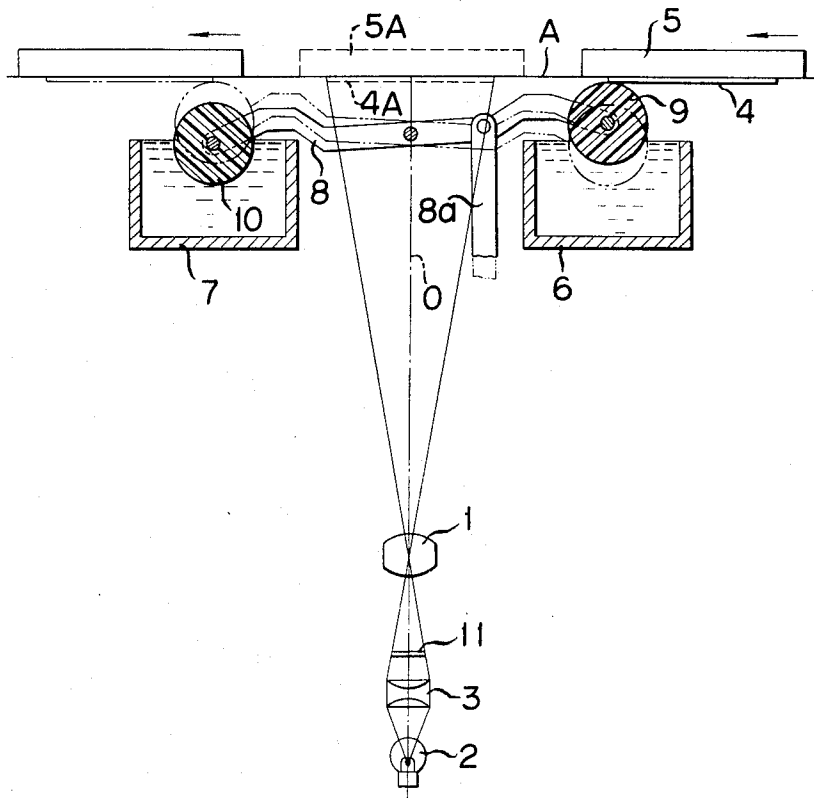


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SADANAO ANDO
EXPOSURE AND DEVELOPMENT DEVICE FOR
WET-TYPE ELECTROSTATIC PHOTOGRAPHY
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**EXPOSURE AND DEVELOPMENT DEVICE FOR
WET-TYPE ELECTROSTATIC PHOTOGRAPHY**
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1 Claim

ABSTRACT OF THE DISCLOSURE

An exposure and developing device for wet-type electrostatic photography in which prior to exposure a light sensitized sheet is moistened with a pre-moistening liquid or agent. The pre-moistening liquid in tanks disposed on the opposite sides of the exposure device respectively is applied by application rollers to the sensitized sheet being advanced with its light sensitized layer being directed downwardly. By application of the pre-moistening liquid or agent, a soft tone image is obtained, thereby rendering visible the details of the image.

BACKGROUND OF THE INVENTION

The present invention relates to an exposure and developing device for wet-type electrostatic photography and more particularly to a light sensitized sheet pre-moistening device for use in wet-type electrostatic photographic exposure and development.

There has been known a so-called "non-charge" electrostatic photographic method in which a light sensitized sheet consisting of a suitable electrically insulating support or substrate applied with a coating of photoconductor such as special zinc oxide in a binder is exposed to a light pattern so as to form an electrostatic latent image; and this image is developed into a visible image by a highly sensitized developing solution consisting of a carrier and toner having a very small particle size. Photoelectric emission produced by the above light pattern illumination or projection is so weak in the photoconductive layer of light sensitized sheet that upon development of an electrostatic latent image a developing solution must be used having a high sensitivity to this latent image and a higher concentration of toner. This developing solution may be used in case of a so-called "weak charge" electrostatic photographic method in which the corona discharge is generated by corona discharge means spaced apart from the sensitized sheet by a relatively long distance, thereby imparting relatively low surface potential to the sensitized sheet; and the sensitized sheet is exposed and then developed.

In case of the above "non-charge" electrostatic photography in which is used a highly sensitive developing solution having a higher concentration of toner, generally the light sensitized sheet is slow to adapt itself with the developing solution so that the developing efficiency is reduced and it is difficult to obtain a good quality image. Therefore, it is preferable to moisten the light sensitized sheet with a pre-moistening liquid or agent having a high resistance such as a toner carrier of the developing solution prior to immersing the sensitized sheet into the developing solution.

In the above described electrostatic photographic method, the process generally comprises the steps of exposure pre-moistening, development, cleaning or washing, and drying for fixing in the order named. In this process order, only a hard tone image is obtained as far

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as the same type of sensitized sheet is used so that no image tone adjustment can be expected.

One of the objects of the present invention is to provide an exposure and developing method by which the image tone can be adjusted suitably.

Another object of the present invention is to provide a pre-moistening device which can make it possible to obtain selectively soft or hard tone image.

SUMMARY OF THE INVENTION

It is impossible to obtain a soft tone image when a light sensitized sheet is applied with a pre-moistening liquid or agent after its exposure. However, the inventor has discovered that a soft tone image can be obtained by applying a sensitized sheet with a pre-moistening liquid or agent, which may be of conventional type.

There may be proposed various methods for applying to a sensitized sheet a pre-moistening liquid or agent. One method is to apply an atomized pre-moistening agent to the sensitized sheet; another, a second method is application by a brush; a third method, to flow the pre-moistening liquid upon the light sensitized sheet and so on. However, the use of an application roller is best suited for automatic and continuous application of pre-moistening liquid.

Therefore, according to the present invention, a light sensitized sheet is advanced with its sensitized layer being directed downwardly and a pre-moistening liquid is applied by an application roller which is immersed from time to time in the pre-moistening liquid in a container. According to one embodiment of the present invention, a pair of pre-moistening liquid chambers or tanks are disposed on the opposite sides of a light sensitized sheet exposure device or system respectively so that the light sensitized sheet may be selectively applied with the pre-moistening liquid prior to or after exposure, whereby a hard or soft tone image can be selectively obtained.

The above and other objects, features and advantages of the present invention will become more apparent from the following description taken in conjunction with the accompanying drawing.

BRIEF DESCRIPTION OF DRAWING

The single figure is a schematic sectional view showing one embodiment of a light sensitized sheet pre-moistening device according to the present invention.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Along the optical axis O of the copying lens 1 is disposed a light source 2 for illumination and between the copy lens 1 and the illumination light source 2 are interposed condenser lenses 3. A light sensitized sheet passage A is formed in a plane perpendicular to the optical axis O so that a light sensitized sheet carriage 5 carrying a light sensitized sheet 4 may move along this passage A. The sensitized sheet carriage 5 may be for example of a type in which its sensitized sheet carrying face is provided with perforations or small holes communicated with a suitable suction device so that the sensitized sheet 4 may be attracted and held in position. Opposed to the passage A are disposed a pair of tanks 6 and 7 for receiving pre-moistening liquid on both sides of the optical axis O respectively. A rocking member 8 has its center pivoted to a stationary member of the device and has application rollers 9 and 10 rotatably fixed to the ends thereof respectively. The application rollers 9 and 10 are adapted to be partially immersed in pre-moistening liquid or agent and to apply the pre-moistening liquid to the sensitized sheet 4. A connecting rod 8a is loosely fixed over a pivot extending from the right

side arm of the rocking member 8. Upon vertical movement of the connecting rod 8a, the rocking member 8 is caused to rock so that one roller 9 or 10 remains in the pre-moistening liquid, thereby preventing this roller 9 or 10 from contacting with the sensitized sheet 4 being moved along the passage A. The sensitized sheet carriage 5 is adapted to hold in position the sensitized sheet 4 upon the undersurface thereof and is moved in the direction indicated by the arrow toward the position indicated by the broken lines 5A where the carriage 5 stops so that the sensitized sheet 4 may be held in exposure position indicated by the broken line 4A. In this state, the sensitized sheet 4 is exposed and thereafter the carriage is further advanced in the direction indicated by the arrow. In a plane perpendicular to the optical axis O and between the copy lens 1 and the condenser 3 is held in stationary position an original 11 to be copied such as negative or positive film. The light emanated from the light source 2 is condensed through the condenser lenses 3 and passes through the original 11 so that an image of the original 11 is formed by the copy lens upon the sensitized sheet 4 at the exposure position 4A for exposure.

Upon upward movement of the connecting rod 8a, the roller 9 is caused to contact with the light sensitized sheet 4 advanced in the direction indicated by the arrow from the right in the figure so that the pre-moistening liquid is applied to the sensitized sheet 4. Thereafter, the pre-moistened sensitized sheet 4 is exposed and developed. According to the experiments conducted by the inventor, the soft tone image was obtained. On the other hand, when the connecting rod 8a is pulled down, the roller 9 is prevented from contacting with the sensitized sheet 4 so that the un-moistened sensitized sheet is exposed. Upon development of this sensitized sheet, a hard tone image may be obtained. From the foregoing, it will be seen that according to the present invention, either of hard or soft tone may be arbitrarily selected from an ordinary halftone negative film in enlargement and printing. The movement of the connecting rod 8a for selectively actuating the rocking member 8 in such a manner as described above may be effected manually or automatically in response to the movement of the carriage 5 or the sensitized sheet 4. The stop positions of the connecting rod 8a may be adjusted by any suitable means such as click stops.

According to the present invention, a light sensitized sheet may be moistened by a pre-moistening liquid prior to its exposure so that the soft tone image can be obtained opposed to the conventional method. That is, the image quality may be suitably controlled. According to the pre-moistening device comprising application rollers 9 and 10, pre-moistening liquid receiving tanks 6 and 7 disposed on the opposite sides relative to the exposure system, either of the rollers 9 or 10 may be selectively actuated so as to apply the pre-moistening liquid to the sensitized sheet 4 prior to or after the exposure thereof so that either of soft or hard tone image may be selectively attained. Thus, opposed to the conventional method, the monotonous images may be avoided and no special quality sensitized sheet is required for obtaining various tone images.

The present invention has been so far described with particular reference to the embodiment of the present invention, but it will be understood that variations and modifications can be effected without departing from the true spirit of the present invention as described hereinabove and as defined in the appended claims.

I claim:

1. An exposure and developing device for wet-type electrostatic photography comprising:

- a passageway wherein a light sensitized sheet is conveyed therealong;
- a first station located along said passageway;
- a first tank located at said first station, said first tank having pre-moistening liquid therein which includes a toner carrier of a developing solution;
- a second station located along said passageway downstream of said first station;
- a lens system and associated light source located adjacent said second station on an optical axis passing through said second station and being perpendicular to said passageway, a location on said optical axis adjacent said light source being provided for locating an original to have an image thereof formed on said sensitized sheet at said second station;
- a third station located along said passageway downstream of said second station;
- a second tank located at said third station, said second tank having pre-moistening liquid therein which also includes a toner carrier of a developing solution;
- a first application roller located to be movable between a first position partially immersed in the liquid in said first tank and a second position in contact with said conveyed sensitized sheet at said first station;
- a second application roller located to be movable between a first position partially immersed in the liquid in said second tank and a second position in contact with said conveyed sensitized sheet at said third station;
- an elongated member interconnecting said rollers by having its ends connected respectively to each roller, said elongated member having a centrally located pivot on said optical axis so that said elongated member can be provided with a rocking movement about said pivot; and
- means connected to said elongated member on one side of said pivot to selectively apply said rocking movement thereto whereby movement of said first application roller into sheet contact position and consequent rocking movement of said second application roller into immersion position applies pre-moistening liquid to said sensitized sheet before it reaches said second station to provide a soft tone image upon developing, and movement of said second application roller into sheet contact and consequent rocking movement of said first application roller into immersion position applies pre-moistening liquid to said sensitized sheet after it reaches said second station to provide a hard tone image upon developing.

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