PHOTOGRAPHIC TRANSFER PROCESS UTILIZING A PRIMARY COLOR DEVELOPER FOR PRODUCING A COLORED PHOTOGRAPHIC TRANSFER IMAGE


Original application October 8, 1946, Serial No. 702,039, another Patent No. 2,661,293, dated December 1, 1953, Divided and this application November 10, 1953, Serial No. 391,310

8 Claims. (Cl. 95—88)

This invention relates to photography and, more particularly, to novel photographic processes.

This application is a division of my copending application Serial No. 702,039, filed October 8, 1946 for Process for Producing a Colored Photographic Image by Means of Exhaustion of Developer by Polaroid Patent No. 2,661,293, which, in turn, is a continuation-in-part of my application Serial No. 559,550, filed June 9, 1944 for Photographic Process and Apparatus (abandoned and replaced by application Serial No. 64,670) filed December 11, 1944, now issued as Patent No. 2,545,181 on February 27, 1951.

It is a principal object of this invention to provide an improved photographic process wherein a visible positive image is obtained from a photosensitive layer containing a latent or developed negative image, by utilizing the diffusion effect created by said photosensitive layer on a substance, usable in forming said visible positive image, to control the amount of said substance which is available for creating said positive image.

Another object of the present invention is to provide a photographic process wherein a photosensitive layer containing a latent or developed negative image is permeated with a substance having the capability of entering into a reaction which produces a visible effect on another layer, said substance is reacted with a material in said photosensitive layer to selectively make portions of said substance incapable of creating said visible effect, and the remainder of said substance is used to effect a visible effect on said other layer, said visible effect, due to its selective creation, forming a positive image.

Another object of the present invention is to assure, in processes of the above type, a substantially complete reaction of said substance with said material prior to the creation of said visible effect.

This invention accordingly comprises the process involving the several steps and the relation and order of

one or more of such steps with respect to each of the others 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 accompanying drawings.

Figures 1 through 4 are diagrammatic representations of various steps of a preferred modification of the invention; Figure 1 showing a photosensitive layer containing a latent negative image; Fig. 2 showing the photosensitive layer after development; Fig. 3 showing an image-carrying layer formed into a permeable assembly with the developed photosensitive layer; and Fig. 4 showing the final positive image on the image-carrying layer.

Fig. 5 is a diagrammatic cross-sectional view of a composite photographic film unit showing one physical embodiment of the invention.

Fig. 6 is a diagrammatic cross-sectional view of a composite photographic film unit showing another physical embodiment of the invention; and

Fig. 7 is a diagrammatic cross-sectional view of a composite photographic film unit showing still another physical embodiment of the invention.

In general this invention relates to novel photographic processes and produces for the production of a fixed stable positive image of a latent or developed negative image contained in a photosensitive layer, the positive image being formed in or on another layer hereinafter referred to as an image-carrying layer.

A real image of any object is a visible likeness or reproduction of that object. Photographically, an image may be recorded in a photosensitive layer by transforming said layer, which is originally substantially homogeneous throughout its volume, into a layer such that a chemical characteristic thereof has an image-wise variation throughout the image area, the variation being a function of the brightness aspects of the original subject image. The resulting recorded image may be a real image, i.e., a visible image, or a latent image, i.e., an image which, while not visible per se, has the capacity upon suitable chemical treatment to produce a visible image. The term "record image," when used here in its photographic sense, may be characterized as a record of the brightness aspects of any predetermined subject matter such as a person, object, or real image, the record being in the form of a layer of material containing a visible effect on said material, the visible effect being of such a nature that it becomes visible upon chemical development, while the invisible character of the image, the chemical characteristic of said layer, produces an image-wise variation of the chemical characteristic of said layer, or upon making possible the differential chemical treatment of said layer thereby differentiating optical characteristics of said layer.

This invention relates to the use of such a record image in a photosensitive layer for forming another image on an image-carrying layer, said other image being reversed in the positive-negative sense, with respect to said record image.

In its preferred aspect the process involves the production on an image-carrying layer of a positive image of a record negative image by permeating the layer containing said negative image with a uniform quantity of a substance in solution, selectively utilizing the differential chemical characteristic of said layer, causing said uniform permeated substance, said effect being a function of the image-wise variation of said chemical characteristic, transferring said uniform permeated substance to said image-carrying layer and utilizing said unaffected portions to create a varying visible effect which gives a positive image of said negative image.

The creation of the visible effect on the image-carrying layer may be the result of the creation of a color.

The first step of the preferred process is to permeate a uniform quantity of a liquid composition into the photosensitive layer containing a record image of a latent or developed negative image. The liquid composition preferably comprises a solution of a reactive substance. The latent or developed negative image in the photosensitive layer preferably comprises a photosensitive...
material having an imagewise distribution which varies as a direct function of the exposure creating said latent or developed negative image.

The amount of reactive substance permeating a unit area of the photosensitive layer is substantially uniform throughout an area thereof at least coextensive with said negative image and is preferably such that it will be substantially completely reacted by the portion of said photosensitive layer containing a highest concentration of said imagewise distributed material.

This reactive substance in the liquid composition is one capable of entering into a reaction with said material in said photosensitive layer and also of entering into a reaction which produces a visible effect on said image-carrying layer.

The first step of the process, the reactive substance is reacted with the material in the photosensitive layer and portions of said substance are rendered incapable of producing a visible effect as the result of this reaction. The extent of reaction between the substance and the material in the photosensitive layer preferably varies, from point to point thereof, as a function of the point-to-point degree of exposure creating the negative image. This thus results in a distribution of unreacted substance whose capability of creating a visible effect varies in amount from point to point.

The second step of the process, the remainder of the reactive substance, i.e., that portion thereof which did not react with the material in the photosensitive layer, is then transferred to said image-carrying layer forming said photosensitive layer by superimposing one of said layers on the other of said layers, the superimposing being sufficient to create the reactive portions of the photosensitive layer. The variable effect of the superimposing comprises the creation of a color and varies from point to point in accordance with the distribution of the unreacted substance. Due to the selective visible effect, i.e., color created, there is formed a positive image of said negative image on said image-carrying layer.

Referring now to Figs. 1 through 4 there is shown a diagrammatic representation of the various steps of a preferred embodiment of the process of the present invention.

Referring specifically to Fig. 1 there is provided a layer of photosensitive material 10, which is shown as having been exposed to a subject image to create developable portions indicated by the dots 16, these dots representing developable grains of photosensitive material. Varying portions of the photosensitive layer 10 have different maximum amounts of developable grains 16 therein, portion 10a having a maximum amount of developable grains, portion 10b having a substantially minimum amount of developable grains, and portion 10c having a substantially intermediate amount of developable grains.

In Fig. 2, the photosensitive layer 10 is shown as having been uniformly permeated with a solution of the reactive substance 16. The distribution of said reactive substance 16 is such that there exists a predetermined quantity per unit area of the substrate distributed through the photosensitive layer 10. The uniform permeation is accomplished such as by dipping the photosensitive layer in a concentrated bath of the reactive substance, the photosensitive layer being in contact with the bath only long enough to absorb a predetermined amount of the reactive substance 16 to either on its surface or within the layer 10. The photosensitive layer 10 should not be left in the bath long enough to permit the transfer of reacted portions of the substance from the layer 10 to the bath. The concentration of the bath should be such that the photosensitive layer 10 may take up and support a uniform quantity of the substance, the concentration of the substance per unit area of the layer 10 being preferably just enough to be completely reacted by a most reactive portion of the photosensitive layer 10. Other methods of accomplishing solution of the photosensitive layer are equally feasible such as spreading a predetermined layer 14 of a viscous solution of the substance in contact with the surface of the photosensitive layer 10. The substance may be also be applied by other means such as by spraying etc.

After the solution has permeated the photosensitive layer 10, the reactive substance reacts with the developable portion of the photosensitive layer 10 being about half the amount of reaction product 17 as does the portion 10a. Since the amount of reactive substance with which the photosensitive layer 10 is permeated is not substantially no reaction product 10c has about half the amount of reaction product 17 as does the portion 10a. Since the amount of reactive substance with which the photosensitive layer 10 is permeated is not substantially no reaction product 10c has about half the amount of reaction product 17 as does the portion 10a. Since the amount of reactive substance with which the photosensitive layer 10 is permeated is not substantially no reaction product 10c has about half the amount of reaction product 17 as does the portion 10a. Since the amount of reactive substance with which the photosensitive layer 10 is permeated is not substantially no reaction product 10c has about half the amount of reaction product 17 as does the portion 10a.
The image-carrying layer 12 is formed by a color forming layer 19, which may be colored by a pigment, such as a colloidal metal, or which may be colored by molecules of dye. For simplicity of description, the colored portion 19 is represented as having an intensity depending on depth, in actuality the intensity of color may be primarily at and near the surface of the image-carrying layer, the effect depending upon the intensity of dye created, the size of a pigment, created, or the quantity per unit of either. In the portion 12a of the image-carrying layer, where no unreacted substance existed, there is no formation of a color, and in portion 12b, there was produced a maximum intensity of color, and in portion 12c, a color having about half the intensity of the color produced in the portion 12b. It can be seen, then, that there is a substance which varies from point to point, throughout the area of the image-carrying layer 12, substantially in inverse proportion to the amount of the reagent of photo-sensitive material in the corresponding portion of the photosensitive layer 10.

Where the image on the image-carrying layer 12 is formed in terms of a pigment 19 and the reactive substance, the developer, the unreacted portions of the developer may be utilized to form this pigment 19 by the reducing action of the developer on a reducible metal salt. This reducible metal salt can be a salt which is not photosensitive such as mercury chloride or a photosensitive salt such as a silver halide. In either case, the pigment formation is selective, due to the selective reduction of the silver halide, varying from point to point, where there was a maximum development of the latent negative image and being a maximum where there was a minimum development of the latent negative image. There is thus created on the image-carrying layer 12, an image of the latent negative image in the photosensitive layer.

When the reactive substance is a developer and a dye image-carrying layer 12, there are a number of ways of accomplishing the dye formation, depending upon the type of developer utilized. In one method, there may be provided, for reaction with the developer, a color-former capable of coupling with the developer, i.e., unoxidized, portions of the developer to create a color 19. This color, due to its selective creation, varies in amount from point to point, being a minimum where there was a maximum development of the latent negative image, and being a maximum where there was a minimum development of the latent negative image. There is thus created on the image-carrying layer 12, an image of the latent negative image in the photosensitive layer. In another method of forming a dye image there is utilized a color-former, a color-former capable of coupling with oxidized, rather than unoxidized, portions of the developer. In this case, the developer is reacted with the photosensitive material-containing a latent negative image to cause a development of the negative image resulting in a selective oxidation of the developer and trapping of the oxidized developer within the developed portion of the photosensitive layer 10, it being necessary to prevent migration of the oxidized developer from the photosensitive layer 10. The remainder of the developer is then utilized to create a color 19 on the image-carrying layer 12. In order to form this color, it is necessary to oxidize the unreacted portions of the developer on the image-carrying layer, by selective oxidation of the developer with the latent negative image. This oxidation may be accomplished by providing an oxidizing agent on the image-carrying layer, in which case the oxidizing agent may be either a direct oxidizing agent such as a silver halide or a nonphotostabilizing oxidizing agent such as sodium perborate. It is also contemplated to oxidize the unreacted portions of the developer on the image-carrying layer by separating the oxidizing layer from the photosensitive layer by separating the oxidizing layer from the photosensitive layer whereby to permit the ready access of oxygen from the atmosphere to the unreacted portions of the developer. After the oxidizing agent has been oxidized on the image-carrying layer it is reacted with a suitable color-former to cause a coupling and the creation of a color. The color-former is coupled with the oxidized oxidizing layer, which varies from point to point, depending upon the amount of oxidized oxidizing layer in corresponding portions of the latent negative image.

One of the above methods of dye image formation, the color-former, which is reacted with the developer to cause a coupling therebetween, is preferably located on the image-carrying layer 12 in solid form. However, it may be coated on, or included in, the photosensitive layer 10, or it may be in solution in the liquid composition. This latter modification of the invention is particularly feasible where the developer is coated on one of the layers in solid form rather than being in solution in the liquid composition.

In still another method of forming a dye image, a self-developing agent is utilized. This development may be one of the type known in the art as a direct color-forming developer, i.e., one which couples with itself when oxidized. The developer is selectively reacted with the photosensitive material-containing a latent negative image, and the reacted portions are preferably trapped in the photosensitive layer. Then the unreacted portions of the developer are utilized to selectively create a color 19 on the image-carrying layer 12, by oxidizing the unreacted portions of the developer.

A preferred method of permeating the photosensitive layer with a uniform quantity per unit area of a liquid composition containing the reactive substance is to release the liquid composition between the photosensitive layer and the image-carrying layer and to spread this liquid composition in a uniform film, this film being a minimum thickness of a pigment, and the image-carrying layer and the image-carrying layer. Such a method of uniform permeation has certain advantages and is particularly adaptable to use with film units of the type shown in Figs. 5, 6 and 7 which show examples of the physical embodiments of the present invention.

Each of these film units may be processed by the application thereto of a single mechanical stress to cause the release and spreading of the liquid composition, thus making it possible for the film unit to be handled by a hand camera, or as the result of ejection of the film unit from a hand camera.

The construction or the film unit also permits accurate spreading of the liquid composition in a uniform thin layer in a position to permeate the photosensitive layer with a uniform amount of a solution of the reactive substance.

Since the liquid composition is spread between two layers, which may be only slowly permeable to oxygen, it substantially prevents the access of oxygen to the liquid composition during the time it exists in a layer form within the confines of the film unit. This arrangement prevents the xerographic or spreading of the negative image, where such a substance is oxidizable. Separation of the image-carrying layer from the film unit renders the surrounding atmosphere available for effecting the xerographic isolation of oxidizable material on the image-carrying layer. This feature permits the use of reactive substances which are quite easily oxidizable and prevents such oxidation until the positive image has formed, which is then desired to oxidize the reactive substance for the purpose of creating a positive image.

When the outer surface of the layers of the film unit are opaque to actinic light, the construction of the film unit permits the liquid composition, particularly where the liquid is viscous, to form a lightproof laminate of the film unit so that the film unit may be ejected from a camera into daylight immediately after the mechanical treatment. Exposure of the photosensitive layer is effected prior to the formation of said lightproof laminate and with the photosensitive layer of the image-carrying layers in spread apart or separated relation with respect to each other. Since the composite laminate is opaque to actinic light, the photographic process may be carried beyond completion outside the camera with no danger of destroying the latent image as the result of light-reaching the photosensitive material.

Such film units should have certain features in order that they may fulfill the requirements of the process. In the first place, it is preferable that the film units have within their confines all the materials necessary for the complete processing thereof to form the final positive image. In the second place, the film units should be designed so that they may inherently assure the proper sequence of reactions, or can be used so as to assure this proper sequence of reactions.
tain being positioned in the film unit for release of its liquid composition so as to permit the permeation of the liquid into at least the surface portions of the photosensitive and image-carrying layers. The liquid composition is preferably viscous and preferably includes the reactive substance and at least includes a solvent therefor.

The film unit of Fig. 5 preferably comprises a photosensitive layer 30, an image-carrying layer 32, and a container 34 having therein a liquid composition and positioned between the two layers 30 and 32. For supporting the photosensitive layer 30 there is provided a usual film base 36.

In another preferred embodiment of the invention, shown in Fig. 6, there is provided a film unit of a general type described in connection with the discussion of Fig. 5, the embodiment of Fig. 6 being particularly useful in those processes described previously where the reactive substance reacts with a material on the image-carrying layer to create a color.

Referring now to Fig. 6, where like numbers correspond to like elements of Fig. 5, there is provided the usual layer 30 of photosensitive material, carried by a base layer 36. An image-carrying layer 32 is also provided. On that surface of the image-carrying layer 32 which is closest to the photosensitive layer 30 there is provided a coating or layer 38 of a material which is only slowly permeable to a liquid composition within a container 34.

In still another embodiment of the invention shown in Fig. 6 is usable with all processes of the type discussed previously and is particularly useful for those processes wherein, in a developer is the reactive substance and the image-carrying layer is a material which is quite reactive with the developer, the reaction of the developer with the material being that which creates a color constituting the positive image.

In still another physical embodiment of the invention there is provided a composite film unit comprising a photosensitive layer and an image-carrying layer similar to the embodiment of Figs. 5 and 6 but having its various layers arranged with respect to the introduction of the liquid composition that the liquid composition must permeate through the layer of photosensitive material before reaching the image-carrying layer. Such an embodiment of the invention is shown in Fig. 7 where like numbers correspond to like elements of Figs. 5 and 6.

Referring specifically to Fig. 7 there is provided a usual photosensitive layer 30 coated on the upper surface of an image-carrying layer 32. A container 34 is provided in the film unit in a position to discharge its liquid composition adjacent that surface of the photosensitive layer 30 which is furthest from the image-carrying layer 32. For assisting in spreading the liquid composition in a uniform manner adjacent the surface of the photosensitive layer 30 there is provided a relatively impermeable backing layer 40.

The embodiment of Fig. 7 may be utilized with any of the processes previously described and it has particular advantage in those processes wherein the reaction of the reactive substance with the negative must be completed before the liquid composition permeates the image-carrying layer.

In the above-described processes portions of a reactive substance, such as a developer, are selectively rendered incapable of creating a color by reaction with a layer of photosensitive material containing a latent negative image to cause the development thereof, and the unreacted portions of the reactive substance are utilized in a color-creating reaction to form a positive image on an image-carrying layer. In the development of the latent negative image it is essential to carry the first reaction to substantial completion before the second reaction commences. The proper sequence of the two reactions is obtainable in numerous ways.

One way of assuring the proper sequence is described above in connection with the discussion of Figs. 1 through 4, where the development of the latent negative image is accomplished while it is separate from the locale of the subsequent development of the liquid layer into a permeable assembly with the image-carrying layer. This way of assuring the proper sequence between the two reactions is not as preferred as those ways to be discussed hereinafter because it is not particularly applicable for use with a compact apparatus such as a hand camera.

When film units of the type of Figs. 5, 6 and 7 are utilized with the process of the present invention and the liquid composition is spread in a uniform layer within the film unit while the various layers thereof are in permeable relationship to each other, the proper sequence of reactions may be assured by providing the proper physical and/or chemical relationship between the various materials.

There are a number of forms that this relationship may take. The first form, which is particularly useful with the embodiment of Fig. 5, involves the provision of various materials such that the development of the latent negative image is inherently faster than the color-creating reaction which forms the positive image. An example of this modification of the invention is one wherein silver halide in the latent negative image is more readily reducible than the metallic salt on the image-carrying layer. Another modification of this form of the invention, useful with the embodiment of an oxidizing agent on the image-carrying layer which oxidizes the developer more slowly than the developer develops the latent negative image.

Another form of a relationship of material for assuring the proper sequence of reactions is the provision of some means for temporarily preventing the color creating reaction. This means may comprise a container, as shown in Fig. 6, on the surface of the image-carrying layer or a hardened surface on the image-carrying layer which is adapted to retard penetration of the developer into the image-carrying layer until such time as the dye has been made developable by exposure to light. In another form, where there is used a developer which, when oxidized, couples with itself or another substance, this couplant can be prevented, if no oxidizing agent is included on or within the image-carrying layer, or if the oxidizing agent must be treated, such as by exposure to light, before it is capable of oxidizing the unreacted portion of the developer, the developer cannot couple until the image-carrying layer has been exposed to aerial oxidation or the oxidizing agent has been activated such as by being exposed to actinic light.

Another way of assuring the proper sequence of reactions, as shown in Fig. 7, is to adjust the direction of permeation of the developer so that it permeates through, and is substantially completely reacted by, the photosensitive layer before reaching the image-carrying layer.

In the above discussion of the processes applicable to Figs. 1 through 4 and Figs. 5, 6 and 7, no mention is made of the preferred materials. These materials vary in accordance with the specific processes involved and are discussed in more detail hereinafter.

In the following discussion of preferred examples of the various processes of the present invention it may be assumed that all the processes may be practiced as shown in Figs. 1 through 4 and are usable with the modifications of the physical embodiments of the invention shown in Figs. 5, 6 and 7, it is essential that the image-carrying layer and either supplying a protective slowly permeable coating thereover or causing the reactive substance to permeates through the image-carrying layer before it contacts the reactive material. Where the process is also particularly well suited for use with a film unit of the type shown in Fig. 5, it is so stated. In the following examples the numbers 1 through 4 unless the process is particularly applicable to one of Figs. 5 through 7.

One method of creating a dye positive image from a latent negative image is to use a material capable of coupling with unreacted portions of a reactive substance, such as a developer, to form a dye. This dye may be formed by the use of a color-former, or dye base such as a diazonium fast salt, on the image-carrying layer, which is capable of coupling with unreacted por-
tions of an amine or phenol developer. Such a process is set forth in the following nonlimiting example:

**EXAMPLE 1**

The image-carrying layer 12, which may be conventional baryta-coated paper, is prepared by coating with a water solution of Naphthol Fast Orange GC and allowed to dry. Naphthol Fast Orange GC is stabilized and diazotized with meta chlor aniline (American Dyestuff Reports, 1939, vol. 28, No. 4, pp. 82–83). The photosensitive layer 10 comprises a relatively slow, high contrast orthochromatic silver halide emulsion, such as is employed with copying film, commonly known to the trade as contrast process ortho film. The photosensitive layer is exposed to actinic light and permitted to react with a developer by dipping for a few seconds in a solution of 1,5-dihydroxy-naphthalene. Development of the photosensitive layer is continued for several minutes after removal from the developer bath. The developed photosensitive layer is then placed in contact with the image-carrying layer to cause the unreacted portions of the developer to migrate to the surrounding developer layer where they couple with the Naphthol Fast Orange GC to form a positive dye image on the image-carrying layer. This image appears to be intensified by the aerial oxidation of the unreacted developer after the initial positive image is formed. Thus the image appears to be formed by the unreacted portions of the developer which couples, partially in its unoxidized and partially in its oxidized condition, with the color-former. Those portions of the developer oxidized as the result of the development of the latent negative image appear to be trapped within the photosensitive layer and thus cannot spoil the positive image.

In another method of forming a dye positive image from a latent negative image there is utilized a color-former capable of coupling with oxidized, rather than unoxidized, portions of the developer. Such a process where the color-former is contained in the liquid is described in the following nonlimiting example:

**EXAMPLE 2**

The photosensitive layer 10, which may comprise an ortho-chromatic emulsion of the character described in connection with Example 1, is exposed to actinic light to create therein a latent negative image. This latent negative image is developed using the following developer:

- Diethylparaphenylenediamine hydrochloride: 6 grams
- Sodium sulphite: 10 do.
- Potassium bromide: 0.5 do.
- Sodium carbonate: 117 do.
- Color-former (p-nitrophenylacetanilide): 0.10 cc.
- Acetone: 10 cc.

The negative is removed from the above developing bath after approximately 5 seconds and development is allowed to continue for a minute and a half. The developed negative is then pressed into contact with an image-carrying layer 12 containing an oxidizing agent. Such an image-carrying layer may be prepared by submerging a sheet of paper, known in the art as imbibition paper, with a 10% solution of sodium perborate. The negative is left in contact with the image-carrying layer for approximately four minutes to permit the sodium perborate to oxidize the unreacted portions of the developer so that they may couple with the color-former. The negative is then separated from the image-carrying layer to reveal the positive dye image on the image-carrying layer. The image obtained by this process is magenta and may be utilized to advantage in three-color photography.

**EXAMPLE 3**

A cyan positive image may be obtained in Example 2 by using, as the color-former, 2,4-dichloro-1-naphthol.

**EXAMPLE 4**

A yellow positive image may be obtained in Example 2 by using, as the color-former, ethyl acetooacetate acid.

While the above description of the invention relates to a process where the color-former is included in the developer liquid, it is equally possible to swab a solution of one or more of the color-formers on the image-carrying layer. This swabbing with a color-former may be accomplished either before or after the unreacted portions of the developer have been transferred to the image-carrying layer. In this case the developer solution is the same except that no color-former is included therein.

In the above described examples, sodium carbonate was used as the oxidizing agent for oxidizing those portions of the developer unaffected by the development of the latent negative image. Other non-photosensitive oxidizing agents such as sodium perborate, ammonium dichromate, and ammonium persulfate may also be used.

It is also contemplated to use a photosensitive oxidizing agent within the surface of the image-carrying layer. Such a photosensitive oxidizing agent may be a silver halide and is preferably dispersed within the surface of the paper. This photosensitive material may be either exposed or unexposed depending upon the desired type of process. If exposed, it reacts with the developer as soon as it contacts the developer. If unexposed, it must be exposed to actinic light, or otherwise made developable, before it can oxidize the developer. This latter condition has certain advantages since it enables the use of such an unexposed oxidizing agent with a film unit of the type shown in Fig. 5.

In practicing the above modification of the invention it is equally possible to rely upon aerial oxidation as the sole means for oxidizing the unreacted portions of the developer as set forth in the following example:

**EXAMPLE 5**

The process of Example 2 is modified by eliminating the oxidizing agent from the image-carrying layer 12. When portions of the image-carrying layer have been imbued with the developed negative for 4 or 5 minutes it is separated from and the invisible image in unreacted developer on the surface of the image-carrying layer is exposed to aerial oxidation. As the developer oxidizes it couples with the color-former to create a color and thus produces a positive image.

In the process of the type of Example 2, where a color-former couples with the oxidized developer, it is desirable to insure the trapping, within the photosensitive layer, of all the developer that is oxidized by the development of the latent negative image. Such a trapping may be improved by including within the photosensitive layer 10 a color-former that couples with the oxidized developer to form a relatively immobile dye. Thus, as the developer is oxidized by the development of the latent negative image, it immediately couples with the color-former in the photosensitive layer 10 and is converted into an immobile dye, thereby being trapped within the photosensitive layer. This is particularly desirable where the color-former used to create the positive image is placed on the image-carrying layer rather than in the developer solution.

In still another method of forming a dye positive image from a latent negative image, a self-coupling developer is used. This developer may be one of the types described in the art as a direct color-forming developer, i.e., one which couples with itself to form a dye when oxidized, as set forth in the following nonlimiting example:

**EXAMPLE 6**

A layer of silver halide photosensitive film 30—36 of Fig. 5, such as orthochromatic copying film of the type described in Example 1, is exposed to a subject image. A preferred form of image-carrying layer 32 comprises a sheet of imbibition paper. A suitable liquid composition contains the following:

- Water: 476 cc.
- Sodium carboxymethyl cellulose: 42.6 grams.
- Sodium hydroxide: 17.5 do.
- 1,3-dihydroxy-naphthalene: 9.0 do.

With such a liquid composition, the process is preferably carried out by spreading a thin liquid composition between the exposed layer 30 and the image-carrying layer 32. This spreading may be accomplished by releasing the liquid composition from a container 34 positioned between these two layers and spreading the liquid by means such as pressure rollers. The 1,3-dihydroxy-naphthalene develops the latent negative image and, where development occurs, it self-couples to form an immobile dye. Where development does not occur, the unreacted developer is separated from the surface of the image-carrying layer. The image-carrying layer 32, with the positive image in terms of unreacted developer on its surface, is then separated from the photosensitive layer 30 and exposed to air so as to oxidize the
unreacted developer. This oxidation causes the developer on the image-carrying layer to self-couple, thus creating a color forming a positive image of the subject image.

It is equally possible to use oxidizing agents on the image-carrying layer of Example 6 rather than relying on aerial oxidation to oxidize the unreacted developer on the image-carrying layer. In such a case the film unit should be of the form of Figs. 6 or 7 and the oxidizing agents may be of the various types discussed in connection with Examples 2 through 4 above.

A positive image on the image-carrying layer is formed in terms of a color created by a pigment, as distinguished from a color created by a dye, the unreacted portion of the developer film may be used to form this pigment by the reducing action of the developer on a reducible salt, as set forth in the following nonlimiting example:

**EXAMPLE 7**

The layer 10 of photosensitive material preferably comprises an orthochromatic emulsion of the copying film type referred to in Example 1. The layer 10 is exposed to actinic light to create therein a latent negative image. This negative image is then developed by placing it in a bath containing:

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<tr>
<th>Grams</th>
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<tr>
<td>Hydroquinone</td>
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<tr>
<td>Sodium sulphite</td>
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<tr>
<td>Sodium hydroxide</td>
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<tr>
<td>Water</td>
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The layer 10 is removed from the bath after about 30 seconds and development is allowed to continue for about 2 minutes. The developed negative image containing an invisible image in unreacted developer, is then placed in intimate contact with an image-carrying layer comprising a sheet of uniformly exposed photosensitive paper such as a preferably fast, conventional enlarging paper having an emulsion comprising silver bromide and silver chloride. The unreacted developer permeates and develops the exposed photosensitive grains in the image-carrying layer and thus develops a positive image in silver on the image-carrying layer. The undeveloped grains in the image-carrying layer are then preferably fixed out by bathing in a suitable silver halide solvent, such as a solution of sodium thiosulphate.

The process of Example 7 has been described in connection with a process of the type shown in Figs. 1 through 4. It may equally be used in film units of the type shown in Figs. 6 and 7, or in a film unit like Fig. 5 where the image-carrying layer is sufficiently impermeable so as to delay permeation thereof by the developer. If it is desired to include a silver halide substrate in the liquid composition for the purpose of removing unreacted silver halide from the image-carrying layer of Example 7 the photosensitive material in the photosensitive layer 30 is made of a selectively reducible material such as sodium carboxymethyl cellulose carried in the liquid-processing composition or this unreacted silver halide may be transported to the base which supports the photosensitive layer.

In still another modification of the invention, a nonphotosensitive salt is added to the image-carrying layer for the purpose of making available a material which can be reduced to a pigment by unreacted portions of the developer. This salt may be added after the invisible image in unreacted developer has been formed on the surface of the image-carrying layer. One method of practicing this feature of the invention is set forth in the following nonlimiting example:

**EXAMPLE 8**

A copying film, of the type heretofore described, is used as the photosensitive layer 10, and a sheet of inhibitor paper is used as the image-carrying layer 12. The photosensitive layer is then exposed to a subject image and developed with a liquid composition 14 comprising a mixture of solutions A and B as follows:

**Solution A**

<table>
<thead>
<tr>
<th>Grams</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sodium carboxymethyl cellulose</td>
</tr>
<tr>
<td>Water</td>
</tr>
<tr>
<td>Sodium hydroxide</td>
</tr>
</tbody>
</table>

**Solution B**

<table>
<thead>
<tr>
<th>Grams</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sodium sulphite</td>
</tr>
<tr>
<td>Sodium hydroxide</td>
</tr>
<tr>
<td>Hydroquinone</td>
</tr>
</tbody>
</table>

Water to make 300 grams.

This development is preferably accomplished by spreading the liquid composition in a uniform thin layer between the photosensitive layer 30 and the image-carrying layer 32 of Fig. 5. This spreading is preferably accomplished by releasing the liquid composition from a container 34 thereto positioned between the two layers. After several minutes the image-carrying layer 32 is separated from the photosensitive layer 30 and there is seen an extremely faint yellowish image, which apparently is an image in an unreacted developer which has started to oxidize.

The image-carrying layer 32 is next swabbed with a dilute solution of silver nitrate and a gray positive image is developed as the result of the reduction of the silver nitrate by the unreacted developer.

**EXAMPLE 9**

A yellow positive image can be obtained in the process of Example 8 by swabbing the image-carrying layer 32, containing an invisible positive image in unreacted developer, with a salt such as ferric chloride, chromic trioxide or platinum chloride.

In another modification of the invention wherein unreacted portions of the developer are utilized for creating a color in terms of a pigment, a nonphotosensitive salt is selectively reduced to colloidal particles by these unreacted portions of the developer, as set forth in the following example:

**EXAMPLE 10**

An image-carrying layer 32 of Fig. 5 is formed of baryta paper and is prepared by swabbing with a 2% solution of chloroplatinic acid. The photosensitive layer 30 and the base layer 36 may comprise a sheet of Contrast Process Ortho film. With such materials the liquid composition of the container 34 preferably comprises:

<table>
<thead>
<tr>
<th>Grams</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water</td>
</tr>
<tr>
<td>Sodium sulphite</td>
</tr>
<tr>
<td>Sodium hydroxide</td>
</tr>
<tr>
<td>Sodium carboxymethyl cellulose</td>
</tr>
<tr>
<td>Hydroquinone</td>
</tr>
</tbody>
</table>

The film unit is processed by exposing the photosensitive layer 30 to actinic light and then passing it through a wringer. The layers are kept together for a few minutes and then separated to reveal a yellow positive image on the image-carrying layer.

**EXAMPLE 11**

An image-carrying layer 32 of Fig. 5 is formed of baryta paper and is prepared by swabbing with a 2% solution of palladium chloride. The photosensitive layer 30 and the base layer 36 may comprise a sheet of the heretofore described copying film. With such materials the liquid composition in the container 34 preferably comprises:

<table>
<thead>
<tr>
<th>Grams</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water</td>
</tr>
<tr>
<td>Sodium sulphite</td>
</tr>
<tr>
<td>Sodium hydroxide</td>
</tr>
<tr>
<td>Sodium carboxymethyl cellulose</td>
</tr>
<tr>
<td>Hydroquinone</td>
</tr>
</tbody>
</table>

The film unit is processed by exposing the photosensitive layer 30 to actinic light and then passing it through a wringer. The layers are kept together for a few minutes and then separated to reveal a yellow positive image on the image-carrying layer.

**EXAMPLE 12**

The contrast of the positive image obtained by the process of Example 11 may be improved by treating the prepared image-carrying layer with (a) ammonium hydroxide or (b) ammonium hydroxide and hydrochloric acid to form colorless palladium complexes in place of the palladium chloride.

Other reducible salts, which may be nonphotosensitive or only slightly photosensitive, such as a silver salt of sodium carboxymethyl cellulose, may also be used as the reducible metallic salt on the image-carrying layer 32.
Another modification of the invention wherein the reaction of the developer with the negative image is inherently faster than the color-forming reaction is described in the following nonlimiting example:

**EXAMPLE 13**

The photosensitive layer 30 and the base layer 36 of Fig. 5 may comprise a silver halide photographic film such as the heretofore described copying film. For use with this photosensitive layer 30 the liquid composition in the container 34 preferably comprises:

<table>
<thead>
<tr>
<th>Grams</th>
<th>Water solution of sodium carboxymethyl cellulose</th>
<th>5%</th>
<th>2,698,244</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sodium hydroxide</td>
<td>1.5</td>
<td>2,698,244</td>
<td></td>
</tr>
<tr>
<td>Pyrocatechin</td>
<td>0.5</td>
<td>2,698,244</td>
<td></td>
</tr>
</tbody>
</table>

The image-carrying layer 32 is preferably formed of a sheet of baryta paper which has been swabbed with a color-former capable of coupling with unreacted portions of the pyrocatechin. Such a color-former may be applied by making an alcohol and water solution of Naphthol Orange Salt GC. The photosensitive layer 30 is exposed to actinic light, and the developer is then spread between the exposed photosensitive layer 30 and the image-carrying layer 32 to the use of pressure rollers or other suitable means. The pyrocatechin appears to react first with the unreacted material in the photosensitive layer 30, and then the unreacted portions thereof migrate to the image-carrying layer where they couple with the color-former on the image-carrying layer to give a positive image.

In still another modification of the embodiment of Fig. 5 wherein a dye positive image is obtained, a process is used which is similar to that described in Example 2. In the following example there is shown a method of practicing this feature of the invention with the modification of Fig. 5 wherein the proper sequence of reactions is achieved by using an oxidizing agent which oxidizes the developer more slowly than the developer develops the latent negative image:

**EXAMPLE 14**

The photosensitive layer 30 and the base layer 36 preferably comprise a sheet of the copying film of the preceding example, and the image-carrying layer 32 comprises a sheet of baryta paper which has been swabbed with a 10% solution of sodium perborate. A preferred liquid composition comprises:

<table>
<thead>
<tr>
<th>Grams</th>
<th>Diethylphenylencainidine hydrochloride</th>
<th>75</th>
<th>2,698,244</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sodium sulphite</td>
<td>1.5</td>
<td>2,698,244</td>
<td></td>
</tr>
<tr>
<td>Potassium bromide</td>
<td>0.6</td>
<td>2,698,244</td>
<td></td>
</tr>
<tr>
<td>5% water solution of sodium carboxymethyl cellulose</td>
<td>131</td>
<td>2,698,244</td>
<td></td>
</tr>
<tr>
<td>Sodium carbonate</td>
<td>14.62</td>
<td>2,698,244</td>
<td></td>
</tr>
<tr>
<td>2,4-dichloro-1-naphthol (color-former)</td>
<td>1.1</td>
<td>2,698,244</td>
<td></td>
</tr>
</tbody>
</table>

After exposure of the photosensitive layer to actinic light to create therein a latent negative image, the film unit is processed to release the liquid composition from the container 34 and to spread the liquid in a uniform thin layer between the photosensitive layer 30 and the image-carrying layer 32. The developer (diethylphenylencainidine hydrochloride) develops the latent negative image and, where development occurs, it couples with the color-former and apparently is trapped within the negative by forming a relatively immobile dye. The unreacted portions of the developer are then slowly oxidized by the sodium perborate on the image-carrying layer. As these portions are oxidized they couple with the color-former to create a color on the image-carrying layer constituting the positive image.

A specific modification of the embodiment of Fig. 6 is described in the following nonlimiting example wherein a metallic salt is selectively reduced by unreacted portions of a developer and a slowly permeable polyvinyl alcohol coating is placed over the metallic salt to assure a proper sequence of reactions.

**EXAMPLE 15**

A solution is prepared by adding 20 grams of mercuric nitrate to 200 cc. of a 3 per cent nitric acid solution. A sheet of baryta paper, for use as the image-carrying layer 32, is placed in this solution for two minutes and the excess solution is removed from the sheet by the use of squeegee. The sheet is then soaked in a 10 per cent solution of sodium chloride for five minutes, thus forming mercuric chloride in the surface of the baryta paper. The sheet is then dried in air at room temperature. To one surface of a sheet prepared as above there is laminated a layer 38 of polyvinyl alcohol. This layer 38 of polyvinyl alcohol is preferably in the neighborhood of 0.0006 inch thick and is laminated to the baryta sheet by using a water solution of polyvinyl alcohol.

For use with the above described composite sheet 32—38 a liquid composition in the container 34 preferably comprises the following ingredients:

<table>
<thead>
<tr>
<th>Grams</th>
<th>Water</th>
<th>2,698,244</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sodium carboxymethyl cellulose</td>
<td>116</td>
<td>2,698,244</td>
</tr>
<tr>
<td>Sodium sulphite</td>
<td>78</td>
<td>2,698,244</td>
</tr>
<tr>
<td>Sodium hydroxide</td>
<td>74.6</td>
<td>2,698,244</td>
</tr>
<tr>
<td>Citric acid</td>
<td>38.5</td>
<td>2,698,244</td>
</tr>
<tr>
<td>Hydroquinone</td>
<td>52</td>
<td>2,698,244</td>
</tr>
</tbody>
</table>

In preparing this liquid composition, the water and sodium carboxymethyl cellulose are mixed for two hours. Then all of the other elements, except the hydroquinone, are added and mixed for 5 minutes. Lastly the hydroquinone is added and the whole batch is mixed for two hours at 50° C. under an atmosphere of nitrogen.

For the negative photosensitive layer 30—36 a preferred material is a sheet of the photosensitive layer 30 and the polyvinyl alcohol coating 38. When the above described liquid composition is spread between the exposed photosensitive layer 38 and the polyvinyl alcohol coating 38 on the image-carrying layer 34, the developer develops the latent negative image in the photosensitive layer, this development being substantially completed before any substantial permeation of the polyvinyl alcohol layer 38 takes place. Where the developer is unreacted by this development, it permeates through the polyvinyl alcohol coating and reduces the mercuric chloride on the surface of the image-carrying layer to colloidal black particles forming a positive image of the latent negative image.

While the above modification of the invention described a preferred form thereof, numerous other materials and processes may be utilized. The slowly permeable layer 38 may comprise plastics other than polyvinyl alcohol, and reducible salts other than mercuric chloride may be used. The liquid composition is also susceptible of wide variations without departing from the scope of the invention.

While the slowly permeable layer 38 of polyvinyl alcohol directly on the surface of the prepared image-carrying layer 32 by the use of a doctor blade or other coating techniques.

The slowly permeable barrier layer 38 may equally be formed of a plastic such as cellulose nitrate, as set forth in the following example:

**EXAMPLE 16**

In this case a sheet of baryta paper, containing mercuric chloride, is dipped in a bath containing the one-half second cellulose nitrate solution in equal parts of butyl alcohol and butyl acetate. The sheet is dried, and the layer of cellular nitrate is found to be approximately .0001 to .0002 inch thick over the mercuric chloride. Such a sheet is preferably used with a developer of the type mentioned above.

In the embodiment of the invention of Figs. 5, 6 and 7, the material which reacts with the developer on the image-carrying layer 32 may be situated on the surface thereof nearest the photosensitive layer. If such be the case with respect to Fig. 7, the photosensitive layer 30 is preferably so formed that it may be readily separated from the image-carrying layer 32. This separation may be assisted by including within the liquid composition a film-forming material, such as sodium carboxymethyl cellulose, which is capable of forming a strong adhesive bond between the
photoactive layer 30 and the backing layer 40. Thus when the image-carrying layer 32 is separated from the backing layer 40, the photosensitive layer 30 adheres to the backing layer 40. The photosensitive layer of Fig. 3 may, if desired, be carried by a suitable permeable base 5 material such as a sheet of gelatin, on which the base can be mounted with respect to the image-carrying layer so that it can be readily separable therefrom as in the manner of conventional stripping film.

In another modification of Figs. 5, 6 and 7, the material 35 in the unreacted portions of the developer is situated on the surface of the image-carrying layer farthest from the photosensitive layer. In this case no separation of the various layers of the film unit is required after the image-carrying layer has been mounted on the backing material, such as paper or gelatin, for example, and is not required to be included on the upper surface of the image-carrying layer in a position to oxidize unreacted portions of the developer as it permeates through the composite film unit. On the lower surface of the paper, there may be a color-former capable of coupling with the oxidized developer. As the developer reaches the color-former on the lower surface it couples therewith to form a positive dye image.

In still another modification of the embodiment of Figs. 5, 6, and 7, there may be one reactive material in one surface of the image-carrying layer and another reactive material on the other surface of the image-carrying layer. As an example of such an arrangement, as applied to Fig. 7, an oxidizing agent may be included on the upper surface of the image-carrying layer in a position to oxidize unreacted portions of the developer as it permeates through the composite film unit. On the lower surface of the film, there may be a color-former capable of coupling with the oxidized developer. As the developer reaches the color-former on the lower surface it couples therewith to form a positive dye image.

The liquid composition in the container 34 preferably comprises an aqueous solution of a reactive substance. For assisting in spreading the liquid in a uniform film, the liquid preferably includes a viscosity-increasing compound constituting a film-forming material of the type which, when spread over a water-absorbent base, will form a relatively firm, dimensionally stable film. Where the aqueous solution is alkaline, the film-forming material is preferably one which is not hydrolyzed by the alkali, and a suitable film-forming material is a high molecular weight polymer as, for example, a polymeric, water-soluble ether instead of an alkaline solution as sodium hydroxide or the metal salt of carboxylated cellulose, e.g., sodium or aluminum carboxymethyl cellulose. Other film-forming materials or thickeners agent can be used for the conversion of nonviscous solutions to viscous compositions where the conditions are such that their ability to increase the viscosity of the solution is not destroyed when left in solution for a considerable length of time. The viscosity of the liquid composition is preferably in the neighborhood of 20,000 centipoises although it may be as low as 8 centipoises. The high viscosities are preferred, since they give a more accurate control of spreading of the liquid composition.

In the various physical embodiments of the invention, the liquid composition in the container 34 preferably comprises an aqueous solution of the reactive substance. In some cases, however, it is desirable to include in the reactive substance, such as a developer, in or on one of the layers of the film unit and for liquid composition to include only water, possibly an alkali, and possibly a film-forming material to aid in accurate spreading. In other cases, the liquid composition may, for example, comprise only an aqueous solution of the developer, and there may be included in solid form in one or more of the layers of the film unit which may be required.

In still another modification of the physical embodiment of the invention the film unit may contain no liquid and may contain, in solid form, a film-former carried in said solution within the film unit. Such a modification of the invention is not as preferred as those described, since it requires the addition of a solvent to the film unit which cannot be processed by the application of mechanical stress to the film unit. Such a modification of the invention is, however, included within the scope of the present application.

The image-carrying layer, while being preferably formed of papers such as those known in the art as baryta paper or imitation paper, may contain other materials such as a water-permeable plastic or a water-permeable, reversible, film-forming organic colloid capable of having high viscosity characteristics and also good jetting strength, in which dye bases or dyes may be suspended.

Examples of other suitable image-carrying layers are regenerated cellulose; polyhydroxalkanes, such as polyvinyl nitrile, polyvinyl acetate, cellulose ethers, such as methyl cellulose, or their derivatives, such as sodium carboxymethyl cellulose or hydroxyethyl cellulose; papers; plastics, such as vinyl, polyester, or nylon; and any other mixture of these materials where the latter are compatible. Where the above materials are transparent, they may be mounted on an opaque base if desired, or have incorporated therein a colloidal pigment to render them opaque.

Throughout the specification and appended claims the expression "positive image" has been used. This expression should not be interpreted in a restrictive sense since it is used primarily for purposes of illustration, in that it defines the image produced on the image-carrying layer as being reversed, in the positive-negative sense, with respect to the image in the photosensitive layer. As an example of an alternative meaning for "positive image," assume that the photosensitive layer is exposed to actinic light through a negative transparency and that the latent image in the photosensitive layer will be a positive and the image produced on the image-carrying layer will be a negative. The expression "positive image" is intended to cover such an image produced on the image-carrying layer.

In preceding portions of the specification the expression "color" has been frequently used. This expression is intended to include the use of three colors to obtain black.

Throughout the specification and claims the expression "superimposing" has been used. This expression is intended to cover the arrangement of the image-carrying layer in such a way as to appear to be added to or combined with the film unit without being physically bonded thereto or in separated condition and including between them at least one layer or stratum of a material which may be a viscous liquid.

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

What is claimed is:

1. A process of forming positive transfer images in color wherein a single application of liquid to the exposed silver halide emulsion of a photosensitive element produces the necessary sequence of steps of staining, developing, and superimposing the liquid composition onto the latent image in the film unit in the manner disclosed in said finished positive print, said process comprising the steps of: permuting silver halide emulsion with a liquid composition comprising silver halide emulsion solution, and, during said development, having said silver halide emulsion superimposed on an image-receiving layer that said liquid has access to the latter layer; providing within the liquid composition comprising said photosensitive element and said receiving layer a reagent capable of developing exposed silver halide to silver and capable of reacting in the presence of an oxidizing agent to give a dye and comprising a primary color-forming silver halide developer, said reagent being so distributed throughout said liquid so as to have a substantially constant depthwise concentration per unit surface area of said liquid and being present per unit area substantially only in such a quantity as to cause said reagent to be substantially completely reacted within the liquid in the event of the full development of the silver halide of said unit area, said reagent not being caused to react when compared thereby and when dissolved therein being mobile in said liquid; developing the latent image in the silver halide emulsion by means of said reagent and also cause the development of silver to participate in the formation of a dye image in the emulsion and to there effect the exhaustion of the reagent for participation in providing image dye in proportion to each individual unit area of said liquid; transferring to said image-receiving layer in solution in said composition at least a part of the unreacted portion of said reagent; thereafter, causing the transfer of the unreacted
portion of said reagent to react within the image-receiving layer in the presence of an oxidizing agent to produce a dye image in said layer; and, throughout said process, maintaining said image-receiving layer free of appreciable amounts of silver, silver salts and material which, during said process or in the presence of light and air, will impart to said image receiving layer a color that will adversely affect the visibility of the said image in the image-receiving layer.

2. In a process of forming positive transfer images in color as defined in claim 1, the step of separating the image-receiving layer and said photosensitive element from their superposed relationship at some stage of said process after the unreacted portions of said reagent have been transferred to said image-receiving layer.

3. A process of forming positive transfer images in color as defined in claim 1 wherein said reagent is contained in said liquid composition when the liquid composition is permeated into said silver halide emulsion.

4. A process of forming positive transfer images in color as defined in claim 1 wherein said reagent is contained in said liquid composition and the image-receiving layer is part of a separate element, and wherein said process includes the step of retarding the contact of said liquid composition with said image-receiving layer by causing said liquid composition, before coming into contact with said image-receiving layer, to pass through a stratum of material which is located between said emulsion and said image-receiving layer and which is characterized by being slowly permeable to said liquid composition.

5. A process of forming positive transfer images in color as defined in claim 1 wherein the permeation of said emulsion with said liquid composition is effected by the step of providing a layerwise distribution of said liquid composition between said photosensitive element and another element, the latter element supporting said image-receiving layer.

6. In a process of forming positive transfer images in color as defined in claim 5, the step of separating said image-receiving layer and said photosensitive element from their superposed relationship at some stage of said process after unreacted portions of said reagent have been transferred to said image-receiving layer.

7. A process for forming positive transfer images in color as defined in claim 1 and including the steps of providing a layerwise distribution of liquid composition having said reagent dissolved therein between said emulsion and a stratum of material which is located on said image-receiving layer and is characterized by being less permeable to said liquid composition than said emulsion and permeating said emulsion with liquid composition from said layerwise distribution while retarding contact of liquid composition with said image-receiving layer until said liquid composition has passed through the stratum of lesser permeability.

8. A process of forming positive transfer images in color as defined in claim 1 and including the step of effecting the oxidation of the unreacted portion of said developer which is transferred to said image-receiving layer with an oxidizing agent substantially uniformly distributed throughout at least a stratum of said image-receiving layer adjacent the surface thereof to which said reagent is transferred.

No references cited.