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E. KRON ET AL
PHOTOCOPY MEANS

2,989,913

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2 Sheets-Sheet 1

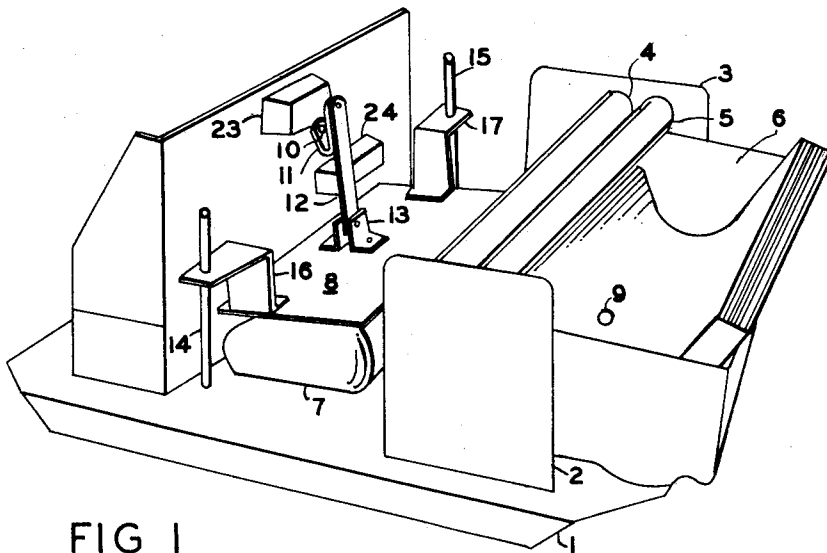


FIG 1

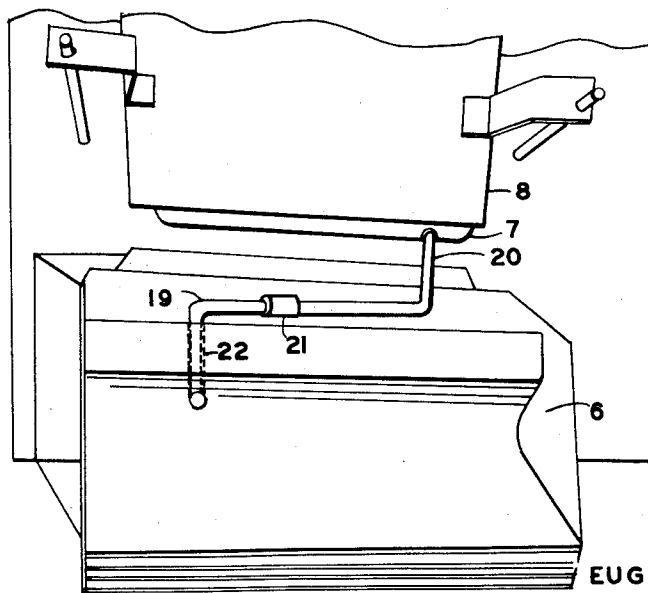


FIG 2

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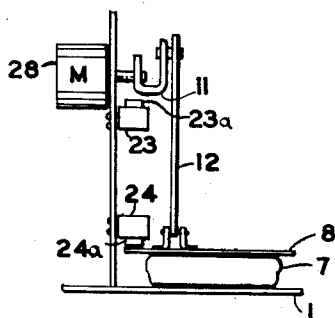


FIG 3

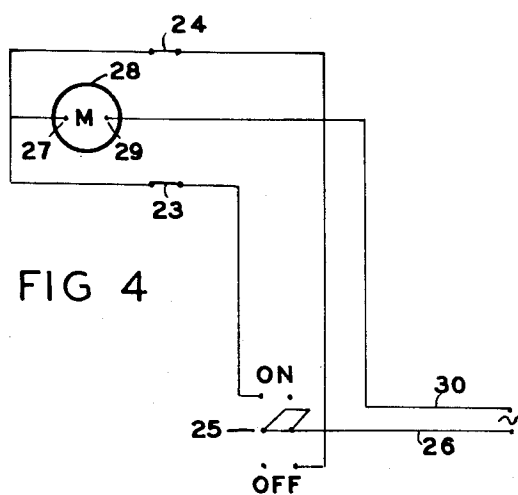


FIG 4

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PHOTOCOPY MEANS

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3 Claims. (Cl. 95-89)

This invention relates to photocopy means and more particularly to such means having automatic chemical handling means.

This invention relates to a method, and apparatus for storage and utilization of photographic solution as related to the general photographic and photocopy field. It can also be used in other fields where a chemical or other liquid must be stored away from air to prevent oxidation and to provide a means for utilization of a chemical without excessive handling as would normally take place.

More particularly the invention provides means for storing the liquid chemicals in sealed containers between uses, and means for automatically filling and emptying the chemical holding tray for use. The sealed container minimizes oxidation of the chemicals between uses and therefore greatly extends their life. Means are also provided for automatically replenishing the chemicals between uses.

In photocopy machines a sensitized paper is first exposed to light in contact with the paper to be copied. The sensitized paper is then passed through a liquid chemical bath in a tray in contact with a second sensitized paper to transfer a positive impression thereon.

Prior photocopy machines have several disadvantages as follows:

(1) The chemicals must be poured into and out of the tray by clerical or secretarial personnel who do not like to perform this chore as it is somewhat difficult and spilling can stain or damage clothing.

(2) The chemicals oxidize in the open tray between uses which greatly shortens their life.

The present invention solves this problem by providing the chemicals in plastic bags having flexible tubing which is attached to the tray. The bag rests below the level of the tray. When the machine is turned on a motor operated platen squeezes the bag and fills the tray. When the machine is turned off the squeeze platen is retracted and the tray empties back into the bag by gravity. The bag is located below the tray and the connecting tube is arranged so that the bag is sealed from air at all times. The squeeze plate does not force all of the chemicals out of the bag so that a predetermined amount is left in the bag to replenish the chemicals when they are returned to the bag after use. This replenishing feature tends to lengthen the life of the chemicals.

The operation of this system is quite simple and depends solely upon the flexible container having pressure exerted upon it by some outside force, to force the liquid into the main tray to be utilized. When the solution is no longer desired in the main tray, the pressure is released from the bag to allow the liquid to drain back by gravity feed. This system may not necessarily have to drain by gravity, and can also be arranged so that a vacuum, for instance by using a bellows type container, is created in the secondary bag or cartridge to exhaust the solution from the primary tray.

This system may be either manually, mechanically, or electrically operated or by any combination of these techniques. Our present device is electro-mechanical and automatic. The On/Off switch automatically selects the correct mode or position of the pressure platen.

The major advantages of the invention are as follows:

(1) It extends the tray life of the solution, as when

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the machine is not in operation the fluid is in the flexible container and has small contact area with air thereby greatly minimizing the deleterious effects of oxidation.

(2) Since all the fluid is not forced out of the bag on any one pressure stroke some of the fluid remains. The remaining fluid functions as a replenisher and when the developing fluid returns to the container mixing takes place which also extends the tray life of the fluid.

(3) The automatic function of this device, whereby the limit switches and the On/Off toggle switch select the proper mode of operation, eliminates human error or inconvenience whereby the operator of the machine may be required to manually operate or position the container in order to get the desired flow either into the developing tray or into the flexible container.

(4) The convenience of installing a fresh container of solution with no mixing requirements. It is done by the operator by merely pushing the bag hose into a valve or connecting seal or joint.

Accordingly a principal object of the invention is to provide new and improved photocopy means.

Another object of the invention is to provide new and improved photocopy means eliminating the manual pouring of chemicals.

Another object of the invention is to provide new and improved photocopy means having means for automatically filling and emptying the holding tray for each period of use.

Another object of the invention is to provide new and improved photocopy means having means for automatically filling and emptying the holding tray for each use and storing the chemicals between uses in a sealed container to eliminate oxidation of the chemicals between uses.

Another object of the invention is to provide new and improved means for replenishing the chemicals after each use.

Another object of the invention is to provide new and improved photocopy means comprising a tray for holding chemicals, a bag removably mounted below said tray, said bag having a flexible tube connected to said tray, and means connected to squeeze said bag to force the predetermined amount of the contents of said bag into said tray.

These and other objects of the invention may be seen by the following specification and drawings of which:

FIG. 1 is a perspective view of an embodiment of the invention.

FIG. 2 is a detail perspective view of the embodiment of FIG. 1.

FIG. 3 is a detail view of the cam operated switching means.

FIG. 4 is a schematic circuit diagram of the limit and On/Off switching.

Referring to the figures the invention comprises a base member 1 and a pair of side supports 2 and 3 which operatively support a pair of squeezing rollers 4 and 5. A tray 6 is provided for holding the liquid chemical solution. The tray is curved to guide the papers which are inserted, to travel between the rollers 4 and 5 which are motor driven. The tray preferably has a series of raised internal projections to minimize adherence of the paper to the tray. The tray may be of a plastic such as Lucite, corrosion resistant steel, or equivalent, which is inert with respect to the chemical solution. The tray is shown in pulled-out position in FIG. 1. It normally sets with a vertical guide wall directly under the rollers 4 and 5 in operative position, and preferably has an extending portion to hold the bag 7.

The apparatus thus far described is conventional except that the tray of the present invention is modified to connect with the flexible plastic bag container 7 which holds

the chemicals as will be described. The plastic bag 7 is mounted on a flat horizontal portion of the frame or tray behind and below the bottom of the paper receiving portion of tray 6. The contents of the bag are adapted to be forced into the tray via orifice 9 by means of the platen 8 which is adapted to move up and down by means of the motor shaft 10 and the linkage comprising the cam arm 11 and the straight arm 12 which is pivotally connected at its upper end to the cam arm 11 and pivotally connected at its lower end to the brackets 13 connected to the platen 8. The travel of the platen is guided by the guide-rods 14 and 15 which pass through apertures in the guide brackets 16, 17 mounted on the platen.

In FIG. 1 the platen is shown close to its top position. When the motor is turned on the linkage will drive the platen down putting pressure on the plastic bag 7 and forcing the contents up into the tray 6 through the plastic neck or tube 20, FIG. 2, connected to the bag 7, FIG. 2. The end of the tube 20 is inserted in a cylindrical plastic sealing valve 21 mounted on the tray 6. The other end of the seal 21 is fixedly connected to a plastic tube 19 which extends through a shaftway 22 through the rear wall of the tray 6. Therefore as the platen is forced down the contents of the bag will be forced up into the tray 6.

When the platen 8 is driven up the contents of the tray will flow by gravity back into the flexible bag 7 as it is mounted below the bottom of the tray 6. Alternatively a bellows type container could be used instead of the bag with bellows directly connected to the driving means so that a vacuum would be created to suck the liquid into the container in which case it would not be necessary to rely on a gravity feed. However, the gravity feed is simpler and has been found adequate in use.

The operation of the motor is controlled by two normally closed limit switches 23 and 24 and the operation of the motor is controlled by the main On/Off switch 25 as shown in the circuit of FIG. 4. The main On/Off switch would preferably also control the operation of the rollers 4 and 5 as well as the lighting required for the photocopy process.

Referring more specifically to FIGS. 3 and 4 the main On/Off switch 25 may be a conventional double pole double throw switch. The center contacts are connected to one side 26 of the line. One of the "On" contacts of switch 25 is connected through normally closed limit switch 23 to terminal 27 of the motor 28. The opposite "Off" contact of switch 25 is connected through the normally closed limit switch 24 to the same terminal 27 of the motor 28. The other terminal 29 of the motor is connected to the other side 30 of the line.

The operation of the automatic switching is as follows, referring to FIGS. 3 and 4:

When the machine is off the platen is stopped in the "Up" position with the bag filled for storage between uses. When the main switch 25 is turned on a circuit is connected between one side 26 of the line through normally closed micro switch 23 through the motor 28 back to the other side 30 of the line. The motor will then operate to drive the platen down until the cam actuator 11 strikes the spring arm 23a of the switch 23 to open the circuit. The motor will then stop with the platen in the "Down" position and the tray will remain filled so long as it is desired to operate the machine.

When the machine is turned off by throwing the switch 25 to "Off" position a second circuit is completed from the side 26 of the line through the normally closed limit switch 24 through motor 28 back to the other side of the line 30. This circuit drives the motor in the same direction and raises the platen until the top surface of the platen strikes the spring arm 24a of switch 24 to open the switch 24 and stop the motor with the platen in the original "Up" position.

The amount of motion of the platen 8 is chosen so that it does not force all of the chemical liquid out of the bag so that a predetermined amount is left in the bag which has a replenishing effect on the chemical solution when it is returned to the bag after use. This replenishing feature tends to lengthen the life of the chemicals.

Many modifications may be made by those who desire to practice the invention without departing from the scope thereof. For instance, various equivalent motor control systems may be used as well as a vacuum type system using a bellows container instead of the gravity feed system of the present invention. For instance a manually operated system, or a spring loaded mechanical system or mechanical system using weights or pressure, or electrical system using solenoids or combinations of these ramifications could be used.

The invention is not limited to photocopy apparatus but has general utility in the automatic flowing of liquids to and from containers.

Many modifications may be made by those who desire to practice the invention without departing from the scope thereof which is defined by the following claims:

We claim:

1. Photocopy means comprising a tray for holding chemicals, a portable bag removably mounted below said tray, said bag having a flexible tubing connected to said tray, means connected to squeeze said bag to force a predetermined amount of the contents of said bag into said tray, comprising a motor, a driven platen adapted to squeeze said bag and means to control said motor to retract said platen to permit said tray to be emptied into said bag by gravity, said control means comprising a pair of limit switches connected to operate said motor to drive said platen between predetermined limits.

2. Processing means comprising a tray for holding liquids, a portable bag removably mounted below said tray, said bag having flexible tubing connected to said tray, and means connected to squeeze said bag to force a predetermined amount of the contents of said bag into said tray, said last means comprising a motor, a plate connected to said motor and adapted to squeeze said bag and to be retracted to permit said tray to be emptied into said bag, control means for said motor comprising a first limit switch connected to stop said motor when said plate is driven a predetermined amount into squeezing position, and a second limit switch connected to stop said motor when said plate is in retracted position, a power source, a main switch connected to said limit switches and said power source whereby when said main switch is turned on said tray will be filled and when said main switch is turned off said tray will be emptied.

3. In photocopy means having a tray for holding chemicals, means to insert in and remove chemicals from said photocopy means without moving said photocopy means comprising a portable bag removably mounted below said tray, said bag having flexible tubing directly connected to said tray, means connected to squeeze said bag to force a predetermined amount of the contents of said bag into said tray, comprising a drivable platen adapted to squeeze said bag, means connected to drive said platen and means to control said drive means to retract said platen to permit said tray to be emptied into said bag by gravity, said control means comprising a limit stop means connected to operate said drive means to drive said platen between predetermined limits.

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