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DIFFUSION TRANSFER PHOTOGRAPHIC PROCESS AND PRODUCT

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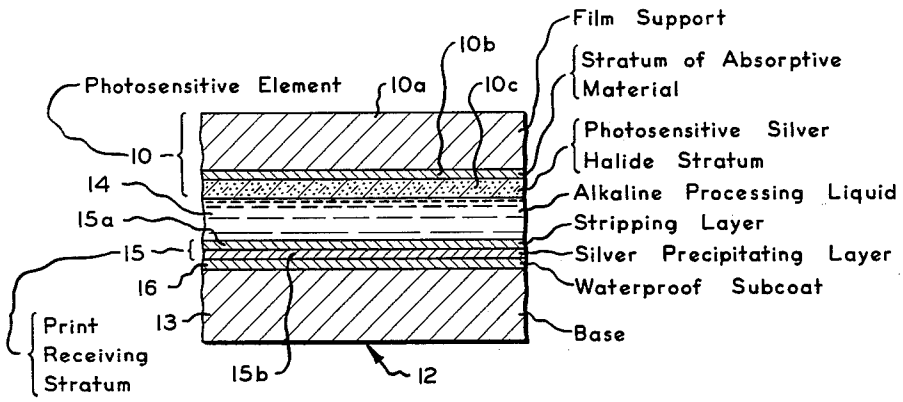

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DIFFUSION TRANSFER PHOTOGRAPHIC PROCESS AND PRODUCT

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This application is a continuation-in-part of application Serial No. 493,880, filed March 14, 1955 (now U.S. Patent No. 2,923,623 issued Feb. 2, 1960), which latter application is in turn a continuation-in-part of application Serial No. 448,441, filed August 9, 1954 (now U.S. Patent No. 2,968,554, issued January 17, 1961), which last named application is in turn a continuation-in-part of application Serial No. 176,961, filed August 1, 1950.

This invention relates to photographic processes and products, and more particularly, has reference to improvements in silver halide transfer-reversal processes and film units useful in carrying out the same.

In one type of silver halide transfer process, a thin layer of an alkaline processing solution comprises a silver halide developer, a silver halide transfer agent and an organic film-forming material is provided between the superposed surfaces of a photoexposed gelatin silver halide stratum of a photosensitive element and a stratum of image-receptive material provided on a print-receiving element. Developer and transfer agent are permeated into the silver halide stratum by the absorption of liquid from said layer of solution into the photosensitive element where the developer reduces latent image silver halide to silver and the transfer agent reacts with unreduced silver halide to form soluble silver complexes which are diffusible from the photosensitive stratum and through the layer of said alkaline solution to be deposited on the image-receiving stratum. These complexes deposited on the print-receiving element are there reduced to silver to provide a reverse image of the latent image formed in the photosensitive stratum following which the photosensitive and print-receiving elements are separated with the layer of processing solution, now in the form of a film, adhered to one or the other of said element.

In transfer processes as usually carried out, the absorption into the photosensitive element of liquid from the layer of processing solution is continuous throughout the period needed to provide the transfer image and results in a more or less gradual reduction in the thickness of the layer of processing solution. Liquid absorption in silver halide transfer processes occurs for the most part in the silver halide stratum. Finally, the absorption of liquid from the layer of processing solution during the processing period facilitates the formation of the solid content of the processing solution into a film which can be stripped as a unit with either the photosensitive element or the print-receiving element upon the separation of said elements.

Certain benefits are derived in a transfer process when the rate or volume of liquid absorption is increased. For example, a high order of absorption leads to the attainment of a substantially dry transfer print. Also, the reduction in the thickness of the layer of processing solution which results from absorption reduces the distance through which silver complexes must travel to reach the print-receiving element with consequent minimization of the lateral diffusion of said complexes whereby to obtain a transfer print of high resolution.

The present invention is directed to achieving these beneficial advantages by the utilization of practices which makes it possible to absorb a volume of liquid into the

photosensitive element as a whole that is greater than the volume of liquid absorbable into the silver halide stratum by itself and which tend to accelerate the absorption and consequent reduction in the thickness of the layer of processing solution. In this regard, it should be noted that this invention deals with masses of liquid and solids of small volume and thickness in that the silver halide stratum may have a thickness of only a fraction of a micron and the layer **14** of processing solution is limited to a liquid volume such as to allow it to be formed into a layer having an initial thickness of from 0.002 to 0.003 inch only.

Under these circumstances, it will be realized that liquid absorbed into the photosensitive stratum to replace any volume of liquid withdrawn from the photosensitive stratum and into an environment on the side thereof remote from the layer **14** of processing solution will effect a high order of reduction in the thickness of said layer **14**.

To this end, the invention employs an absorption mechanism for removing liquid absorbed into the silver halide stratum through that face thereof which is furthest from the layer of processing solution, whereby more liquid from said layer of processing solution becomes available for absorption and is absorbed into the silver halide stratum. Advantageously, this obsorption mechanism is carried out with a medium capable of providing, on a photographic film support, a subcoat adapted for carrying a gelatin silver halide emulsion stratum of substantially uniform thickness and of protecting the silver halide stratum from penetration thereof by impurities which are contained in the photographic support and which tend to desensitize or otherwise contaminate the photosensitive silver halide.

Accordingly, one object of the present invention is to provide a photographic silver halide transfer process employing the steps of forming a liquid layer of an alkaline processing solution comprising a silver halide developer and a silver halide transfer agent between the superposed faces of a print-receiving element and a photoexposed silver halide stratum, absorbing liquid from said layer into and through said silver halide stratum and into an absorptive stratum comprising a mixture of a material which is substantially alkali soluble or at least readily permeable to alkali and a material which is substantially alkali insoluble or at least difficultly or slowly dissolved or hydrolyzed by alkaline solutions whereby, as a result of said absorption, a reduction of a high order in the thickness of the layer of processing solution is effected, during said liquid absorption, developing latent image silver halide to silver and forming silver complexes in the silver halide stratum with liquid present therein, and transferring at least a part of said silver complexes toward said print-receiving element, by diffusion from the photosensitive element, and reducing said silver complexes to silver adjacent said print-receiving element to provide a reverse image of the latent image in the photoexposed silver halide stratum.

Other objects of the invention are to provide silver halide transfer processes of the character set forth wherein said processing liquid absorbed into said absorptive stratum is penetrated therethrough without the rapid and complete dissolution and destruction thereof and into contact with a photographic film support, and especially to processes which utilize a film support of a porous material capable of absorbing alkaline processing solution in contact therewith whereby to enhance the ability of the photosensitive element to absorb the processing liquid; to provide the previously described absorption mechanism in processes which utilize a print-receiving element having an image-receptive stratum supported upon a stratum of a material which is substantially impervious to the

alkaline processing solution, as well as in processes wherein the transfer image is formed in the layer of processing solution between the photosensitive and print-receiving elements or partially in said layer and in the print-receiving element.

Another object of the invention is to provide a method of forming and using a photosensitive element having a built-in absorption mechanism of the character described to the end of providing a transfer image in a print-receiving element employed in conjunction with the photosensitive element.

Further objects of the invention are to provide a photographic product for carrying out a silver halide transfer process which comprises a photosensitive element having a photographic film support, a liquid-absorptive stratum comprising a mixture of a material which is substantially impermeable or at least difficultly permeable to water but is soluble or at least readily permeable to alkaline liquids and a material which is substantially alkali insoluble or at least difficultly or slowly solubilized or hydrolyzed by alkaline solutions and which stratum is carried on one side of the photographic film support with a photosensitive silver halide stratum carried on the first-mentioned stratum on the side thereof furthest from the photographic film support and providing an outer face of the photosensitive element for use with a print-receiving element and especially a print-receiving element having an image-receptive stratum providing an outer face thereof and which is so associated with the photosensitive element as to permit the outer faces of the two elements to be positioned in superposed relation for confinement therebetween of a thickened alkaline liquid processing solution comprising a silver halide developer and a silver halide transfer agent spreadable between the faces to carry out the processing of the product; and to provide photographic products of the character set forth wherein said photographic film support is porous and capable of absorbing liquid permeated through the liquid-absorptive stratum, and wherein the image-receptive stratum of the print-receiving element is supported upon a stratum or subcoat of a material which is substantially impervious to the alkaline processing solution.

Other objects of the 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 a preferred embodiment of a photographic product useful in carrying out the invention is disclosed, in exaggerated cross section, in a condition undergoing processing in accordance with the invention.

In the drawing, a layer **14** of an alkaline processing liquid comprising a solution of a silver halide developer and a silver halide transfer agent, to which there has been added a viscosity-imparting agent, is shown as formed and confined between the superposed faces of a photosensitive element **10** and a print-receiving element **12** which are shown as arranged in a sandwich type of structure and which together provide a preferred embodiment of a film unit employable for carrying out a silver halide transfer-reversal process. Examples of suitable agents for thickening the processing solution include a water-soluble polymer such as a plastic, starch or gum or a material such as an insoluble emulsifiable oil.

Photosensitive element **10** comprises a photographic film support **10***a*, one side of which is subcoated with a mixture comprising a material which is substantially alkali soluble or at least readily permeable to alkali and a material which is substantially alkali insoluble or at least difficultly or slowly dissolved or hydrolyzed by alkaline liquids to provide a stratum **10***b*. A suitable gelatin silver halide emulsion is supported on the face of the stratum **10***b* furthest from the photographic film support to provide a photosensitive stratum **10***c*.

A print-receiving element **12** of a preferred construction is illustrated as comprising a base **13** which as shown is of a liquid-permeable material and carries on one face thereof a subcoat or stratum **16** of a material which is substantially impervious to water and to the processing solution. Print-receiving stratum **15** is supported on the impervious subcoat **16**. The stratum **15** of image-receptive material is shown as comprising a stripping layer **15***a*, constituting the outer surface portion of stratum **15** and a silver precipitating layer **15***b*. Both the stratum **15***a* and the stratum **15***b* are permeable to the processing solution. However, it should be observed that only a surface portion of element **12**, namely, the stratum **15**, is capable of being permeated to any appreciable extent by the ionic reagents contained in the processing solution. It will be appreciated that the base **13** may comprise a liquid-impervious material such as a conventional plastic photographic film base material. If base **13** is substantially liquid impermeable, stratum **16** may be just an integral extension of the base, in which case no line of demarcation, as shown in the drawing, will actually exist between the layer **16** and the base **13**.

The film unit provided by photosensitive element **10** and the print-receiving element **12** is constructed and arranged, as will be well understood to the art, so that the elements **10** and **12** may be brought into superposed relation with the outer surface of the photosensitive stratum **10***c* and the outer surface of the stratum **15** of image-receptive material in facing relation to each other following the exposure of the photosensitive element **10** in suitable camera apparatus.

By one practice, processing of the exposed film unit proceeds by drawing photosensitive element **10** and the print-receiving element **12** between a pair of pressure-applying rolls so as to superpose the elements **10** and **12** in desired relation to each other and to effect the spreading of a processing solution, introduced between the elements as they are drawn through the pressure-applying rolls, whereby to form a layer **14** of processing solution of a thickness of approximately 0.002 to 0.003 inch. Alternatively, the processing solution is coated on the outer face of the photosensitive stratum **10***c* or onto the outer face of the print-receiving stratum **15** or onto both of these just-mentioned strata, following which the photosensitive element **10** and the print-receiving element **12** are brought into superposed relation and are pressed together. Processing of the film unit after its exposure is in all instances carried out in the absence of light or radiation actinic to the photosensitive stratum.

More specifically, a typical processing liquid of suitable alkalinity, i.e., a pH of at least 8 or 9, comprises a solution of a silver halide developer such as hydroquinone and a silver halide transfer agent such as sodium thiosulfate which is thickened to a viscosity ranging from 100 to 200,000 centipoises at 20° C. by the addition of an agent such as a water-soluble polymer, e.g., a plastic material such as sodium carboxymethyl cellulose, starch or gum or which is thickened by an agent such as a water-insoluble emulsifiable oil present in the liquid as the internal phase of a water-oil emulsion. A typical formulation of the processing solution comprises:

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Water	1860
Sodium carboxymethyl cellulose	93.0
Sodium sulfite	78.0
Sodium hydroxide	54.6
Sodium thiosulfate	14.5
Hydroquinone	52.0
Sodium sulfate	52.0

Developer and transfer agent from the layer of alkaline processing solution **14** are permeated into the silver halide stratum by the absorption of liquid from said layer of solution. Additionally, liquid thus absorbed into the photosensitive stratum **10***c* is withdrawn therefrom by an absorption mechanism comprising the absorptive stratum **10***b*. Thus, portions of the liquid processing solution, which have penetrated through photosensitive stratum **10***c* to the face thereof furthest removed from the layer of processing solution **14**, come into contact with the stratum of material **10***b* and because of the nature of the stratum **10***b* are absorbed therein.

As liquid is withdrawn from the photosensitive stratum **10***c*, more liquid from the layer of processing solution is absorbed into the photosensitive stratum. The absorption mechanism provided by the stratum **10***b* is enhanced by an auxiliary absorption mechanism provided by the photographic film support **10***a* in instances where the film support is of a porous character capable of absorbing liquid from the processing solution. When the photographic film support **10***a* is of a porous material, it will absorb liquid which has penetrated through the stratum **10***b*. While liquid absorbed by this mechanism into the support **10***a* may cause the support to become damp to the touch, it should be observed that the quantity of liquid thus absorbed is relatively small and furthermore that in most instances the photosensitive element **10**, following processing of the film unit, will usually be destroyed or thrown away.

In all instances, the removal of liquid from the photosensitive stratum **10***c* by any absorption mechanism of the character described places the photosensitive stratum **10***c* in a condition to absorb more liquid from the layer **14** of processing solution. It will thus be appreciated that by the use of a built-in absorption mechanism, the photosensitive element is able to absorb more liquid from the layer **14** than it would if it consisted solely of a support having an emulsion stratum thereon. The ability of the photosensitive element to absorb a greater volume of liquid than would normally be absorbable into the photosensitive stratum not only carries out an efficient and high order of reduction in the thickness of the layer **14** of processing solution but tends to do so at an accelerated rate.

While the thickness of the layer **14** of processing solution is undergoing reduction by reason of absorption of liquid therefrom into the photosensitive element **10**, developer present in liquid in the silver halide stratum reduces latent image silver halide to silver, while transfer agent present in the photosensitive stratum reacts with unreduced silver halide to form soluble silver complexes. In the preferred embodiment of the film unit, these complexes diffuse from the photosensitive stratum **10***c* and through the layer of alkaline processing solution **14** and are deposited on the image-receiving stratum **15** where they are reduced to silver to provide the transfer image. Following this, the photosensitive and print-receiving elements are separated with the layer **14** of processing solution, which by this time has become formed into a film, adhered to the photosensitive stratum or to the image-receptive stratum. In the embodiment of the invention illlustrated, the layer **14** of processing solution will be adhered to the photosensitive element as will more presently be pointed out in detail.

As will hereinafter be pointed out, by suitable modification, these practices may be carried out so that the transfer image is provided in the layer **14** of processing solution or partially in that layer and on the print-receiving element. Under these circumstances, the layer of processing solution may be stripped away from the photosensitive element as an integral part of the print-receiving element.

The present invention is specially suited for carrying out a silver halide transfer-reversal process with a photographic film unit wherein the photosensitive element thereof comprises a porous and liquid-absorbing photographic film support, for example, paper, which carries an extremely thin gelatin silver halide emulsion stratum having a thickness of the order of from a fraction of a micron to four microns or slightly more and wherein the print-receiving element thereof comprises a stratum of an image-receptive material which is extremely thin and of the order of from less than 1 micron to 3 microns or more and which is supported upon a subcoat or base that is substantially impervious to the liquid processing solution.

However, it will be understood that the enhanced absorption obtained by the utilization of a special absorption mechanism comprising the stratum **10***b* may be utilized in conjunction with a photographic film support **10***a* which is substantially impervious to the processing solution as well as in conjunction with thicker emulsion strata than those previously indicated and that such combinations are employable with a print-receiving element such as the element **12** or with a print-receiving element comprising a silver precipitating layer carried on a paper support and without the use of the liquid-impervious subcoat **16**.

From the standpoint of lower material costs and expense, it is highly desirable to employ a paper support for a photosensitive emulsion. However, a paper support presents certain well-recognized disadvantages. For example, it is difficult to provide a photosensitive stratum of a substantially uniform thickness on unsized paper because of the penetration of the gelatin emulsion into the pores of the paper. Additionally, the paper is absorbent to water and moisture contained in the emulsion when it is coated. Water thus absorbed into the paper support is likely to dissolve impurities therein and carry them in solution into the emulsion layer. This condition is undesirable because these impurities tend to and frequently do effect the desensitization of the emulsion or otherwise contaminate it.

As heretofore pointed out, the medium employed in providing the absorption mechanism of this invention is useful in conjunction with a porous film support such as unsized paper which makes it possible to provide a photosensitive silver halide stratum thereon of uniform thickness and which further makes it possible to prevent or avoid desensitization of the photosensitive material.

By reason of the nature of the materials which provide the stratum or subcoat **10***b*, it will be appreciated that this stratum provides an effective means for preventing impurities in the support from being introduced into a silver halide emullsion stratum coated on the stratum. Furthermore, the materials of stratum **10***b* provide a structure on the porous and absorbent support in the nature of a solid film which is substantially impenetrable by the gelatin emulsion and which consequently makes it possible to coat on stratum **10***b* an emulsion stratum of substantially uniform thickness.

A further understanding and appreciation of the concepts hereof may be gained from a consideration of the materials and constructional details employed in connection with the film units of this invention.

In a preferred embodiment and as heretofore indicated, the film support **10***a* is a porous and absorbent paper in an untreated and unsized condition of which unsized and untreated Alpha paper is an example. Other papers of suitable absorbing qualities may, however, be employed. Alternatively, although not as preferred, the support **10***a* may comprise any conventional photographic film support of an organic plastic which is substantially impervious to the alkaline processing solutions and to water.

In more detail, properties of the mixture of materials satisfactory for providing the stratum **10***b* on the film support **10***a* require that the materials, forming said stratum **10***b*, be in part alkali soluble or readily permeable to alkaline solutions and in part substantially alkali in-

soluble or at least difficultly or slowly solubilized or hydrolyzed by alkaline liquids of the nature of the processing solution employed herein. The material swellable and permeable to alkaline liquids preferably is also substantially water insoluble and impermeable or at least difficultly permeable to water. Also, the materials of stratum **10***b* should be of a nature soluble in conventional organic solvents so that it is coatable in a solution thereof onto a supporting surface to provide a stratum or subcoat thereon which, upon evaporation of the solvent liquid therefrom, forms a solid film adhered to said surface.

A preferred example of one of the materials suitable for stratum **10***b* is a commercially available cellulose acetate hydrogen phthalate which has a combined degree of substitution by acetate and acid phthalate substituents of a nature to cause this compound to be substantially water insoluble and impermeable while being swellable and permeable to alkaline solutions. The term cellulose acetate phthalate is commonly applied to cellulose esters of this nature which may have one carboxyl of phthalic acid combined with the cellulose as well as to esters of this nature which may have both carboxyl groups of the phthalic acid combined with the cellulose. The preferred material is the acid form of cellulose acetate phthalate, namely, the form thereof where only one carboxyl of the phthalic acid is combined with cellulose while the other carboxyl has a free hydroxyl group and for more precise identification, this ester of cellulose is referred to in the specification and claims as cellulose acetate hydrogen phthalate. Suitable cellulose acetate hydrogen phthalates possessing the foregoing characteristics are found among those described in an article entitled "Cellulose Esters of Dibasic Organic Acids" by Carl J. Malm and Charles R. Fordyce appearing in Industrial and Engineering Chemistry, volume 32, page 405, 1940, and also in U.S. Patent No. 1,954,337, issued to Cyril J. Staud, April 10, 1934.

Other examples of suitable alkali-soluble or permeable and water-insoluble and impermeable materials for stratum **10***b* include polyvinyl hydrogen phthalate and easily saponified organic film-forming materials such as shellac and Japan wax.

It has been noted that most cellulose acetate hydrogen phthalates are soluble in dilute sodium hydroxide. In order to prevent liquid-absorptive stratum **10***b* from complete dissolution and to maintain it in a relatively firm condition during the processing period, stratum **10***b* contains in addition to a material of the type described above, e.g., cellulose acetate hydrogen phthalate, a material which is substantially alkali insoluble or at least difficultly or slowly dissolved or hydrolyzed by akaline solutions. Thus by regulating the concentrations or amounts of the materials in stratum **10***b* the structure thereof and the rate of permeation therein and therethrough of alkaline solutions can be controlled. The amount of material employed in stratum **10***b* which is alkali insoluble or slowly modified by alkaline solutions to effect solubility thereof preferably is such as to maintain stratum **10***b* in a relatively firm condition yet permit a high order or rate of permeation or penetration of alkali solutions therethrough. Suitable materials comprise those which are substantially alkali insoluble, slowly alkali-soluble materials such as benzoic anhydride, and slowly alkali-hydrolyzable materials such as, for example, cellulose esters, e.g. cellulose acetate, cellulose nitrate, and the like. One preferred material is cellulose acetate which is initially alkali insoluble but which is slowly hydrolyzed by the alkaline solutions employed to alkali-soluble materials. The term "slowly alkali-solubilized material" or similar expressions will include within its meaning materials which are slowly dissolved in aqueous alkaline liquids or solutions and materials which are slowly hydrolyzed by aqueous alkaline liquids or solutions. By "slow" it is meant that the complete dis-solution or complete hydrolysis of the alkali-solubilized material employed is not accomplished or achieved during the period of photographic processing. The term "initially relatively insoluble in alkaline liquids" or similar expressions will include within its meaning materials which are (a) substantially insoluble in alkaline liquids, (b) slowly dissolved by alkaline liquids, and (c) slowly hydrolyzed by alkaline liquids.

One preferred composition for absorptive stratum **10***b* comprises a mixture of cellulose acetate hydrogen phthalate and cellulose acetate. A suitable composition for providing stratum **10***b* comprises, for example, 7.5 grams of cellulose acetate hydrogen phthalate and 2.5 grams of cellulose acetate in solution in a mixture of 200 cc. of acetone and 20 cc. of methyl Cellosolve. As indicated previously, the ratio of cellulose acetate hydrogen phthalate and cellulose acetate may be varied to obtain any desired degree of permeability and swellability. The cellulose acetate concentration may be as high as about 50 percent by weight of a coating composition such as of the type described above.

While organic solvents from the mixture may penetrate into the photographic film support, any impurities transported in solution from the support will be retained in absorptive stratum **10***b* which is allowed to thoroughly dry before the gelatin silver halide photosensitive stratum **10***c* is coated thereon.

Photosensitive element **10**, illustrated in the drawing, is especially adapted for employment with extra fast gelatin silver halide emulsions. High-speed emulsions are coated in extremely thin layers of the order of a fraction of a micron to 4 microns or slightly more as heretofore indicated. The products of the present invention are particularly useful in improving the results obtained when the transfer process is carried out with one of the high-speed photosensitive silver halide emulsions such as the emulsion of the relatively high-speed orthochromatic films, e.g., Eastman Kodak Verichrome Film, having an A S A speed rating of 0200 and an A S A exposure index rating in the daylight of 50, and the extremely high-speed panchromatic emulsions, e.g., Eastman Kodak Super XX Pan having an A S A speed rating of 0400 and an A S A exposure index rating in the daylight of 100, and Ansco Triple S Pan. Also satisfactory are the emulsions of Kodak Photoflure Safety films and Du Pont High Speed Pan film. It is also to be kept in mind that the products and processes of the present invention are also useful with slower emulsions and when so used give excellent results. Such emulsions, for example, comprise Contrast Process Ortho film or the emulsions of chloride and chlorobromide type printing and enlarging papers. The slower emulsions will, of course, be provided by relatively thick strata of the nature, for example, of from 30 to 40 microns.

In a preferred embodiment, the print-receiving element **12** employs a base **13** comprising a water-permeable material such as uncoated or gelatin coated paper, for example baryta coated paper, or the base may comprise a substantially water-impermeable material such, for example, as unplasticized polymethacrylic acid or one of the cellulosic esters, such as cellulose nitrate, cellulose acetate, cellulose butyrate, cellulose propionate, cellulose acetate butyrate or cellulose acetate propionate. Preferred however, are the rubbery types of plastics such as polyvinyl butyral.

As heretofore mentioned, if base **13** is liquid permeable, stratum **16** constitutes a separate liquid-impermeable film comprising one of the just-named water-impermeable materials and is coated on the support. Also, as previously mentioned, if the base **13** is substantially water impermeable, the stratum **16** may be just an integral extension of the base.

The stratum **15** of image-receptive material, as previously indicated, comprises a layer **15***b* coated on base **13** and a stripping layer **15***a* coated on layer **15***b*. Layer **15***b* comprises a matrix of a water-insoluble inorganic adsorbent substance such as silica in which there is in-

corporated suitable silver precipitating agents, such, for example, as the metallic sulfides and selenides and heavy metals.

The layer **15***a* provides a stripping layer of a nature such that the layer **14** of processing solution will, upon solidification, become adhered thereto by a weaker bond than the bond between said layer **14** and the silver halide stratum **10***c*. Thus, the layer **14** of processing liquid will remain adhered to the photosensitive element **10** in the illustrated embodiment of film unit when the photosensitive element and the print-receiving element are separated. Suitable materials for providing stripping layer **15***a* comprise gum arabic, sodium alginate, pectin, cellulose acetate hydrogen phthalate, polyvinyl alcohol, hydroxyethyl cellulose or polymethacrylic acid and, when kept very thin, may be of plasticized methyl cellulose, ethyl cellulose, methyl methacrylate or butyl methacrylate.

Print-receiving elements embodying the preferred construction illustrated in the drawing are detailed in connection with my U.S. Patent No. 2,823,122, issued February 11, 1958.

As an alternative construction, the film unit may be so designed that the layer **14** of processing solution when solidified will remain adhered to the print-receiving element upon separation of the film unit. For example, the stripping layer **15***a* disclosed in the drawing may be omitted. This alternative construction is useful in instances where the silver complex is transferred by diffusion from the photosensitive element toward the print-receiving element and the complex is at least in part reduced to silver in the layer of processing solution. United States Patent No. 2,662,822, issued to Edwin H. Land on December 15, 1953, discloses a suitable print-receiving element and practices for carrying out this concept of the invention.

Additionally, the concepts of this invention may be practiced with modified embodiments of print-receiving elements. Thus, the liquid-impermeable subcoat **16** may be omitted and the print-receiving stratum **15** comprising the layers **15***a* and **15***b*, or merely the layer **15***b* of image-receptive material containing the silver precipitating agents may be applied directly to a liquid-permeable film base such as one of the papers heretofore mentioned.

Although the present invention has been described above in relation to silver transfer-reversal processes, it is to be understood that it may be applied to other transfer black-and-white, as well as color processes. It should also be pointed out that absorptive strata of the type described herein may also be employed as barrier layers in photosensitive elements useful in multicolor transfer processes as well as photographic reagent-carrying layers also useful in transfer processes.

Since certain changes may be made in the above product and process without departing from the scope of the invention herein involved, it is intended that all matter contained in the above description or shown in the accompanying drawing shall be interpreted as illustrative and not in a limiting sense.

What is claimed is:

1. In a photographic silver halide transfer process, the steps which comprise forming a layer of an alkaline solution of a silver halide developer and a silver halide transfer agent between one face of a print-receiving element and one face of a photosensitive element located in superposed relation to the print-receiving element, said photosensitive element being photoexposed to provide a latent image, said photosensitive element comprising a photographic film support composed of a paper material, a stratum comprising a mixture of cellulose acetate hydrogen phthalate and cellulose acetate, in the ratio of one to three parts of cellulose acetate hydrogen phthalate to each part of cellulose acetate, carried by one side of said support and a photoexposed silver halide stratum carried by the surface of said first-mentioned stratum furthest from said support; absorbing said solution into said silver halide stratum and through said silver halide stratum and into said first-mentioned stratum and, as a result of said absorption, increasing the rate and the amount of the reduction of the thickness of said layer of solution; by means of said solution present in said silver halide stratum, developing latent image silver halide to silver and forming silver complexes soluble and transferable in said solution from said photosensitive element toward said print-receiving element; transferring said silver complexes toward said print-receiving element by diffusion from said photosensitive element; and reducing said silver complexes to silver adjacent the said face of said print-receiving element to provide a reverse image in silver of the latent image formed in said photosensitive element.

2. A photographic silver halide transfer process as defined in claim **1** wherein said photosensitive element and said print-receiving element are separated after the formation of said silver image by the reduction of said complexes.

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