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“A PROCESS FOR THE PREPARATION OF RESIN BINDER FOR USE IN ELECTROPHOTOGRAPHIC ZINC OXIDE COATINGS”

COUNCIL OF SCIENTIFIC AND INDUSTRIAL RESEARCH, RAJI MARG, NEW DELHI-1, INDIA, AN INDIAN REGISTERED BODY INCORPORATED UNDER THE REGISTRATION OF SOCIETIES ACT (ACT XXI OF 1860).

The following Specification describes the nature of this invention :—

This is an invention by CHITTARI VENKATA SURYANARAYANA, Scientist, ALUR SUNDARAM LAKSHMANAN, Scientist, JAGANNATHAN KUPPUSAMI, Senior Scientific Assistant, and KUNJUMANI CHANDRAN, Senior Laboratory Assistant, Central Electrochemical Research Institute, Karaikudi, all Indian citizens.

This invention relates to improvements in or relating to the formulation of a resin binder for zinc oxide coatings on paper for electrostatic photographic use.

In the hitherto known process of coating the zinc oxide, the resins used abroad are such that not only are they not mentioned explicitly, excepting by their trade names, but the groups of compounds like silicones are not indigenously available, and the available ones are not suitable. Also the resins play a not fully understood role in the process of image formation and no clear cut properties are given in literature. Only we know that they must exclude moisture from the layer and must be insulators. A few of such compounds alone serve the purpose of zinc oxide being photosensitive when used with the binder.

The present invention concerns a resin, indigenously available, which has been used successfully with a small quantity of an addition agent as a binder for zinc oxide layers. Two examples of such hitherto known coating compositions are given below:

Example 1:

80 gm of 60% solution of silicone resin in xylene (SR-82)
106 gm of toluene
120 gm of white photoconducting zinc oxide

Example 2:

Synolac 600 S	...	...	...	12.4 gm
Toluene	...	...	...	35.0 gm
Zinc oxide	...	...	...	52.6 gm

The object of this invention is to make a resin binder composition containing indigenously available materials and achieve a comparably good quality of the sensitive zinc oxide electrophotographic layer.

To these ends, the invention broadly consists in mixing optimum proportions of two types of resins. In addition, materials which may improve the adhesion may also be added sometimes. The resins may be polyvinyl alcohol, ethyl cellulose, perspex, shellac, polystyrene, alkyds, or polyurethanes.

The following is an example of the coating composition prepared:

10 gm of photoconducting zinc oxide, Electrox 2030
8 to 12 ml saturated solution of shellac in rectified spirit
5 to 8 ml of 5% solution of ethyl cellulose in xylene
15 to 20 ml of xylene.

The zinc oxide powder is first taken in a mortar and xylene added. This is ground well for about 15 min. Now ethyl cellulose in xylene and shellac in rectified spirit are added and the grinding continued at least for about 20 min. A little xylene is added to the slurry now and then if it becomes too viscous.

This is the resin bound zinc oxide composition which is now ready for coating on paper or on aluminium plate. The coated layers on aluminium plate have been used in the 'Autofax' electrophotographic machine and have been found to give prints. If the resin is unsuitable or the proportions are far too different outside the given range no prints are obtained.

The following are the main advantages of the invention:

- 1 The resin formulation useful for coating electrophotographic grade of zinc oxide on a paper base has been formulated purely out of indigenously available materials.
- 2 The formulation thus made works successfully when used with electrophotographic grade of zinc oxide.

Dated this 6th day of July, 1972.

(Sd.)

PATENTS OFFICER,
Council of Scientific & Industrial Research.

PRICE : TWO RUPEES

THE PATENTS ACT, 1970.

Complete Specification SECTION 10

"A PROCESS FOR THE PREPARATION OF RESIN BINDER FOR USE IN ELECTROPHOTOGRAPHIC ZINC OXIDE COATINGS"

COUNCIL OF SCIENTIFIC AND INDUSTRIAL RESEARCH, RAJI MARG, NEW DELHI-1, INDIA, AN INDIAN REGISTERED BODY INCORPORATED UNDER THE REGISTRATION OF SOCIETIES ACT (ACT XXI OF 1960).

The following Specification particularly describes and ascertains the nature of this invention and the manner in which it is to be performed :-

This is an invention by CHITTARI VENKATA SURYANARAYANA, Scientist, ALUR SUNDARAM LAKSHMANAN, Scientist, JAGANNATHAN KUPPUSAMI, Senior Scientific Assistant and KUNJUMANI CHANDRAN, Senior Laboratory Assistant, all of the Central Electrochemical Research Institute, Karaikudi-3, India, all Indian citizens.

This invention relates to improvements in or relating to the formulation of a resin binder for zinc oxide coating on paper for electrostatic photographic use.

To give a brief account of the electrophotographic process concerned here, the zinc oxide coated paper-based electrostatic photographic process relies on the photoconductivity of zinc oxide. The zinc oxide layer on paper is first sprayed with a uniform negative electrostatic charge. This charged layer is then exposed to a pattern of light, for example, printed matter which selectively dissipates the charge in illuminated areas of the photosensitive zinc oxide layer. The charge in the non-illuminated areas is retained, forming a latent electrostatic image of the pattern. This latent electrostatic image is then developed (made visible) by the deposition of finely divided pigmented and triboelectrically charged powders of positive polarity, referred to in the art as 'toner'.

The zinc oxide (a special electrophotographic variety is coated on a conducting paper with an appropriate resin binder. The present invention concerns that resin.

In the hitherto known process of coating the zinc oxide, the resins used abroad are such that not only are they not mentioned explicitly, excepting by their trade names, but the groups of compounds like silicones are not indigenously available and the few available ones are not suitable. Also the resins play a not fully understood role in the process of image formation and no clear cut properties are given in literature. A few of such compounds alone serve the purpose, allowing zinc oxide retain its photosensitivity when used with the binder.

The main object of the invention concerns a resin, indigenously available, which has been used successfully, with a small quantity of an addition agent, as a binder for zinc oxide layers.

The main finding underlying the invention is the evolution of a combination of indigenously available resins, which makes a reasonably satisfactory resin binder for zinc oxide electrophotographic coatings.

At present, there does not seem to be any resin binder for this special use available in India and the present invention will remove the necessity of importation of the binder.

The present invention consists of a process for the preparation of a resin binder to obtain the requisite viscosity of zinc oxide for coating on paper, to be used in electrophotography, comprising mixing two resins selected from ethyl cellulose, polymethylmethacrylate, polystyrene, alkyds, polyurethanes, polyvinyl alcohol and shellac and zinc oxide of electrophotographic grade. The following is an example of the coating composition:

10 gm of zinc oxide of electrophotographic grade
8 to 12 ml saturated solution of shellac in rectified spirit.

5 to 8 ml of 5% solution of ethyl cellulose in xylene.

The zinc oxide powder is first taken in a mortar and xylene added. The zinc oxide is dispersed in xylene. A dye mixture consisting of Rose Bengal and Fluorescein in a solvent is added to this at this stage to make the final layer sensitive to visible light. Now ethyl cellulose in xylene and shellac in rectified spirit are added and the blending operation continued for about 5-10 min. A little xylene may be added to the slurry if it becomes too viscous.

This is the resin bound zinc oxide composition which is now ready for coating on paper or on aluminium plate for testing. The coated layers on aluminium plate have been used in the 'Autofax' electrophotographic machine and have been found to give prints. If the resin is unsuitable or the proportions are far too different outside the given range, no prints are obtained.

The following are the main advantages of the invention:

1. The resin formulation useful for coating electrophotographic grade of zinc oxide on a paper base has been formulated purely out of indigenously available materials.
2. The formulation thus made works successfully when used with electrophotographic grade of zinc oxide.

The resin binding zinc oxide to the paper is an essential part of the sensitive layer. It binds the oxide to form a film on the paper substrate and prevents electrical leakage, otherwise than by photoconductivity. Such a resin binder has not so far been available indigenously. This invention concerns the formulation of a reasonably satisfactory binder using indigenously available substances. The binder composition prepared by the process of the invention is not merely an admixture resulting in the aggregation of the properties of the components thereof.

Noteworthy Features

A process for the preparation of a suitable composition of two resins to form a resin binder for coating electrophotographic zinc oxide on base paper without destroying its photosensitivity. The resins may be ethyl cellulose, polymethylmethacrylate, polystyrene, alkyds, polyurethanes, polyvinyl alcohol or shellac.

We Claim :

1. A process for the preparation of a resin binder to obtain the requisite viscosity of zinc oxide for coating on paper, to be used in electrophotography comprising mixing two resins selected from ethyl cellulose, poly-methylmethacrylate, polystyrene, alkyds, polyurethanes, polyvinyl alcohol and shellac and zinc oxide of electrophotographic grade.

2. A process as claimed in claim 1 wherein,

10 gm of electrophotographic grade of zinc oxide,
8 to 12 ml saturated solutions of shellac in rectified spirit and

5 to 8 ml of 5% solution of ethyl cellulose in xylene are mixed.

3. A process as claimed in any of the preceding claims wherein the zinc oxide powder is first taken in a mortar and xylene added, the zinc oxide is dispersed in xylene, a dye mixture consisting of Rose Bengal and Fluorescein in a solvent is added to this, at this stage, to make the final layer sensitive to visible light, methyl cellulose in xylene and shellac in rectified spirit are added and the blending operation continued for about 5 to 10 minutes.

4. A process as claimed in any of the preceding claims wherein a further quantity of xylene is added to the slurry if it becomes too viscous.

5. A process for preparing a resin binder, for coating zinc oxide on paper to get the photosensitive zinc oxide layer used in electrostatic photography, substantially as herein-before described.

Dated this 4th day of October, 1973.

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