Aug. 29, 1961 S. H. GEERTSEN 2,997,950

LIQUID DUPLICATING MACHINE COMPRISING ROLLERS, THE PRESSURE OF WHICH IS ADJUSTABLE

Filed Sept. 11, 1959 2 Sheets-Sheet 1

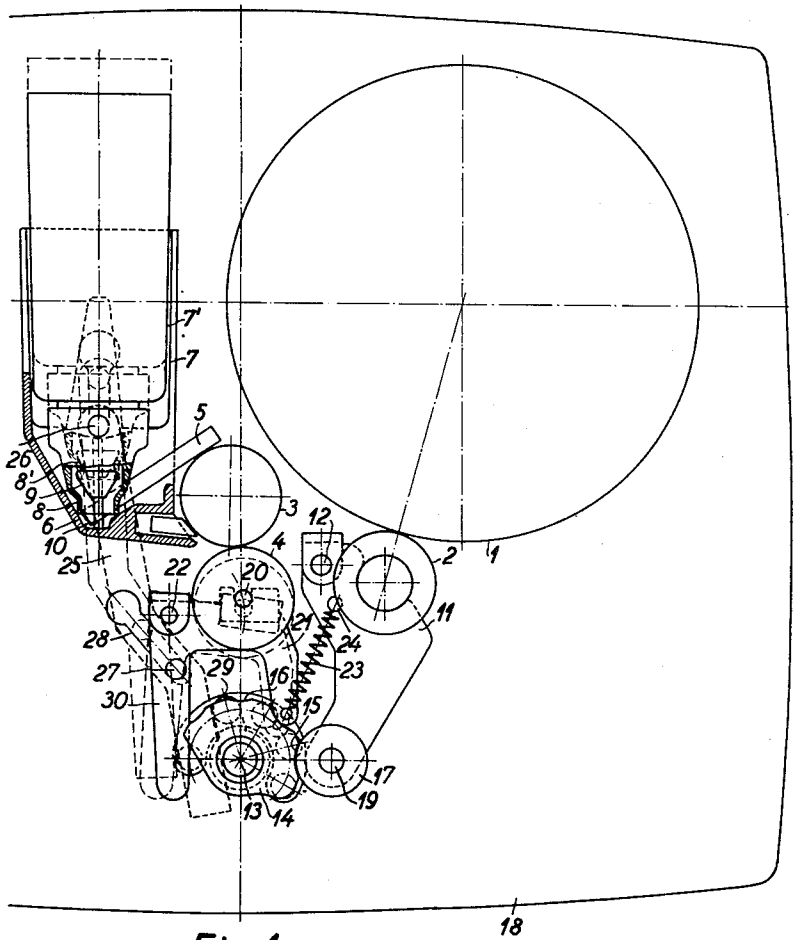


Fig.1

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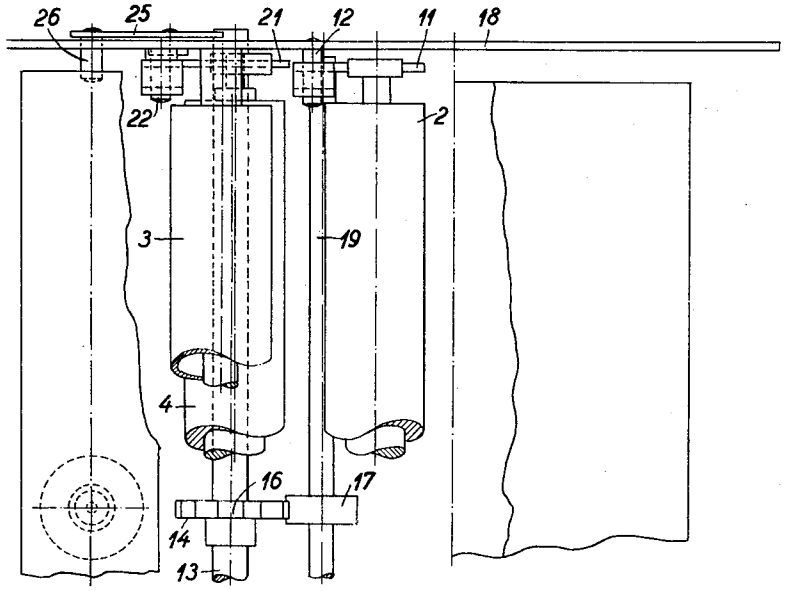


Fig.2

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LIQUID DUPLICATING MACHINE COMPRISING ROLLERS, THE PRESSURE OF WHICH IS ADJUSTABLE

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5 Claims. (Cl. 101—148)

This invention relates to a liquid duplicating machine comprising a feed roller and a pressure roller, which can be pressed against a moistening roller and a master cylinder, respectively, with adjustable pressure, and a liquid supply device from which liquid is supplied to the moistening roller whether the duplicating machine is turning out copies or is brought to a temporary standstill.

In a known type of liquid duplicating machines in which the liquid is supplied by means of a pump the supply of liquid is interrupted automatically when the duplicating machine is stopped. In another known type of liquid duplicating machines the liquid is supplied from a supply tank to a container, in which the level of the liquid is kept constant and from which the liquid is led on to the moistening roller, e.g. by means of a wick. In the latter type of duplicating machines the user has had to put up with the drawback that the supply of liquid to the moistening roller is continued in spite of the fact that the duplicating machine has been stopped. Certainly, there is the theoretical possibility that the supply tank can be emptied or possibly completely removed from the duplicating machine, but in practice only few users will resort to this.

It has been found that a loss of liquid occurs even if the moistening roller does not rotate and thereby receives liquid for use in the moistening of the paper to be printed. The liquid used is generally volatile, as for example it may contain considerable quantities of spirit. This entails that a rather considerable evaporation occurs from the open liquid surfaces and particularly from the wick, if any, and it is an object of this invention to remedy this drawback.

Duplicating machines having a handle for releasing the pressures between the master cylinder and the pressure roller and between the moistening roller and the feed roller are known, and in the present invention this possibility of adjustment is utilized, by providing a common release mechanism which by the operation of a single handle releases the feed roller and the pressure roller and further interrupts the supply of liquid.

The user is already prepared to release his duplicating machine, when it is put out of action, because he wants to avoid irreversible deformations caused by the constant pressure of stationary pressure roller and feed roller against the master cylinder and moistening roller, respectively. Now by the measure according to the invention the user when putting the duplicating machine away after use, need not perform other adjustments than the one he usually performs. Nevertheless the user attains that in the type of liquid duplicating machines herein referred to the usual waste of liquid, which one has hitherto put up with as a necessary operation cost, will not occur.

An expedient embodiment of the liquid duplicating machine according to the invention comprises a common oscillatory operating shaft on which is secured an adjustment disc the circumference of which is provided at different radial distances from the axis, for a control member, e.g. a feeler roll, mounted on a lever which dependent on the position of the operation shaft can force the pressure roller with a higher or lower pressure against the master cylinder. In at least one of its positions, the release position of said common operation shaft relieves the pressure of the pressure roller against the master

cylinder, releases a lever mechanism, actuating the feed roller into abutment with a substantially constant pressure on the moistening roller during the operation of the duplicating machine, and actuates a lifting mechanism for a liquid supply tank of the type in which the liquid supply is automatically blocked when the tank is raised. This construction is particularly simple because it utilizes the type of liquid supply tanks known per se designed as a closed tank which below is provided with a comparatively narrow discharge opening which in the operating position is held under the surface in the liquid container and thereby keeps the level in the latter approximately constant. In the mouth a kind of needle valve may be provided which is opened when the supply tank is led into its operation position downwards towards the bottom of the liquid container and which is closed when the supply tank is lifted.

The lever mechanism for actuating the feed roller may comprise at least one double-armed lever which by a spring is kept in its operating position with a pressure substantially independent of the pressure variations which by means of the operation shaft can be effected in the contact face between the pressure roller and the master cylinder, said lever being turnable by means of a release member for relieving the pressure between the feed roller and the moistening roller, and further arranged for being actuated at the termination of the motion of the lifting mechanism under influence from the member actuating the lifting mechanism by a turning of the operation shaft. By this construction, separate transmission means from the operation shaft to the lifting mechanism and the release mechanism for the feed roller are obviated.

In the latter construction, the lifting mechanism for the liquid supply tank can according to the invention be made particularly simple by being only designed with at least one substantially vertically displaceable rod which is arranged for being actuated by means of the rotary operation shaft. Even if one rod is sufficient for obtaining the desired motion, two rods are generally preferred, one at either end of the supply tank.

The invention will in the following be further explained with reference to the accompanying purely diagrammatical drawings which illustrate only the parts of a liquid duplicating machine necessary for understanding the invention,

FIG. 1 showing parts of a liquid duplicating machine viewed in the axial direction of the master cylinder, and

FIG. 2 showing some of these parts in plan view.

In the drawing, **1** designates a master cylinder and **2** a pressure roller, while **3** is a moistening roller and **4** a feed roller in contact with the latter. The moistening roller is supplied with liquid from a pad of wick **5** which dips into a liquid container **6** to which liquid is supplied from a supply tank **7**, the mouth **8** of which in the operating position is below the level of the liquid in the liquid container **6**, but which, when the supply tank is lifted into the position **7'**, is brought to take up the position **8'** some distance above the level of the liquid in the liquid container **6**.

In the mouth **8** a conical valve body **9** with a needle **10** is provided which in the operating position of the supply tank rests against the bottom of the liquid container **6**. In this position, liquid can pass out through the mouth **8**. If, on the other hand, the supply tank is lifted from the position **7** into the position **7'**, the valve body **9** will not follow the beginning of the motion, but will be led towards the mouth **8** so as to close the latter from the inside, and hereby liquid is prevented from leaving the supply tank **7**.

The pressure roller **2** is actuated by means of a lever **11** which is rotatable around an axis **12** to produce an adjustable pressure against the master cylinder **1**. The adjustment is effected by means of an operation shaft **13**

provided with an adjustment handle, not shown, for turning the shaft besides an adjustment disc **14** which is secured on the shaft and along its circumference provided with a series of depressions, two of which are in FIG. 1 designated by the reference numerals **15** and **16**. A feeler roll **17** engages the depression **15** in the position shown in FIG. 1. By turning the adjustment disc **14** by means of the shaft **13**, the different other depressions, e.g. the depression **16**, may be brought into the position which the depression **15** takes up in FIG. 1, and as the depressions in a clockwise direction of rotation in FIG. 1 have increasing distances from the axis in the shaft **13**, there will by a clockwise turning of the adjustment disc via the feeler roll **17** and the lever **11** be produced a stepwise increasing pressure between the pressure roller **2** and the master cylinder **1**. As appears from FIG. 2, the adjustment disc **14** and the feeler roll **17** are located in the central plane of the machine halfway between the side stringers in the framing of the machine, one of which is shown at the top of FIG. 2 and designated by **18**. The transmission of the motion of the feeler roll **17** is therefore effected by means of a transmision rod **19**, and in practice there are at either of the side stringers **18** of the duplicating machine one set of members like those described in connection with FIG. 1.

The shaft **20** of the feed roller **4** is actuated by one arm of a double-armed lever which turns around an axis **22**. The pressure, with which the feed roller **4** presses against the moistening roller **3**, is determined by a spring **23**, one end of which is connected with the arm **21**, and the other end of which is connected to a suitable fixed or almost fixed point. In the present case a point **24** is used on the lever **11** and located in the vicinity of the axis of rotation **12** of the latter. The point **24** might also be a fixed point on one of the side stringers of the duplicating machine, so that there would be no mechanical connection between the mechanism for regulating the pressure between the master cylinder **1** and the pressure roller **2** and the mechanism for keeping the pressure between the moistening roller **3** and the feed roller **4** approximately constant.

The lifting mechanism for lifting the supply container **7** is provided with a substantially vertically displaceable rod **25** which, as will be seen in FIG. 2, lies outside the side stringer **18** of the duplicating machine, but is provided with a pin **26** projecting in through an opening in the stringer, so that it can actuate the supply tank **7** for lifting. The motion of the rod **25** is guided by means of a pin **27** which is secured on the rod and slides in a slot **28** in the stringer. The rod **25** is slightly Z-shaped and may at its lower branch be actuated by means of a crank-like cam **29**, secured on the operation shaft **13**, when the shaft is turned counter-clockwise. By a continued turning of the shaft **13**, whereby the supply tank **7** is lifted by means of the rod **25**, the cam **29** will towards the termination of the motion enter into contact with an arm **30** which hereby turns around the axis **22** and relieves the pressure between the feed roller **4** and the moistening roller **3**, the double-armed lever **21**, **30** being turned clockwise around the axis **22**.

The motion of the double-armed lever **21**, **30** may be very slight, the aim being solely a relief of the pressure. Thus, the rollers **3** and **4** need not be brought out of contact with each other. This also applies to the master cylinder **1** and the roller **2**. A construction, in which the roller pairs remain in contact with each other, offers various practical advantages, for example that the operation motions can be kept small, and that it is unnecessary to take special measures to prevent the released rollers from rattling during transport.

I claim:

1. In a liquid duplicating machine, a master cylinder, a pressure roller, means for pressing said pressure roller with an adjustable pressure against said master cylinder, a moistening roller, a feed roller, means for pressing said feed roller with approximately constant pressure against said moistening roller, a liquid supply device comprising a movable closed supply tank for supplying liquid to the moistening roller and having one opening, a valve inserted in the opening, means for opening and closing said valve in dependence on the position of the movable supply tank, and a common release mechanism for releasing said pressures between said master cylinder and pressure roller, and said moistening roller and feed roller and for raising the liquid supply tank and thereby closing said valve.

2. In a liquid duplicating machine, a rotatable master cylinder, a pressure roller, means for pressing said pressure roller against said master cylinder with adjustable pressure, a moistening roller, a feed roller, means for pressing said feed roller with approximately constant pressure against said moistening roller, a liquid supply device having a movable closed supply tank with one opening, a valve inserted in the opening, means for actuating said valve by the movement of the supply tank, and a common release mechanism for releasing the pressure of said pressure roller and said feed roller against said master cylinder and said moistening roller respectively, and for raising the liquid supply tank and thereby closing said valve.

3. A liquid duplicating machine as claimed in claim 1, further including a liquid container and a control pin mounted on said valve and protruding from the bottom of said liquid supply tank to contact the bottom of said liquid container, when said liquid tank is in the lowermost position and thereby open said valve.

4. A liquid duplicating machine as claimed in claim 2, wherein the means for pressing said pressure roller against said master cylinder includes a pair of double-armed levers carrying at one arm said pressure roller and at the other arm a feeler roll, said means for pressing said feed roller against said moistening roller including a second pair of double-armed levers carrying at one arm said feed roller and a spring for urging said feed roller against said moistening roller with approximately constant pressure, and said common release mechanism including a third pair of levers for raising and lowering said supply tank, and a common operation shaft comprising means for actuating when turned to off position said three pairs of levers to release said pressures and close said valve.

5. A liquid duplicating machine as claimed in claim 2 wherein said common release mechanism comprises a rotatable shaft carrying a first cam for operating the means for pressing said pressure roller with adjustable pressure against said master cylinder, a second cam for operating against the action of a spring said means for pressing said feed roller with approximately constant pressure against said moistening roller and a third cam for operating said movable supply tank.

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