

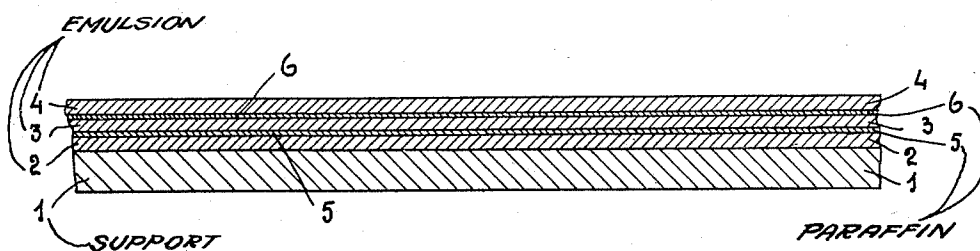
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PHOTOGRAPHIC MATERIAL

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PHOTOGRAPHIC MATERIAL

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My invention relates to photographic materials including photographic films, plates, papers etc. and more especially to material comprising a plurality of layers arranged on a support in superposition. It has particular reference to light-sensitive material for color photography and cinematography and includes also a process of treating such material. As is well-known to those skilled in the art, negative material has been used in color photography and cinematography, which consists of a plurality of superposed light-sensitive layers which are separated after exposure. As a rule each of these layers is sensitized for a different part of the spectrum. Such multi-layer material is produced by pouring one layer on top of the other. It is however known that the separation of the superposed layers encounters difficulties which could hitherto not be overcome entirely. It has already been suggested to arrange between adjoining layers a thin intermediate support, which can readily be stripped. However in view of the fact that such intermediate support must possess a certain thickness, one or the other of the light-sensitive layers, when the material is exposed in the camera, will be out of focus and in consequence thereof an indistinct image will be produced. One has also suggested to insert between the light-sensitive layers very thin layers of collodium or similar material, since such layers, similarly as the intermediate supports mentioned above, are adapted to facilitate the stripping of the light-sensitive layers and, in contrast to the intermediate supports, are very thin. However such collodium layers cannot prevent the negative from being damaged and deformed when the part negatives are stripped.

In the photographic material according to the present invention a plurality of layers are superposed in such manner that the light-sensitive layers each consisting of a binder such as gelatine and a light-sensitive substance such as a silver halide suspended therein are arranged in closest superposition, so that the production of sharp and distinct images is guaranteed. Moreover these layers can be separated easily and without any danger of a negative being damaged.

In accordance with this invention the new material comprises, intermediate between the light-sensitive layers, fusible intermediate layers, the melting temperature of which lies within a predetermined range of temperatures, i. e. above the temperature which enables a light-sensitive layer to be arranged on the intermediate layer, and below the temperature at which the light-sensitive layers and/or their support would be

damaged or destroyed, if the multi-layer material were exposed to this temperature for a short part of time.

I prefer providing intermediate layers melting at different temperatures and arranging the intermediate layers in such manner that the melting temperatures rise in the direction from the top layer towards the support or carrier, i. e. an intermediate layer farther remote from the support will have a lower melting point than an intermediate layer nearer to the support.

The material constituting the fusible intermediate layers may for instance be wax, paraffin, fatty substances, natural or artificial resins, etc.

I have found that the intermediate layers may be poured with extreme thinness (below 5 microns and preferably about 2-3 microns) and will still be able to serve my purpose.

I may choose the material for the intermediate layers in such manner that the refractive index of the intermediate layers and that of the binder forming part of the light sensitive layers are about the same so that in this manner the optical contact between the light-sensitive layers is assured.

In the drawing photographic material embodying my invention is illustrated diagrammatically by way of example in cross section, drawn to a greatly enlarged scale. The material here shown is a negative material of a kind adapted for use in three-color photography.

Referring to the drawing, 1 is the support, which may be glass, Celluloid, cellulose acetate, paper or some other suitable material and 2, 3 and 4 are three light-sensitive layers. The layer 2 is sensitized for red, layer 3 for green-yellow. Layer 4 is not sensitized and therefore only blue-sensitive. Between the layers 2 and 3 is arranged a very thin paraffin layer 5 melting at about 70° C. Between the layers 3 and 4 is arranged a similarly very thin paraffin layer 6 which melts already at about 40° C.

In order to prevent blue rays from reaching the light-sensitive layers 3 and 2, the intermediate layer 6 and/or the light sensitive layer 4 may contain a yellow color filter dyestuff. In order to prevent certain rays from penetrating the layer 3 and reaching the layer 2, the layers 3 and/or 5 may also contain corresponding color filter dyestuffs.

The light-sensitive layer 2 may be replaced by a panchromatic emulsion sensitized for the entire spectrum and in that case a red color filter dyestuff in the intermediate layer 5 may prevent other than red rays from reaching the light-sensitive layer 2.

Obviously the light-sensitive layers may be supposed in different sequence than shown in the drawing and it is also possible to so form the new material that it is able to satisfy the many different conditions to be fulfilled by a color photography material. Thus for instance the layer 2, which is sensitive for blue and red, may be arranged on top and in this case the sensitivity of this layer for blue may be reduced by well-known means. It is however also possible to obtain a copy from the red part-negative without reducing the blue-sensitivity of the layer 2 by combining, in a well-known manner, after separation and developing of the light-sensitive layers, the blue-red negative with a positive print of the blue part-negative.

The new photographic material according to this invention offers the particular advantage of being fit to be exposed in any kind of camera.

After exposure the light-sensitive layers are separated from each other and are mounted separately on transparent supports which may for instance be coated with a gelatine layer to which may be admixed substances adapted to facilitate the pasting-on of the light-sensitive layer. Instead of gelatine also other substances facilitating the fixing of the light-sensitive layers may be used. In the case, where the material is designed for use in cinematography, it is preferable to use, for the individual layers, supports possessing the same properties (shrinkage limits etc.) as the support of the multi-layer material.

I have also found it advantageous to use individual supports having perforations of the same dimensions as the support of the multi-layer material in order that on transferring the individual layers onto their individual supports the perforations of these layers and of their supports are in exact register. In view of the necessity of providing perforations of identical dimensions in the original support and in the supports for the individual layers it appears desirable that the manufacturer who produces the multi-layer material, provide his customer also with the corresponding number of supports for the part-layers. These part-supports should, if possible, be formed from the same batch as the multi-layer support in order to possess the same properties as this support. Therefore when selling a material such as shown on the drawing, this material shall preferably be accompanied by two transparent supports designed to take up the light-sensitive layers 3 and 4. While these layers are then transferred onto these new supports, the light-sensitive layer 2 remains on the original support 1.

The light-sensitive layers may be separated from each other and transferred onto their individual supports in the following manner:

In order to transfer the layer 4 onto one of the individual transparent supports provided for this purpose, the gelatine layer, which may be arranged on this support, is moistened and the layer 4 pressed onto the gelatine layer in such manner as to firmly adhere to it. Now the multi-layer negative as a whole together with the transparent individual support adhering to it is heated to about 45-50° C., whereby the paraffin layer 6 is caused to melt. The transparent individual support may now be removed together with the light-sensitive layer 4. I thus obtain the original negative material, from which the top layer 4 is removed, and on the other hand the combination of this layer with a transparent

support. As a rule a thin layer of paraffin adheres to both. As far as such fusible layers still adhering to the articles are soluble, they are now removed by means of appropriate solvents, well-known in the art, which, while dissolving the fusible substance, are unable to exert an obnoxious influence on the light-sensitive layers or on their support. Similarly as the layer 4 also layer 3 is separated from the multi-layer material and transferred onto a transparent support. However in order to cause the paraffin layer 6 to melt the multi-layer material must be heated to about 75-80° C. Since the light-sensitive layer 2 remains on the original support 1, there result at the end of the separating operation three separate supports carrying the light-sensitive layers 2, 3 and 4 respectively, each of which can be treated like any ordinary negative material. The further separate treatment enables each of the three negatives to be developed to the desired gamma.

The operations of separating and transferring the light-sensitive layers must, in certain cases, be varied or differently combined with each other according to the requirements of each individual case. Instead of three light-sensitive layers the new photographic material may also comprise only two such layers arranged in superposition on a common support. The third light-sensitive layer may be arranged on a separate support and may be used together with the two-layer material as a bi-pack. When using such negative materials, after exposure only one of the two superposed light-sensitive layers must be transferred onto a transparent support. However operating with a bi-pack involves the disadvantages, that the light-sensitive layers must be exposed across a support, that the contact between the light-sensitive layers is not satisfactory and that a special kind of camera is required for the exposure.

Obviously in photographic material according to this invention a greater or lesser number of light-sensitive layers than three may be provided. Any such different material is used for producing more or less than three part-negatives.

The process according to this invention may readily be adapted to any material. For instance if four part negatives shall be obtained, the four light sensitive layers may either be arranged on a common support or, as in a bi-pack for three-color photography, be distributed on two supports in such manner, that three layers are arranged on one support, the fourth layer on another support. Alternatively the layers may be arranged in pairs on two supports.

Various changes may be made in the details disclosed in the foregoing specification without departing from the invention or sacrificing the advantages thereof.

I claim:

1. A photographic material comprising in combination, a plurality of superposed light-sensitive layers and a fusible intermediate layer between adjoining light-sensitive layers, the melting temperature of the fusible layer being above the temperature which enables a light-sensitive layer to be arranged on the intermediate layer, and below the temperature at which the light-sensitive layers would be damaged if exposed to this temperature for a short time.

2. A photographic material comprising in combination, a support, a plurality of superposed light-sensitive layers arranged on said support

and a fusible intermediate layer between adjoining light-sensitive layers, the melting temperature of the fusible layer being above the temperature which enables a light-sensitive layer to be arranged on the intermediate layer, and below the temperature at which the light-sensitive layers and said support would be damaged if exposed to this temperature for a short time.

3. The photographic material of claim 1, in which a plurality of fusible intermediate layers is provided, different layers having different melting points.

4. The photographic material of claim 2, in which a plurality of more than two light-sensitive layers is arranged in super-position with a fusible layer between every two adjoining light-sensitive layers, the melting point of the fusible layer nearest to the support being higher than the melting point of a layer farther away from the support.

5. The photographic material of claim 2, in which a plurality of more than two light-sensitive layers is arranged in superposition with a fusible layer between every two adjoining light-sensitive layers, the melting points of the layers farther away from the support being lower than those of the layers nearer to the support.

6. The photographic material of claim 1, in which each light-sensitive layer comprises a binder and a light-sensitive substance suspended in said binder, the binder and the fusible layer having refractive indexes of the same order.

7. The method of producing part images for color photography with the aid of a photographic multi-layer material which is a combination of a plurality of superposed light-sensitive layers and a fusible layer between adjoining light-sensitive layers, the melting temperature of the fusible layer being lower than the temperature at which the adjacent light-sensitive layers would be damaged if exposed to this temperature for a short time, which comprises placing an auxiliary transparent support, coated with a binder, onto the topmost light-sensitive layer of the multilayer material, heating the multilayer

material together with the auxiliary support resting thereon to a temperature slightly above the melting point of said fusible intermediate layer and removing the auxiliary support together with the topmost light-sensitive layer adhering to it.

8. The method of claim 7 as applied to a photographic multilayer material being a combination of a plurality of light-sensitive layers with a fusible intermediate layer between each two adjacent light-sensitive layers, these fusible intermediate layers having different melting points, which comprises placing an auxiliary transparent support, coated with a binder, onto the topmost light-sensitive layer of the multilayer material, heating the multilayer material together with the auxiliary support resting thereon to a temperature slightly above the melting point of the fusible intermediate layer adjoining the topmost light-sensitive layer, removing the auxiliary support together with the topmost light-sensitive layer adhering to it, placing another auxiliary transparent support, coated with a binder, onto the light-sensitive layer uncovered by the removal of the topmost layer, heating the multilayer material together with said other auxiliary support slightly above the melting point of the fusible intermediate layer adjoining said uncovered light-sensitive layer and removing said other auxiliary support together with the uncovered light-sensitive layer adhering to it.

9. The process of claim 7, in which the multilayer material comprises a transparent support made of a material having identical properties as the auxiliary transparent support.

10. The process of claim 7, in which the multilayer material comprises a transparent support, and this support and the auxiliary transparent support are formed with perforations of equal dimensions allowing exact registering.

11. In the process of claim 7 the washing off of the remainder of the binder material by means of a solvent for such material.

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