May 31, 1966 A. J. SABLE 3,253,916

PHOTOGRAPHIC PRODUCT AND PROCESS

Filed Sept. 12, 1962

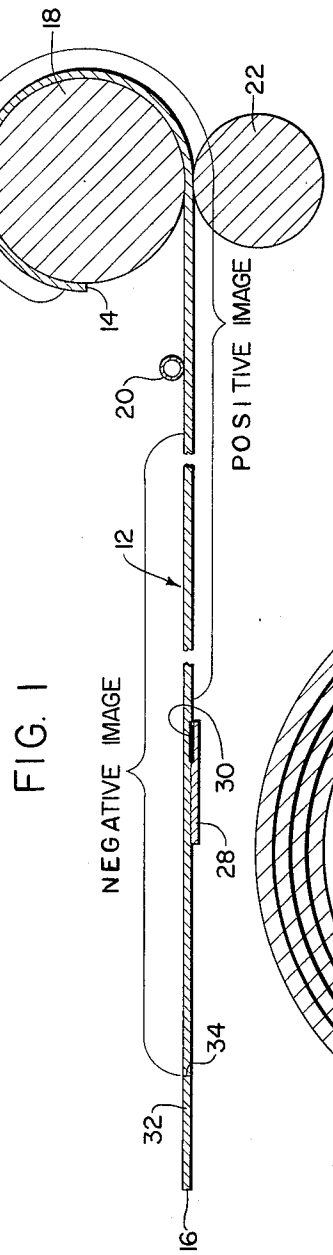

FIG. 1

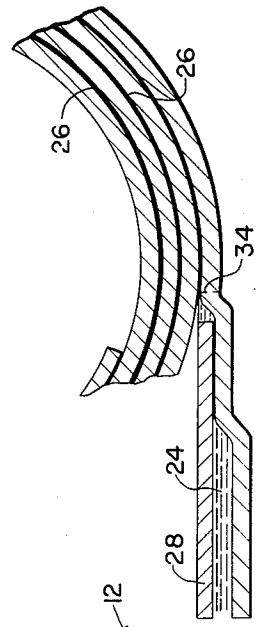

FIG. 3

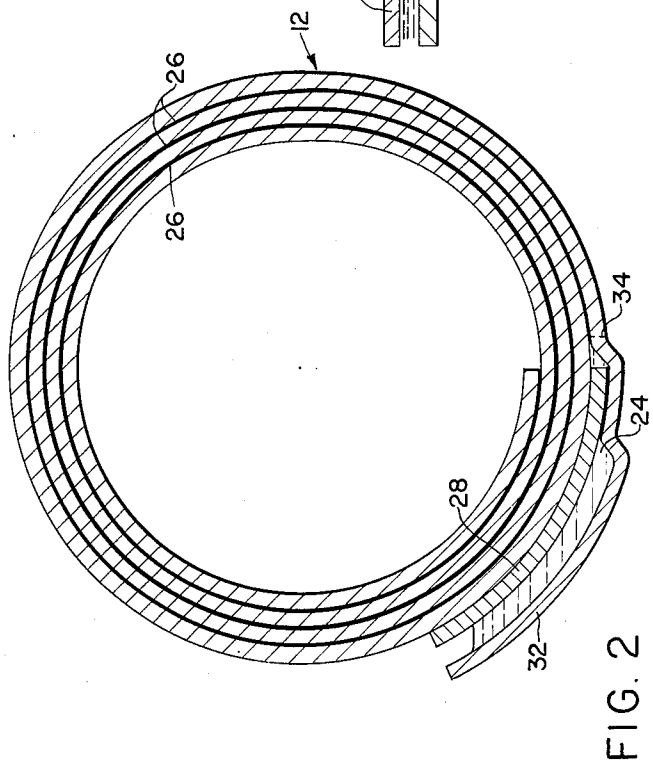

FIG. 2

INVENTOR.
Arthur J. Sable

BY Brown and Mikulka
and
Robert E. Gorb
ATTORNEYS

United States Patent Office 3,253,916 Patented May 31, 1966

3,253,916

PHOTOGRAPHIC PRODUCT AND PROCESS

Arthur J. Sable, Boston, Mass., assignor to Polaroid Corporation, Cambridge, Mass., a corporation of Delaware

Filed Sept. 12, 1962, Ser. No. 223,011
11 Claims. (Cl. 96—29)

This invention relates to photographic products and processes and more particularly to processes for producing photographic prints and products useful therein.

Diffusion-transfer reversal processes in which a liquid processing composition is distributed between and in contact with an exposed layer of a photosensitive image-recording material and another layer superposed therewith and reacted with the image-recording material to produce a positive transfer print supported on the other layer are well known in the art. In connection with such processes, it has been proposed to provide the layer of image-recording material on one side of a supporting sheet and, following exposure, process the image-recording material by coiling the sheet upon itself while distributing the liquid processing composition between the image-recording layer and the other side of the supporting sheet to form a transfer image thereon. In such processes each sheet, when exposed and treated with a liquid, would constitute a photographic print and, with the exception of the liquid, provide all of the materials required to produce a print.

It is contemplated that the sheet would be coiled and a liquid composition distributed between opposite sides of successive convolutions of the coiled sheet by advancing the sheet between a pair of juxtaposed pressure-applying members one of which functions as a support around which the coil is formed. Each succeeding convolution of the coil is brought into superposition with the previous convolution at the bite, i.e., between the jaxtaposed members, where a mass of the liquid is provided for distribution between adjacent surfaces of the sheet as successive portions of the sheet surfaces are brought into superposition at the bite of the members. After the liquid has been distributed between and in contact with the areas of the sheet surfaces to be treated, an undistributed mass of the liquid still remains between the sheets at the bite of the juxtaposed pressure-applying members. The problem is to collect, retain and dispose of this (now) excess liquid so as to prevent the liquid from being distributed beyond the trailing end of the sheet into contact with one of the pressure-applying members and/or the outer surfaces of the outer (last) convolution of the coiled sheet.

An object of the invention is to provide a novel and improved photographic product useful in a method of photography as described and including means for collecting and retaining, for disposal, processing liquid in excess of that utilized to treat the image-recording material while facilitating disposal of this excess liquid.

Other objects of the invention are: to provide a novel and improved photographic process of the above type to produce a finished photographic print rapidly and easily and requiring a minimum of simple, inexpensive apparatus; and to provide a method as described in which the liquid employed is confined at all times by the sheet materials, and excess processing liquid is readily and easily separated, for disposal, from the finished print.

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

The 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, and the product possessing the features, properties and the relation of elements which are exemplified in the following detailed disclosure, and the scope of the application of which will be indicated in the claims.

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

FIGURE 1 is a somewhat schematic, sectional view illustrating the method of the invention and a photographic product useful therein;

FIG. 2 is a view similar to FIGURE 1 illustrating another step in the process; and

FIG. 3 is a fragmentary view similar to FIG. 2 illustrating another step in the method of the invention.

The present invention is concerned with the production of positive photographic prints by a method which can be performed easily and rapidly with a minimum of simple, inexpensive apparatus and utilizes materials in themselves inexpensive. It is in the furtherance of these aims that it has been proposed to produce the positive image comprising a print by a diffusion-transfer reversal process on the opposite side of the sheet carrying the photosensitive image-recording material from which the positive transfer image is formed. The invention finds special utility and advantage in document copying where it is desirable to produce a positive copy of a document inexpensively on a sheet of paper similar in size and shape (usually rectangular) to the original document; and wherein a negative image on the reverse side of the copy from the positive is not considered particularly objectionable although, if desired, provision can be made for stripping the negative image from the support which carries the positive print.

The single sheet supporting the image-recording material following exposure of the latter is coiled upon itself with the image-recording material innermost so that the exposed area of the image-recording material is superposed with another area of the opposite surface of the support sheet. The support sheet is usually coiled around a cylindrical supporting member while the liquid is distributed between and in contact with the outer surface of one convolution and the inner surface (image-recording material) of the next convolution. The processing liquid is initially provided on the sheet as an elongated mass located adjacent the leading end of a surface of a portion of the sheet to be treated and is distributed between convolutions of the sheet by the progressive application of compressive pressure to portions of the sheet succeeding from its leading end. A compression member is provided in juxtaposition with the cylindrical supporting member for superposing successive convolutions of the sheet and distributing the processing liquid therebetween during movement of the sheet into the coil between the supporting and compression members. The sheet is permitted to remain in a coiled condition for a predetermined period during which the liquid is reacted with the image-recording material to produce a positive diffusion-transfer reversal image on the side of the sheet opposite the image-recording material. At the end of this predetermined time, the sheet is uncoiled to reveal a positive image on one side and a negative image on the other side, the latter of course being displaced toward the trailing end of the sheet from the positive image by a distance at least equal to the length of the first convolution. This portion of the sheet at the trailing end supporting only a negative image on one side may, if desired, be trimmed from the remainder of the sheet supporting the positive image and the major portion of the negative image.

Reference is now made to FIGURE 1 of the drawing wherein there is illustrated a photographic product constructed according to the invention and useful in the method thereof together with the essential components of apparatus for performing this method. The product comprises a first or support sheet **12** the thickness of which

is shown in the drawings as exaggerated for purposes of illustration, it being understood that in practice the thickness of the sheet may be on the order of .001 to .004 inch. Supporting sheet **12** may be formed of any of the usual film base materials used in photography; however, paper is preferred because of its low cost and particularly when the purpose for which it is to be employed is the copying of documents. Sheet **12** is generally rectangular in shape and, with the exception of its length about which more will be said later, may conform substantially to the standard size or sizes of paper generally used commercially, e.g., 8½ x 11 inches or 8½ x 13 inches. Sheet **12** is coated on one surface with a layer of a photosensitive image-recording material such as a gelatino silver halide emulsion. This layer is approximately equal in size to the print which is to be made, i.e., the original document to be copied, and may include a leading edge spaced from the leading edge **14** of sheet **12** toward the trailing edge **16** of sheet **12**. The layer of photosensitive image-recording material may, if desired, completely cover one side of sheet **12**; or, in another embodiment, the layer of photosensitive material may terminate, as suggested, a predetermine distance from the leading edge of the sheet.

The image-recording layer is photoexposed in a conventional manner to produce an image therein. Exposure may be accomplished by an image-forming optical system or, in the case of document copying, either by direct or reflex exposure in conjunction with the document being copied. Following exposure, sheet **12** is attached at its leading end to a cylindrical supporting member **18** which may be rotated in order to coil sheet **12** around the periphery of the supporting member. The diameter of supporting member **18** is preferably as small as possible consistent with maintaining the requisite structural strength and rigidity inasmuch as the length of each convolution of the sheet, and particularly the first convolution which is essentially waste, is a function of the circumference of roll **18**. Various mechanisms may be employed for securing the leading end of sheet **12** to roll **18**, a preferred mechanism being to provide a pressure-sensitive adhesive on the leading end portion of sheet **12** on the same surface thereof as the layer of image-recording material. In an alternative embodiment, the leading end portion of the sheet and a section of the roll periphery may be provided with a contact adhesive having substantial sheer strength, yet relatively little strength in tension so that the sheet may be readily stripped from roll **18** when processing is complete.

Sheet **12**, in the form shown in FIGURE 1, is coiled on roll **18** with the image-recording material containing the negative image facing inwardly, this arrangement being preferred over an arrangement in which the image-recording material faces outwardly because it locates the waste material at one end of the sheet. The processing liquid, which is preferably quite viscous, is provided on sheet **12** on the same surface thereof as the image-recording material. The processing liquid is preferably dispensed from a tubular container **20**, very much like a drinking straw, as an elongated uniformly distributed mass extending substantially from side to side of the sheet or at least the area thereof to be treated, and located toward the trailing end of the sheet from the leading end of the sheet by a distance approximating the circumference of roll **18**, i.e., the length of the first convolution of the sheet. The mass of liquid is located on the sheet so as to become disposed between the outer surface of the coiled sheet at the leading end portion thereof and the inner surface of the coiled sheet at the leading edge of the area in which the positive transfer image is formed. The leading edge of the negative image, it will be noted, is thus spaced from leading edge **14** of sheet **12** by a distance greater (by the width of the mass of liquid) than the circumference of roll **18**, and a corresponding section at the opposite (trailing) end of sheet **12** which may be considered to constitute waste material.

The processing liquid is distributed from this mass betwen the outer surface of each convolution and the inner surface of the next succeeding convolution of sheet **12** as the sheet is being coiled. A pressure-applying member **22** juxtaposed with supporting member **18** and biased toward the supporting member is provided for distributing the processing liquid between and in contact with adjacent surfaces of superposed convolutions of sheet **12**. Although pressure member **22** is shown as a cylindrical roll, it may comprise any form of member providing a surface tangent with the surface of roll **18** along an axial line on that surface. For example, pressure member **22** may comprise a flat plate or bar which is either movable toward and away from roll **18**, and is biased toward the roll. Roll **18** and member **22** may comprise rigid materials such as metal or slightly pliant materials such as hard rubber and are designed to apply compressive pressure to the sheet progressively from its leading edge toward its trailing edge as the sheet is being coiled upon roll **18**.

As previously noted, the invention contemplates the formation of a positive diffusion-transfer image on the opposite surface of sheet **12** from the exposed image-recording material. Processes of this type and materials useful therein are disclosed in U.S. Patent No. 2,662,822, issued December 15, 1953, in the name of Edwin H. Land. Typical materials include silver halide as the image-recording material while the liquid processing composition comprises a silver halide developer, a silver halide solvent and an agent providing a silver precipitating environment for promoting the reduction of silver halide. The image-recording material may be coated on one side of ordinary bond paper while the transfer image is produced on the opposite side of the paper which requires substantially no special preparation for this purpose. During the processing, exposed silver halide is devolped to produce a negative image while a soluble silver complex is formed from undeveloped silver halide and is diffused from the silver halide layer and reduced to form an image in silver which is the positive of the subject matter of the latent image in the silver halide. The processing liquid may be distributed between opposite surfaces of sheet **12** as a thin layer in which the positive transfer image is formed. This layer is the result of the inclusion in the processing liquid of a thickening or film forming agent such as sodium carboxymethyl cellulose. However, in a preferred form of the invention, the processing liquid which is thickened to facilitate distribution is advanced between adjacent surfaces of the sheet primarily to effect the wetting of one or both surfaces of the sheet which absorb reagents from the mass of viscous liquid as the latter is moved relative to and in contact with the sheet surfaces. It is noted that in this latter process, even though the purpose of liquid distribution may not be to spread the liquid in a layer, the viscosity providing agent, being a film-forming material, tends to adhere to the sheets to form a layer which may be extremely thin; and this layer, however thin, is formed between the sheets and performs the function of retaining the convolutions of the sheets in superposition during the period required for formation of a transfer image. The silver transfer image is precipitated in the presence of the aforementioned precipitating agent, e.g., solid minute particles of a substance insoluble in the liquid for accelerating the reduction by the developer of silver bearing ions in solution; and this silver precipitating agent becomes affiliated with the surface of sheet **12** resulting in the formation of the transfer image thereon.

Coiling of sheet **12** and distribution of the processing liquid, herein designated **24**, is continued until the trailing edge of the exposed area of the image-recording layer has been advanced into superposition with the surface of the opposite side of sheet **12** to form a coil such as is shown in FIGS. 2 and 3 in which the layer of photosensitive image-recording material and the layer of liquid, which may be extremely thin, are designated **26**. The

mass of liquid at the bite of members 18 and 22 where successive convolutions of the sheets are brought into superposition may be considerable; and, in accordance with the invention, provision is made for collecting and retaining this mass of liquid now considered excess so that continued advancement of the sheet between members 18 and 22 does not result in distribution of the mass of liquid in contact with member 22 and/or the outer surface of sheet 12 at the trailing end portion thereof. The means for collecting and retaining excess processing liquid comprises a trapping sheet 28 secured to the opposite side of sheet 12 from the image-recording material at the trailing edge of the area in which the transfer image is formed. Trapping sheet 28 comprises a generally rectangular sheet of a material such as paper preferably equal in width to the width of sheet 12 and having a length substantially less than the length of sheet 12 and just sufficient to collect and retain the excess processing liquid.

Trapping sheet 28 is secured at its leading edge portion to sheet 12 by a strippable adhesive designated 30 so that at least the trailing edge portion of trapping sheet 28 is free for movement with respect to sheet 12. Roll 18 is rotated to cause the leading edge of trapping sheet 28 to enter the bite between members 18 and 22 on two successive occasions. During the first passage between members 18 and 22, trapping sheet 28 is located outermost and performs no function. However, during the second passage of the trapping sheet between members 18 and 22, the trapping sheet is disposed between successive convolutions of sheet 12, and the pressure exerted by member 22 is relieved so as to provide a space between trapping sheet 28 and the trailing end portion, designated 32, of sheet 12 in which the mass of excess processing liquid is collected and retained. The effect trapping of the excess processing liquid, member 22 is preferably displaced away from member 18 to provide the above-described space between trapping sheet 28 and trailing end portion 32 of sheet 12. Trailing end portion 32 is preferably coextensive with trapping sheet 28 and includes a leading edge spaced along sheet 12 from the leading edge of trapping sheet 28 by the length of the convolution of sheet 12 including the trapping sheet and the trailing end portion of the negative image, preferably so that trailing edge 16 of sheet 12 and the trailing edge of trapping sheet 28 are aligned when sheet 12 is completely coiled upon itself around roll 18.

The invention provides for separating the portion of the product retaining the collected excess processing liquid from the portion of sheet 12 comprising the positive print. To facilitate this separation, sheet 12 is precut, perforated or otherwise weakened at the leading edge of trailing end portion 32 along a transverse line designated 34. Sheet 12 is allowed to remain in a coiled condition during a predetermined imbibition period at the end of which the trailing end portion 32 and trapping sheet 28 are withdrawn from the coil, which is facilitated by the fact that there is no processing liquid between trapping sheet 28 and the outer surface of the preceding convolution of sheet 12. This may be accomplished by manually grasping the trailing end portion and the trapping sheet between the fingers, since the latter do not come into contact with the processing liquid, as the liquid is retained between the trapping sheet and the trailing end portion. Simultaneously with the withdrawal of the trailing end portion of the trapping sheet from the coil, the trailing end portion is torn from the remainder of sheet 12 along line 34 where sheet 12 had been precut to facilitate such tearing. Ridding the positive transfer print from the excess processing liquid is thus accomplished by a single, simple, easily performed motion while the excess processing liquid is retained at all times between a pair of sheets so that it does not come into contact with either the apparatus or the fingers of the operator. The processing liquid, by virtue of the film-forming agent, functions to adhere trapping sheet 28 to trailing end portion 32, and this coupled with the fact that the trapping sheet and the trailing end portion are both grasped causes the trapping sheet to strip away from sheet 12 to which it had originally been adhered thereby leaving a single sheet containing the positive transfer image and constituting a photographic-transfer print. The remainder of sheet 12 may then be uncoiled and, if desired, the trailing end portion of sheet 12 containing only a negative image on one side may be severed from the remainder of the sheet containing the positive image on the opposite side; and sheet 12 may be precut for this purpose so that separation of both the trapped liquid and the negative is performed in one operation.

In another embodiment of the invention, the image-recording material may be provided on the side of sheet 12 which faces outwardly when the sheet is coiled. In this embodiment, the negative image extends from adjacent the leading edge of sheet 12 and trapping sheet 28 is located with its leading edge adjacent the trailing edge of the exposed area. The mass of liquid is deposited on the opposite side of the sheet from the negative image at a location spaced from the leading edge of sheet 12 approximately the length of a single convolution. Stated differently, the positions of the negative and positive images are reversed. However, this embodiment is less preferred because it results in waste at both ends of sheet 12 rather than at only one end.

In another embodiment of sheet 12, the photosensitive layer may be supported on a stripping layer in turn supported on sheet 12; and the positive print may be subjected to an after treatment, e.g., application of a solvent for the stripping layer, to remove the image-recording layer containing the developed negative image. However, it is felt that for document-copying purposes, the presence of a negative image of the document on the reverse side of the positive copy of the document should not prove unduly objectionable particularly if material comprising sheet 12 is sufficiently opaque so that the negative image is not seen through the side of the paper supporting the positive image.

By virtue of the present invention, the production of a positive photographic print is reduced to a simple, easily performed process requiring only a minimum of apparatus which need not be expensive or complex and utilizes simple and inexpensive materials. The materials employed for each copy comprise a single sheet to which is attached a small sheet and a container of processing liquid. The apparatus includes, in addition to means for exposing the photosensitive material, means (not shown) for ejecting the fluid contents of the container onto the sheet, means for rotating roll 18 and means (not shown) for relieving pressure exerted by member 22 against roll 18, the means not shown being well known to those skilled in the art.

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 drawings shall be interpreted as illustrative and not in a limiting sense.

What is claimed is:

1. In a photographic product including a sheet designed to be treated with a liquid by coiling said sheet and distributing said liquid between and in contact with successive superposed convolutions of said coiled sheet, in combination:

a layer of a photosensitive image-recording material supported on the side of said sheet;

a retaining sheet approximately equal in width to the first-mentioned sheet and having a length which is substantially less than the length of said first-mentioned sheet;

said retaining sheet being secured to said first-mentioned sheet at the leading edge portion of said

retaining sheet with the trailing edge of said retaining sheet spaced from the trailing edge of said first-mentioned sheet by at least the length of a single convolution of said first-mentioned sheet when the latter is coiled such that said trailing edge of said first-mentioned sheet extends to said trailing edge of said retaining sheet when said sheets are coiled;

said retaining sheet being removably secured to said first-mentioned sheet; and

said first-mentioned sheet being precut along a transverse line substantially parallel with said trailing edge of said first-mentioned sheet and spaced therefrom by a distance substantially equal to the length of said retaining sheet in order to promote severance of the trailing end portion of said first-mentioned sheet from the remainder thereof.

2. The photographic product of claim 1 in which said first-mentioned sheet is provided at its leading end on said one surface with a pressure sensitive adhesive.

3. The photographic product of claim 1 in which said retaining sheet is secured to said first-mentioned sheet by a strippable adhesive.

4. In a photographic product including a sheet designed to be treated with a liquid by coiling said sheet and distributing said liquid between and in contact with successive superposed convolutions of said coiled sheet, in combination:

a layer of a photosensitive image-recording material supported on one side of said sheet;

a retaining sheet approximately equal in width to the first-mentioned sheet and having a length which is substantially less than the length of said first-mentioned sheet;

said retaining sheet being secured to the other side of said first-mentioned sheet at the leading edge portion of said retaining sheet with the trailing edge of said retaining sheet spaced from the trailing edge of said first-mentioned sheet by at least the length of a single convolution of said first-mentioned sheet when the latter is coiled such that said trailing edge of said first-mentioned sheet extends to said trailing edge of said retaining sheet when said sheets are coiled;

said retaining sheet being removably secured to said first-mentioned sheet; and

said first-mentioned sheet being precut along a transverse line substantially parallel with said trailing edge of said first-mentioned sheet and spaced therefrom by a distance substantially equal to the length of said retaining sheet in order to promote severance of the trailing end portion of said first-mentioned sheet from the remainder thereof.

5. In a photographic product including a sheet designed to be treated with a liquid by coiling said sheet and distributing said liquid between and in contact with successive superposed convolutions of said coiled sheet, in combination:

a layer of a photosensitive image-recording material on one side of said sheet;

a retaining sheet approximately equal in width to the first-mentioned sheet and having a length which is substantially less than the length of said first-mentioned sheet;

said retaining sheet being secured to said one side of said first-mentioned sheet at the leading edge portion of said retaining sheet with the trailing edge of said retaining sheet spaced from the trailing edge of said first-mentioned sheet by at least the length of a single convolution of said first-mentioned sheet when the latter is coiled such that said trailing edge of said first-mentioned sheet extends to said trailing edge of said retaining sheet when said sheets are coiled;

said retaining sheet being removably secured to said first-mentioned sheet; and

said first-mentioned sheet being precut along a transverse line substantially parallel with said trailing edge of said first-mentioned sheet and spaced therefrom by a distance substantially equal to the length of said retaining sheet in order to promote severance of the trailing end portion of said first-mentioned sheet from the remainder thereof.

6. In a photographic film assemblage including a generally rectangular sheet designed to be treated with a liquid by coiling said sheet and distributing said liquid between and in contact with succesive superposed convolutions of said coiled sheet, in combination:

a layer of a photosensitive image-recording material supported on one side of said sheet and covering at least an exposure area extending substantially from side to side of said sheet and from a leading edge, spaced from the leading end of said sheet toward the trailing end of said sheet by slightly more than the length of a convolution thereof, when the latter is coiled, over a major portion thereof;

a generally rectangular trapping sheet at least equal in width to said exposure area and having a length which is substantially less than the length of said first-mentioned sheet;

said trapping sheet being secured to one side of said first-mentioned sheet with the leading edge of said trapping sheet spaced from the trailing edge of said exposure area and the trailing edge of said trapping sheet spaced from the trailing edge of said first-mentioned sheet, by said length of a single convolution of said first-mentioned sheet so that said trailing edges of said sheets are aligned when said first-mentioned sheet is completely coiled;

said trapping sheet being secured to said first-mentioned sheet at the leading edge portion of said trapping sheet by a strippable adhesive;

said first-mentioned sheet being precut along a transverse line substantially parallel with said trailing edge of said first-mentioned sheet and spaced therefrom by a distance substantially equal to the length of said trapping sheet in order to promote severance of the trailing end portion of said first-mentioned sheet from the remainder thereof.

7. A method of producing a positive photographic print comprising:

exposing an area of a layer of photosenstive image-recording material carried on one side of a first sheet to produce an image in said layer;

depositing on said one side of said sheet a liquid capable of reacting with said exposed image-recording material to produce a positive diffusion-transfer image, said liquid being deposited as an elongated mass extending substantially from side to side of said area across said sheet and located adjacent the leading edge of said area;

coiling said first sheet upon itself around a supporting member with said one side facing inwardly to form a coil having a first innermost convolution approximately equal in circumference to the distance between the leading and trailing edges of said area.

while coiling said sheet around said supporting member applying compressive pressure progressively to said sheet to distribute said liquid between and in contact with adjacent surfaces of successive convolutions of said sheet toward the trailing end thereof;

compressive pressure being applied to said sheet by urging a second member toward and into juxtaposition with said supporting member while advancing said sheet between said members into said coil;

continuing to advance said second sheet between said members into said coil while applying compressive pressure to said first sheet until a second sheet adhered to the other side of said first sheet in the vicinity of said trailing end of said first sheet is advanced

into said coil and becomes engaged between said members for a second time;

whereupon the pressure exerted upon the trailing end portion of said first sheet superposed with said second sheet disposed thereunder is relieved to collect and retain said liquid between said trailing end portion and said second sheet;

retaining said sheets in a coiled condition during a predetermined period during which said liquid is reacted with said image-recording material to produce a positive diffusion-transfer reversal image between convolutions of said first sheet on said other side thereof; and

thereafter stripping said second sheet from said first sheet together with said trailing end portion of said first sheet and said liquid retained therebetween, separating said trailing end portion from the remainder of said first sheet carrying said image and uncoiling said remainder of said first sheet comprising said positive print.

8. The method of claim **7** in which said first sheet is coiled by attaching said first sheet at its leading end to a generally cylindrical supporting member, urging a second member into juxtaposition with said supporting member and rotating said supporting member to coil said sheet thereon and distribute said processing liquid.

9. The method of claim **8** in which said first sheet is attached to said supporting member by a pressure sensitive adhesive.

10. The method of claim **7** in which said mass of liquid is deposited on said other side of said first sheet and said first sheet is coiled with said one side facing outwardly.

11. A method of producing a positive photographic print comprising:

photoexposing an area of a layer of photosenstive image-recording material carried on one side of a generally rectangular first sheet to produce an image in said layer, said area and said sheet being substantially rectangular and having leading and trailing edges, said leading edge of said area being spaced from said leading edge of said sheet at least a predetermined distance;

depositing on said one side of said sheet a liquid capable of reacting with said exposed image-recording material to produce a positive diffusion-transfer image, said liquid being deposited on said sheet as an elongated mass extending substantially from side to side of said area across said sheet adjacent said leading edge of said area;

coiling said first sheet upon itself around a support

member with said one side facing inwardly to form a coil having a first, innermost convolution approximately equal in circumference to said predetermined distance;

while coiling said sheet around said supporting member, applying compressive pressure progressively to said sheet to distribute said liquid between and in contact with adjacent surfaces of successive convolutions of said sheet toward said trailing edge thereof;

compressive pressure being applied to said sheet by urging a second member toward and into juxtaposition with said supporting member while advancing said sheet between said members into said coil;

continuing to advance said second sheet between said members into said coil while applying compressive pressure to said first sheet until a second sheet, having a leading edge adhered to the other side of said first sheet and spaced therefrom by said predetermined distance, is advanced into said coil and becomes engaged between said members a second time;

whereupon the pressure exerted upon the trailing end portion of said first sheet superposed with said second sheet is relieved in order to collect and retain said liquid between said trailing end portion and said second sheet;

retaining said sheets in a coiled condition during a predetermined processing period during which said liquid is reacted with said image-recording material to produce a positive diffusion-transfer reversal image between convolutions of said first sheet on said other side thereof; and

thereafter stripping said second sheet from said first sheet together with said trailing end portion of said first sheet and said liquid retained therebetween, separating said trailing end portion from the remainder of said first sheet carrying said image and uncoiling said remainder of said first sheet comprising said positive print.

References Cited by the Examiner

UNITED STATES PATENTS

2,088,145	7/1937	Von Biehler	96—71
2,686,717	8/1954	Land	96—29
2,740,717	4/1956	Yutzy et al.	96—29
2,882,151	4/1959	Yutzy et al.	96—29

NORMAN G. TORCHIN, *Primary Examiner.*

A. E. TANENHOLTZ, J. RAUBITSCHEK,
Assistant Examiners.