

1

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ELECTROPHOTOGRAPHIC PROCESS

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This invention relates in general to the art of electrophotography, now known as xerography, and in particular to a sensitive plate for electrostatic electrophotography. More specifically, the invention relates to a new xerographic or electrophotographic member comprising a conductive backing having on at least one surface thereof a photoconductive insulating coating consisting of a mixture of selenium and tellurium.

In the art of xerography, it is usual to form an electrostatic latent image on a member or plate which comprises a conductive backing member such as, for example, a metallic surface having a photoconductive insulating layer thereon. It has previously been found that a suitable plate for this purpose is a metallic member having a layer of vitreous selenium. Such a plate is characterized by being capable of receiving a satisfactory electrostatic charge and selectively dissipating such a charge when exposed to a light pattern, and, in general, is largely sensitive to light in the blue green spectral range and in this spectral range has a photographic speed of about 0.5 A. S. A. with normal developing techniques.

Now in accordance with the present invention it has been found that an improved electrophotographic or xerographic plate can be prepared by incorporation in the photoconductive insulating coating of a small quantity of tellurium. The plates as thus modified are characterized by a broader range of spectral sensitivity, particularly in the red spectral range and by an increased overall photographic speed. In addition, other advantages are believed to exist.

In general, the permissible range of concentration or proportion of tellurium in the selenium layer is relatively broad and may extend from about 0.1% to 10%, and preferably lies in the range of about 1% to 8% or about 5%. Within these ranges the speed and spectral sensitivity are significantly improved and other qualities and properties of the layers are maintained or in some instances actually improved.

The new and improved plates of the present invention can be prepared by a variety of methods. For example, selenium and tellurium in the desired proportions may be mixed and in molten form sprayed on the desired surface, or they may be evaporated onto the plate under high vacuum, preferably from a mixture in a single evaporation source or, optionally, from two separate sources operating to volatilize their contents at the desired speed ratio. Likewise, the mixed ingredients may be placed in a suitable film forming binder and applied to the surface in the form of a selenium-tellurium lacquer.

The general scope and nature of the invention having been set forth, the following examples are given as typical illustrations of methods by which the desired plates may be prepared:

Example 1.—An aluminum plate is prepared for coating by careful washing with water containing a small amount of detergent, after which it is dried and then degreased by immersion in an organic solvent such as, for example, tri-chloro ethylene. A mixture of about

2

95 parts by weight selenium and about 5 parts by weight tellurium is melted together and maintained in a molten condition for an hour to assure uniformity of mixture. The selenium-tellurium mixture is flowed across the surface of the plate and the plate with the molten coating on it is rapidly spun to smooth out the surface, and the spinning continued until the coating is solidified.

The plate as thus prepared has a coating of resistivity at least 10^{14} ohms-cm. and is characterized by the ability to accept an electrostatic charge on its surface of greater than 300 volts and by the ability to retain such a charge in the absence of illumination for a period of more than 10 minutes. When exposed to mild illumination the electrostatic potential on the surface is almost immediately dissipated to a low residual potential. When the charged plate was exposed to a light pattern or optical image, the charge is selectively dissipated to yield an electrostatic latent image which in turn can be developed by an electrostatically attractable powder to yield a visible powder image.

Example 2.—A mixture is prepared of 92% selenium and 8% tellurium and this mixture melted and placed in a spray gun. In an atmosphere of nitrogen the molten mixture is sprayed on a cleaned brass surface to form a 50 micron photoconductive insulating coating of selenium-tellurium mixture on the metallic surface. The surface is lightly buffed to remove irregularities without heating the surface at any time above about 100° C. The resulting product is a suitable and satisfactory electrophotographic plate.

In general, the plates prepared by the above method are similar in physical appearance to plates having a layer of substantially pure vitreous selenium. The plates are glossy in appearance and have a dark red almost black color. It is believed that the allotropic structure of the photoconductive insulating layer is largely amorphous although it is to be understood that crystalline varieties of selenium or tellurium may be present and probably are present in limited proportion. The plate has a specific resistivity of at least 10^{16} ohms-cm. and generally about 10^{16} ohms-cm. in the absence of illumination, which resistivity drops several orders upon illumination. It is photoconductively sensitive to radiation in the blue green spectral range and in addition has substantial sensitivity in the red spectral range. Its photographic sensitivity in white light is significantly greater than the photographic sensitivity of a pure selenium plate.

It is to be understood that the backing member selected for this plate may be in the form of a flat plate or may equally be in the form of a cylinder, flexible sheet or other member having a surface suitable for the electrophotographic process. The member may be a metallic surface or may, if desired be an electrically conductive non metallic member such as conductive plastic, conductive glass, conductively coated paper or other web or film-like member, or other conductive supporting surface, as desired.

What is claimed is:

1. An electrophotographic process comprising placing an electrostatic charge on the surface of an electrophotographic member comprising a photoconductive insulating layer having a resistivity of at least about 10^{14} ohms-cm. in darkness and capable of accepting an electrostatic potential of at least 300 volts and substantially retaining said potential for at least 10 minutes in the absence of illumination and capable of rapidly dissipating this charge by increased conductivity upon exposure to light, said layer being a substantially vitreous uniform mixture of between about 0.1% to 10% tellurium and the remainder substantially vitreous selenium overlying and in electrically conductive contact with a conductive backing member, selectively dissipating electrostatic charge

3

from the surface of the charged photoconductive insulating layer by exposing the charged layer to a light image thereby creating an electrostatic latent image on the surface of the photoconductive insulating layer, and developing said electrostatic latent image with electrically charged powder particles.

2. A process according to claim 1 in which the photoconductive insulating layer is about 5% to about 10% tellurium and the remainder substantially selenium.

3. A process according to claim 1 in which the photoconductive insulating layer is about 5% to about 10% tellurium and the remainder substantially selenium, the conductive backing member comprising aluminum.

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