Sept. 10, 1946. E. W. PETERSON 2,407,443

SHEET MOISTENING DEVICE FOR DUPLICATING MACHINES

Filed March 16, 1945 2 Sheets-Sheet 1

Fig. 2.

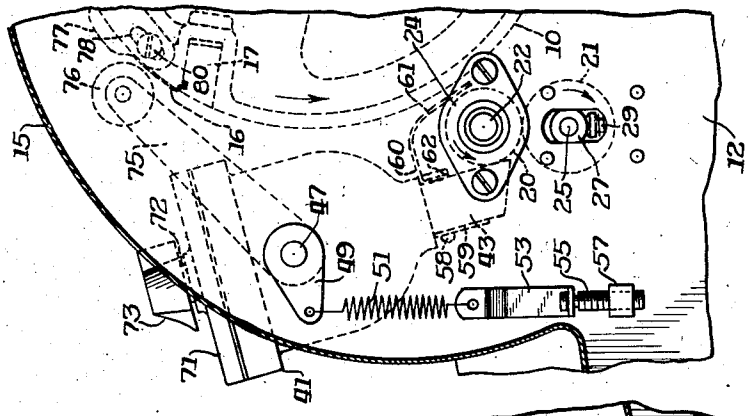
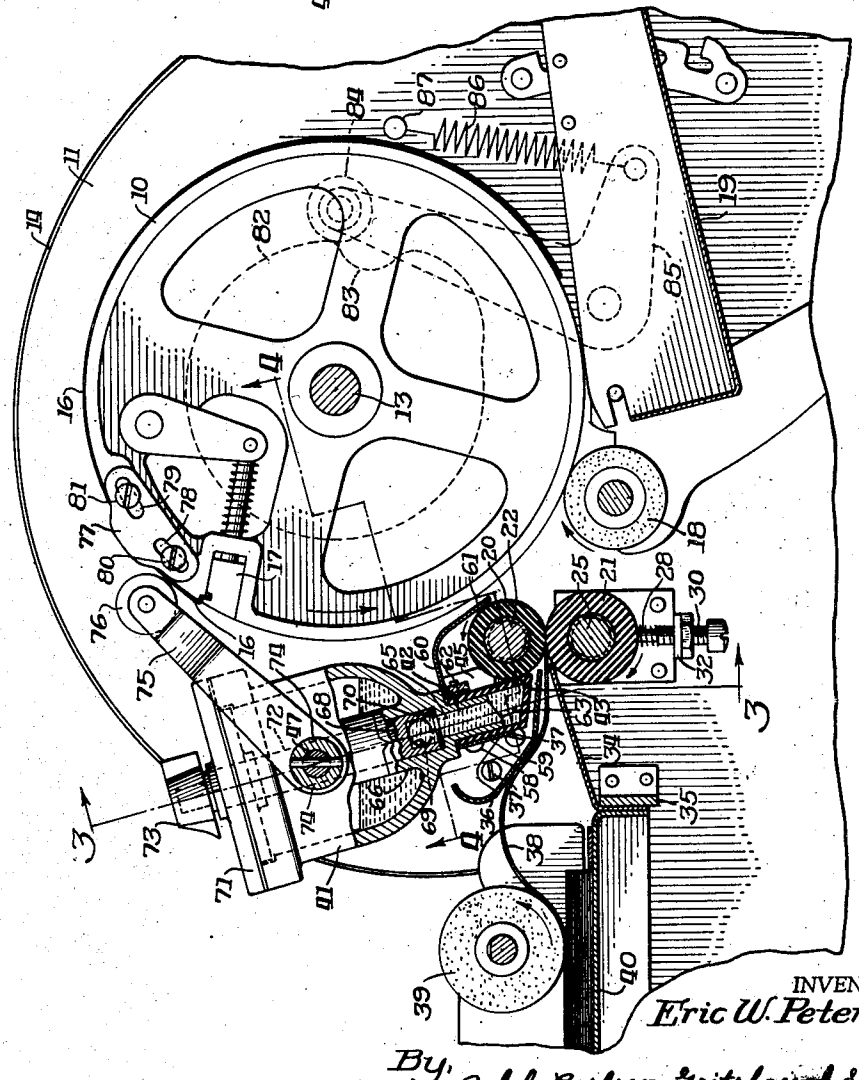


Fig. 1.



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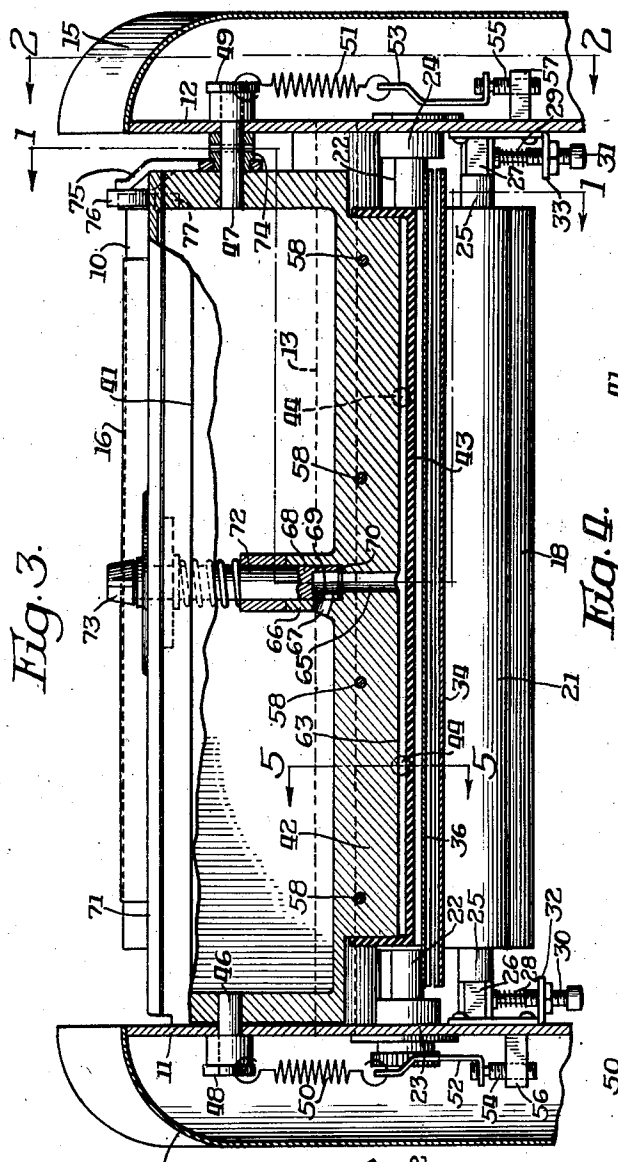


Fig. 3.

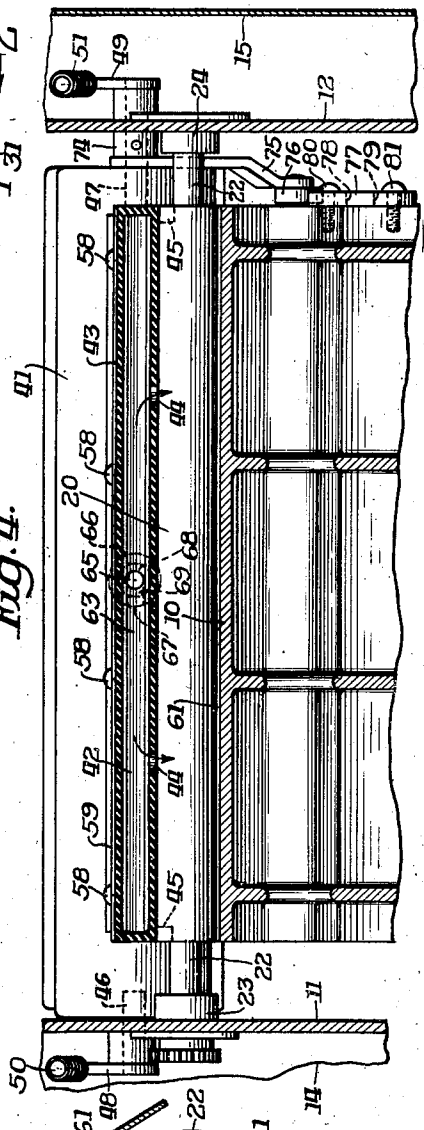


Fig. 4.

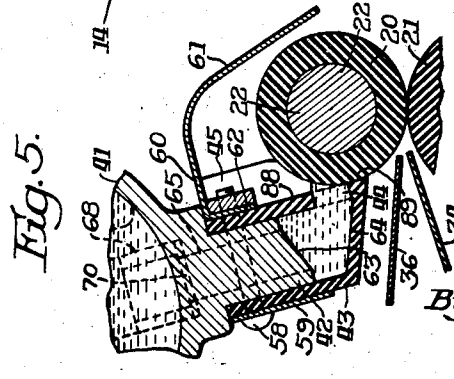


Fig. 5.

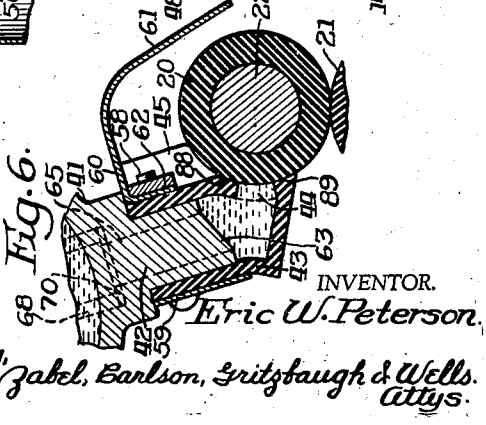


Fig. 6.

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UNITED STATES PATENT OFFICE

2,407,443

SHEET MOISTENING DEVICE FOR DUPLICATING MACHINES

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Application March 16, 1945, Serial No. 583,060

5 Claims. (Cl. 101—132.5)

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The present invention relates to improvements in a moistening mechanism for moistening copy sheets in a liquid process duplicating machine wherein the copy sheets are moistened with a solvent for the ink in which the matter to be copied is provided in reverse upon the master sheet, the master sheet being mounted upon a suitable drum. My invention is particularly directed to an improvement in one form of moistening device shown in the application of George J. Rundblad, Serial No. 573,413, filed January 18, 1945, for a Liquid duplicating machine.

It is the principal purpose of my invention to provide an improved moistening device such as that shown in the aforesaid application with means to prevent loss of the moistening liquid when the device is standing idle. In duplicating apparatuses of the character above referred to the moistening liquid is extremely volatile, also it necessarily has a low surface tension so that it may spread uniformly over the copy sheet. Both of these characteristics tend to cause loss of the liquid wherever it is exposed to atmosphere or to a surface along which it may creep to further spread itself and increase its evaporation. My invention contemplates the provision of a novel construction whereby the liquid supply means supplying the moistening liquid is sealed at all times when the duplicating apparatus is at rest. The sealing is accomplished in such fashion as to avoid the necessity of any special adjustment by the operator. Furthermore, the actual accomplishment of sealing is done as an auxiliary act in connection with the positioning of the duplicating apparatus in so called "home" position.

The nature and advantages of my invention will appear more fully from the following description and the accompanying drawings wherein a preferred form of the invention is shown. It should be understood however that the drawings and description are illustrative only and should not be taken as limiting the invention except insofar as it is limited by the claims.

In the drawings:

Figure 1 is a longitudinal sectional view through a portion of a duplicating machine of the type above referred to showing my invention as applied thereto;

Figure 2 is a fragmentary sectional view taken on the line 2—2 of Figure 3;

Figure 3 is a fragmentary sectional view taken on the line 3—3 of Figure 1;

Figure 4 is a fragmentary sectional view taken on the line 4—4 of Figure 1;

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Figure 5 is an enlarged fragmentary sectional view taken on the line 5—5 of Figure 3; and

Figure 6 is a view similar to Figure 5 but showing the parts in a changed position.

Referring now to the drawings, my invention is embodied in a liquid process duplicating machine wherein a drum 10 is mounted in suitable side frames 11 and 12 by means of a shaft 13. The side frames are preferably in the form of flat sheets punched with the necessary openings for mounting bearings and the like. These side frames are covered by housing members 14 and 15 of relatively thin sheet material shaped to provide the necessary space for the parts outside of the frames 11 and 12 and to present a pleasing exterior appearance.

The drum 10 is adapted to carry a master sheet 16. The drum is provided with a clamping means 17 which is suitably operated to clamp or release the master sheet by such means as that shown in the application above referred to. A platen roller 18 cooperates with the drum to press copy sheets against the master sheet 16 after the copy sheets have been moistened. A copy sheet receiving tray 19 is mounted between the side frames 11 and 12 in a position to receive the copy sheets from the drum.

The duplicating machine is provided with a pair of combined feeding and moistening rollers 20 and 21, the roller 20 in the present instance being the moistening roller while the roller 21 is a counter roller, spring pressed toward the moistening roller 20. The moistening roller 20 has a shaft 22 which is journalled in suitable bearings 23 and 24 that are provided in the side frames 11 and 12. The counter roller 21 has a shaft 25 which is reduced in diameter at its end to receive two bearing blocks 26 and 27 (see Figures 2 and 3). These bearing blocks are slidable vertically in suitable apertures provided in the side frames 11 and 12 and are spring pressed upwardly by two plungers 28 and 29. The plungers are mounted in adjustable hollow screws 30 and 31 that are threaded in two brackets 32 and 33.

Immediately in advance of the rollers 20 and 21 I provide a guide channel for directing copy sheets between the rollers. This guide channel comprises a lower plate 34 which is carried upon a cross tie bar 35 between the side frames 11 and 12, and an upper plate 36 which is fastened to the side frames 11 and 12 by suitable screws shown at 37 in Figure 1. Figure 1 shows a copy sheet 38 being advanced by a feed roller 39 to the rollers 20 and 21. A feed tray 40 is mounted

in the machine with its front end positioned as shown.

The means for moistening the roller 20 so that it in turn can moisten the copy sheets 38 comprises a moistening liquid receptacle 41 which is provided with a depending rib portion 42 over which a rubber boot 43 is secured. Suitable means are provided whereby liquid can be fed from the receptacle 41 down through the rib 42 into the boot 43. This boot 43 has a plurality of openings 44 in the side face thereof that is directed toward the roller 20. Likewise, the boot has ribs 45 at its opposite ends which project forward above the level of the openings 44 to engage the surface of the roller adjacent its ends and formed with the boot and the roller a trough into which liquid is fed through the openings 44. This trough provides a continuous uniform supply of liquid for moistening the roller as it rotates downwardly across the face of the boot. The boot surface itself serves as a means of limiting the amount of liquid that will be carried downward by the roller into engagement with a copy sheet. When the supply of liquid in the trough falls below the top level of the openings 44 air can enter the lower portion of the boot and thus pass upwardly into the receptacle 41 allowing more liquid to flow through the openings 44. However, the trough still remains filled with liquid at all times regardless of whether the machine is running, and if there should be an air leak by evaporation of the liquid by the level of the openings 44 or by virtue of a poor closure of the valve that controls the outlet of the receptacle 41, liquid can continue to flow while the machine is idle until the contents of the receptacle are exhausted. According to my invention, I provide means to overcome this difficulty.

In order that my invention may be fully understood a more detailed description of the receptacle 41, the mounting of the boot 43 thereon, and the valve arrangement for the receptacle will be given. The receptacle 41 is pivoted by two stub shafts 46 and 47 to the side frames 11 and 12. The shafts have lever arms 48 and 49, the arms being fixed to the shafts. The lever arms are biased downwardly by suitable springs 50 and 51 which are connected by two links 52 and 53 to adjusting screws 54 and 55 which are threaded into lugs 56 and 57 that are carried by the side frames 11 and 12. This construction provides means for yieldingly pressing the lower end of the receptacle 41 toward the drum 10 so as to maintain the normal running pressure desired between the boot 43 and the roller 20. The boot 43 is clamped to the rib 42 by a series of bolts 58 spaced longitudinally along the rib. On one side there is a strip 59 of metal interposed between the heads of the bolts 58 and the wall of the boot 43 so as to uniformly press the boot against the rib 42. On the side of the rib a strip 60 of metal is formed to provide a splash shield portion 61 and a boot engaging portion 62 that is held against the boot 43 by the bolts 58. It will be noted that the lower end of the rib 42 is bevelled as shown at 63 in the opposite direction to the slope of the bottom portion 64 of the boot 43. However, the entire lower end of the boot 43 is beyond the rib 42 so that it is free to yield under pressure. The boot 43 is made of some resilient material, for example, crude rubber, or a synthetic rubber such as neoprene or Buna S may be used.

The rib 42 has a central aperture 65 extending upwardly therethrough into the receptacle 41. The receptacle has an upstanding hollow valve housing 66 in the bottom thereof. The housing 66 has a side opening 67. Within the housing 66 there is a valve 68 which has an opening 69 that can be moved into and out of register with the opening 67 by turning the valve 68. The valve 68 is open at its bottom end and bears upon a gasket 70 which is apertured to establish communication with the opening 65.

The receptacle has a sealed cover 71 and the valve 68 has a stem 72 that extends through the cover 71 having a liquid tight packing around it to prevent air from getting into the receptacle at the top. A finger piece 73 is mounted on the stem 72. The operation of the valve 68 is essentially the same as that described in the application hereinbefore identified.

Referring now particularly to Figures 1, 5, and 6 it will be noted that the sub shaft 47 has a collar 74 keyed thereto, and this collar has a lever arm 75 fixed thereon. The lever arm 75 carries a roller 76 at its free end, the roller being adapted to engage a cam member 77 that is adjustably mounted on the drum 10 by means of two elongated slots 78 and 79 in the cam member and two screws 80 and 81 that are threaded into the drum for clamping the cam member 77 in position. The elongated slots 78 and 79 provide for adjustment of the cam member both radially of the drum and circumferentially of the drum because the apertures are arranged at an angle to each other. In normal "home" position of the drum, a cam 82 (see Figure 1) is so mounted that a notch 83 therein is engaged by a roller 84 that is carried at one end of a ball crank lever 85. The other end of the lever is connected to a spring 86 which is fixed to a pin 87 on the side frame of the machine. Normally the roller 76 rides along the surface of the drum at the end thereof beyond the master sheet 16 during the greater part of the cycle of operation. However, when the drum approaches "home" position the roller 84 starts to drop into the notch 83 at the time the roller 76 starts to climb the cam surface 77. When the roller 76 rides up on the cam surface it turns the shaft 47 through the connection provided by the lever arm 75. This in turn starts the receptacle 41 to rotate forcing the boot 43 toward the roller 20 and distorting the boot to the position shown in Figure 6 of the drawings. The net result of this operation is to seal the openings 44 by providing direct pressure contact at 88 and 89 around the openings 44 between the boot and the roller 20. It is evident that a certain amount of the liquid in the trough between the boot and the roller will be squeezed upwardly by this action to lie between the roller and the boot and between the end ribs 45. However, this small amount of liquid will soon evaporate or spread along the roller 20 and thus leave a very small amount of liquid. After that further escape of liquid from the receptacle 41 is prevented by the seal around the openings 44.

In normal vertical operation of the machine the liquid remaining in the trough at the end of each cycle of operation is adequate to insure quick moistening of the roller 20 at the beginning of a new cycle when the receptacle 41 sends back to normal operating position. However, when the machine has been idle for some time it is advisable to prime it by running the machine through one cycle of operations or possibly two cycles before actually beginning to make copies.

It is believed that the nature of my invention will be clear from the foregoing description. The

principal advantages are in the provision of a means for sealing off the moistening liquid at the end of the duplicating operations. The continual pressing and resilience of the boot **43** is not adversely affected. However, if the machine is allowed to stand idle for days at a time the boot may eventually take a permanent set and have to be replaced just as any resilient device of this character has to be replaced. Otherwise the seal of the liquid receptacle against leakage of its contents while the machine is idle, remains effective at the end of each cycle of operations of the duplicating machine.

Having thus described my invention, I claim:

1. Moistening means for duplicating machines comprising a moistening roller, a resilient hollow boot having a side face engaging the roller, an aperture in the boot above the normally engaging surfaces of the roller and boot, whereby to pass liquid to the roller from within the boot, means to supply liquid to said boot, and means to press said boot and roller together to seal said aperture.

2. A duplicating machine having a frame, a drum therein adapted to support a master sheet, a moistening roller operable to moisten the surface of a copy sheet advancing to the drum, drive means operable to rotate the drum through repeated cycles, means for moistening said roller comprising a resilient hollow boot having a surface in engagement with the roller and having an aperture above the engaging surfaces of the boot and roller to supply liquid to the surface of the roller from within the boot, a liquid supply receptacle connected to the boot, and means operable by the drum rotation periodically to compress the boot against the roller around said aperture and thereby seal the aperture.

3. A duplicating machine having a frame, a drum therein adapted to support a master sheet, a moistening roller operable to moisten the surface of a copy sheet advancing to the drum, drive means operable to rotate the drum through repeated cycles, means for moistening said roller comprising a resilient hollow boot having a surface in engagement with the roller and having

an aperature above the engaging surfaces of the boot and roller to supply liquid to the surface of the roller from within the boot, a liquid supply receptacle connected to the boot, and means operable by the drum at the completion of each cycle of the drum, to form the boot wall about said aperture into engagement with the roller and thereby seal the aperture.

4. A duplicating machine having a frame, a drum therein adapted to support a master sheet, a moistening roller operable to moisten the surface of a copy sheet advancing to the drum, drive means operable to rotate the drum through repeated cycles, means for moistening said roller comprising a resilient hollow boot having a surface in engagement with the roller and having an aperture above the engaging surfaces of the boot and roller to supply liquid to the surface of the roller from within the boot, a liquid supply receptacle carrying said boot and movably mounted on the machine frame, and means operable upon rotation of the drum periodically to move the receptacle to compress the boot against the roller and seal the roller.

5. A duplicating machine having a frame, a drum therein adapted to support a master sheet, a moistening roller operable to moisten the surface of a copy sheet advancing to the drum, drive means operable to rotate the drum through repeated cycles, means for moistening said roller comprising a resilient hollow boot having a surface in engagement with the roller and having an aperture above the engaging surfaces of the boot and roller to supply liquid to the surface of the roller from within the boot, a liquid supply receptacle having a rib at the bottom on which the boot is fixed and from which the boot projects into engagement with the roller, said receptacle being pivoted on the frame, a lever arm on the receptacle and a cam on the drum operating to swing the receptacle at the completion of each cycle of the drum, to form the boot wall about said aperture into engagement with the roller and thereby seal the aperture.

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