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Prevot

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[54] PROCESS FOR APPLYING A MAGNETIC TRACK DIRECTLY ON AN ANTIHALATION BACKING OF A CINEMATOGRAPHIC FILM

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[58] **Field of Search** 117/235, 238, 239, 237, 240

[56] **References Cited**

UNITED STATES PATENTS

3,227,555	1/1966	Norman	117/235 X
3,243,376	3/1966	Lovick et al.	117/235 X
3,220,843	11/1965	Lovick et al.	117/235 X

FOREIGN PATENTS OR APPLICATIONS

1,322,353	8/1963	France

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[57] **ABSTRACT**

A magnetic sound track is applied on the antihalation backing layer of a cinematographic film, such as cellulose acetate, by coating the magnetic particles from a solution containing a polymeric binder (such as nitrocellulose) dissolved in a solvent mixture consisting essentially of about 15 to 35 percent of a dioxane (such as 1,4-dioxane or 4-methyl-1,3-dioxane) and 65 to 85 percent of 2-methoxy ethanol, by weight. This track is firmly adhered to the support and is irremovable by alkaline photographic processing solutions which remove the backing layer. Moreover, undesirable curl of the film, and cracking of the magnetic stripe are avoided with this solvent mixture.

3 Claims, No Drawings

PROCESS FOR APPLYING A MAGNETIC TRACK DIRECTLY ON AN ANTIHALATION BACKING OF A CINEMATOGRAPHIC FILM

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates to the application of magnetic tracks on the back layer of cinematographic films.

The use of magnetic sound tracks for recording the sound on cinematographic films is well known.

In the case of a film having a carbon black antihalation backing, one usually first proceeds to the printing and developing operations, then the magnetic track is applied and one proceeds to the recording of the sound. However, the support of a developed film may have been more or less deformed by the treatment, which renders difficult the correct application of a magnetic track.

Thus, it is desirable, in order to simplify the treatment of cinematographic films, to apply the magnetic track directly to the unexposed film, but the adhesion of the track must then withstand severe conditions. A track that is applied to an unexposed film and the adherence of which to the support is defective, risks deterioration of the track itself, as well as deterioration of the photosensitive emulsion layer and the baths during treatment of the film, through the migration of the magnetic oxide and the formation of deposits on said emulsion layer.

2. The Prior Art

The proper adhesion of the magnetic track has been obtained by using, in order to prepare the magnetic dispersion, mixtures of suitable solvents which are compatible with the binder of the dispersion, and which dissolve the antihalation layer until they attack the surface of the subjacent support. Various mixtures have been suggested. French Pat. No. 1,332,353 describes the use, for making the magnetic dispersion, of a mixture of solvents comprising 2-butoxy-ethanol, butanol, 2-methoxy-ethanol (methyl cellosolve solvent) and an N,N-dialkyl derivative of an aliphatic amide. The U.S. Pat. No. 3,227,555 describes a similar solvent mixture, but wherein the N,N-dialkylamide is replaced with a derivative of diazomethane. These compositions have the disadvantage of increasing the cost of the film manufacture due to the rather high price of solvents, particularly of N,N-dialkylamides.

SUMMARY OF THE INVENTION

The object of the present invention is to provide an inexpensive and extremely efficient process for applying a magnetic track directly to the carbon black antihalation backing of a cinematographic film.

The process of the invention is characterized in that one uses for the magnetic dispersion a solvent mixture in specific proportions of 2-methoxy-ethanol and a dioxane, which mixture has a dissolving power that is sufficient for both the antihalation layer and the support, thus making possible an efficient adhesion of the magnetic track. Moreover, the novel mixture of solvents does not cause the film to curl, and produces a magnetic stripe which is highly resistant to cracking.

The mixture of solvents that is used, according to the invention, for the adhering of the magnetic track comprises approximately 15 to 35 percent by weight of a dioxane and 85 to 65 percent by weight of 2-methoxy-ethanol (ethylene glycol monomethyl ether), excluding any other solvent. According to a preferred embodiment of the invention, the proportions by weight of dioxane and 2-methoxy-ethanol and 25 percent and 75 percent, respectively.

This mixture proves to be entirely effective for applying a magnetic track directly on the antihalation backing of a cellulose triacetate cinematographic film, particularly when the degree of acetylation of the triacetate is above 43 percent, and when the binder of the antihalation layer is a water-insoluble cellulose ester which is soluble in an alkaline medium, such as cellulose acetate phthalate, acetate maleate, -acetate succinate, -acetate propionate phthalate, -acetate propionate maleate or -acetate propionate succinate, or a synthetic resin consisting of a polyvinyl derivative, such as polyvinyl phthalate or polyvinyl acetate phthalate.

The dioxane, when used alone, causes an accentuated transversal incurvature of the support because of its too strong attacking power; moreover, the magnetic track, after drying, becomes split lengthwise in its middle portion. When adding a certain amount of 2-methoxy-ethanol to the dioxane, one profits from the high solvent power of the latter with respect to the binder of the antihalation backing.

For the cellulose esters, such as those mentioned above, the dissolving power of 2-methoxy-ethanol is very superior to the solvent power of dioxane or 2-methoxy-ethyl acetate which are usable, as is described in U.S. Pat. No. 3,243,376, in the form of mixtures with N,N-dialkyamide.

On the other hand, the 2-methoxy-ethanol has a weak attacking power for the cellulose triacetate support. Mixed with dioxane, it limits the attacking power of the latter with respect to the support, preventing it from transversal incurvation, making it thus possible to obtain a uniform track which will not split or crack.

According to the present invention, one uses thus a mixture of two solvents, the one, 2-methoxy-ethanol, which facilitates the dissolution of the binder of the backing layer, the other, dioxane, attacking the support superficially, the proportions of these two solvents being adjusted so that the two effects combine in order to produce a track that adheres well to the support.

In fact, mixtures of these two solvents in proportions other than those indicated above are not suitable, the magnetic track displaying either cracking defects, or, after development, an insufficient adherence to the subjacent carbon black backing, as will be seen in the following Examples 4 to 7.

The magnetic substances usable according to the invention may display variable characteristics, particularly with respect to permeability and coercivity. Among the well-known magnetic substances, one may cite ferromagnetic oxides, in particular the acicular (needle-shaped) type. One has also the possibility of modifying the nature of the substances constituting the magnetic dispersion, e.g., by using alloys having as a base iron, copper, aluminum, nickel, cobalt or carbon. In many cases, one of the elements entering the composition of these alloys is not magnetic.

In order to prepare these magnetic materials, the compounds known under the name "metal carbonyls" may be submitted to decomposition by heat, which makes it possible to obtain materials in the form of finely divided particles.

For example, by submitting iron carbonyl or mixtures of metal carbonyls to decomposition by heat, one can obtain iron or finely divided alloys, respectively; according to the nature of carbonyls that are selected, one may thus prepare alloys of nickel, cobalt, chromium, tungsten, or molybdenum. Processes for the preparation of ferromagnetic substances are described in U.S. Pat. No. 2,694,656. One may use the IRN ferromagnetic oxides manufactured in the United States by the C.K. Williams Co.; the IRN 110 and IRN 115 oxides are particularly advantageous because of their higher coercivity.

The binder that enters the composition of the magnetic dispersion must, on the one hand, be soluble in the indicated solvents and, on the other hand, will have to resist the solvents used in the cleaning of the films, such as carbon tetrachloride, trichloroethylene, perchloroethylene, methyl chloroform, "white spirit" solvent, etc. Among the different resins which have been tried as binders for the composition of the sound track, in particular polyvinyl acetate or polyvinyl acetate-polyvinyl chloride copolymer, only nitrocellulose makes it possible to satisfy these requirements. The dispersion may, moreover, contain other additives that are used in the conventional manner, e.g., plasticizers, such as dioctyl phthalate or dispersing agents, such as oleic acid.

THE PREFERRED EMBODIMENTS

The magnetic tracks described in the examples that follow, were coated with a narrow-set coating device, the thickness of the layer that is deposited being 10 microns after drying, and the travel speed of the film being 6 m. per minute. The temperature of the drying frame is 45° C. and the drying time 7 minutes. When exiting from the coating device, the film is kept at room temperature on a 2.5 m. length, which is necessary so as to allow the solvents to penetrate through the antihalation layer and to attack the support before their evaporation.

After photographic treatment, which may be a treatment in black and white, or in color, according to the type of film, the hardness and the adherence of the track were tested qualitatively by means of scratching with a nail for attempted removal of the magnetic dispersion and by applying and then removing an adhesive that is sensitive to pressure. In the case of Examples 1 to 3, the track could not be removed and remained entirely adherent. In the case of Examples 4 to 7, outside the scope of the invention, the magnetic track displayed either cracks or insufficient adhesion.

The following examples illustrate the invention:

EXAMPLE 1

In a 1-liter stoneware ball mill, containing 2 kgs. of small steel balls the diameter of which varies of from 4 to 10 mm., one disperses over a period of 36 hours the following mixture:

Ferromagnetic oxide	123 g.
Oleic acid	3 g.
1,4-dioxane	75 g.
2-methoxy-ethanol	35 g.

Once the dispersion is completed, one adds the following dope:

2-methoxy-ethanol	190 g.
nitrocellulose	41 g.

One used the nitrocellulose manufactured by Poudrerie de Bergerac (France) under the reference CA 4 E 32. One homogenizes the mixture in a ball mill for 24 hours, and the obtained composition is filtered through a sintered bronze filter unit, of a porosity equal to 10 microns. The final product contains 33 percent by weight of binder with respect to iron oxide.

EXAMPLE 2

One repeats the method of operation of Example 1, but this time one uses the following dispersion:

Ferromagnetic oxide	123 g.
Oleic acid	3 g.
1,4-dioxane	75 g.
Dioctyl phthalate	3 g.
2-methoxy-ethanol	35 g.

One adds to this dispersion the same dope as that prepared in Example 1.

EXAMPLE 3

One repeats the method of operation of Example 1, but this time one uses the following mixture:

Ferromagnetic oxide	123 g.
Oleic acid	3 g.
4-methyl- 1,3-dioxane	75 g.
Dioctyl phthalate	3 g.
2-methoxy-ethanol	35 g.

A dispersion is obtained to which one adds, as previously, the dope prepared in Example 1.

The sound tracks obtained in Examples 1 to 3 adhere completely to the films after photographic treatment.

EXAMPLES 4 to 7

One repeats the method of operation of Example 1, but using solvent mixtures containing appropriate proportions of dioxane and methylglycol which are outside the scope of the present invention.

If a solvent mixture is used containing 90 percent by weight of 1,4-dioxane and 10 percent by weight of 2-methoxy-ethanol, one obtains a magnetic tape the adherence of which is good, but which displays cracks. By using a solvent mixture containing 80 percent by weight of 1,4-dioxane and 20 percent by weight of 2-methoxy-ethanol, one obtains likewise a magnetic track the adherence of which is good but which displays cracks. By using, on the contrary, a solvent mixture containing 10 percent by weight of 1,4-dioxane and 90 percent by weight of 2-methoxy-ethanol, the magnetic track that is obtained does not display cracks, but adheres very poorly to the support.

The invention has been described in detail with particular reference to preferred embodiments thereof, but it will be understood that variations and modifications can be effected within the spirit and scope of the invention.

I claim:

1. A process for applying a magnetic stripe to a photographic element including a cellulose ester film support having a polymeric antihalation layer coated on one surface of the support and removable therefrom by treatment with alkaline photographic developing solution, said polymeric antihalation layer comprising a film-forming binder selected from the group consisting of cellulose esters and polyvinyl esters characterized in insolubility in water and solubility in an alkaline solution, said process comprising coating a stripe on said antihalation layer from an organic solvent solution containing a film-forming polymeric nitrocellulose binder insoluble in said alkaline solution, and ferromagnetic particles, said solvent consisting essentially of a mixture of about 15 to 35 percent of a dioxane with about 65 to 85 percent of 2-methoxy-ethanol by weight thereby forming a magnetic stripe containing said binder and particles composite with the antihalation layer, firmly adhered to the support and irremovable therefrom by treatment with said alkaline solution.

2. A process in accordance with claim 1 wherein said solvent consists essentially of about 25 percent of said dioxane, and about 75 percent by weight of said 2-methoxy-ethanol.

3. A process in accordance with claim 1 wherein said dioxane is 1,4-dioxane or 4-methyl-1,3-dioxane.

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