United States Patent

Seto

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[54] LIGHT-INTERCEPTING COMPOSITION FOR PHOTOGRAPHIC LIGHT-SENSITIVE FILM

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[52] **U.S. Cl.**.....**117/155 UA,** 117/68, 117/161 UC, 96/84 R, 96/85

[51] **Int. Cl.**.....**D21h 1/28,** G03c 1/86

[58] **Field of Search**.....117/155 UA, 161 UH, 161 UC, 117/160 A, 226, 68; 96/84 R, 85

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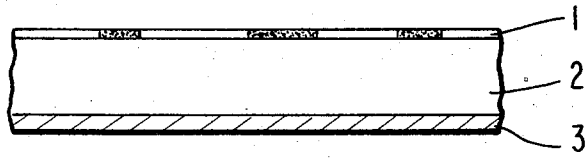
[57] **ABSTRACT**

Light-intercepting composition consisting of an ethylene-vinyl acetate copolymer having dispersed therein carbon black. In film form, the composition is laminated to a paper to provide a light-intercepting paper for use in photographic light-sensitive roll film.

7 Claims, 6 Drawing Figures



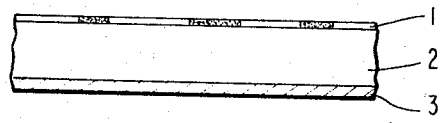


FIG. 1

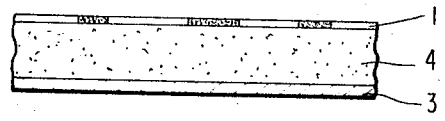


FIG. 2

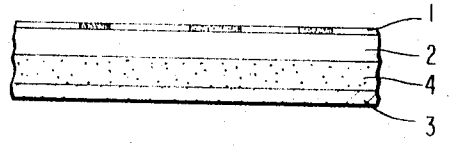


FIG. 3

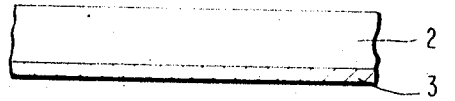


FIG. 4

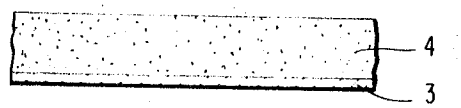


FIG. 5

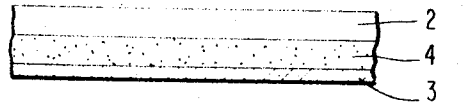


FIG. 6

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LIGHT-INTERCEPTING COMPOSITION FOR PHOTOGRAPHIC LIGHT-SENSITIVE FILM

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates to a light-intercepting composition for photographic light-sensitive films, and more particularly to a composition for providing a light-intercepting paper for photographic light-sensitive films.

2. Description of the Prior Art

Usually, photographic light-sensitive roll film is rolled up on a spool with a paper strip having a layer of black paper thereon which carries the "scene" numbers.

In this case, the top portion of the photographic film, i.e., the portion thereof to be first exposed, is attached to a light-intercepting paper by an adhesive tape. However, the other portions of the photographic film are not attached to the light-intercepting paper since the film is rolled up on a spool with the light-intercepting paper.

The light-intercepting paper is used to prevent the light-sensitive roll film from exposure to light before use. It is separated from the light-sensitive film during processing of the film. The volume or dimensions of the spool is determined with reference to the thickness of standard light-intercepting paper available and , of course, by the mechanism of camera. Hence, the thickness of the light-intercepting paper has an effective upper limit. The mechanical strength requirement of the light-intercepting paper (in the camera) defines the lower limit of the thickness of the light-intercepting paper.

In manufacturing light-intercepting papers, a light-intercepting material, such as carbon black, is added to a cellulose slurry in the paper manufacturing step. However, the addition of carbon black is accompanied by faults, i.e., the light-intercepting paper thus prepared is lacking in flexibility (caused by the carbon black) and the thickness of the paper is too great when complete light interception is reached. Accordingly, when such a conventional light-intercepting paper is employed, a light-sensitive film carrying the light-intercepting paper cannot easily be rolled up in spool. Moreover, since the light-intercepting paper contains carbon black, it will often contaminate the photographic materials when it is brought into contact with these materials. Accordingly, the surface of the light-intercepting paper must be coated with a lacquer.

The present invention thus provides a light-intercepting composition and a light-intercepting paper which overcomes the disadvantages inherent in the prior art.

SUMMARY OF THE INVENTION

The present invention provides a light-intercepting composition, basically for use with photographic films, which comprises an ethylene-vinyl acetate copolymer having dispersed therein carbon black. Preferably, from about 3 to about 50 percent by weight carbon black is dispersed in the ethylene-vinyl acetate.

The copolymer preferably comprises from about 12 to about 40 percent by weight vinyl acetate.

The resultant light-intercepting composition, and the light-intercepting paper formed by the use of said light-intercepting composition, has several advantages over the prior art. The papers formed thereby are thinner and more flexible than the heretofore known prior art light-intercepting papers, and the composition of the present invention does not result in the contamination problems existent with the prior art light-intercepting papers.

An object of the present invention is to provide a light-intercepting composition for use in preparing a thin, flexible light-intercepting paper for use with photographic light-sensitive films.

A further object of this invention is to provide a light-intercepting paper for use with photographic light-sensitive film.

BRIEF DESCRIPTION OF THE DRAWING

FIGS. 1–6 represent various embodiments of a light-sensitive paper utilizing the light-intercepting composition of the present invention.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

The light-intercepting composition for use with photographic light-sensitive films of the present invention comprises an ethylene-vinyl acetate copolymer having dispersed therein carbon black.

The preferred ethylene-vinyl acetate copolymer for use as the light-intercepting composition of this invention is one containing 12–40 percent by weight vinyl acetate, having a low hygroscopicity and a good film-forming property. For instance, exemolary are Evaflex (Trade name sold by Mitsui Polychemical Co.) and Elvax (Trade name sold by DuPont Chemical Co.). If the content of vinyl acetate is less than 12 percent, the hardness of the film of the copolymer is increased, while if the content of the vinyl acetate is higher than 40 percent, blocking occurs and the strength of the film formed is reduced.

The proportion of carbon black in the composition and the light-intercepting paper of this invention is preferably 3–50 percent by weight, based on the weight of the copolymer. If the content of carbon black is too low, the light-interceptance of the light-intercepting film becomes poor, and the film tends to suffer electrifical accumulation. If the carbon black content is too high, the film becomes brittle and flexibility is reduced.

To prepare the light-intercepting composition of this invention, the ethylene-vinyl acetate copolymer, carbon black, and a dispersion aid may be mixed in a homomixer. Mixing is preferably carried outin the presence of a solvent, or in a roll mill. Depending upon the degree of polymerization of the copolymer, mixing may be conducted by heatine. As dispersion aids, there may be illustrated sorbitan monooleate, sorbitan sesquioleate, sorbitan monostearate, polyoxyethylene alkyl ether, poly-oxyethylene alkylaryl ether and the like.

To prepare a light-intercepting paper using the composition of this invention, the composition may be applied to a white, colored or black paper by any conventional coating method, for example by heat-coating methods and heat extrusion methods.

The light-intercepting papers prepared using the composition of this invention will now be explained with reference to the accompanying drawing in which FIGS. 1 to 6 are schematic cross-sectional views showing various embodiments of light-intercepting papers prepared using the compositions of this invention.

FIG. 1 illustrates a light-intercepting paper consisting of a white paper 2 having a print-bearing layer 1 and a layer 3 of the light-intercepting composition of this invention at the opposite side of the paper to that of the print-bearing side.

FIG. 2 shows another embodiment of the light-intercepting paper consisting of a colored paper 4 having a print-bearing layer 1 and a layer 3 of the light-intercepting composition of the invention at the opposite side of the paper to the print-bearing side.

FIG. 3 shows still another embodiment of the light-intercepting paper consisting of a laminate of a white paper 2 and a colored paper 4 said white paper having a print-bearing layer 1 and said colored paper bearing a layer 3 of the light-intercepting composition of this invention.

In FIG. 4, FIG. 5 and FIG. 6 there are shown light-intercepting papers having no print-bearing layers corresponding to those shown in FIG. 1, FIG. 2 and FIG. 3, respectively.

As illustrated above, the light-intercepting composition of this invention may be applied to the surface of a white paper or a colored paper, e.g., a black paper containing carbon black.

The light-intercepting paper prepared using the light-intercepting composition of this invention is sufficiently flexible and illustrates sufficient light-intercepting power, although the

layer of the light-intercepting composition of this invention is comparatively thin. Moreover, the light-intercepting paper illustrates a high mechanical strength. Further, by using the light-intercepting composition of this invention, an excellent light-intercepting layer can be obtained even with the use of a single thin layer without the necessity of precoating physical and/or chemical treatment to facilitate the preparation of the light-intercepting paper.

This invention will now be described in more detail by referring to the following examples in which all parts are by weight.

EXAMPLE 1

The following blend was formed:

Ethylene-vinyl acetate copolymer (Containing 18 percent vinyl acetate; melt index 2.5; Evaflex No. 460 trade name of Mitsui Polychemical Co.)

Evaflex No. 460	100 parts
Carbon black	40 parts
Toluene	980 parts

The mixture thus formed was mixed in a homo-mixer to provide the light-intercepting composition.

The above composition was applied to a paper of 75 g./m² at a thickness of 20 g./m² to provide a leader paper having excellent flexibility and good antihygroscopicity.

The hardness of the paper was increased by only 0.2 units (as compared to the hardness of the original paper) by the application of the composition of this invention. The hygroscopicity of the leading paper was 100 g./m²/24 hours.

EXAMPLE 2

The following mix was formed:

Ethylene-vinyl acetate copolymer (containing 12 percent vinyl acetate; melt index 3.5; Evaflex No. 560 (trade name of Mitsui Polychemical Co.)

Evaflex No. 560	100 parts
Carbon black	10 parts
Toluene	550 parts

The mixture thus formed was mixed in a homo-mixer to provide the light-intercepting composition of this invention.

This composition was applied to a black paper at 90 g./m² and at a thickness of 5 g./m². This light-intercepting paper for photographic light-sensitive roll film could completely cover the pinholes of a black paper and yield complete light interceptance.

To further illustrate the most preferred forms of the present invention, the ethylene-vinyl acetate copolymers utilized should illustrate a melt index value within the range of from about 1.0 to about 150. Although not critical, it has been found that the most preferred results in the practice of the present invention are obtained when carbon black having a particle size below about 50 mμ is utilized, most preferably of a pH of 4–8.

What is claimed is:

1. A light-intercepting paper for photographic light-sensitive film comprising a paper and a layer of a light-intercepting composition provided on the surface of said paper, said composition comprising an ethylene-vinyl acetate copolymer, wherein said copolymer contains from about 12 percent to about 40 percent by weight of vinyl acetate, having dispersed therein carbon black in an amount ranging from about 3 to about 50 percent by weight based on the weight of said copolymer.

2. The light-intercepting paper as claimed in claim 1 wherein said carbon black of said light-intercepting composition has been dispersed in said copolymer with the aid of a dispersing agent selected from the group consisting of sorbitan monooleate, sorbitan sesquioleate, sorbitan monostearate, polyoxyethylene alkyl ether and polyoxyethylene alkylaryl ether.

3. The light-intercepting paper as claimed in claim 1 wherein the melt index value of the ethylene-vinyl acetate copolymer employed ranges from about 1.0 to about 150.

4. The light-intercepting paper as claimed in claim 1 wherein the particle size of the carbon black is below 50 millimicrons.

5. The light-intercepting paper as claimed in claim 1 wherein the pH of the carbon black ranges from about 4 to about 8.

6. The light-intercepting paper as claimed in claim 1 wherein said carbon black has been dispersed in said copolymer by means of a solvent.

7. The light-intercepting paper as claimed in claim 6 wherein said solvent is toluene.

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