

Dec. 23, 1941.

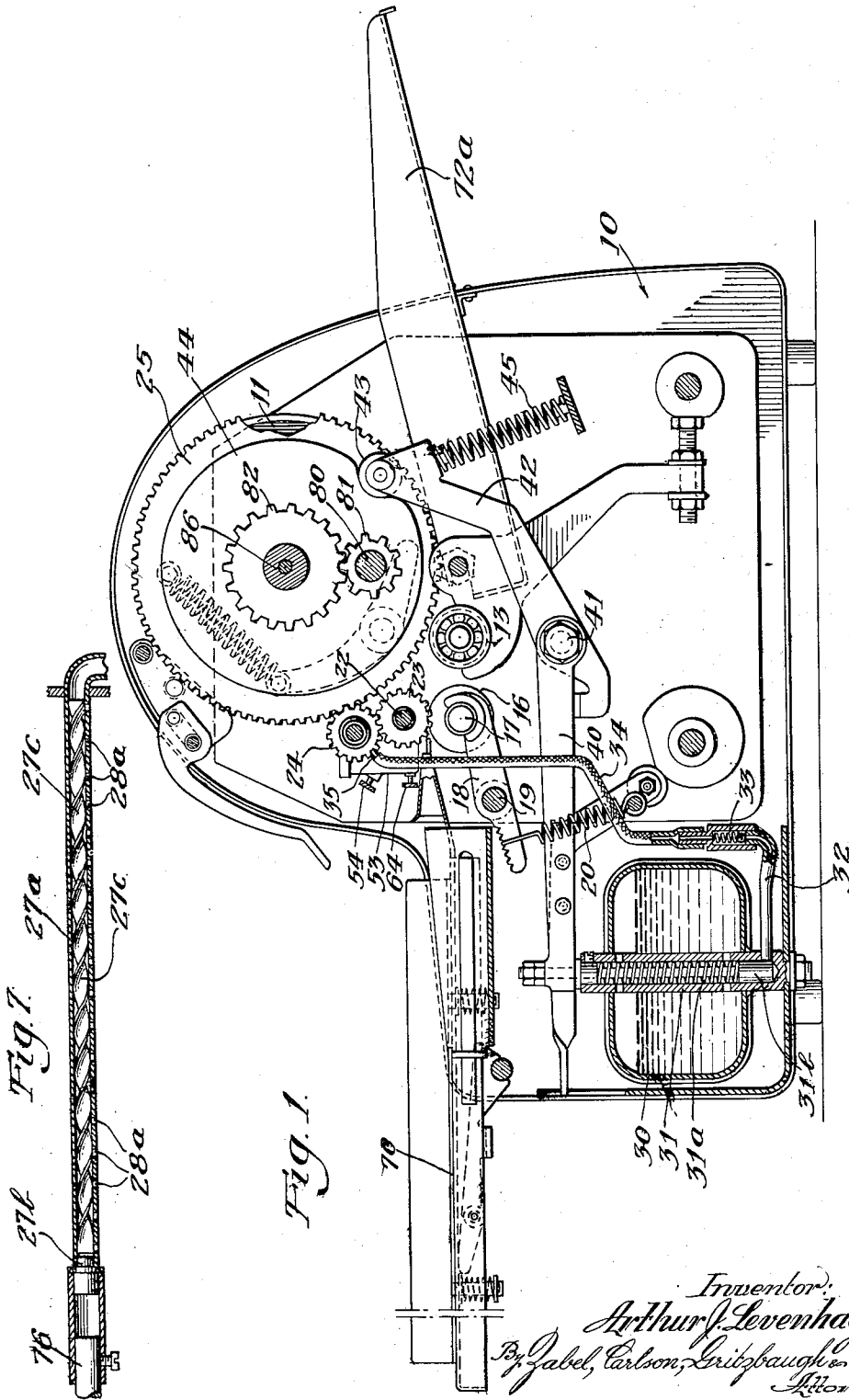
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2,266,880

MOISTENING APPARATUS

Filed April 13, 1939

3 Sheets-Sheet 1



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3 Sheets-Sheet 2

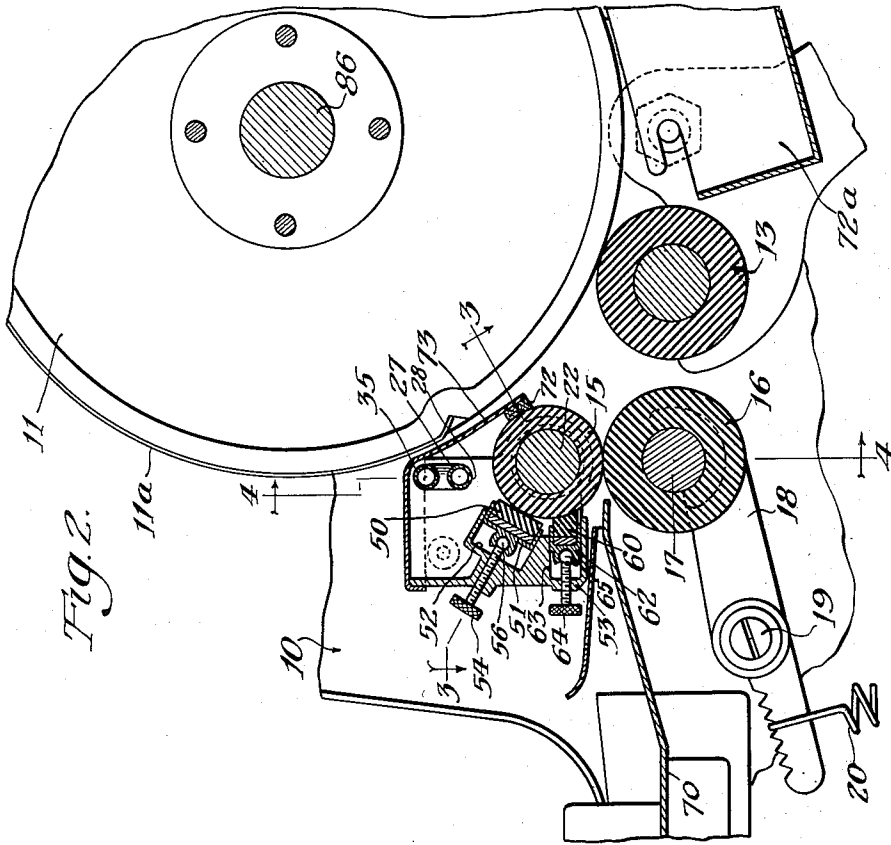


Fig. 2.

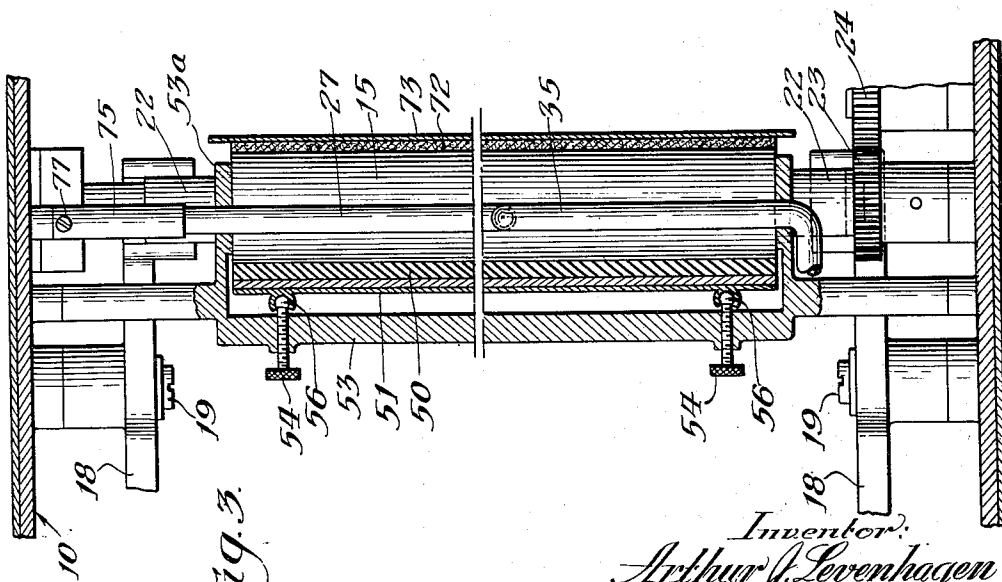


Fig. 3.

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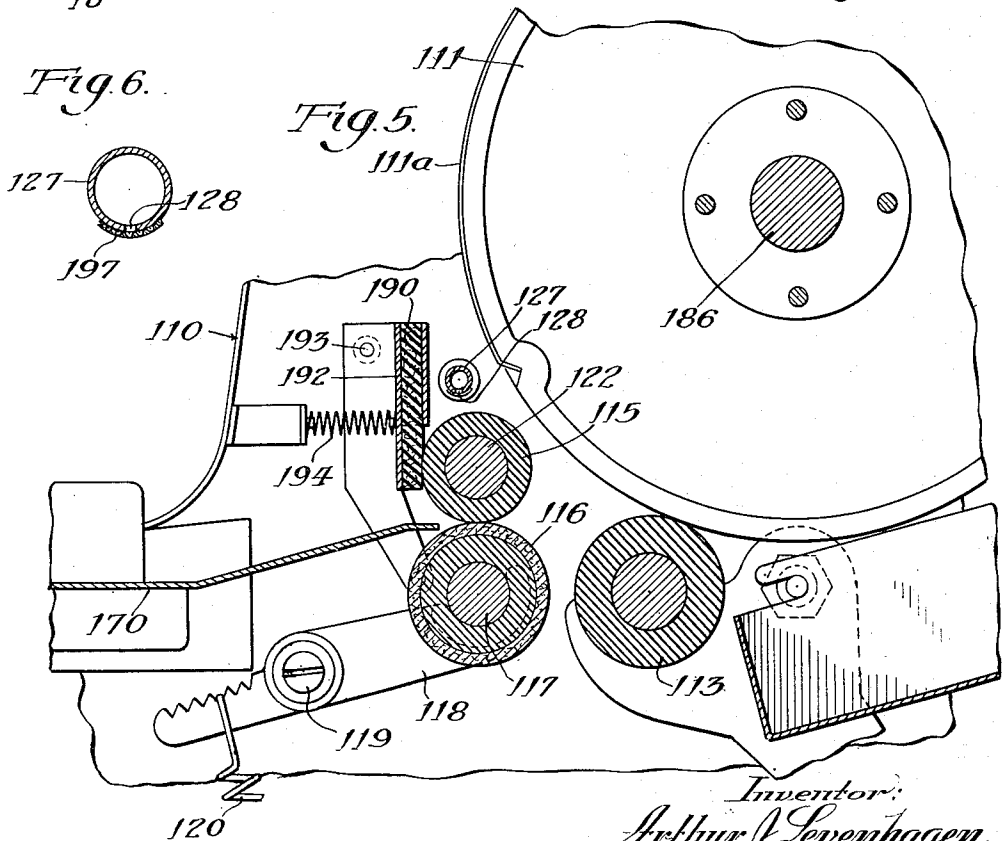
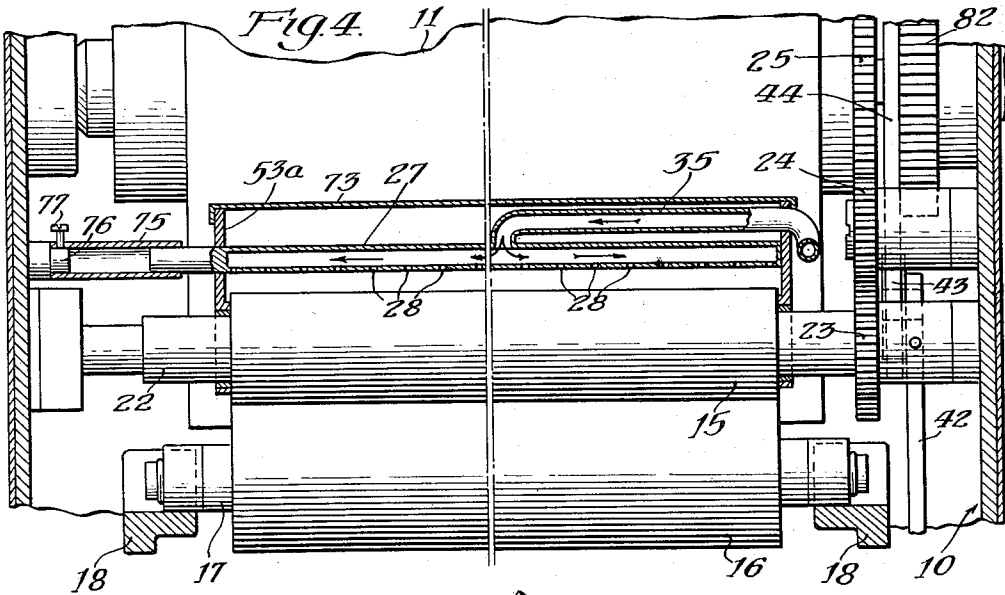
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MOISTENING APPARATUS

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3 Sheets-Sheet 3



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UNITED STATES PATENT OFFICE

2,266,880

MOISTENING APPARATUS

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5 Claims. (Cl. 91—49)

The invention relates to moistening means and is particularly adapted to be embodied in duplicating machines to moisten the copy sheets with a solvent for copying ink.

In the accompanying drawings two forms of the invention are shown embodied in a duplicating machine of the type wherein the data to be duplicated is typewritten or otherwise marked in copying ink on a master sheet which is mounted upon a duplicating drum and against which the copy sheets are pressed one by one until the desired number of copies have been obtained. The data to be duplicated is formed upon the master sheet with suitable copying ink and as each copy sheet is advanced to the duplicating drum it is moistened with a solvent for the copying ink so that a slight amount of the copying ink is dissolved or softened during each copying operation to form the data upon the copy sheets. The improved moistening means preferably comprises combined feeding and moistening rollers, the solvent being preferably sprayed or otherwise applied directly to one of the rollers so that it will moisten the copy sheets as they are advanced to the duplicating drum. Improved means is provided for distributing and controlling the amount of solvent on the roller.

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

Fig. 1 is a longitudinal, vertical section taken through a duplicating machine which embodies one form of the invention;

Fig. 2 is an enlarged fragmentary, vertical, longitudinal section taken through the improved moistening means which form a part of the duplicating machine shown in Fig. 1;

Fig. 3 is a fragmentary section taken on line 3—3 of Fig. 2;

Fig. 4 is a section taken on line 4—4 of Fig. 2;

Fig. 5 is a fragmentary, longitudinal section taken through a duplicating machine which comprises moistening means embodying another form of the invention;

Fig. 6 is an enlarged fragmentary section taken through a tube which forms part of the moistening means shown in Fig. 5; and

Fig. 7 is a longitudinal section of a tube which embodies another form of the invention and may be used in place of the tubes 27 and 127.

Referring for the present to Figs. 1 to 4, inclusive, wherein a preferred embodiment of the invention is illustrated, the reference character

10 designates generally the frame of a duplicating machine of the wet process type. Rotatably journaled in the frame 10 is a duplicating drum 11 which may be rotated by any suitable means such as a crank (not shown). Means (not shown) is provided for attaching a master sheet to the drum 11 and a platen or pressure roller 13 is provided for pressing copy sheets against the master sheet as the drum 11 is rotated.

15 The master sheet is preferably made by typing or writing upon one side of a sheet of paper which has a carbon sheet contacting its other side so that the data to be duplicated appears in reverse upon the other side of the sheet.

20 Then when copy sheets are moistened with a suitable solvent for the carbon and are pressed against the master sheet by the platen roller 13, a very small amount of carbon is dissolved or softened each time a copy sheet is brought into contact with a master sheet so that the data to be duplicated is copied on the copy sheet.

The improved means for applying the solvent to the copy sheets comprises rollers 15 and 16 which also, in the preferred forms of the invention, serve as feeding rollers to advance the copy sheets to the bight between the drum 11 and the platen roller 13. The roller 16 is carried by a shaft 17 which has its ends rotatably journaled in levers 18 pivoted upon stub shafts 19 mounted in the frame 10. Springs 20 yieldingly urge the levers 18 in a direction to hold the roller 16 in contact with the roller 15.

The roller 15 is fixed to a shaft 22 which has its ends rotatably journaled in the frame 10. A pinion 23 fixed to the shaft 22 meshes with an idler pinion 24 and the idler pinion 24 meshes, in turn, with a gear 25 with which the drum 11 is constrained to rotate. Obviously, when the drum 11 is rotated the roller 15 will rotate in unison therewith and it will rotate the roller 16 through its frictional contact therewith.

Any suitable means may be provided for spraying or otherwise applying the solvent directly to the roller 15 but in the preferred forms of the invention the solvent is pumped to a perforated tube 27 disposed above the roller 15 so that the solvent will be sprayed through apertures 28 on the roller 15. The means for pumping the solvent to the tube 27 comprises, in this instance, a reservoir 30 holding a supply of solvent. A pump 31 extends through the reservoir 30 and is adapted to pump the solvent through a tube 32, a check valve 33 and a flexible tube 34 to a tube 35 which has a discharge

end communicating with the tube 27 at a point substantially midway between its ends (Fig. 4). This insures equal distribution of the solvent to both ends of the tube 27. Of course, the apertures 28 are relatively small and are closely spaced along the bottom side of the tube 27. The means for actuating the pump 31 comprises a lever 40 pivoted upon a pin 41. A lever 42 pivoted upon the pin 41 has one end engageable with the lever 40 and is provided at its other end with a roller 43 engageable with a cam 44 constrained to rotate with the gear 25. The cam 44 cooperates with a compression spring 45 to oscillate the lever 42 when the cam 44 is rotated. The details of construction of the pump 31 and the means for actuating it do not form a part of this invention and, therefore, are not described in more detail. However, the pump 31 comprises a compression spring 31a which cooperates with the lever 40 to reciprocate a plunger 31b forming part of the pump 31.

Means is provided for spreading the solvent on the surface of the roller 15 and for controlling the amount of solvent which will adhere to the roller 15 to contact copy sheets passing between the rollers 15 and 16. This means preferably comprises a wiping element 50 which contacts the roller 15 and is preferably made from spongy material which will not absorb any appreciable quantity of the solvent. In practice it has been found that neoprene in sponge form gives exceedingly good results but in some instances it may be preferable to employ sponge rubber.

The wiping element 50 is in the form of a relatively long strip secured in a channel shaped holder 51 slidably journaled in a deep groove 52 formed in a bracket 53 which is mounted in the frame 10 (Fig. 2). A pair of screws 54 screw-threaded in the bracket 53 have ball and socket connections 56 with the holder 51. Obviously the screws 54 may be manipulated to urge the wiper 50 toward and away from the roller 15 and also to bring the wiper into adjusted positions so that its two ends will engage the roller 15 with equal pressure.

In the preferred construction a second wiper member 60 is employed, the wiper member 60 being preferably formed from the same material as the wiper 50 and being mounted in a channel shaped holder 62 slidably journaled in a deep groove 63 formed in the bracket 53. A pair of screws 64 screw-threaded in the bracket 53 have ball and socket connections 65 with the holder 62 and may be manipulated in the same manner as the screws 54 to bring the wiper 60 into adjusted positions with respect to the roller 15.

The machine is preferably provided with a table 70 adapted to support a stack of copy sheets (not shown) which may be advanced manually, one by one, to the bight between the rollers 15 and 16 so that when these rollers rotate they will advance the copy sheets, one by one, to the bight between the drum 11 and the platen roller 13. The platen roller 13 will press the moistened copy sheets against the master sheet on the drum 11 and the copy sheets will then be discharged onto a tray 72a mounted in the frame 10.

The solvent discharged on the roller 15 by the tube 27 is not distributed evenly on the roller but the wipers 50 and 60 serve to distribute the solvent on the roller 15 and limit the amount of solvent which adheres to the roller 15 when it rotates into contact with the copy sheet. The screws 54 and 64 may be manipulated to vary

the thickness of the film of solvent which will adhere to the surface of the roller 15 as it passes from beneath the wipers 50 and 60.

It is understood, of course, that the drum 11 and the roller 15 rotate in counterclockwise directions (Fig. 2) and that the roller 16 is rotated in a clockwise direction (Fig. 2) by the roller 15.

A master sheet 11a is shown in Fig. 2 upon the drum 11.

Means is preferably provided for removing lint from the roller 15 which has a tendency to pick up lint or fibres from the copy sheets. The lint removing means preferably comprises a strip of felt 72 carried by a housing member 73 mounted upon the bracket 53. In some instances it may be desirable to make the strip 72 of sponge neoprene or sponge rubber.

Any suitable means may be provided for mounting the tube 27. In this instance the tube 27 extends through a plate 53a forming part of the bracket 53 and also has one end projecting into a sleeve 75 mounted upon a pin 76 projecting from the frame 10. A set screw 77 detachably secures the sleeve 75 to the pin 76. The construction is such that the set screw may be loosened to permit the sleeve 75 to be moved to the right (Fig. 4) so that it will be disengaged from the pin 76 whereupon the tube 27 and the tube 35 will be free to be lifted from the machine with the bracket 53 which is detachably secured in the frame by suitable means (not shown). Of course, before the tube 27 and the tube 35 can be lifted from the machine the flexible tube 34 must be disengaged from the tube 35.

As stated above the drum 11 may be driven by a crank (not shown). For this purpose a shaft 80 extends through one portion of the frame 10 and is provided with a pinion 81 which meshes with a gear 82 constrained to rotate with the drum 11 and mounted on a shaft 86 upon which the drum 11 is mounted, the shaft 86 being rotatably journaled in the frame 10.

The roller 15 is preferably formed from non-absorbent material such as rubber or neoprene, the roller being finished preferably with a smooth unbroken surface. The roller 16 is preferably formed of absorbent material such as felt.

Referring now to Figs. 5 and 6 wherein another form of the invention is illustrated, the reference character 111 designates a duplicating drum which is substantially identical with the duplicating drum 11 and is shown carrying a master sheet 111a which is preferably made in the same manner as the master sheet 11a. The drum 111 is mounted on a shaft 186 which corresponds to the shaft 86 described above, the shaft 186 being rotatably mounted in a frame 110 which is substantially identical with the frame 10 described above. Corresponding with the drum 111 is a platen or pressure roller 113 which is substantially identical with the pressure roller 13 described above and is preferably mounted in the same manner. Means is provided for applying solvent to the copy sheets which are to be pressed against the master sheet 111a by the pressure roller 113. This means preferably comprises rollers 115 and 116 mounted on shafts 122 and 117, respectively, the shaft 117 being carried by levers 118 pivoted upon stub shafts 119 projecting from the frame 110. Springs 120 yieldingly urge the levers 118 in a counterclockwise direction (Fig. 5) to hold the roller 116 in contact with the roller 115. A tube 127 which is preferably identical with the tube 27 described above and is provided with aper-

tures 128 is supplied with solvent by any suitable means (not shown) such as for instance a reservoir and a pump substantially identical with the reservoir 30 and the pump 31 described above. Of course, the solvent is sprayed on the roller 115 through the apertures 128.

Improved means is provided for spreading the solvent upon the surface of the roller 115 so that a thin film thereof of substantially equal thickness throughout will be advanced to and applied on the upper surfaces of copy sheets passing between the rollers 115 and 116. In the preferred embodiment of the invention the rollers 115 and 116 also function as feed rollers and advance the copy sheets to the bight between the drum 111 and the pressure roller 113.

The means for spreading the solvent on the roller 115 and for limiting the amount of solvent which is passed to the copy sheets comprises a strip 190 of fine sponge rubber or sponge neoprene, the term "fine" being employed to indicate that the openings in the rubber are relatively small. The strip 190 is held in the housing or bracket 192 which is pivoted to the frame 110 by pins 193. Compression springs 194 yieldingly urge the bracket 192 in a counterclockwise direction (Fig. 5) around the pins 193 and, therefore, hold the strip 190 in engagement with the roller 115.

In some instances it is preferable to provide means for dividing the solvent forced through the apertures 128 into finer streams than would otherwise be obtained. Such means preferably comprises a very fine screen 197 soldered or otherwise secured to the tube 127 over the apertures 128.

In the operation of the apparatus shown in Figs. 5 and 6 the copy sheets are advanced from a copy sheet table 170 to the bight between the rollers 115 and 116 which advance the copy sheets to the bight between the drum 111 and the pressure roller 113. The roller 115 applies a film of solvent to the upper surface of the copy sheets and this solvent softens a small amount of the carbon on the master sheet so that the data on the master sheet is duplicated in positive upon the copy sheets. The roller 115 rotates in a counterclockwise direction (Fig. 5) and the solvent sprayed thereon must pass between the roller 115 and the strip 190 which spreads the solvent over the roller 115 to obtain a suitable film of solvent thereon as it rotates into contact with the copy sheets.

Rollers 115 and 116 are preferably formed from the same materials as the rollers 15 and 16, respectively. It will be noted that said materials are non-fibrous.

Referring now to Fig. 7, the reference character 27a designates a tube which may be employed in place of the tube 27 described above. The tube 27a is bent at one end to communicate with the flexible tube 34 whereby solvent may be delivered to the tube 27a. The left hand end (Fig. 7) of the tube 27a is closed by a plug 27b and projecting through the tube from the plug 27b is a helical member 27c preferably formed from sheet metal which is twisted to give it the helical formation. The left hand end (Fig. 7) of the tube 27a is detachably mounted on a pin 76a which corresponds to the pin 76 described above. The tube 27a is provided with apertures

28a which correspond to the apertures 28 described above and have the same function. When the solvent is forced into the tube 27a it normally tends to enter the tube with such pressure that most of it travels directly to the left hand end (Fig. 7) of the tube and generally a larger amount of the solvent is sprayed from the apertures 28a at the left hand end of the tube than is sprayed from the apertures 28a at the right hand end of the tube. The spiral member 27c retards this surge of liquid through the tube 27a and, therefore, substantially equal amounts of solvent are sprayed through all of the apertures 28a.

While there have been shown and described certain embodiments of the invention, it is to be understood that it is capable of many modifications. Changes, therefore, may be made without departing from the scope of the invention as described in the appended claims, in which it is the intention to claim all novelty inherent in the invention as broadly as possible, in view of the prior art.

I claim:

1. Moistening means for applying a film of liquid to one face of a sheet comprising in combination two rollers rotatably mounted in cooperative relation to each other for forwarding a sheet between them, means for driving one of said rollers for forwarding a sheet, means for spraying liquid on one of said rollers, and a strip of rubber-like material in the form of a sponge contacting said one roller in position for the liquid sprayed on the roller to pass between the roller and the strip before it is brought into contact with the other roller.

2. Moistening means for applying a thin film of liquid to one side of a paper sheet, or the like, said moistening means comprising rollers contacting opposite sides of the sheet, means for driving one of said rollers, means for spraying liquid on one of said rollers, and a strip of sponge rubber contacting the last-mentioned roller for spreading the liquid thereon.

3. Moistening means for applying a thin film of liquid to one side of a paper sheet, or the like, said moistening means comprising rollers contacting opposite sides of the sheet, means for driving one of said rollers, means for spraying liquid on one of said rollers, and a strip of sponge neoprene contacting the last-mentioned roller for spreading the liquid thereon.

4. Moistening means for applying a thin film of liquid to one side of a paper sheet, or the like, said moistening means comprising rollers contacting opposite sides of the sheet, means for driving one of said rollers, means for spraying liquid on one of said rollers and a plurality of strips of sponge rubber spaced circumferentially of the last-mentioned roller and contacting it for spreading the liquid thereon.

5. Moistening means for applying a thin film of liquid to one side of a paper sheet, or the like, said moistening means comprising rollers contacting opposite sides of the sheet, means for driving one of said rollers, means for spraying liquid on one of said rollers, and a plurality of strips of sponge neoprene spaced circumferentially of the last-mentioned roller and contacting it for spreading the liquid thereon.

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