April 30, 1963 W. H. RYAN ETAL 3,087,815

PHOTOGRAPHIC DIFFUSION TRANSFER PROCESS

Filed April 22, 1959

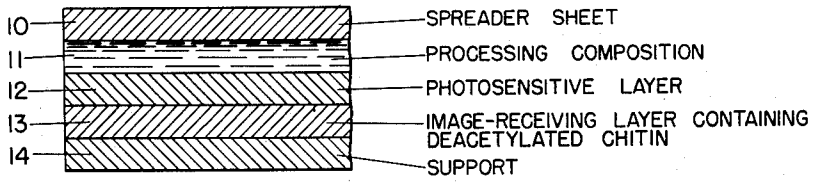



FIG. 1

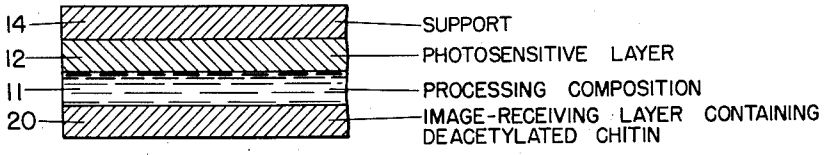



FIG. 2

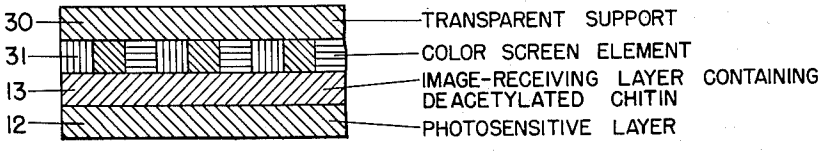



FIG. 3

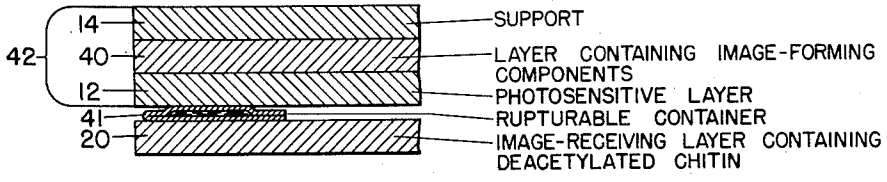



FIG. 4

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3,087,815

# PHOTOGRAPHIC DIFFUSION TRANSFER PROCESS

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This invention relates to photography and, more particularly, to novel photographic diffusion-transfer processes and products for utilization therein.

It is one object of the present invention to provide novel diffusion-transfer processes and products for utilization therein whereby improved positive silver images may be produced.

Another object of the present invention is to provide novel diffusion-transfer processes and products for utilization therein whereby improved additive color reproduction may be attained.

A further object of the present invention is to provide novel diffusion-transfer processes and products for utilization therein whereby improved subtractive color reproduction may be attained.

A still further object of the present invention is to provide novel photographic products and processes wherein a positive diffusion-tranfer image is disposed in a single stratum, self-sustaining, dimensionally stable image-receiving element.

A still further object of the present invention is to provide novel photographic products and processes wherein a positive diffusion-transfer image is disposed in an image-receiving stratum exhibiting increased resistance to abrasion.

A still further object of the present invention is to provide novel photographic products and processes wherein an image-receiving element for use in monochromatic and/or multichromatic diffusion-transfer processes comprises, at least in part, a mordant for soluble dyes transferred thereto.

Other objects of the present invention will in part be obvious and will in part appear hereinafter.

The invention accordingly comprises the several steps and the relation and order of one or more of such steps with respect to each of the others, and the product possessing the features, properties and the relation of elements which are exemplified in the following detailed disclosure, and the scope of the application of which will be indicated in the claims.

For a fuller understanding of the nature and objects of the invention, reference should be had to the following detailed description taken in connection with the accompanying drawing wherein:

FIGURE 1 is a diagrammatic enlarged cross-sectional view illustrating the association of elements during one stage of the performance of a diffusion-transfer process for the production of positive silver prints and showing, as one of the elements, an embodiment of the novel print-receiving elements of the present invention, the thicknesses of the various materials being exaggerated;

FIG. 2 is a view similar to that of FIG. 1 illustrating the association of elements during one stage of the performance of another diffusion-transfer process for the production of positive silver prints which illustrates another embodiment of the novel print-receiving elements of the present invention;

FIG. 3 is a diagrammatic enlarged cross-sectional view of one embodiment of the novel image-receiving elements of the present invention, for use in obtaining additive multicolor images, comprising a support, an additive color screen element, an embodiment of the present invention as the image-receiving stratum, and a photosensitive silver halide emulsion; and



FIG. 4 is a diagrammatic enlarged cross-sectional view of one embodiment of the novel image-receiving elements of the present invention, for use in obtaining subtractive color images, comprising a photosensitive element which comprises a support, a layer containing color image-forming components and a photosensitive silver halide emulsion, a rupturable container, and an embodiment of the present invention as the image-receiving element.

The present invention comprehends improved processes and products of the type whereby a positive print is obtained in a single step by suitably treating an exposed photosensitive element, containing a latent image therein, in superposed relationship to an appropriate image-receiving element with a processing composition.

In diffusion-transfer processes, for the formation of positive silver images, a latent image contained in an exposed photosensitive silver halide emulsion is developed and almost concurrently therewith a soluble silver complex is obtained by reaction of a silver halide solvent with the unexposed and undeveloped silver halide of said emulsion. Preferably, the photosensitive silver halide emulsion is developed with a processing composition in a viscous condition which is spread between the photosensitive element comprising the silver halide emulsion, and a print-receiving element comprising, preferably a suitable silver precipitating layer. The processing composition effects development of the latent image in the emulsion and substantially contemporaneous therewith forms a soluble silver complex, for example, a thiosulfate or thiocyanate, with undeveloped silver halide. This soluble silver complex is, at least in part, transported in the direction of the print-receiving element and the silver thereof is largely precipitated in the silver precipitating layer of said element to form a positive image therein.

Additive color reproduction may be produced by exposing a photosensitive silver halide emulsion through an additive color screen having filter media or screen elements each of an individual additive color, such as red or blue or green, and by viewing the reversed or positive silver image formed by transfer to a transparent, print-receiving element through the same or a similar screen which is suitably registered with the reversed positive image carried by the print-receiving layer.

The copending application of Howard G. Rogers, Serial No. 748,421, filed July 14, 1958 (a continuation-in-part of Serial No. 415,073, filed March 9, 1954 and now abandoned), discloses and claims diffusion-transfer processes wherein initially mobile and diffusible dye developers, that is, complete dyes which contain in the same molecular structure a silver halide developing function, are utilized in the development of a latent image present in an exposed photosensitive silver halide emulsion, effecting thereby immobilization of said dye developers in said photosensitive emulsion as a function of the point-to-point degree of exposure thereof, and transferring at least part of the imagewise distribution of mobile dye developer from the unexposed areas of said photosensitive emulsion, by imbibition, to a superposed image-receiving layer or element to impart thereto a color transfer image.

United States Patents Nos. 2,647,049, issued July 28, 1953, 2,661,293, issued December 1 1953, 2,698,244, issued December 28, 1954, 2,698,798, issued January 4, 1955, and 2,802,735, issued August 13, 1957, all in the name of Edwin H. Land, disclose diffusion-transfer processes wherein color coupling techniques are utilized to provide color images. Image-forming components comprising one or more color developing agents and one or more color formers or couplers are reacted to provide

a positive color image to a superposed image-receiving element.

It has now been discovered that diffusion-transfer processes such as those mentioned above may be substantially improved by use of deacetylated chitin in the print-receiving medium.

The term "deacetylated chitin" as utilized herein is intended to signify the product prepared by removing in whole or in part the acetyl groups from the polymeric acetamido derivative of a carbohydrate technically designated as chitin. It is also intended to include any other product substantially identical therewith, as for example, where such product is produced synthetically.

The presence of deactylated chitin in the image-receiving layer provides, subsequent to contact of said chitin with alkali, as for example, an alkaline photographic processing composition, a substantially water-insoluble, abrasion-resistant matrix which may be substantially flexible, semi-rigid, or rigid depending upon the concentration of deacetylated chitin contained in said image-receiving element. In addition, the deacetylated chitin affords substantial protection to the positive image. An image-receiving layer comprising, at least in part, deacetylated chitin may be washed, for example, to effect demoval of a photosensitive emulsion and/or film-forming processing composition adhering thereto, or residual, undesired reagents remaining therein, without deleterious effects. Where desirable, the concentration of chitin disposed in the print-receiving element may be of sufficient magnitude to provide an integral single layer element exhibiting sufficient internal support as to substantially alleviate the necessity of providing one or more separate supporting layers.

The concentration of deacetylated chitin disposed in the image-receiving layer may be varied over a wide range according to the degree of rigidity desired, during and subsequent to processing, and the thickness and character of the image-receiving stratum employed.

The image-receiving layer in addition to the deacetylated chitin contained therein may itself be comprised of one or more strata of a permeable material dyeable from a photographic processing composition. As examples of image-receiving materials of a dyeable nature, mention may be made of: regenerated cellulose; polyvinyl alcohol; partially hydrolyzed polyvinyl acetate; sodium alginate; cellulose ethers, such as methyl cellulose or other cellulose derivatives such as sodium carboxymethyl cellulose or hydroxyethyl cellulose; papers; proteins, such as gelatin or glue; carbohydrates, such as gums and starches; and mixtures of such materials, as for example, polyvinyl alcohol and gelatin, where they are compatible. Gelatin comprises a preferred image-receiving material.

Referring now to FIG. 1, one embodiment of the novel image-receiving layers of the present invention in the performance of a transfer process for the production of positive silver prints comprises a spreader sheet **10**, a layer of relatively viscous processing agent **11**, a photosensitive silver halide emulsion layer **12**, an image-receiving layer **13** containing deacetylated chitin and preferably containing silver precipitating nuclei, such as the silver precipitating nuclei disclosed in United States Patent No. 2,698,237, issued December 28, 1954, to Edwin H. Land, and a suitable support layer **14**. Support layer **14** may comprise an opaque material where a reflection print is desired or may comprise a transparent material where a transparency is desired.

Liquid layer **11** may be obtained by spreading a photographic processing composition, for example, in a manner disclosed in U.S. Patent No. 2,698,244, issued December 28, 1954, to Edwin H. Land. As disclosed in the aforementioned U.S. patent, the liquid processing composition may be disposed in a rupturable container so positioned in regard to the appropriate surface of the silver halide emulsion that, upon compression by spreader sheet **10**, a substantially uniform layer **11** of processing composition is distributed over the surface of said photosensitive emulsion **12**, positioned distally from the deacetylated chitin-containing image-receiving layer **13**. The processing composition may be one of the film-forming processing compositions disclosed in U.S. Patent No. 2,543,181, issued February 27, 1951, to Edwin H. Land. It may comprise, for example, a developing agent such as hydroquinone, an alkali such as sodium hydroxide, a silver halide complexing agent such as sodium thiosulfate, and a high molecular weight film-forming thickening agent such as sodium carboxymethyl cellulose. All these materials are preferably in aqueous solution. These photographic agents are preferably contained in solution in the processing liquid prior to the spreading thereof as layer **11**, but they may be in part or wholly added to the processing composition as it is spread between spreader sheet **10** and photosensitive silver halide emulsion **12**, said agents being so located on or adjacent to the surface of one or both of said layers as to be dissolved by or otherwise interacted with the liquid agent when the latter wets said surface.

In carrying out the aforementioned transfer process, the photosensitive silver halide emulsion **12** is exposed to a predetermined subject matter to form therein a latent image of said subject matter. A substantially uniform distribution of processing composition **11** is distributed on the external surface of said emulsion, as for example, according to the previously described procedure. Processing composition reagents permeate into the photosensitive emulsion, developing the latent image contained therein according to the point-to-point degree of exposure of said emulsion. Substantially contemporaneous with the development of the latent image, an imagewise distribution of soluble silver complex is formed from unexposed silver halide within said emulsion. At least part of said silver complex, solubilized, is transferred, by inbibition, to the deacetylated chitin-containing print-receiving stratum **13**. The transferred silver complex is reacted to provide a positive, reversed image of the latent image. Subsequent to formation of the positive image in the deacetylated chitin-containing image-receiving layer **13**, dissociation of said layer from emulsion layer **12** may be effected.

Where desired, the deactylated chitin-containing image-receiving layer **13** may be dissociated from emulsion layer **12** by washing the emulsion from the surface thereof with water. It must be noted that the abrasion-resistant properties provided image-receiving element **13** by the inclusion therein of deactylated chitin alleviates the necessity of subsequently overcoating the external surface of image-receiving layer **13** with a transparent abrasion-resistant water-insoluble plastic to prevent subsequent laceration and resultant degradation of the positive image.

The fabrication of the novel print-receiving elements of the present invention will be illustrated in greater detail in conjunction with the following specific example which sets out a representative image-receiving element and the utilization thereof in a diffusion-transfer process of the last-mentioned type. This example is intended to be illustrative only.

*Example 1*

A mixture comprising 100 cc. of water, 0.1 gram of deacetylated chitin and 1 cc. glacial acetic acid is blended in a Waring Blendor. 0.12 g. of silver acetate is dispersed in the resultant blend to provide photographic silver precipitating nuclei.

A print-receiving element is prepared by coating a surface hydrolyzed cellulose acetate base with the blend. After this coating has dried, a silver iodobromide emulsion is applied. The photosensitive emulsion is exposed and processed by spreading an aqueous liquid processing composition, such as described in the aforementioned U.S. Patent No. 2,543,181, on the external surface of the photosensitive emulsion. After an imbibition period of approximately one minute, the image-receiving element is

stripped from the emulsion and contains a positive transfer image of the photographed subject.

In the aforementioned example, spreading of the liquid processing composition on the external surface of the photosensitive emulsion is preferably effected by rupture of a suitably positioned frangible container and distribution of its processing composition contents by means of a converted cellulose acetate spreader sheet, i.e., a cellulose acetate sheet the surface of which has been converted to cellulose. When employed in Example 1, the converted cellulose acetate spreader sheet exhibited an adhesive capacity for the processing composition in excess of the adhesive capacity exhibited by the photosensitive emulsion. A means is thus provided for effecting dissociation of the processing composition from contact with the photosensitive emulsion, preferably subsequent to image formation, by dissociating the spreader sheet from its proximate relationship to the external emulsion surface.

It will be apparent that the facility with which the photosensitive emulsion layer is dissociated from contact with the deaceylated chitin print-receiving element may be increased by providing a conventional stripping layer interposed between said emulsion and the print-receiving element. The stripping layer may be coated on the surface of the print-receiving element and the photosensitive emulsion thereafter coated on the external surface of said stripping layer.

A further embodiment of the present invention is illustrated in FIG. 2, which comprises a photosensitive silver halide emulsion **12**, a layer **11** of the previously noted relatively viscous film-forming processing composition, and an image-receiving layer **20** containing a sufficient concentration of deaceylated chitin to provide a self-sustaining, dimensionally stable, rigid, semi-rigid or flexible film, and preferably containing silver precipitating nuclei.

As previously stated, layer **11** of processing composition may be distributed in a substantially uniform manner between photosensitive emulsion layer **12** and image-receiving layer **20**, for example, in accordance with the procedures disclosed in the aforementioned U.S. Patent No. 2,543,181. For example, one or more rupturable containers may be attached to either photosensitive emulsion layer **11** and/or image-receiving layer **20** such that upon superposition of the respective layers **11** and **20** said container or containers are so positioned as to be capable, upon rupture, of releasing their contents in a substantially uniform layer between and in contact with the opposed surface of each of said layers. Rupture of the container or containers are spreading of the contents thereof may be accomplished, for example, by compression between a pair of opposed, suitably gapped, rollers.

In carrying out the aforementioned transfer process, the photosensitive silver halide emulsion **12** is exposed to a predetermined subject matter to form therein a latent image of said subject matter. The exposed emulsion is superposed on the deacetylated chitin-containing image-receiving element **20** and the photographic processing composition **11** spread between the opposed surfaces of said photosensitive emulsion **12** and said image-receiving element **20**. Reagents permeate into the photosensitive emulsion **12**, developing the latent image contained therein and forming a soluble silver complex of unexposed silver halide. Soluble silver complex is transported from photosensitive emulsion layer **12**, at least in part, by imbibition, to the deacetylated chitin-containing print-receiving stratum **20** and the silver of the complex is precipitated thereon to provide the desired positive image. The lamination formed by the spreading of processing composition in layer **11** between photosensitive emulsion **12** and print-receiving element **20** is kept intact for approximately ½ to 1½ minutes, preferably 1 minute, and at the termination of this time interval the deacetylated chitin-containing print-receiving layer **20** is dissociated from emulsion **12**, as for example, by stripping.

The following examples illustrate the fabrication of additional print-receiving elements of the present invention and the utilization thereof in diffusion-transfer processes of the last-mentioned type, which however, are not limited to the details therein set forth and are intended to be illustrative only.

*Example 2*

Deacetylated chitin and gelatin are each separately treated by evaporating gold onto the surface of flakes or particles thereof, in accordance with the vacuum deposition procedures disclosed in the copending U.S. application of Edwin H. Land, Serial No. 705,845, filed December 30, 1957, to provide photographic silver precipitating nuclei.

A print-receiving element is prepared by coating a cellulose acetate support, whose surface has been hydrolyzed, with a 1% acetic acid solution comprising a mixture of 2 grams each of the deacetylated chitin and gelatin described above. After this coating has dried, a cellulose acetate hydrogen phthalate stripping layer is applied.

A photosensitive element is exposed and processed by spreading an aqueous liquid processing composition comprising:

| | | |
|---|---|---|
| Water | cc. | 150 |
| Hydroquinone | grams | 2.8 |
| Sodium sulfite | do | 20 |
| Metol | do | 1.55 |
| Sodium thiosulfate | do | 10 |
| Aqueous solution of medium viscosity sodium carboxymethyl cellulose consisting of 20 grams of the latter compound in 100 cc. of water | do | 100 |
| Sodium hydroxide | do | 5.6 |

between said photosensitive element and the print-receiving element, prepared above, as said elements are brought into superposed relationship. After an imbibition period of approximately one minute, the print-receiving element is separated and contains a positive transfer image of the photographed subject. This print could be washed in running water without deleterious effects.

*Example 3*

A print-receiving element is prepared by coating a cellulose acetate support, of the type disclosed in Example 2, with a mixture comprising 5 parts polyvinyl alcohol and 1 part deacetylated chitin, each of which components had previously been treated by evaporative deposition of gold onto flakes or particles thereof, to provide silver precipitants, according to the procedure disclosed in Example 2. After this coating has dried, a cellulose acetate hydrogen phthalate stripping layer is applied thereon.

The resultant print-receiving element is employed in the diffusion-transfer process of Example 2 to provide a positive transfer image thereon.

The procedures of Examples 2 and 3 provide positive transparencies which do not have to be subjected to hardening treatments after stripping. In addition, it is possible to wash such images after an extended interval to remove residual developer traces.

*Example 4*

A print-receiving element is prepared by coating a cellulose acetate-coated paper base with a 1% acetic acid solution containing 1 gram of the treated deacetylated chitin and 1 gram of the treated gelatin described in Example 2, to give an image-receiving layer approximately one-half as thick as that in Example 1. After this coating has dried, a cellulose acetate hydrogen phthalate stripping layer is coated thereon.

The resultant print-receiving element is employed in the diffusion-transfer process of Example 2 to provide a positive transfer image thereon.

As illustrated in FIG. 3, one embodiment of the present invention for use in additive multicolor diffusion-

transfer processes is a composite film unit comprising a transparent support **30**, an additive color screen element **31**, an image-receiving layer **13** containing deaceylated chitin and preferably containing silver precipitating nuclei, and a photosensitive silver halide emulsion **12**.

In carrying out an additive multicolor diffusion-transfer process utilizing the aforementioned composite film unit, exposure of the photosenstive silver halide emulsion to a predetermined subject matter is effected through color screen element **31**. A liquid processing composition is applied to photosensitive emulsion **12**, as for example, according to the procedure previously described in explanation of FIG. 1. The liquid processing composition permeates into photosensitive emulsion **12**, developing the latent image contained therein, forming an imagewise distribution of soluble silver complex in the unexposed areas thereof, and transferring, at least part of said imagewise distribution, by imbibition, toward image-receiving layer **13** wherein the silver of said complex is precipitated to provide a reversed positive silver image of said latent image. Dissociation of emulsion layer **12** from image-receiving layer **13** may be accomplished, for example, according to the procedure previously described in explanation of FIG. 1. As previously stated, in additive multicolor processes the viewing of the positive image takes place through a stationarily registered color screen element, either that screen element through which exposure was accomplished or a duplicate thereof. Although in the aforementioned process exposure is accomplished through the stationary color screen element predisposed in the image-receiving element, thus avoiding the problems incident upon attempts to register a mobile screen element with the deposited silver image, it must be noted that the inventive concept of the present specification is equally applicable to the numerous additive multicolor diffusion-transfer processes utilizing color screen elements in combination with silver transfer processes, such as, for example, the additive multicolor transfer processes disclosed in U.S. Patent No. 2,614,926, issued October 21, 1952, to Edwin H. Land.

U.S. Patent No. 2,707,150, issued April 26, 1955, to Edwin H. Land, discloses additive multicolor processes utilizing a color screen element in a photosensitive emulsion wherein, subsequent to the selective exposure of the photosensitive emulsion through said color screen and substantially simultaneous with the development of the latent image contained therein, the color screen element filter media, preferably soluble dyes, transfer, at least in part, by imbibition to an image-receiving element to form therein a substantially duplicate screen pattern of the original color screen. In the practice of this procedure utilizing an image-receiving layer comprising chitin, the deacetylated chitin exhibits the properties of a mordant for numerous of the potentially available soluble dyes utilized as filter media.

The following examples illustrate the fabrication of additional print-receiving elements of the present invention and the utilization thereof in additive multicolor diffusion-transfer processes, which, however, are not limited to the details therein set forth and are intended to be illustrative only.

*Example 5*

An additive multicolor print-receiving element is prepared by coating a Dufay color film base, which comprises a transparent plastic support having a preformed additive color screen thereon, with the deacetylated chitin/silver acetate blend of Example 1. After this coating has dried, a silver iodobromide emulsion is applied thereon. This photosensitive emulsion is exposed through the transparent support and additive color screen. The exposed emulsion is processed by spreading a liquid processing composition such as that set forth in Example 2 on the external surface of the said emulsion. After an imbibition period of approximately one minute, the emulsion is separated from the deacetylated chitin-containing print-receiving layer which contains a positive transfer image of the photographed subject.

Viewing of the multicolor additive positive transfer image takes place through the transparent base and preformed additive color screen through which exposure was accomplished.

*Example 6*

An additive multicolor print-receiving element is prepared by coating a Finlay plate, which comprises a transparent glass support having a preformed additive color screen thereon, with the deacetylated chitin/silver acetate blend of Example 1. A photosensitive silver iodobromide emulsion is applied thereon, exposed, processed and viewed according to the procedure of Example 5.

In the following illustrative description of FIG. 4, the term "image-forming components" is intended to signify the dye image precursors utilized in the previously noted color coupling and dye developer diffusion-transfer techniques, as well as the coupling dye techniques disclosed in U.S. Patent No. 2,774,668, issued December 18, 1956, to Howard G. Rogers, and in the copending U.S. application of Howard G. Rogers, Serial No. 613,691, filed October 3, 1956, to provide monochromatic or multichromatic subtractive color image formation.

FIG. 4 of the accompanying drawing illustrates one method of processing a photosensitive silver halide emulsion to obtain a subtractive color transfer image in accordance with this invention. A photosensitive element **42** comprises a support **14**, a layer **40** containing at least one color image-forming component, preferably at least one dye developer, and a photosensitive silver halide emulsion layer **12**. As shown in the particular embodiment depicted in FIG. 4, the photosensitive element is shown in a spread-apart relationship (as, for example, during exposure) with an image-receiving layer **20** containing deacetylated chitin having mounted thereon a rupturable container **41** holding a processing composition. After exposure, the image-receiving element **20** containing deacetylated chitin is brought into superposed relationship with the photosensitive element and the rupturable container **41** is ruptured by application of suitable pressure, for example, by advancing between a pair of rollers (not shown), and a layer of the liquid processing composition is spread between the superposed elements. The processing composition permeates the photosensitive silver halide emulsion layer **12** and layer **40** containing image-forming components providing at least one subtractive color. In exposed areas of the photosensitive element the color image-forming components, at least to some extent, exhibit decreased solubility in contradistinction to unexposed areas. Thus, in unexposed areas, the color image-forming components will transfer, at least in part, by imbibition, to the superposed image-receiving element **20** to form thereon a positive image in terms of said unexposed areas. The image-receiving element **20** may be separated from a superposed relationship with the photosensitive element after at least a portion of the color-forming components has been transferred.

It is also contemplated to utilize, in the preparation of subtractive color images, a film structure similar to FIG. 1, wherein the silver halide emulsion is coated over the image-receiving layer and the processing composition must permeate through the emulsion before reaching the image-receiving layer.

Multicolor images may be obtained using color-forming components and diffusion-transfer processes by several techniques. One such technique contemplates the use of a photosensitive stratum comprising at least two sets of selectively sensitized, minute, photosensitive elements arranged in the form of a photosensitive screen. Transfer processes of this type are disclosed in the aforementioned copending U.S. application of Howard G. Rogers, Serial No. 748,421. In such an embodiment, each of the minute

photosensitive elements has associated therewith appropriate color image-forming components in or behind the silver halide emulsion portion. In general, a suitable photosensitive screen, prepared in accordance with the disclosures of the last-mentioned copending application, comprises minute red-sensitized emulsion elements, minute green-sensitized emulsion elements and minute blue-sensitized emulsion elements arranged in side-by-side relationship in a screen pattern and having associated therewith, respectively, cyan color image-forming components, magenta color image-forming components, and yellow color image-forming components.

Another process for obtaining multicolor transfer images utilizing color-forming components employs an integral multilayer photosensitive element wherein at least two selectively sensitized photosensitive strata are superposed on a single support and are processed, simultaneously, and without separation, with a single, common image-receiving layer. A suitable arrangement of this type comprises a support carrying a red-sensitive emulsion stratum, a green-sensitive emulsion stratum and a blue-sensitive emulsion stratum, said emulsions having associated therewith, respectively, cyan color image-forming components, magenta color image-forming components and yellow color image-forming components. The color image-forming components may be utilized in the emulsion layer, for example, in the form of particles, or one or more may be employed, respectively, as a layer behind the appropriate silver halide emulsion strata. Each set of emulsion and associated color-forming components may be separated from the other sets by suitable interlayers, for example by a layer or layers of gelatin or polyvinyl alcohol.

A further technique for obtaining multicolor images employs a plurality of photosensitive elements associated with appropriate numbers of image-receiving elements and adapted to be treated with one or more liquid processing compositions, the appropriate color image-forming components being incorporated in the photosensitive elements. Examples of film structures of this type are disclosed in the previously cited U.S. Patent No. 2,647,049.

While a rupturable container, such as container **41** in FIG. 4, provides a convenient means for spreading a liquid processing composition between layers of a film unit whereby to permit the processing to be effected within a suitable camera apparatus, the processes of this invention may be otherwise effected. For example, a photosensitive element, after exposure in suitable apparatus and while preventing further exposure thereafter to actinic light, may be removed from such apparatus and permeated with the liquid processing composition as by coating the composition on said photosensitive element or otherwise wetting said element with the composition, following which the permeated, exposed, photosensitive element, still without additional exposure to actinic light, is brought into contact with the image-receiving element for image formation in the manner heretofore described. Details of such rupturable containers as illustrated in FIG. 2 may be found in United States Patent No. 2,634,886, issued April 14, 1953, to Edwin H. Land.

As previously stated, the utilization of an image-receiving element comprising deacetylated chitin exhibits the additional advantageous property in that said chitin exhibits the properties of a mordant for numerous of the potentially available color image-forming components, for example, color image-forming components such as dye developers, color couplers, coupling dyes, etc.

Since certain changes in carrying out the above process, and certain modifications in the products which embody the invention, may be made without departing from its scope, it is intended that all matter contained in the above description or shown in the accompanying drawing shall be interpreted as illustrative only and not in a limiting sense.

What is claimed is:

1. A process of forming silver diffusion transfer images which comprises the steps of developing an exposed photosensitive silver halide emulsion by contact of said emulsion with an aqueous alkaline processing solution which includes a silver halide developing agent and a silver halide solvent; contacting unexposed and undeveloped silver halide therein with said silver halide solvent and forming thereby an imagewise distribution of soluble silver complex in unexposed areas of said emulsion, as a function of the point-to-point degree of exposure thereof; transferring from said emulsion, at least in part, by imbibition, said imagewise distribution of soluble silver complex to an image-receiving layer containing silver precipitation nuclei positioned in superposed relationship with said emulsion, said image-receiving layer containing deacetylated chitin in a concentration sufficient to render said image-receiving layer substantially water insoluble upon reaction of said deacetylated chitin with said aqueous alkaline processing solution; and there precipitating said silver complex to provide thereby a silver transfer image.

2. A process as defined in claim 1, wherein an additive color screen is positioned between said image-receiving layer and a support for said image-receiving layer, and exposure of said photosensitive emulsion is effected through said additive color screen.

3. A process as defined in claim 1, wherein said image-receiving layer comprises deacetylated chitin, silver precipitation nuclei, and a polymer selected from the group consisting of gelatin and polyvinyl alcohol.

4. A process as defined in claim 1, wherein said photosensitive emulsion is coated over said image-receiving layer on a common support.

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