll, and the bite of the middle roll and of said first roll controlling the amount of solvent adhering to the surface of said first roll, means to supply solvent to said reservoir, and wipers contacting the ends of said first roll and said middle roll to prevent the wetting of the end surfaces of said first roll.

6. A moistening device for duplicating machines, comprising a series of three rolls rotating at substantially the same peripheral speed and cooperating with each other to form two bites, the bite of the middle roll and one of the end rolls forming a reservoir for the supply of solvent to the surface of said middle roll, and the bite of the middle roll and the other end roll controlling the amount of solvent adhering to the surface of said other end roll, means actuated intermittently to supply solvent to said reservoir, a baffle to limit the amount of solvent passing over said one end roll, and wipers contacting the ends of said one end roll and said middle roll to prevent the flow of solvent over the ends of said rolls.

7. A moistening device for duplicating machines, comprising a moistening roll, a supply roll, a third roll in contact with said supply roll, an intermittently actuated pump for supplying liquid to the bite formed between said supply roll and said third roll, members contacting the ends of said supply and third rolls at the bite thereof to form a reservoir and to prevent the overflow of liquid at the ends of said rolls, means for rotating said moistening roll and for actuating said pump, means for resiliently urging said supply roll against said moistening roll to cause rotation of the supply roll and to regulate the thickness of the film of solvent adhering to said moistening roll, and means for resiliently urging said third roll against said supply roll to cause rotation of

said third roll, said rolls being arranged so that said supply roll will transfer liquid from said reservoir to the bite of said supply and moistening rolls for application to the surface of said moistening roll.

8. A moistening device for duplicating machines, comprising a moistening roll, a supply roll in contact therewith, a third roll in contact with said supply roll, spray means intermittently actuated for supplying liquid to the bite formed between said supply roll and said third roll, wiper members contacting the ends of said supply and third rolls at the bite thereof to form a reservoir and to prevent the overflow of liquid at the ends of said rolls, said rolls being arranged so that said supply roll will transfer liquid from said reservoir to the bite of said supply and moistening rolls, and said supply and moistening rolls cooperating with each other so as to permit a film of liquid of controlled thickness to be carried through their bite on the surface of said moistening roll, and means to regulate the accumulation of liquid at the bite of said supply and moistening rolls.

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