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Rhodes

[11] **3,847,642**

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[54] **METHOD FOR TRANSFERRING ELECTROSTATOGRAPHICALLY FORMED IMAGES**

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[58] **Field of Search** .... 96/1 R, 1.4, 1 LY, 28; 117/17.5, 37 LE

[56] **References Cited**

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[57] **ABSTRACT**

A method and apparatus for transferring and fixing images formed by electrostatographic imaging techniques is disclosed. Accordingly, a thin film of a viscous material is applied to an imaging member prior to, or after, forming an electrostatic latent image thereon. The latent image is developed with electroscopic marking material and the thus developed image is transferred by contact to a recording medium. A portion of the viscous material is also transferred to the recording medium with the image and is subsequently solidified thereby fixing the image to the recording medium.

17 Claims, 2 Drawing Figures

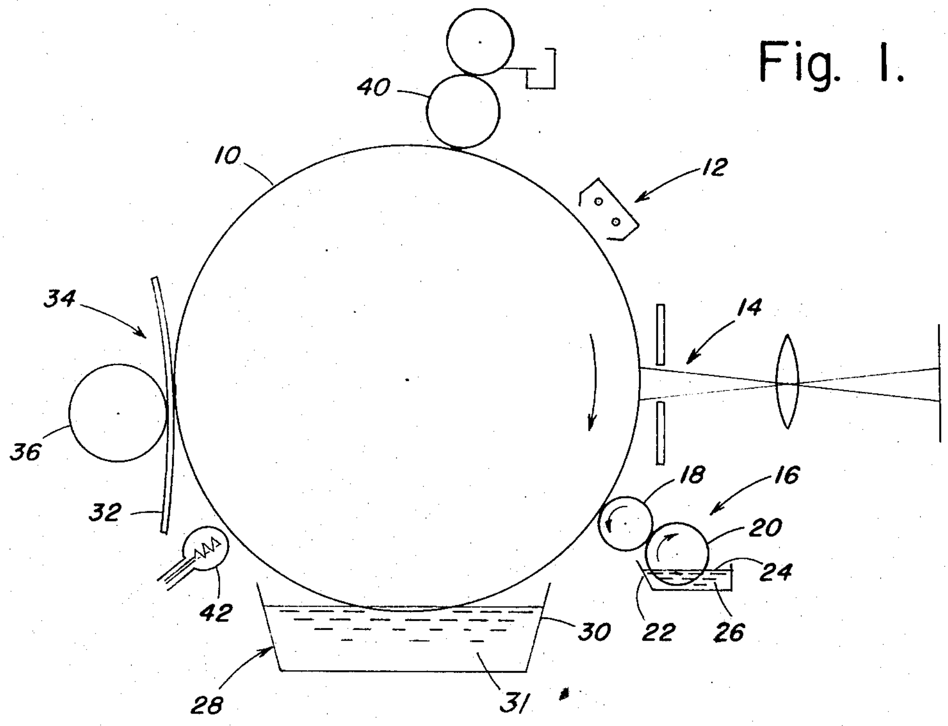

Fig. 1.

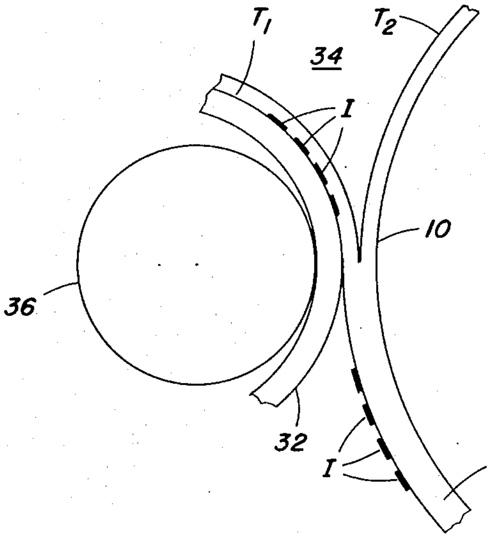

Fig. 2.

METHOD FOR TRANSFERRING ELECTROSTATOGRAPHICALLY FORMED IMAGES

BACKGROUND OF THE INVENTION

This invention relates to imaging systems and more particularly to a method of transferring to a receiving medium an electrostatographically formed image.

The formation and development of images on the surface of photoconductive materials by electrostatic means is well known. The basic electrostatographic process, as disclosed in U.S. Pat. No. 2,297,691 to C. F. Carlson involves placing a uniform electrostatic charge on a photoconductive insulating member, exposing the member to a pattern of activating radiation corresponding to the image to be reproduced to dissipate selectively the charge on the areas of the member exposed to the activating radiation, and developing the resulting electrostatic latent image by depositing on the image a finely divided electroscopic material, referred to in the art as a "toner." The toner will normally be attracted to those areas of the member which retain a charge, thereby forming a toner image corresponding to the electrostatic latent image. This image may then be transferred to a support or receiving surface, such as paper and may subsequently be permanently affixed to a support surface as by heat. Instead of latent image formation by uniformly charging the photoconductive member and then exposing the member to a light-and-shadow image, one may form the latent image directly by charging the member in image configuration. The powder image may be fixed to the photoconductive layer if elimination of the powder image transfer step is desired. Other suitable fixing means, such as solvent or overcoating treatment may be substituted for the foregoing heat fixing step.

Similar methods are known for applying the electroscopic particles to the electrostatic latent image to be developed. Included within this group are the "cascade" development technique disclosed by E. N. Wise in U.S. Pat. No. 2,618,552; the "powder cloud technique" disclosed by C. F. Carlson in U.S. Pat. No. 2,221,776 and the "magnetic brush" process disclosed, for example in U.S. Pat. No. 2,874,063.

Development of an electrostatic latent image may also be achieved with a liquid rather than dry developer materials. In conventional liquid development, more commonly referred to as electrophoretic development, an insulating liquid vehicle having finely divided solid toner material dispersed therein contacts the imaging surface in both charged and uncharged areas. Under the influence of the electric field associated with the charged image pattern, the suspended particles migrate toward the charge portions of the imaging surface separating out of the insulating liquid. This electrophoretic migration of charged particles results in the deposition of the charged particles on the imaging surface in image configuration.

A further technique for developing electrostatic latent images is the liquid development process disclosed by R. W. Gundlach in U.S. Pat. No. 3,084,043 hereinafter referred to as polar liquid development. In this method, an electrostatic latent image is developed or made visible by presenting to the imaging surface a liquid developer on the surface of a developer dispensing member having a plurality of raised portions or "lands" defining a substantially regular patterned surface and a

plurality of portions depressed below the raised portions or "valleys." The depressed portions of the developer dispensing member contain a layer of conductive liquid developer which is maintained out of contact with the electrostatographic imaging surface. Development is achieved by moving the developer dispensing member loaded with liquid developer in the depressed portions into developing configuration with the imaging surface. The liquid developer is believed to be attracted from the depressed portions of the applicator surface in the charged field or image areas only. The developer liquid may be pigmented or dyed.

The development system disclosed in U.S. Pat. No. 3,084,043 differs from electrophoretic development systems where substantial contact between the liquid developer and both the charged and uncharged areas of an electrostatic latent imaging surface occurs. Unlike electrophoretic development systems, substantial contact between the polar liquid and the areas of the electrostatic latent image bearing surface not to be developed is prevented in the polar liquid development technique. Reduced contact between a liquid developer and the non-image areas of the surface to be developed is desirable because the formation of background deposits is thereby inhibited. Another characteristic which distinguishes the polar liquid development technique from electrophoretic development is the fact that the liquid phase of a polar developer actually takes part in the development of a surface. The liquid phase in electrophoretic developers functions only as a carrier medium for developer particles.

In copending application of Alan B. Amidon, Joseph Mammino and Robert M. Ferguson, Ser. No. 839,801, filed July 1, 1969, now abandoned, and entitled Imaging Systems, a technique is disclosed wherein an electrostatic latent image is developed by placing the imaging surface adjacent a patterned applicator surface having a substantially uniform distribution of raised portion of "lands" and depressed portions or "valleys" and containing a relatively non-conductive liquid developer in the depressed portions of the applicator. Liquid developers having a conductivity of up to about 10^{-14} $(\text{ohm cm})^{-1}$ are surprisingly attracted to the image portions without any substantial electrophoretic separation of particles from the liquid.

While capable of producing satisfactory images, these liquid development systems can be improved upon in certain areas. Particular areas of improvement include those liquid development systems employing reusable or cycling imaging surfaces. In these systems, for example, a photoconductor such as a selenium or selenium alloy drum as the photoconductor surface is charged, exposed to a light-to-shadow image and developed by bringing the image bearing surface into developing configuration with an applicator containing developing quantities of liquid developer thereon. The liquid developer is transferred according to an appropriate technique from the developer applicator onto the imaging surface in image configuration. Thereafter, the developer pattern on the imaging surface is transferred to a receiving surface, such as paper. The liquid developer may be absorbed by the paper to form a permanent print. During the transfer operation, not all the liquid developer is transferred to the paper and a considerable quantity remains on the imaging surface. In order to recycle the imaging surface, this residual developer must be either removed or immobilized; otherwise it will tend to be present as a background in subsequent cycles. If the liquid developer is relatively conductive having a resistivity less than 10^{10} ohm centimeters, any residue remaining on the imaging surface may damage charge acceptance of the imaging surface by laterally dissipating electrostatic charge subsequently put on it. Furthermore, lateral conductivity of residues of conductive liquid developer on the imaging surface may become excessive and the resolution of the resulting image will be poor. On repeated cycling, there is also a progressive accumulation of liquid developer on the imaging surface since in each cycle not all the developer is transferred to the paper. This progressive accumulation of developer residue results in an overall loss of density, deterioration of fine detail and contributes to increased background deposits on the final copy particularly since accurate imaging on the imaging surface may be inhibited.

Procedures to remove the developer liquid from the surface of a photoconductor have been employed. However, to provide the necessary removal of ink film, the cleaning step must be so severe and complete that there may be a progressive degradation of the imaging surface lessening its useful life span. The severity of the cleaning step is dictated by the fact that in cleaning a liquid film from a surface, the film is progressively split so that on each separate cleaning, about one half the liquid remains on the photoconductive surface. The cleaning solvents generally necessary to provide adequate cleaning frequently are major contributors to the chemical attack on the imaging surface and are frequently hazardous due to their volatility and toxicity. In some instances and with complete removal of the ink film, the electrical properties of a photoconductor for example, are virtually destroyed by the cleaning operation after only a small number of cycles. In other instances, the cleaning solvents employed may act as solvents for the resin binder in a binder plate or may induce crystallization of the thin layer of selenium as do most liquid carriers used in formulating liquid developers.

In electrostatographic imaging systems employing particulate toner, the photoconductive insulating member is subjected to appreciable wear by contact with a relatively abrasive mixture of resinous toner particles and carrier beads which must be removed from the photoconductive member after each imaging cycle. Some special photoconductive surfaces are easily damaged. Consequently, the photoconductive material which may be used in a cyclic process are limited to hard, tough, abrasive resistant surfaces, and even then, the photoconductive member must be periodically replaced.

OBJECTS OF THE INVENTION

It is, therefore, an object of this invention to provide an imaging system which overcomes the above noted deficiencies.

Another object of this invention is to provide a novel imaging system.

Still another object of this invention is to provide a novel method of transferring an electrostatically formed image.

A further object of the invention is to provide an image transfer system wherein the photoconductive insulating member is not cyclically subjected to severe treatment.

A still further object of the invention is to provide an image transfer system wherein the surface of the electrostatographic imaging surface maybe repeatedly recycled without appreciable degradation of electrical properties.

Another object of the invention is to provide an image transfer system wherein the transfer and fixing of the image are essentially simultaneously effected.

A further object of the invention is to provide an image transfer system wherein the toner is completely transferred to a receiving surface.

BRIEF DESCRIPTION OF THE INVENTION

These and other objects of the invention are accomplished by providing an imaging system wherein a thin film of an insulating material, as more fully hereinafter described, is utilized in conjunction with a photoconductive imaging member, prior to, or after the formation of an electrostatic latent image which is subsequently formed with a developing material. Prior to transfer of the developed image, the film of the insulating material is caused to be in the viscous or liquid state to permit the film to split or to be transferred completely on contact with a receiving surface together with the developed image. Solidification of the transferred insulating material on the receiving surface fixes the developed image thereon.

DESCRIPTION OF THE DRAWING

Further objects and advantages of this invention may be had by reference to the following description when taken with the accompanying drawings wherein:

FIG. **1** is a schematic view of an embodiment of an electrostatographic imaging system of the invention; and

FIG. **2** is an enlarged, greatly exaggerated, partial cross-sectional view of the transfer zone taken along the lines **2–2** of FIG. **1**.

DETAILED DESCRIPTION OF THE INVENTION

The coined generic term "transferfilm" is intended to be descriptive of the large group of insulating materials used for forming the film on an electrostatographic or photoconductive surface and possessing to a varying but sufficient degree the hereinafter stated properties.

The transferfilm must have the electrical characteristics similar to those of an overcoated xerographic plate, i.e., electrically insulating and having a resistivity greater than about 10^{10} ohm.cm. Increased charge retention and image preservation in electrostatographic imaging systems are obtained with preferred resistivities exceeding about 10^{12} ohm.cm when the transferfilm is in the solid state.

The transferfilm generally exhibits a low melting point, preferably having a sharp melting point to provide simple rapid liquification on each cycle, and is capable of wetting the surface of the receiving member. Typically, in a commercial machine, the transferfilm will have a melting point above the normal ambient operating temperature of the machine. The melting point range of a transferfilm is from about 25°C. to about 95°C. When the photoconductive member is an amorphous selenium photoreceptor, it is preferred to provide a transferfilm having a melting point of from about 28°C. to about 65°C., since at temperatures above about 65°C. amorphous selenium tends to crystallize to a trigonal state which is relatively conductive and therefore less suitable for cyclical use. Imaging surfaces which do not soften or crystallize and can be operated at higher temperatures can employ a transferfilm of correspondingly higher melting temperatures provided suitable means are included for heating such a transferfilm to its melting point.

The transferfilm is compatible with a liquid developer to provide optimum cycling ability, and may be miscible with a liquid developer. If desired, the liquid carrier of a liquid developer may be chosen which will soften a transferfilm. If imaging takes place through the transferfilm coated or spread on the imaging surface of the photoconductive member, the transferfilm is preferably substantially transparent and not opaque or translucent, and in a film thickness sufficient to be split or completely transferred as hereinabove mentioned and as hereinafter more fully discussed, a thickness at least about two microns or more to about **25** microns, preferably about 5 microns. Since a transferfilm may be applied to the imaging surface of a photoconductive member in the solid or liquid state and is the liquid state during transferring, and which transferfilm may subsequently solidify as a solid film on the receiving member, the transferfilm is preferably not too brittle or easily fracturable at ambient conditions of use. In addition, a transferfilm should become tacky when liquified and viscous enough to prevent toner particles from migrating to the imaging surface of the photoconductive member. For clarity and resolution of the transfer image, the transferfilm when liquified preferably should have a sharp melting point and have a high viscosity at the melting point thereof. The viscosity at the melting point at the surface of the transferfilm is preferably from about 10 to about 200 centipoises. In addition to the above properties, the transferfilm of this invention are preferably relatively nonodorous, nonvolatile, and nontoxic to provide optimum safety and comfort to the user.

Any material possessing these properties to varying but sufficient degrees may be employed and since a transferfilm preferably has a sharp melting point to thereby provide quick simple liquification during each cycle, the microcrystalline waxes are a particularly effective material. Typically, the material is selected from the group of materials referred to as wax-like solids and liquids found in nature and to the individual constituents of these naturally occurring wax-like materials irrespective of their source or method of preparation. Typical materials included in this group are hydrocarbons, long chain fatty acids, alcohols, ketones and esters. Synthetic compounds which are not waxes from the standpoint of chemical composition but which do have waxy physical characteristics may also be used. Typical materials of this latter group include silicone waxes, polyethylene waxes, fluorocarbon waxes, fatty acid amides, high molecular weight phthalamides, polymers of alkylene oxides and terphenyls.

Typical silicone derivatives include fatty acid esters of polysiloxanes, particularly the stearyl esters of dimethyl polysiloxane, such as poly (dimethylsiloxy) stearoxysiloxane, poly (diethylsiloxy) stearoxysiloxane, poly (dipropylsiloxy) stearoxysiloxane, poly (methyl ethylsiloxy) stearoxysiloxane, poly (dimethylsiloxy) palmitoxysiloxane, poly (dimethylsiloxy) behenoxysiloxane, poly (dimethylsiloxy) myristoleoxysiloxane, poly (dimethylsiloxy) **2**-hydroxystearoxysiloxane, and poly (dimethylsiloxy) **12**-hydroxystearoxysiloxane.

Typical fluorocarbon waxes include the low melting fluorocarbon materials available from E. I. du Pont de Nemours and identified as Freons. Tetrachloridifluoroethane is particularly effective. Other typical fluorocarbon materials include Vydax AR, a dispersion of a waxy tetrafluoroethylene telomer in Freon TF, Krytox fluorinated solids formed by polymerizing hexafluoropropylene epoxide, all available from E. I. du Pont de Nemours; and Kel F waxes which are polymers of chlorotrifluoroethylene, available from Minnesota Mining and Manufacturing Company. Additional typical materials include hexadecafluoro-1-nonane, eicosafluoro-1-undecane, hexadecafluoro-1-nonal, eicosafluoro-1-undecanol.

Typical hydrocarbon waxes may generally comprise saturated hydrocarbons of carbon chain from about 18 to about 70 carbon atoms. Typical materials comprise eicosane, hexeicosane, docosane, tricosane, tetracosane, pentacosane, 13-methyl pentacosane, 2-methyl pentacosane, hexacosane, heptacosane, octacosane, isoactacosane, nonacosane, triacontane, dotriacontane, tritriacontane, pentatriacontane, hexatriacontane, tetracontane, dotetracontane, tetratetracontane, pentacontane, tetrapentacontane, hexacontane, dohexacontane, tetrahexacontane, hexahexacontane, heptahexacontane, heptacontane, cerane, melissane. Particularly satisfactory cycling ability is obtained with hydrocarbon waxes of from about 18 to about 35 carbon atoms such as octodecane, eicosane, tetracosane, pentatriacontane, and mixtures thereof. Eicosane is especially preferred and may generally be employed as the sole constituent of the additive or be present in major proportion in a mixture of hydrocarbon waxes.

Typical unsaturated hydrocarbon waxes include octadecylene, eicosylene, 1-henicosene, docosylene, 1-tricosene, tetracosylene, 1-pentacosene, hexacosylene, ceratene, octacosylene, 1-nonacosene, melene, 1-hentriacontene, 1-dotriacontene. Preferred are eicosylene and 1-heneicosene.

Typical long chain aliphatic alcohols that may be employed include lauryl alcohol, tridecyl alcohol, myristyl alcohol, pentadecyl alcohol, cetyl alcohol, margaryl alcohol, stearyl alcohol, nonadecyl alcohol, arachidyl alcohol, heneicosyl alcohol, behenyl alcohol, tricosyl alcohol, lignoceryl alcohol, n-lignoceryl alcohol, aryl alcohol, 1-octacosanol pentacosyl alcohol, and hexacosyl alcohol. Preferred are myristyl alcohol and tridecyl alcohol.

Typical esters that may be employed include the alkyl esters of long chain fatty acids, such as palmitic and stearic acid. Typical alkyl esters include the methyl, ethyl, propyl, butyl, amyl, isoaryl, octyl, decyl and cetyl esters. Also included are cetyl laurate, lauryl myristate, myristyl myristate, cetyl myristate, cetyl palmitate, octadecyl palmitate, cetyl palmitate, myricyl palmitate, lauryl stearate, cetyl stearate, stearyl stearate, cetyl stearate, myricyl stearate, myricyl isobehanate, myricyl cerotate, ceryl myricinate. Preferred cycling ability is obtained with lauryl myristate and myristyl myristate.

Typical ketones that may be employed include among others those produced from the catalytic treatment of the higher fatty acids such as palmitone and stearone and those prepared by the Friedel-Crafts condensation of fatty acids with cyclic hydrocarbons such as furyl heptadecyl ketone, methyl furyl heptadeayl ketone, dibenzo furyl hexadecyl ketone and phenoxyphenyl heptadecyl ketone. Preferred results are achieved with furyl heptadecyl ketone and stearone.

Typical fatty acids include both saturated and unsaturated materials such as capric, lauric, myristic, 4-hydroxy myristic palmitic, margaric, stearic, 4-hydroxy stearic, non-adecyclic, 11-hydroxytridecaniarachidic, madullic, behenic, tricosanic, lignoceric, hexanconsanic, octacosanic, triacontanic, lacceric, 9-eicosenic, isoerucic, trans-5-tetracosenoic. The fatty acids may also be employed in the form of a suitable metal salt.

The transferfilm of this invention may be applied to the surface of the photoconductive member in any suitable manner in the liquid or solid phase. Typically, the transferfilm is dusted, sprinkled, brushed, cascaded across the surface and applied as a powder cloud. The transferfilm may also be applied by wiping with a transferfilm impregnated or coated sheets, webs, papers, rolls and cotton wadding. It may also be applied as an aerosol spray or contacted with a roller coated with a transferfilm in the liquid phase.

Should application of the transferfilm be in the solid state, the phase change may be effected by the application of heat or solvent in any manner from a suitable source, including an external source or by means of friction. While the transferfilm may be applied to the photoconductive surface in the solid state, it is generally preferred to apply the transfer-film in the liquid state by contact with a coated roller or other liquid coating means to provide thereby a more uniform layer of the transferfilm. Additionally, the transferfilm may be coated on the photoreceptor surface prior to, or subsequent to exposure imagewise of the photoreceptor surface, such as a photoconductive surface.

The development of the latent image on a photoconductor coated with a transferfilm may be effected in any of the know methods. When the transferfilm is in the liquid state, development will be effected by a liquid developer whereas development of a latent image wherein the transferfilm is in the solid state may be effected by a particulate or liquid developer. In the latter instance, it will be understood that the state of the transferfilm prior to transfer is changed to the liquid state prior to contact with the recording medium. The developers employed preferably are relatively noncondutive to permit cyclic charging and imaging where necessary without the dissipation of charge by a conductive film. Any suitable liquid developer having these properties may be used. Typically, the developers for which the transferfilms of this invention are effective have conductivities of from about 10^{-10} (ohm cm)$^{-1}$ to about 10^{-14} (ohm cm)$^{-1}$. Typical materials within this group include mineral oil, the vegetable oils including castor oil, peanut oil, coconut oil, sunflower seed oil, corn oil, rapeseed oil and sesame oil. Also included are mineral spirits; fluorocarbon oils such as du Pont Freon solvents and Krytox oils; silicone oils, fatty acid esters and oleic acid. In addition, as is well known in the art, the developer may contain one or more secondary vehicles, dispersants, pigments or dyes, viscosity controlling additives or additives which contribute to fixing the pigment on the copy paper.

Transfer of the developed image together with a portion of the transferfilm, as hereinabove mentioned is effected when the transferfilm is in the liquid state, it being understood that the transferfilm may not be in the liquid state at the imaging surface of the photoconductive member, i.e., a gradient of viscosity may exist due to penetration of the liquid carrier of a liquid developer into the transferfilm layer or to heat applied from one side.

It will be readily appreciated that within the framework of the method of developing the latent image, various permutations of the steps of coating, exposing, developing and transferring may be effected. Thus, in one embodiment of the invention, the transferfilm may be applied in liquid state prior to exposure imagewise of the photoconductive drum and maintained in the liquid state through exposure, development of the latent image and the transfer thereof. In another embodiment, the transferfilm may be applied, as hereinabove mentioned in the solid phase prior to exposure imagewise of the photoconductive surface and then changed to the liquid state prior to development of the latent image. In another embodiment, the coating of the transferfilm on the photoconductor is applied in the solid state with imagewise exposure also being effected in the solid state. Thereafter the transferfilm is heated by suitable means to effect a phase change either prior to or after the development of the latent image with a liquid developer and subsequent transfer of the developed image.

Any suitable imaging surface may be used in accordance with this invention. Basically, any surface upon which charge pattern may be cyclically formed or developed may be employed. Typical electrostatographic imaging surfaces include dielectrics such as plastic coated papers, xeroprinting master and photoconductors and photoconductors overcoated with suitable dielectrics. Typical photoconductors that may be employed include selenium and selenium alloys, cadmium sulfide, cadmium sulfo selenide, phthalocyanine binder coatings and polyvinyl carbozole sensitized with 2,4,7-trinitrofluorenone. The electrostatographic imaging surface may be employed in any suitable structure including plates, belts or drums and may be employed in the form of a binder layer.

Referring now to FIG. **1**, there is illustrated an electrostatographic imaging surface, such as a rotatably mounted cylindrical photoconductor drum **10**, formed of selenium. The drum is charged at charging station, generally indicated as **12**; exposed to a light-and-shadow image at exposure station, generally indicated as **14**; and coated with a transferfilm by a transferfilm assembly, generally indicated as **16.** the transferfilm assembly **16** includes a contact roller **18**, an application roller **20** and a transferfilm supply tray **22** (suitably heated) with the surface of the application roller **20** being positioned below the surface **24** of a transferfilm **26.** Rotation of the application roller **20** causes the surface thereof to accumulate transferfilm thereon, a portion of which is applied during rotation to the contact roller **18.** It will be understood that rollers **18** and **20** may be frictionally driven by contact therebetween and by contact of roller **18** with the drum **10**, or may be independently driven by a motor and gearing arrangement (not shown). The electrostatic latent image is developed at a development station, generally indicated as **28,** comprised of a supply tray **30** having a liquid developer **31** contained therein. The developer on the photoconductor is thereafter transferred in image configuration to a receiving surface **32,** such as ordinary paper, which may be moved through a transfer zone, generally indicated as **34,** in contact with the drum **10** at the same speed and in the same direction as the periphery of the drum. The paper to which the developed image is transferred is supplied from supply roll (not shown) and is held in transfer position by an idler roller **36.** A heating element, generally indicated as **42,** may be provided as an additional heat source but must be provided if the transferfilm is in the solid phase after development.

Generally, with the preferred materials and methods of the invention, the transferfilm will split or completely separate from the photoreceptor during the transfer operation in a manner whereby no developer remains on the drum **10.** By the term split, it is meant that a portion of the transferfilm coating will partially separate as graphically illustrated (greatly exaggerated) in FIG. **2.** In FIG. **2,** the transferfilm T including developed image I disposed on photoconductor drum **10** comes in contact with the recording medium **32,** such as paper, at transfer zone **34,** whereat the recording medium **32** is held in transfer position by idler roller **36.** After contact, a portion T_1 of the transferfilm T adheres to the recording medium **32** together with the developed image I with the other portion T_2 of the transferfilm T remaining on the photoconductor drum **10.** It is understood that should the transferfilm separate from the drum **10** no transferfilm will remain on the drum **10** after the transfer operation.

In the event that the transferfilm material and/or developer or toner material used do not result in complete transfer of the image thereby resulting in a carry over of developer or toner on the T_2 coating, the photoconductor drum **10** may be cleaned by contacting the surface of the photoconductor drum **10** with a roller **40** biased opposite to the developer or toner charge prior to the next cycle of operation (See FIG. 1), as well as with a solvent, wet cleaner or the like.

DESCRIPTION OF EXAMPLES

The following examples further define, describe and compare preferred materials, methods and techniques of the present invention. Examples are presented for comparative purposes. In the examples, all parts and percentages are by weight unless otherwise specified.

EXAMPLE I

A clean selenium drum comprising a surface layer of selenium about 50 microns thick on a conductive aluminum substrate is coated to a thickness of 10μ to 15μ with Electro-Stik[1] wax and is positively charged with a corotron device maintained at a potential of 800V. Conventionally, the drum is then exposed to a light-and-shadow image and the latent image on the surface thereof developed by cascade techniques. Bond paper is placed in contact with the developed image and is passed between the drum and a transfer roller heated to a temperature of about 150°C. The resulting transfer image is good with a high background.

[1] Available from Electro-Stik Co. (Chicago, Ill.)

EXAMPLE II

A clean photoconductive layer formed of CdSSe on a drum, is coated to a thickness of from 5μ to 8μ with PE-60[2] and is positively charged to with a corotron device maintained at a potential of 600V. Conventionally, the drum is exposed to a light-and-shadow image and the latent image on the surface thereof developed using a liquid developer. Bond paper is placed in contact with the developed image and is passed between the drum and a transfer roller heated to 160°C. Excellent transfer is achieved with a sharp image being disposed on the bond paper of low background.

[2] A co-polymer formed of 70 mole percent docosylacrylate and 30 mole percent styrene and having a melting point of 60°C.

Although specific materials and operational techniques are set forth in the above exemplary embodiments using the developer composition and development techniques of this invention, these are merely intended as illustrations of the present invention. There are other developer materials and techniques than those listed above which may be substituted for those in the examples with similar results. For example, an intermediate transfer member, such as an endless belt, may be interposed between the photoconductive surface and the transfer film.

Other modifications of the present invention will occur to those skilled in the art upon a reading of the present disclosure which modifications are intended to be included within the scope of this invention.

What is claimed is:

1. An electrostatographic imaging process comprising

providing an imaging member carrying an electrostatic latent image, said imaging member comprising a layer of an organic film forming material having a thickness of from about 2 microns to about 25 microns overlying an electrostatographic imaging surface, said organic material having a resistivity above about 10^{10} ohm-cm, a melting point between about 25°C and about 95°C and a viscosity at its melting point of from about 10 to about 200 centipoises;

developing said electrostatic latent image to form a visible image; and

transferring said developed image to a receiving member by bringing said receiving member into contact with the surface of said imaging member carrying said developed image and separating said receiving member from said imaging member, wherein said organic material is in a liquefied state during said step of transferring and said receiving member comprises a material capable of being wet by said liquefied organic material, wherein said organic material layer splits during said step of transferring with a portion of said layer remaining on said imaging member and a portion of said layer accompanying said developed image to said receiving member.

2. The process as defined in claim **1** wherein said organic film forming material is coated on said electrostatographic imaging surface.

3. The process as defined in claim **2** wherein said latent image is formed on said electrostatographic imaging surface prior to contact with said organic film forming material.

4. The process as defined in claim **3** wherein the organic film forming material is in the liquid phase during application thereof to said electrostatographic imaging surface.

5. The process as defined in claim **3** wherein the organic film forming material is in the solid phase during application thereof to said electrostatographic imaging surface.

6. The process as defined in claim **3** wherein the latent image is developed with a liquid developer.

7. The process as defined in claim **3** wherein said organic film forming material is in the solid state during the step of developing and said step of developing is carried out with a liquid developer whose carrier liquid softens said organic material.

8. The process as defined in claim **3** and further including performing the steps of forming an electrostatic latent image on said member, applying additional organic film forming material, developing and transferring at least one time.

9. The process as defined in claim **4** wherein the organic film forming material is in the liquid state throughout the process and the latent image is developed with a liquid developer.

10. The process as defined in claim **5** wherein the latent image is developed with a particulate developer and said organic film forming material is liquefied prior to transfer of the developed image.

11. The process as defined in claim **2** wherein the organic film forming material is applied to said electrostatographic imaging surface prior to formation of the latent image.

12. The process as defined in claim **11** wherein said organic film forming material is in the solid state during the step of developing and said step of developing is carried out with a liquid developer whose carrier liquid softens said organic material.

13. The process as defined in claim **11** and further including performing the steps of applying additional film forming material, forming an electrostatic latent image on said imaging member, developing and transferring at least one time.

14. The process as defined in claim **11** wherein the organic film forming material is in the solid phase during application thereof to said electrostatographic imaging surface.

15. The process as defined in claim **11** wherein the organic film forming material is in the liquid phase during application thereof to said electrostatographic imaging surface.

16. The process as defined in claim **15** wherein the organic film forming material is in the liquid state throughout the process and the latent image is developed with a liquid developer.

17. The process as defined in claim **14** wherein the latent image is developed with a particulate developer and said organic film forming material is liquefied prior to transfer of the developed image.

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