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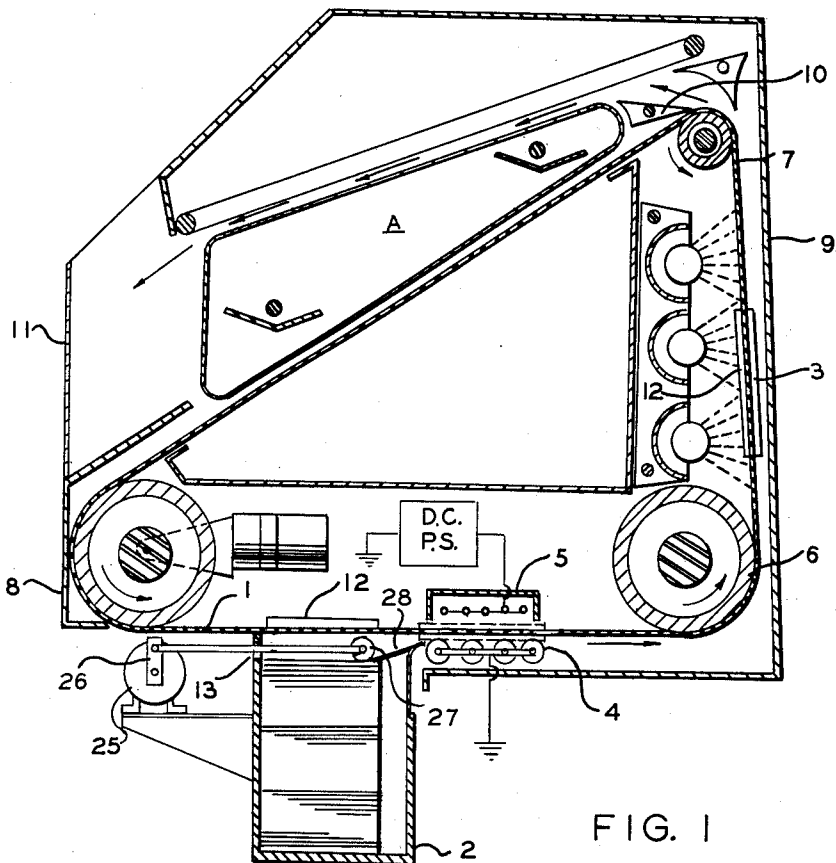
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DIAZOTYPE PRINTING AND DEVELOPING APPARATUS

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2 Sheets-Sheet 1



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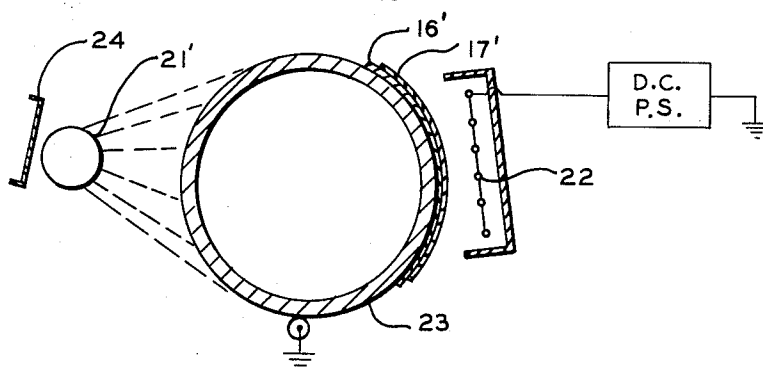
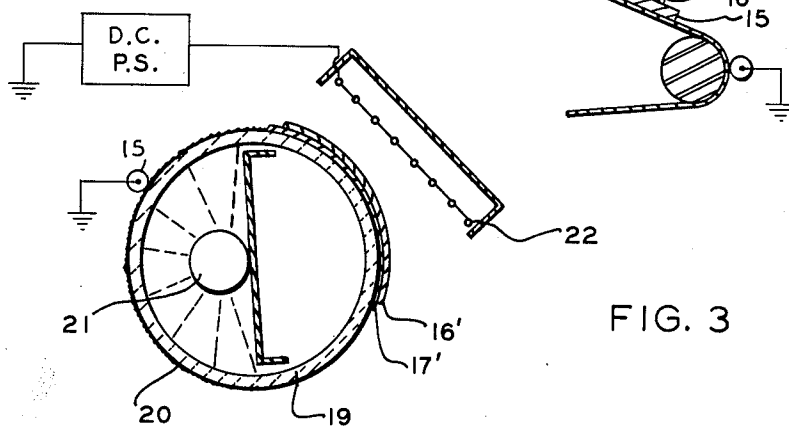
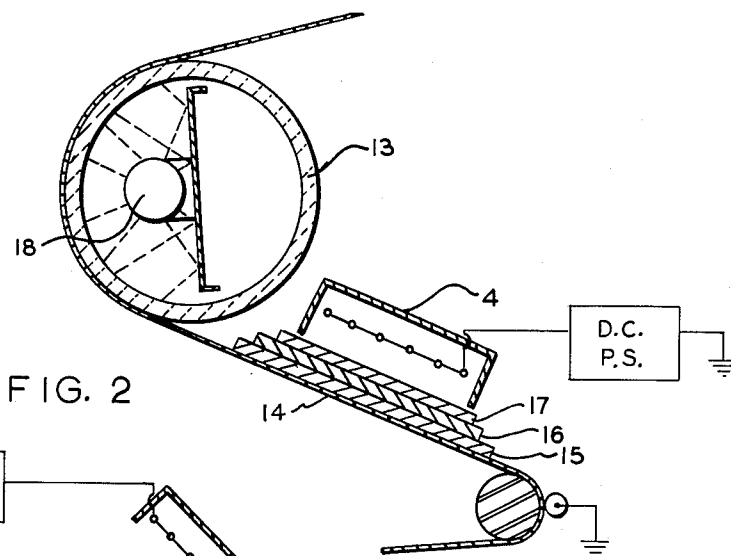
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DIAZOTYPE PRINTING AND DEVELOPING APPARATUS

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2 Sheets-Sheet 2



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DIAZOTYPE PRINTING AND DEVELOPING APPARATUS

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1 Claim. (Cl. 95—75)

This invention relates to a light printing and developing apparatus and more particularly to an improved diazotype reproducing apparatus for producing copies from translucent originals.

Generally, diazo reproducing machines utilize a rotating printing cylinder made of transparent material such as glass, a mercury lamp positioned within the cylinder, and belts conveying the original in contact with the sensitized material around the periphery of the cylinder. The light from the lamp passes through the wall of the cylinder and through the original and exposes the diazo sensitized material. The exposed material is then conveyed to a developing chamber, where it is subjected to moist ammonia gas.

While such machines have several advantages in the duplicating field, they also have certain drawbacks. One of these drawbacks is the relatively slow speed of operation as compared to other duplicating machines, particularly those which utilize a stencil. For this reason, diazotype machines have not been generally used in the high speed multi-copy duplicating field. This is attributable also to the fact that such machines must be manually fed and cannot therefore be loaded to anything approaching their actual capacity.

In addition, the printing cylinder causes tracking difficulties, is prone to become scratched or etched in use, is easily broken and expensive to replace.

In the production of colored foils, used in the proofing of positives for deep etch color, good contact between the half-tone positive and the colored diazotype foil is required and such contact is difficult to obtain in conventional machines. It has therefore, been necessary in order to secure sufficiently good contact, to carry out the exposures of original half-tone positives onto the colored diazotype foils in a vacuum frame device.

It is an object of this invention to provide an improved diazo duplicating apparatus and effective means for automatically feeding an original and diazo copy paper into the apparatus, thereby increasing the speed of reproduction.

It is a particular advantage of this invention that firm contact is obtained between an original or master and a diazotype foil for exposure and processing without the use of a vacuum frame.

It is another object of this invention to provide a modified machine of the diazo reproduction type wherein the use of the printing cylinder and conveying belt for passing the original and the sensitized material may be eliminated.

Other objects and advantages 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 drawings in which:

FIG. 1 is a schematic view of an apparatus in accordance with the invention, constructed in such manner that no printing cylinder is utilized.

FIG. 2 is a schematic view of a modification of a portion of conventional type diazo apparatus, using a printing cylinder in combination with an electrostatic device.

FIGS. 3 and 4 are schematic views of modified forms of diazotype reproducing apparatus utilizing a printing

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cylinder, but eliminating the conventional belts for conveying the original and copy material.

In the apparatus shown in FIG. 1 a transparent or translucent endless belt 1 is used made of thin plastic material. Any of the well known plastic materials such as cellulose acetate, polyethylene, or vinyl resins, may be used to form the belt. A sensitized sheet storage device 2 of suitable construction is positioned adjacent and below belt 1 for feeding diazo sensitized paper 3 over a group of grounded rolls 4 which are disposed adjacent to the outside surface of the belt 1 and positioned to receive the paper from the feeding device 2. A corona discharge device 5 is positioned adjacent to the inner surface of the belt 1 in substantial alignment with the group of rollers 4. The belt is supported by 6, 7 and 8, any one of which may be a driven roller adapted to drive the belt 1. Positioned between rollers 6 and 7 are vapor lamps 9. Three lamps are illustrated in the drawing. However, the number of lamps depend on the strength of illumination necessary to properly expose the diazo material.

A guide, such as deflector plate 10, is positioned adjacent roll 7, which directs the exposed paper 3, separated from belt 1, to the ammonia developing chamber, generally designated A. The developing chamber is of the type commonly used in diazotype machines and forms no part of this invention. After passing over the developing chamber the developed diazotype copy falls into a receptacle 11.

In the operation of the device an original 12 is placed on the inner surface of the belt and is conveyed by the belt under the corona discharge device 5. At the same time, a sheet of sensitized paper 3 is fed by the feeding device 2 over rollers 4. When the original 12 comes under the discharge device 5, an electrostatic field is applied to the surface of the original. This causes both the original 12 and the sensitized paper 3 to adhere tenaciously to the inner and outer surfaces of the belt 1, respectively. After passing under the corona discharge device 5, the belt 1 with the original and sensitized paper carried thereby passes around roller 6 and then around roller 7. In moving from roller 6 to roller 7, the belt 1 carries the original and sensitized paper past lamps 9 where the sensitized paper is exposed through the original. In passing over the roller 6, the exposed diazotype paper is separated from the belt 1 and directed by guide 10 to pass over the developing chamber A.

A number of translucent originals may be placed in numerical sequence on the inner surface of the plastic belt 1. Immediately after the original has been placed in a correctly aligned position upon the belt, the reverse side of which is in close proximity to a grounded metal member, such as the set of grounded metal rollers 4, a corona discharge emanating from a fine metal wire maintained at a D.C. potential of several thousand volts above ground, is applied to the surface of the original lying on the plastic belt. An instantaneous surface charge is caused to appear on the paper surface which induces an equal and opposite charge on the grounded metal member. These unlike charges attract each other with great force, causing the original to adhere to the plastic belt as though it were glued thereto. Each original is placed in numbered sequence upon the belt at a relatively slow machine speed. Once all the originals have been mounted, the motion of the belt is increased up to the proper printing speed, which may be as high as 100 feet per minute or faster.

The sensitized paper is fed to the machine either in cut sheet or web form. In the latter instance no special difficulties are present. In a cut sheet-fed machine, however, means must be provided for introducing each cut

sheet at the proper time and in the proper position relative to each original. This may readily be done in the following way:

A sensitized cut sheet is mechanically injected by feeding device 2 part way so that about one quarter of its length protrudes into the space between the plastic web and the grounded metal member. An electrostatic field is applied to the surface of the original and at the same time, the ejecting mechanism of feeding device 2 releases the sensitized cut sheet. The application of the field causes the partially ejected sheet to adhere with considerable force to the underside of the thin plastic web so that the sensitized sheet is carried along to the exposure station in exact alignment with the original.

By applying electrostatic holding means to conventional diazotype machines, it is feasible to print colored foils used in proofing of positives for deep etch color lithographic work. As mentioned before, it has been necessary to carry out the exposures of original half-tone positives onto the colored diazotype foils in a vacuum frame in order to secure sufficiently good contact. I have found that good foil to foil contact can be obtained on a printing cylinder for reproducing half-tone positives onto diazo materials. In order to secure the degree of contact necessary, I place the original in emulsion to emulsion contact with a diazotype foil, the latter lying on a sheet of black or yellow paper, the paper being against a grounded surface. I then apply a corona discharge to the assembly by supplying to a set of fine wires a potential of 4-8,000 v. D.C. and passing the fine wires over the assembly. It is best during this corona discharge step to have the assembly lying on a grounded metal plate. Under the influence of the corona discharge, the surfaces acquire strong opposite electrostatic charges which cause them to adhere most tenaciously to one another. By stroking the surface with a brush, or piece of cloth, or cellulose fiber, air can be pressed out from between the surfaces to the point where Newton's rings can be seen more or less uniformly over the entire assembly. The contact is sufficiently good so that even when passed around a cylinder of about 6" diameter little or no loss of resolution occurs from slippage arising from the radius of curvature effect.

As seen in FIG. 2 of the drawing, the apparatus consists of a cylinder 13, constructed of transparent material, usually glass. A belt, 14, is made either of metal or a non-conductive material having a conductive upper surface which is connected to ground by means of the roller 15. A sheet of black or yellow paper is placed on the conductive surface of the belt 14; 16 is the sensitized sheet of diazotype material; 17 is the original; 4 is the corona discharge device and 18 is the mercury lamp.

A similar scheme can be used to transport foils in a rotary machine. This can be done in one of two ways, as shown in FIGS. 3 and 4. A glass cylinder 19, FIG. 3, is coated with a suitable oxide composition used in making conducting glass panels. Within this cylinder is placed the usual mercury lamp 21. The conducting surface of the cylinder is kept at ground potential. In place of the conventional belt type of transport, an array of fine wires 22 is placed parallel to the axis of the cylinder and about 1" therefrom. The original 17' and copying paper 16' fed into such a machine is caused to adhere very tightly to the grounded surface of the glass cylinder due to the corona discharge from the fine wires.

Alternatively, as shown in FIG. 4, a grounded metal cylinder 23 can be used and the exposure lamp 21' is placed outside the metal cylinder and the light directed by means of reflectors 24 onto the surface thereof. As the copy and original are fed into the machine they are caused to adhere very tightly to the metal surface of the cylinder due to the corona discharge from the wires 20.

What is claimed is:

In an apparatus for sequential printing and developing of diazo sensitized sheet material, a translucent endless conveyor belt, a plurality of rollers over which said belt is arranged to travel, an exposure light source and a gaseous developing chamber in the path of the travel of said belt, the inner face of said belt being adapted to support an original to be copied, and the outer face of said belt being adapted to hold a sensitized sheet in juxtaposition with said original, electrostatic charging means for causing adherence of said original and said sheet to said belt, whereby upon passing said light source said original is transilluminated and said sheet is exposed, and means for separating said exposed sheet from said belt and directing it to said developing chamber while retaining said original on said belt for sequential printing upon successive superposition over electrostatically held sensitized sheets, a storage compartment for holding a plurality of sheets of sensitized material, means for removing individual sheets from said compartment, a plurality of rollers adjacent said compartment for supporting and conveying each sheet under said belt, said last mentioned rollers being the ground potential side of said electrostatic charging means.

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