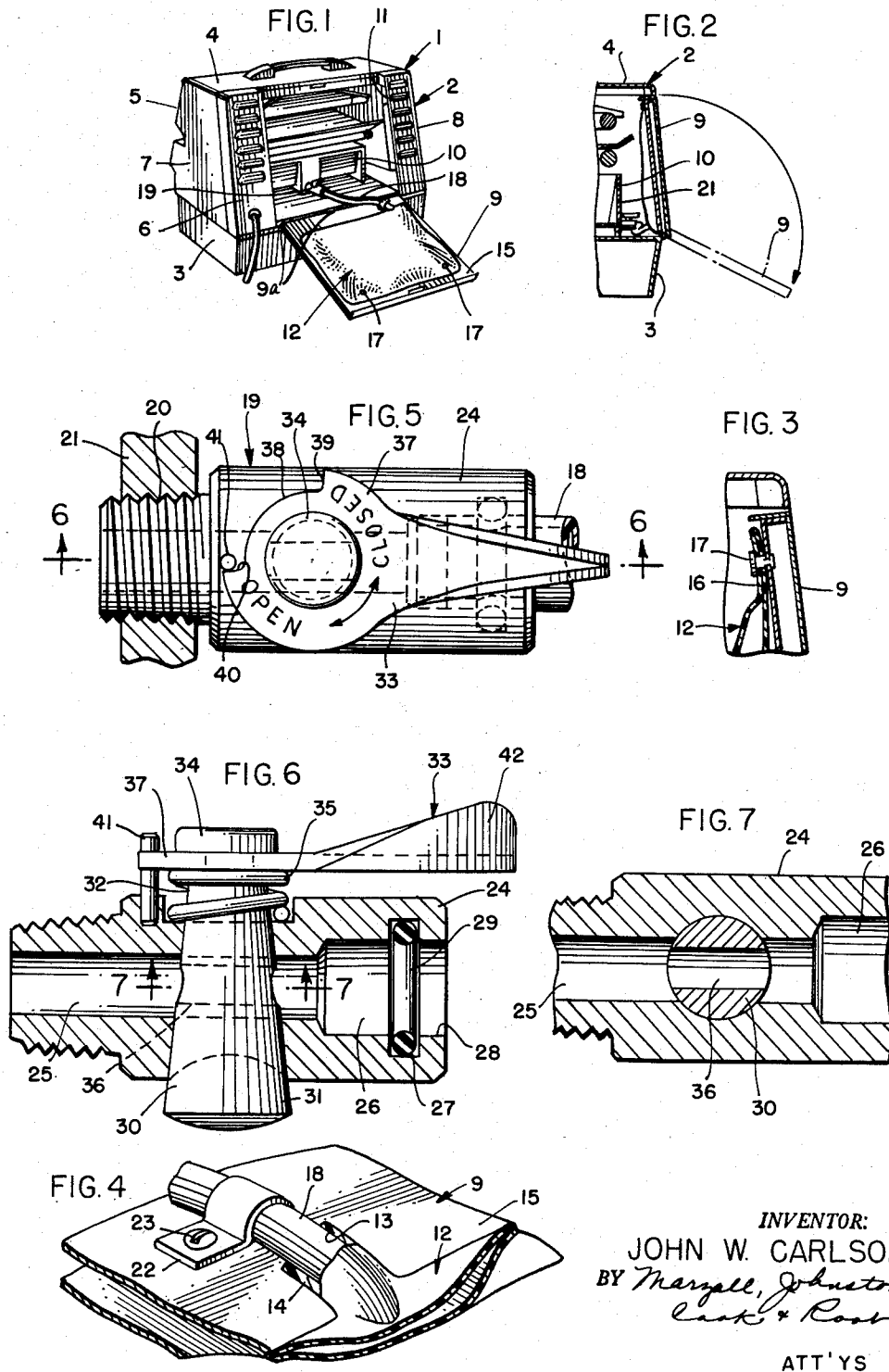


July 16, 1963

J. W. CARLSON
PHOTOCOPYING DEVICES
Filed July 17, 1959

3,097,585



1

3,097,585

PHOTOCOPYING DEVICES

John W. Carlson, Chicago, Ill., assignor to Speed-O-Print Business Machines Corporation, a corporation of Illinois

Filed July 17, 1959, Ser. No. 827,903

11 Claims. (Cl. 95—89)

This invention relates to photocopying devices and, more particularly, to developers for photocopying devices, and the like.

In the field of photocopying, and the like, wherein reproductions are made of articles to be copied, tanks or trays of developing fluid are commonly used, and it is often desirable to house such tanks or trays in the same cabinet of a machine that also houses exposure or printing apparatus. Commonly, under such circumstances, such a tank or tray has heretofore been manually filled with fluid, and the fluid left in the tray at all times, even during periods of non-use, until it was time to replace the fluid, at which time it was again manually changed. Such procedure has several inherent disadvantages. One such disadvantage is that the fluid in such a tank or tray is readily subject to spilling if the cabinet in which the tray is mounted should be tilted or move such as, for example, when moving it from one copying job to another. Another disadvantage is that most developing fluids lose their potency relatively quickly when left in such an open container. A further disadvantage is that such manual filling and emptying of such a tank or tray as is required under the aforementioned conditions is often a messy operation.

It is a primary object of this invention to permit such disadvantages to be overcome.

Another object of the present invention is to enable developing fluid to be put into and removed from a tank, or the like, in a novel and expeditious manner.

Another object is to enable developing fluid to be stored in a novel and expeditious manner when not in use, while maintaining it readily accessible for use when desired.

A further object of the present invention is to enable the potency and cleanliness of such developing fluid to be protected by protectively storing the same during periods of non-use.

An object ancillary to the foregoing is to enable such developing fluid to be stored in a sealed container in a novel and expeditious manner when it is not being used.

A further object of the present invention is to enable control of the feeding of such fluid into and out of a tank, or the like, to be effected in a novel and expeditious manner.

Another object of the present invention is to enable a novel developer or photocopy unit to be afforded which embodies a developing tank or tray disposed in a cabinet, or the like, and which unit has a novel construction which enables developing fluid to be quickly and easily emptied from the tank or tray and stored within the cabinet in a novel and expeditious manner during periods when the developer is not in use.

Another object is to enable a novel developer or photocopy unit of the aforementioned type to be afforded wherein the developing fluid stored in the cabinet of the unit in the aforementioned manner may be quickly and easily fed into the developing tank or tray when it is desired to use the developer.

A further object is to provide a novel developer, or the like, of the aforementioned type wherein the storage of the developing fluid, during periods of non-use, may be accomplished in a novel and expeditious manner in the container in which the fluid is marketed.

Yet another object is to provide a novel developer of

2

the aforementioned type embodying a developing tank and a storage container constituted and arranged in a novel and expeditious manner.

A further object is to provide a novel developer of the aforementioned type including a collapsible bag constituted and arranged therein in a novel and expeditious manner to afford both a readily available supply source of fluid for a developing tank in the unit and a readily available receptacle for receiving developing fluid from the tank.

Another object is to provide a novel developer unit of the aforementioned type wherein developing fluid may be fed from a storage container normally disposed inside the cabinet of the unit into a tank in the cabinet, or may be fed from the tank into the storage container by the simple two-step operation of merely opening and closing a door of the cabinet once and, during the opening and closing of the door, opening or closing a control unit such as a valve.

Another object is to provide a novel developing unit of the aforementioned type embodying a novel valve, tank and storage container constituted and arranged in a novel and expeditious manner.

A further object of the present invention is to afford a novel manually operable valve which may be quickly and easily opened and closed.

Another object is to provide a novel valve which may be connected to tubes, and the like, in a novel and expeditious manner.

Other and further objects of the present invention will be apparent from the following description and claims and are illustrated in the accompanying drawings which, by way of illustration, show the preferred embodiment of the present invention and the principles thereof, and what I now consider to be the best mode in which I have contemplated applying these principles. Other embodiments of the invention embodying the same or equivalent principles may be used and structural changes may be made as desired by those skilled in the art without departing from the present invention and the purview of the appended claims.

In the drawings:

FIG. 1 is a rear perspective view of a photocopy machine embodying the principles of the present invention, showing the machine with the rear door thereof open;

FIG. 2 is a fragmentary transverse sectional view taken through the rear of the machine shown in FIG. 1, showing the door in closed position;

FIG. 3 is an enlarged detail sectional view of a portion of the machine shown in FIG. 2;

FIG. 4 is an enlarged fragmentary perspective view of a portion of the machine shown in FIG. 1;

FIG. 5 is an enlarged plan view of a valve shown in FIG. 1;

FIG. 6 is a longitudinal sectional view taken substantially along the line 6—6 in FIG. 5; and

FIG. 7 is a detail sectional view taken substantially along the line 7—7 in FIG. 6.

In the drawings, a photocopying machine 1, embodying the principles of the present invention, is shown to illustrate the preferred embodiment of the present invention.

The photocopy machine 1 includes a cabinet 2 having a base 3, a top wall 4, a front wall 5, a rear wall 6, and two end walls 7 and 8. A door 9 is hingedly mounted at its lower edge portion by hinges 9a to the upper edge portion of the base 3 for substantially vertical pivotal movement on the hinges 9a between a substantially upright closed position, shown in solid lines in FIG. 2, and a lower open position, shown in broken lines in FIG. 2. It will be noted that the hinges 9a are disposed a sufficient distance above the bottom of the base 3 that when the door 9 is disposed

3

in open position, it may project downwardly away from the upper portion of the cabinet 2 at a substantial angle even when the supporting surface, on which the cabinet 2 rests, engages the normally upwardly disposed edge portion of the door 9 to thereby limit opening movement thereof, FIG. 2.

The photocopy machine 1 includes a tank or tray 10 mounted therein, FIGS. 1 and 2, the tank or tray 10 resting on the upper face of the base 3. Preferably, the tray 10 is loosely mounted in the cabinet 2 and is of such size that it may be readily inserted into the cabinet 2, and removed therefrom, through the opening 11 afforded in the rear wall 6 of the cabinet 2 when the door 9 is disposed in open position.

A flexible collapsible bag 12, which is completely closed except for an opening 13 afforded by a nipple 14 formed in the lower edge portion thereof, FIGS. 1 and 4, is mounted on the inner face 15 of the door 9. The bag 12 may be made of any material suitable for storing developing fluid for prolonged periods of time, but I would prefer to construct the bag of suitable transparent plastic sheeting such as, for example, polyethylene, or the like. The upper edge portion 16 of the bag 12 is preferably reinforced such as, for example, by heat sealing the same together, FIG. 4, and is releasably secured to the upper edge portion of the inner surface 15 of the door 9 by suitable means such as snap buttons 17, FIGS. 1 and 3.

A flexible tube 18 has one end portion mounted in the nipple 14 on the bag 12, and another end portion connected to one end of a valve 19, the other end of the valve 19 having an externally threaded nipple 20 threaded into and extending through the lower end portion of the rear wall 21 of the tank 10, FIGS. 1, 2 and 5. The tube 18 and the valve 19 afford operable and closable conduit for feeding fluid back and forth between the bag 12 and the tank 10, as will be discussed in greater detail presently.

A clamp 22, FIGS. 1 and 4, is removably attached to the lower end portion of the inner face 15 of the door 9 by suitable means such as a screw 23, in position to overlie the tube 18 relatively closely adjacent to the nipple 14 of the bag 12, and is effective to hold the lower edge portion of the bag 12 against the lower edge portion of the inner surface 15 of the door 9. Thus it will be seen that the bag 12 is readily mountable on, and removable from the inner face 15 of the door 9, and, when mounted on the door 9, is effectively held thereon in closely adjacent relation to the inner surface 15 in all positions of the door 9.

The tube 18 may be made of any suitable material and, if desired, may be removable from the nipple 14. However, I prefer to make the tube of the aforementioned polyethylene, and to seal the same into the nipple 14 by suitable means such as, for example, heat sealing. By constructing the bag 12 and the tube 18 in the last mentioned manner, the bag 12 and the tube 18 may be first sealed together and the bag 12 may then be filled, through the tube 18, with the desired amount of developing fluid, and the free end of the tube 18 may then be suitably closed such as, for example, by heat sealing it together, the thus closed bag and tube affording a practical container in which the developing fluid may be sold or otherwise marketed. Subsequently, when it is desired to connect the tube 18 to the valve 19, this may be readily accomplished by opening the closed free end of the tube 18 such as, for example, by severing the closed end portion therefrom and then connecting the tube 18 to the valve 19.

However, if it is so desired, the tube 18 may be removable from the nipple 14, and after the bag 12 has been filled with developing fluid, or the like, the free end portion of the nipple 14 may be closed such as, for example, by heat sealing the outer edge portion thereof together. Thereafter, when it is desired to connect the nipple 14 to the tube 18, the nipple 14 may be opened such as, for example, by cutting off the sealed end portion thereof,

4

and the tube 18 may then be inserted into the nipple 14. In any event, whichever of the two aforementioned bag constructions are used, it will be seen that a practical and efficient container is afforded, in which developing fluid, and the like, may be marketed.

The valve 19 embodies an elongated housing 24 having a passageway 25 extending longitudinally therethrough. The nipple 20 is disposed at one end of the housing 24 and, at the other end of the housing 24, the passageway 25 has an enlarged end portion 26. An annular recess 27 is formed in the side wall 28 of the end portion 26 of the passageway 25, and a flexible, collapsible, continuous ring member 29 is mounted in the groove 27. The ring member 29 is of such cross-sectional size that when it is disposed in the groove 27, with the outer peripheral edge of the ring member 29 disposed in engagement with the outer peripheral edge of the groove 27, the inner peripheral edge of the ring member 29 projects inwardly into the end portion 26 of the passageway 25, FIG. 6. The ring member 29 may be made of any suitable material which is resistant to attack by developing fluids such as, for example, neoprene, or the like, and when it is desired to connect a tube, or the like, such as the tube 18 to the valve 19, this may be readily accomplished by inserting the end of the tube into the end portion 26 of the passageway 25 into a position wherein it extends through the ring 29, as shown in FIG. 5. The end portion 26 of the passageway 25 is preferably of such size that it will receive the end portion of the tube to which it is to be connected with a relatively snug but freely slidable fit. Thus, it will be seen that when the tube thus to be connected is inserted into the passageway 25 a sufficient distance that it extends through the ring 29, the ring 29 is pressed into firm frictional engagement therewith so as to firmly releasably clamp the tube against withdrawal from the valve 19.

It will be seen that, as shown in FIG. 5, when the tube thus inserted into the valve 19 is made of collapsible material, such as polyethylene, or the like, the ring 29 tends to form an indentation in the outer periphery of the tube 18, which assists in holding the tube 18 in the desired position. However, it will be appreciated by those skilled in the art that my novel valve 19 is not limited to use with tubes made of collapsible material, but may also be used with non-collapsible tubes such as, for example, metal tubes, and the like, the frictional engagement of the ring 29 with such a non-collapsible tube being such as to firmly hold the tube in the passageway 25.

An elongated taper plug 30 having an enlarged end portion 31 on one end thereof and a reduced end portion 32 on the other end thereof extends through, and is rotatably mounted in the housing 24, FIG. 6. An elongated handle 33 has a flat end portion secured to the end 32 of the plug 30 by suitable means such as a screw or bolt 34, and a compression coil spring 35 is mounted between the handle 33 and the housing 24 in position to yieldingly urge the enlarged end portion 31 into snugly fitting engagement with the housing 24, FIG. 6.

The taper plug 30 has an opening 36 extending transversely therethrough, the opening 36 being smaller in diameter than the passageway 25 and being so disposed in the plug 30 that when the plug 30 is disposed in normal position, as shown in FIG. 6, the center of the opening 36 is disposed on the longitudinal center line of the passageway 25. When the plug 30 is disposed in the position shown in FIG. 6, wherein the opening 36 extends longitudinally through the passageway 25, the passageway 25 is fully open. However, when the plug 30 is rotated ninety degrees around its longitudinal axis from the position shown in FIG. 6, the opening 36 is then disposed transversely across the passageway 25 to fully close the valve 19. As will be appreciated by those skilled in the art, the plug 30 may be moved into intermediate positions between fully closed and fully open position to thereby partially open the valve 19.

The end portion 37 of the handle 33 has an arcuate-

5

shaped recess formed in the outer peripheral edge thereof to thereby afford two shoulders 39 and 40 at opposite ends of the recess 38. A pin 41 is mounted in the housing 24, and projects outwardly therefrom into the recess 38. The pin 41 is so disposed on the housing 24 that when the plug 30 is disposed in fully closed position, the pin 41 engages the shoulder 39 and when the plug 30 is disposed in fully open position, the pin 41 engages the shoulder 40. The other end portion 42 of the handle 33 disposed at the opposite end thereof from the end portion 37 projects outwardly from the housing 24 to thereby afford a readily accessible finger grip for actuating the handle 33 and thereby opening and closing the valve 19.

From the foregoing it will be seen that the bag 12, filled with developing fluid, and connected to the tube 18, may be attached to the inner face 15 of the door 9 by the snap buttons 17 and the clamp 22. The tube 18 may then be attached to the valve 19, and it will be seen that with the valve 19 closed, the developing fluid will be retained in the bag 12 and the tube 18 in all positions of the door 9.

If, in the operation of the photocopy machine 1, it is subsequently desired to feed the developing fluid from the bag 12 into the tank 10, the door 9 may be opened, the valve 19 opened, and the door 9 may be then closed to thereby cause the developing fluid to be fed by gravity from the bag 12 through the tube 18 and the valve 19 into the tank 10.

Subsequently, if it is desired to again empty the tank 10, this may be readily accomplished by again opening the door 9, to thus dispose the bag 12 below the level of the tank 10 and thereby permit the fluid in the tank 10 to flow by gravity into the bag 12. Thereafter, the valve 19 may first be closed and then the door 9 closed, the developing fluid under such circumstances again being stored within the cabinet 2 in the bag 12 and the tube 18.

With this construction, it will be seen that when it is desired to change the supply of developing fluid for the photocopy machine 1, this may be readily accomplished by opening the door 9 into fully opened position as shown in broken lines in FIG. 2, and with the valve 19 open, permit all fluid to flow downwardly by gravity from the tank 10 and the tube 18 into the bag 12. Thereafter, if the bag 12 and the tube 18 are sealed together, they may be removed as a unit from the valve 19 and the door 9 by releasing the clamp 22 and unsnapping the buttons 17. If the bag 12 is not sealed to the tube 18, it may be removed individually from the door 9 by disengaging it from the tube 18 and releasing the snap buttons 17.

Thereafter, if the bag 12 and the tube 18 have been removed as a unit, a new supply of developing fluid for the tank 10 may be mounted in the cabinet 1 by connecting the upper edge portion 16 of the new bag 12 to the door 9 by snap buttons 17, and securing the lower end portion of the new bag 12 to the door 9 by engaging the clamp 22 over the new tube 18 on the new bag 12. The free end portion of the new tube 18 may then be operatively connected to the valve 19 by inserting it into the passageway 25 as previously described. On the other hand, if the bag 12 has been removed from the tube 18, a new supply of developing fluid for the photocopy machine 1 may be mounted therein by connecting the upper edge portion 16 of a new bag 12 to the door 9 by the snap buttons 17, and operatively connecting the nipple 14 of the new bag 12 to the corresponding end portion of the old tube 18, which is still held by the clamp 22.

From the foregoing, it will be seen that with a photocopy machine constructed in accordance with the principles of the present invention, an old supply of developing fluid may be quickly and easily removed therefrom and a new supply may be quickly and easily substituted therefor.

It will be appreciated by those skilled in the art that although I have disclosed my invention as embodied in a photocopy machine, this is merely by way of illustration

6

and not by way of limitation, and that it may be embodied in other units such as, for example, developers, which do not have apparatus such as, for example, exposure or printing apparatus commonly found in photocopy machines, and which are not essential to the present invention, without departing from the purview of my invention.

From the foregoing it will be seen that I have afforded novel apparatus which is practical and efficient in operation and which may be readily and economically produced commercially.

Thus, while I have illustrated and described the preferred embodiment of my invention, it is to be understood that this is capable of variation and modification, and I therefore do not wish to be limited to the precise details set forth, but desire to avail myself of such changes and alterations as fall within the purview of the appended claims.

I claim:

1. In a developer of the type including a cabinet having a container therein normally disposed in predetermined fixed position in said cabinet, an outer wall hinged on said cabinet for pivotal movement between a raised closed position and a lower open position, a second container for liquid mounted on said wall for movement therewith, and means connecting said second container to said first mentioned container in position to feed liquid from said first mentioned container in said fixed position into said second mentioned container during said pivotal movement of said wall from closed position to said open position and feeding said liquid from said second container to said first mentioned container in said fixed position during said pivotal movement of said wall from said open position to said closed position.

2. The combination in a developer defined in claim 1 and in which said means connecting said containers includes a valve for controlling the flow of liquid between said containers.

3. In copying apparatus of the type including a cabinet having a tank stationarily disposed therein, a wall for said cabinet hinged on said cabinet for pivotal movement relative to said tank between a raised closed position and a lowered open position, a container for liquid mounted on said wall and movable therewith, and means interconnecting said tank and container for feeding liquid therebetween, said container being disposed below said tank in position to receive liquid therefrom when said wall is disposed in said open position and being disposed above said tank in position to feed liquid thereto when said wall is disposed in said closed position.

4. In a developer of the type including a cabinet having a tank stationarily disposed therein, a wall for said cabinet hinged on said cabinet for pivotal movement relative to said tank between a raised closed position and a lowered open position, a container for liquid mounted on said wall and movable therewith, means interconnecting said tank and container for feeding liquid therebetween, said container being disposed below said tank in position to receive liquid therefrom when said wall is disposed in said open position and being disposed above said tank in position to feed liquid thereto when said wall is disposed in said closed position, and means in said first mentioned means for controlling the feeding of liquid therethrough between said tank and said container.

5. In copying apparatus of the type including a housing having a tank for liquid stationarily disposed therein, said housing including a wall hinged on the lower end portion thereof for pivotal movement relative to said tank between a raised closed position and a lowered open position, a collapsible liquid impervious bag mounted on the inner face of said wall for movement with the latter, conduit means connected to said tank and bag for feeding liquid therebetween, and valve means connected to said conduit means for controlling the flow of liquid there-through, said bag being disposed below said tank in posi-

7

tion to receive liquid therefrom when said wall is disposed in said open position, and said bag being disposed above said tank for feeding liquid thereinto when said wall is disposed in said closed position.

6. The combination defined in claim 5 and in which said valve means comprises a valve having a liquid passageway therein, and in which said conduit means extends into one end portion of said passageway, and which includes resilient ring means yieldingly mounted in said one end portion of said passageway in spaced relation to the outer end thereof in frictional engagement with said conduit means in position to releasably hold said conduit means in said one end portion.

7. The combination defined in claim 6 and in which said valve includes an elongated plug extending transversely through said passageway and rotatable between one position effective to close said passageway and another position effective to open said passageway, means mounted on one end of said plug for rotating the latter between said positions, two spaced shoulders on said last mentioned means, and abutment means on said valve in position to engage one of said shoulders when said plug is disposed in position to open said passageway and to engage the other of said shoulders when said plug is disposed in said position to open said passageway.

8. In a photocopy machine of the type including a cabinet having a tank for liquid stationarily disposed therein, a wall for said cabinet having an inner face, an upper edge portion, and a lower edge portion, hinge means on said lower edge portion hingedly mounting said wall to the remainder of said cabinet for pivotal movement relative to said tank between a raised closed position and a lowered open position, a collapsible bag having an upper edge portion releasably secured to the inner face of said upper edge portion of said wall, and a lower edge portion releasably secured to the inner face of said lower edge portion of said wall, and flexible conduit means having one end portion connected to said bag and another end portion connected to said tank for feeding liquid therebetween, said conduit means including means for controlling the flow of liquid therethrough, said wall and bag being disposed in position relative to said tank to feed liquid through said conduit means from said bag to said tank and from said tank to said bag when said wall is disposed in said closed and open positions, respectively.

9. In a photocopy machine of the type including a cabinet having a tank for liquid stationarily disposed therein, a wall for said cabinet having an inner face, an upper edge portion, and a lower edge portion, hinge means on said lower edge portion hingedly mounting said wall to the remainder of said cabinet for pivotal movement relative to said tank between a raised closed position and a lowered open position, a collapsible bag having an upper edge portion and a lower edge portion, means releasably securing said upper edge portion of said bag to the upper edge portion of said inner face of said wall, a flexible tube normally disposed in said housing and having one end portion connected to said bag for feeding liquid into and out of the latter, holding means on said inner face of said wall and normally engaged with said tube in position to hold said lower edge portion of said bag on said inner face of said wall, means connecting the other end portion of said tube to said tank, said last mentioned means comprising a valve connected to said tank and said other end portion of said tube for controlling the flow of said liquid through said tube, said wall being disposed on the remainder of said housing in such position as to dispose said bag in position to receive liquid through said valve and tube from said tank when said valve is open and said wall is disposed in

8

said open position and to feed liquid from said bag to said tank when said valve is open and said wall is disposed in said closed position.

10. In a developer of the type including a cabinet having a tank for liquid stationarily disposed therein; a wall for said cabinet having an inner face, an upper edge portion, and a lower edge portion, hinge means on said lower edge portion hingedly mounting said wall to the remainder of said cabinet for pivotal movement relative to said tank between a raised closed position and a lowered open position, a collapsible bag having an upper edge portion and a lower edge portion, means releasably securing said upper edge portion of said bag to the upper edge portion of said inner face of said wall, means for feeding liquid between said tank and bag, said feeding means comprising a flexible tube normally disposed in said housing and having one end portion connected to said bag, and a valve connected to said tank and said other end portion of said tube and actuatable between open and closed position for controlling the flow of liquid in said tube, and clamping means on said wall and releasably engaged with said tube in position to hold said lower edge portion of said bag on said inner face of said wall, said bag being disposed on said wall in position to receive liquid from said tank when said valve is open and said wall is disposed in said open position, and to feed liquid to said tank when said valve is open and said wall is disposed in said closed position.

11. In a photocopy machine of the type including a cabinet having a base, and having a tank stationarily disposed therein disposed above said base, a wall for said cabinet having an inner face, an upper edge portion, and a lower edge portion, hinge means attached to said lower edge and hingedly mounting said wall on said base for pivotal movement relative to said tank between a substantially upright raised closed position and a lowered open position, said wall projecting outwardly and downwardly from said base when said wall is disposed in said open position, a collapsible liquid impervious bag having an upper edge portion and a lower edge portion, means releasably securing said upper edge portion of said bag to the upper edge portion of said inner face of said wall, means for feeding liquid between said tank and bag, said feeding means comprising a flexible tube normally disposed in said housing and having one end portion connected to said bag, and a valve connected to said tank and said other end portion of said tube and actuatable between open and closed position for controlling the flow of liquid in said tube, and clamping means on said wall and releasably engaged with said tube in position to hold said lower edge portion of said bag on said inner face of said wall, said bag being disposed on said wall in position to receive liquid from said tank when said valve is open and said wall is disposed in said open position, and to feed liquid to said tank when said valve is open and said wall is disposed in said closed position.

References Cited in the file of this patent

UNITED STATES PATENTS

704,942	Smith	July 15, 1902
1,053,409	Leach	Feb. 18, 1913
1,079,288	Caballero	Nov. 18, 1913
2,191,918	Stadtfeld	Feb. 27, 1940
2,287,742	Mandel	June 23, 1942
2,460,270	Ashley et al.	Feb. 1, 1949
2,478,197	Kleiss	Aug. 9, 1949
2,762,281	Kleinstra	Sept. 11, 1956

FOREIGN PATENTS

843,362	Germany	July 7, 1952
---------	---------	--------------