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DIAZOTYPE DEVELOPING APPARATUS

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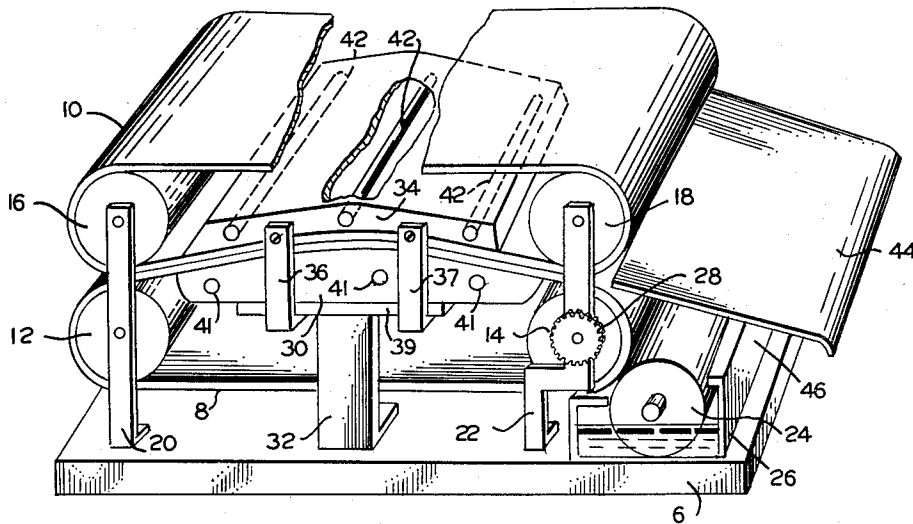


FIG. 1

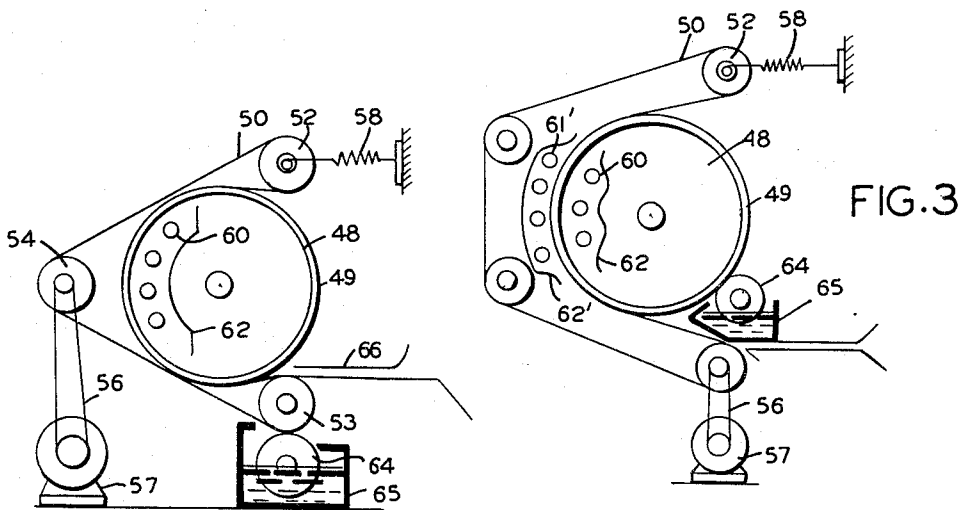


FIG. 2

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DIAZOTYPE DEVELOPING APPARATUS

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This invention relates to diazotype duplicating apparatus and, more particularly, to the development of diazo sensitized material.

Common diazotype materials can be divided into two categories, namely, one-component and two-component materials. One-component materials are sensitized by use of a diazo compound plus other suitable materials not including a coupling component. Processing of one-component papers is brought about by the application of a thin film of solution containing the coupling component together with a suitable neutral or alkaline buffer. Two-component papers are coated with both the diazo and the coupler together with an acidic material which imparts to the system sufficient acidity to prevent premature coupling of the azo components. After exposure of the material to light under the original to be reproduced, development is brought about by rendering the material alkaline.

Heretofore, to obtain a moist, alkaline environment for the material without wetting it so as to avoid diffusion of the dyes, the vapors of aqueous ammonia have been used in various types of developing tanks. These tanks necessarily had to be sealed because the ammonia vapors give off an offensive odor.

The present invention aims to improve the complicated structures of gaseous developing apparatus and proposes instead to subject the exposed two-component material to a moist, alkaline environment by bringing it into contact with an absorbent material previously wetted with an alkaline developing agent and then applying heat to the area of contact. In this manner, the vapors generated are localized to the contact area and, at the same time, the heat also removes the residual solution from the absorbent material so that the latter may be reused by subsequent wetting.

It is a primary object of the invention to eliminate the use of aqueous ammonia vapors in the development of two-component diazotype material.

It is a particular feature of the invention that the absorbent material is in the form of an endless belt which may be continuously used by applying alkaline developer to it and evaporating a desired amount for the diazotype material.

It is a further feature of the invention that the apparatus requires no sealing of the developing gases and no fumes are generated which will require venting of the apparatus.

Other objects and features will be apparent from the following description of the invention, pointed out in particularity in the appended claims, and taken in connection with the accompanying drawing, in which:

FIG. 1 shows, by way of example, a simple developing apparatus, in perspective, illustrating the invention;

FIG. 2 is a schematic representation of one modification of the apparatus; and

FIG. 3 is a schematic representation of another modification.

Referring to FIG. 1, the apparatus is shown mounted on a base 6 and comprises two sets of coengaging conveyor belts 8 and 10 arranged to move over rollers 12, 14, 16 and 18, respectively. Rollers 12 and 16 are journaled in the vertically extending bracket 20 affixed to base 6. Similarly, rollers 14 and 18 are journaled in bracket 22. The other ends of the rollers 12, 14, 16 and

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18, respectively, are similarly supported, but these are not shown in the perspective view.

The belt 8 is of an absorbent material, such as a cotton fabric, and, passing over roller 14, engages the wetting roller 24 which is partially immersed in the developing solution contained in the tank 26. This solution may be made of ammonium salts, such as ammonium carbonate, ammonium formate and the like. Aqueous ammonia may also be used.

The roller 24 rotates in suitable bearings (not shown here). Power for moving the belt 8 and, by contact, also the belt 10, may be applied to the gear 28 affixed to the shaft of the roller 14 by suitable drive (not shown here). Both belts 8 and 10 are constrained to follow a curvilinear path over the platen 30 supported on the bracket 32 and under the platen 34 which is held by cross braces 36 and 37 affixed to the supporting plate 39 of the bracket 32. Platens 30 and 34 are placed one above the other at a sufficient distance to permit easy passage of the belts 8 and 10 but allow firm contact between them. Suitable heating elements 41 and 42 are placed in a lower and upper platen to produce the required heat in the contact area between the belts 8 and 10. A feedboard 44 is attached to the wall 46 of the tank 26 at such an angle as to guide the sensitized sheet material between the belts 8 and 10.

Referring to the operation of the apparatus shown in FIG. 1, the exposed sheet material is placed on the feedboard 44 until, caught between the moving belts, it is conveyed to the area between platens 30 and 34. The portion of the belt 8 contacting the wetting roller 24 absorbs developing solution and applies this to the sheet material as it enters between rollers 14 and 18. As soon as the material enters the area where the platens heat belts 8 and 10, the solution absorbed is volatilized into a gas which is of sufficient temperature and alkalinity to produce development of the diazo image. The heating elements in the platen also volatilize the moisture retained in the belt 8 so that both the sensitized material and the belt are practically moisture-free after leaving the areas between the platens 30 and 34. The developed copy leaves between rollers 12 and 16 in a condition ready for use.

The surface of the belt 8 is thus sequentially wetted with the developing solution from the tank 26 and dried between the platens 30 and 34 while the machine is in operation.

The belt 10 may be made of similar absorbent material so that it may take up moisture from the belt 8 and thus form two contiguous supports between which the diazotype sheet material is evenly heated on both sides, assuring rapid evaporation of the moisture retained in both belts and the paper itself.

The modifications shown in FIGS. 2 and 3 operate under essentially the same principle except that the support over which the material is passed consists of a cylinder 48 having a surface layer 49 of absorbent material, such as felt or canvas. An endless belt 50 is arranged to contact the larger portion of the surface of the cylinder passing over layers 52, 53 and 54. The latter may be connected by a belt 56 to a suitable motor 57. The belt 50 is also tensioned by the spring 58 so as to make firm contact against the cylinder surface. Within the cylinder 48 are placed heating elements 60 similar to those in FIG. 1 indicated by reference characters 41 or 42. The heating elements may be in a suitable housing 62 and face the cylinder wall at midpoint where the belt 50 surrounds it.

Contacting the belt 50 as it passes over the roller 53 is the wetting roller 64 which is immersed in the developing solution contained in the tank 65. A feedboard 66 is arranged above the roller 53 to pass the sensitized sheet material over the surface of the cylinder 48.

Referring to FIG. 3, the arrangement is similar to that shown in FIG. 2 except that instead of the belt 50 contacting the roller 64, the absorbent layer 49 of the cylinder 48 is wetted by the roller 64 immersed in the solution contained in the tank 65. Two sets of heating elements 60 and 60' are arranged in suitable holders 62 and 62' to irradiate both the inner and outer surfaces 48 in a manner similar to the platens 30 and 34 shown in FIG. 1.

The operation of the embodiment shown in FIGS. 2 and 3 is very much the same as that in FIG. 1. The exposed sheet material is placed on the feedboard 66 so as to enter between the belt and then over the surface of the cylinder 48. In the arrangement shown in FIG. 2, the belt 50, moistened by the roller 64, transfers the moisture onto the material. The imbibed solution is then evaporated by the heater 60 as the material passes over the surface of the cylinder 48. In the arrangement shown in FIG. 3, the moisture is transferred onto the sheet material from the absorbent layer 49 placed on the cylinder 48.

The advantages of the above constructions are manifest. There is no need to have a developing tank wherein aqueous ammonia is constantly being evaporated. The material is passed between soft and flexible surfaces, thus it cannot be scratched by the conventional perforated wall of the developing tank. Only the small imbibed amount of solution need be vaporized and this amount of solution is negligible in comparison to the consumption in gaseous developing chambers.

I claim:

1. Apparatus for gaseous development of two-component type diazo sheet material comprising a pair of superimposed platens, one having a convex and the other a concave surface defining a curvilinear space between them, a pair of juxtaposed, endless conveyor belts, at least one of which is of a liquid absorbent material having co-engaging portions passing within said space, each of said belts being suspended between rollers and each roller of one belt being spaced adjacent the corresponding roller of the other belt whereby one pair of adjacent rollers defines the infeed portion and the other pair of adjacent rollers the outfeed portion of said apparatus, means located at the infeed portion for the support of said material to be passed between said belts, a tank containing developing solution, a roller partially immersed

in said tank and contacting one of said belts passing over a roller at the infeed portion and means for maintaining said space at an elevated temperature for evaporating the developing solution retained in said material from being in contact with said absorbent belt while said material is pressed against said concave surface.

2. Apparatus for gaseous development of two-component type diazo sheet material comprising a pair of vertically superimposed platens, the lower one having a convex and the upper a concave surface defining a curvilinear space between them, a pair of vertically-spaced, endless conveyor belts, at least one of which is of a liquid absorbent material having co-engaging portions passing within said space, each of said belts being horizontally suspended between rollers, and each roller of one belt being spaced adjacent the corresponding roller of the other belt whereby one pair of adjacent rollers defines the infeed portion and the other pair of adjacent rollers the outfeed portion of said apparatus, a board located at the infeed portion for the support of said material to be passed between said belts, a tank containing developing solution, a doctor roller partially immersed in said tank and contacting the lower one of said belts at the point where said belt is passing over the lower infeed roller and heater elements distributed in said platens for evaporating the solution retained in said material from said belt moistened by said doctor roller.

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