United States Patent

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[54] **DIAZO DEVELOPER**
1 Claim, 1 Drawing Fig.

[52] **U.S. Cl.** **95/89,** 95/94
[51] **Int. Cl.** **G03d 7/00**
[50] **Field of Search** ..... 95/89, 89(gas), 94, 94(gas)

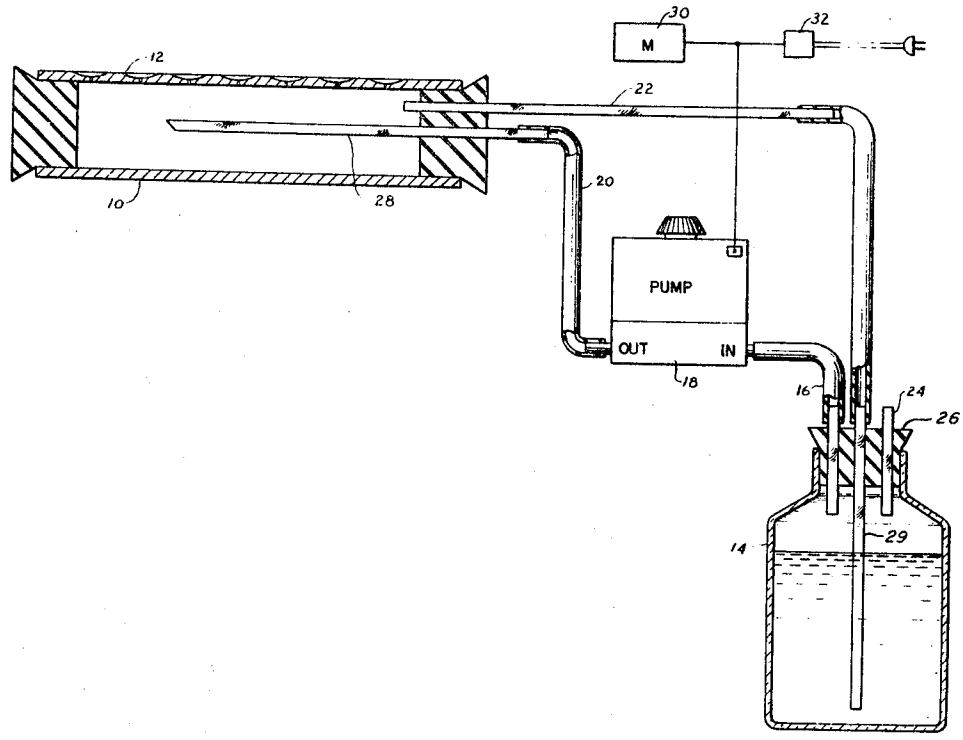
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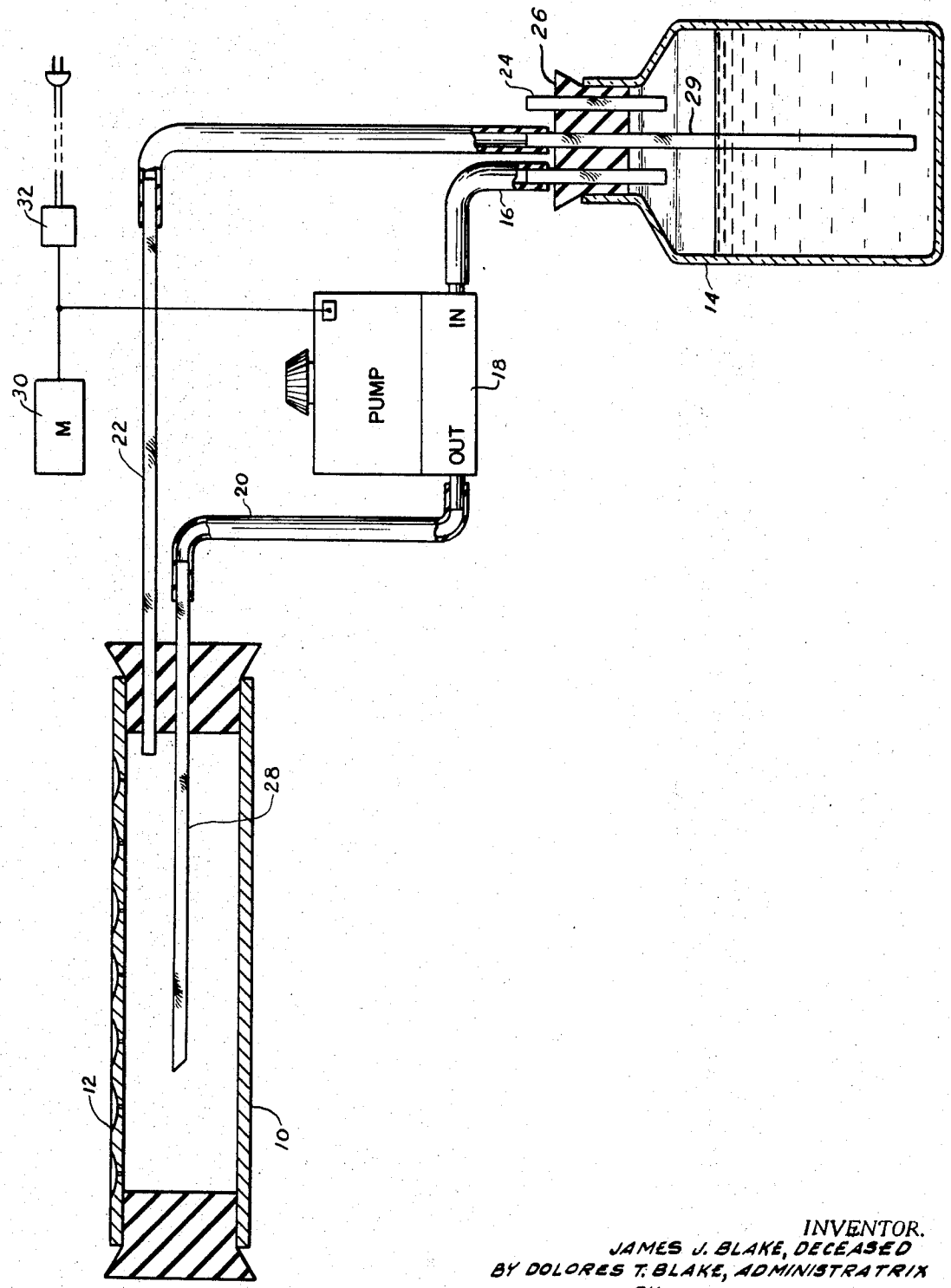
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ABSTRACT: A diazo developer having a perforated developer tray, a container of volatile developer in solution, a pump and two ducts. The first duct is connected between the container having the developer solution and the perforated developer tray. A pump, connected on the first duct, circulates the volatile vapor into the perforated developer tray and thence via the second duct to the container. The second duct equalizes pressure to provide fast charging of the developer at low pressure. A vent equalizes the container with the ambient pressure.





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DIAZO DEVELOPER

This invention relates to duplicating machines of the type employing diazo sensitized material and more particularly to improvements in the developer stage thereof.

Diazo type machines for preparation of duplicates of translucent originals are known to the art. In general, such machines are provided with a printer section where the sensitized material is exposed, through the original, to high intensity light. A separator section then separates the original from the sensitized material and moves the sensitized material to a developer section. In the developer section, the exposed sensitized material is processed by exposure to the vapors of a volatile developing agent, normally ammonia. The developed print is then removed from the developer section. It is the developer section to which this invention is directed.

Many types of developer sections have been devised and a large number of these have been marketed. In one type, a tray in the developer section is filled with an aqueous solution of ammonia. The ammonia fumes fill the developer and the exposed material is passed through the fumes for development. However, in such device, the fumes are always present and are at substantially the same concentration whether a print is developing or not. Since there is always some leakage from the developer section, the room in which the machine is installed becomes fowled with the fumes. The operator of the machine must also remove spent developer and refill the machine, adding to the problem of exposure to fumes.

To provide a concentration of developer fumes at the sensitized material, many sophisticated developer sections have been devised. In several, spot heater elements are used to volatilize the ammonia near the material and only when the material is being processed. The tank of ammonia solution can be more effectively sealed. However, this results in increased water vaporization and need for separation of spent developer. The loading problem is not alleviated. This type of system, as well as many others on the market such as pressure systems, are, of course, considerably more expensive because of the added components.

It is therefore an object of the present invention to provide an improved developer stage of simple and inexpensive construction in which adequate developer fumes are provided when needed and in which loading problems are reduced.

In accordance with this object, there is provided, in a preferred embodiment of the present invention, a developer stage having an ammonia tray with a perforated wall over which the exposed material passes. The developer, such as an aqueous solution of ammonia 28 percent is contained in the shipping container, usually a one gallon plastic bottle. Means are provided to pump the ammonia fumes from the top of the container through the ammonia tray and back into the container. The circulation provides the development fumes necessary and equalizes pressure. Thus very low pressures can be used, with resultant low leakage. A vent into the container is provided for ambient pressure equalization as the ammonia is removed during processing.

Having briefly described the invention, it will be described in detail in the following portion of the specification which may best be understood by reference to the accompanying drawing which is a diagrammatic view of a developer in accordance with the present invention.

In the FIG., there is shown the pertinent position of a developer section comprising a developing tray **10** for development by the ammonia fumes which are applied to the exposed sensitized material through perforations **12**. A developing chamber encloses the material tray, and conveyor equipment but is omitted for clarity. Unlike most known

equipment, the present equipment charges directly from the container **14** of ammonia. The container **14** is preferably the shipping container for conventional solution, such as a 28 percent concentration ammonium hydroxide solution. The volatile ammonia from the solution is circulated through duct **16**, pump **18**, duct **20**, tray **10**, and duct **22**. A vent duct **24**, which is of smaller diameter than ducts **16** and **22** and may be a capillary tube, prevents generation of a sufficiently high vacuum inside the container **14** to collapse the walls thereof.

Thus as can be seen, no tray for liquid developer is required in the developer section, nor need the operator be exposed to fumes as is normal in filling such trays. The shipping container is merely put in position, the cap removed, and plug **26** inserted (with ducts in place in plug **26**).

As soon as the pump is turned on, a volume of ammonia gas distilled from the surface of the ammonia hydroxide solution is charged into the developer tray via discharge nozzle **28**. It was found that positioning the tip of the nozzle about two-thirds of the length of the tray gave the desired uniformity of distribution of the ammonia fumes. The fumes are recirculated through duct **22** and refreshed.

Thus, immediate availability of developer is provided, a feature not found in existing equipment. The extension **29** of duct **22** can approach or or enter the surface of the solution for pressure control. If the tube enters the solution, the pressure in the system is raised. Although sometimes an advantage, higher leakages are encountered. Thus, normally it is preferred that extension **29** ends above the surface of the solution. Then duct **22** acts to equalize the pressure in the system and a greater volume of fumes is passed through the system. With the vent **26**, the developer consists of ammonia, water vapor and air. However, in normal practice, and because of the recirculation, no provision need be made for removal of spent developer from the chamber. Another advantage is the effectiveness of developer use. With the system described, a gallon of solution would last almost a month. The same machine using developer charging in the developer section and heat volatization would require consideraably more developer.

The pump speed can be hand regulated, and adjusted for print speed. Normally the power supply for the print machine and the pump would be interlocked so that developer is circulated only when the machine is running. Alternatively, the print drive motor **30** could be driven in parallel with pump **18** from a variable supply **32** to coordinate pump speed with print speed.

The invention may be variously modified and embodied within the scope of the subjoined claims.

It is claimed:

In a diazo developer wherein diazo prints are processed by exposure to ammonia vapor, a container partially filled with an aqueous solution of ammonia, a tray defining a chamber for ammonia vapor having a perforated upper wall for ammonia vapor to flow through from the tray into contact with exposed diazo sensitive material passed thereover, a first duct coupling the container at a position above said solution level to said tray, a second duct coupling said tray to said container, said second duct enters said container and extends below the surface of said solution, a pump means in said first duct for circulating the ammonia vapor from said container through said first duct, through said tray and through said second duct back to the container to continuously refresh said vapor in the tray and to charge the tray with ammonia vapor for development of diazo prints passed thereover and said pump means is coupled to a developer transport means to coordinate vapor flow to the tray with the developer transport speed.