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NOVEL DETACHABLE MASKS

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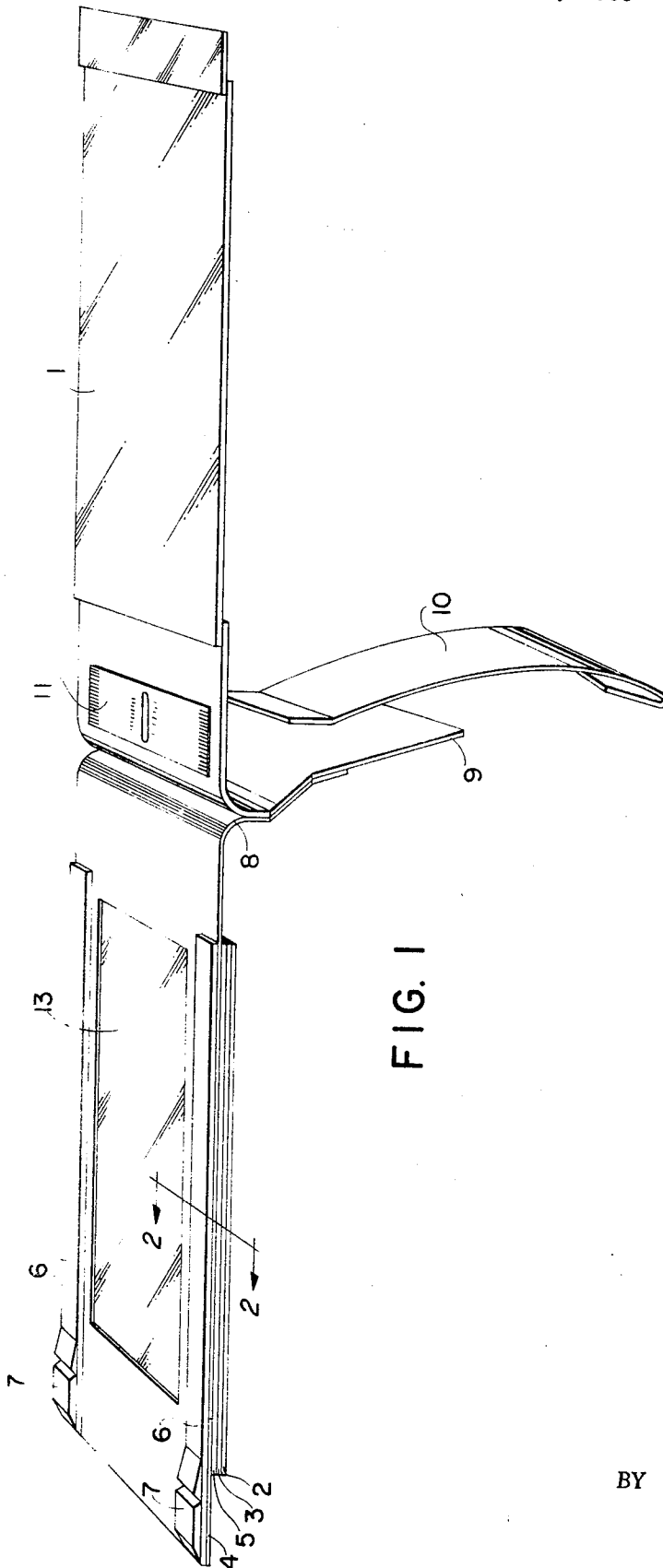


FIG. 1

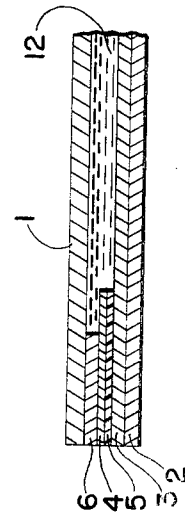


FIG. 3

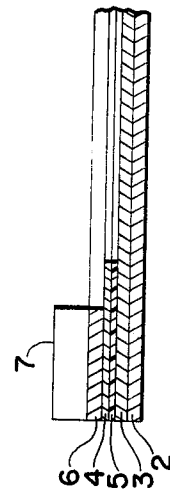


FIG. 2

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NOVEL DETACHABLE MASKS

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12 Claims

ABSTRACT OF THE DISCLOSURE

A photographic diffusion transfer image-receiving sheet comprising a mask directly adhered thereto by an adhesive comprising a mixture of polyvinyl pyrrolidone and a copolymer of vinyl acetate and a monoethylenically unsaturated monocarboxylic acid.

This invention relates to photography and more particularly to products for use in a photographic diffusion transfer process. Specifically, the present invention relates to an improved system for masking the image-receiving sheet of a diffusion transfer type of photographic product.

Presently, photographic film products are available for producing positive image prints almost immediately after exposing the film to an image-forming source of actinic radiation by the well-known diffusion transfer process. The film product comprises a photosensitive sheet containing material which is diffusible during the development process through a layer of alkaline developer fluid to an image-receiving sheet. The image-receiving sheet is superimposed onto the photosensitive sheet following photoexposure and accepts the transferred material thereby forming a positive image of the desired photographic subject. In order to provide a neat, white border on the final print, a mask element, which has a cut out central portion slightly smaller in size than the image-receiving sheet, is adhered thereto. The mask serves a dual purpose in providing a flow space between the two sheets for the developer fluid in addition to supplying a border. The developer fluid is carried in a sealed rupturable pod which is attached to one of the sheets. Following photoexposure, the pod is caused to rupture, and developing fluid is spread between the two sheets by drawing them between two slightly separated steel rollers. The developer fluid effects development of a latent negative image within the photosensitive sheet, and materials, such as dyes when color film is used, or silver when black and white film is used, are transferred by imbibition from the photosensitive sheet through the developer fluid layer to the image-receiving sheet where the transfer image is formed. The developer fluid not only performs the function of photo development, but may also cause the photosensitive sheet to adhere to the outer surface of the mask to form a light-tight sandwich between the sheets.

Following photo development, the image-receiving sheet is separated from the photosensitive sheet and mask. This operation is facilitated by the use of an adhesive bond between the mask and the image-receiving sheet which is degradable by the developer fluid so that, upon completion of the processing cycle, the final print can be stripped easily and cleanly from the mask while leaving the mask adhered to the photosensitive sheet. The time necessary to cause the degradation is called release time. The release time must be at least as fast as the processing time or else the final print will not cleanly separate from the mask and adhesive residues will appear on the print.

The presently available commercial black and white photographic prints formed by the diffusion transfer process allow for the production of a final print after a processing period of about ten seconds. Within this time period, the bond between the mask and the image-

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receiving sheet must have been sufficiently degraded to allow for easy and clean removal of the image-receiving sheet from the mask. This bond is presently provided by coating the mask and receiving sheet with different resinous materials, respectively, preferably from water solutions, and sealing one resinous layer to the other under heat and pressure. However, for effective operation of this process both temperature and pressure are critical in that the use of insufficient temperature and pressures results in the formation of poor bonds, and the use of very high temperatures and pressures causes improper process formation of the final print near the mask. This criticality requires constant stoppage of machinery for adjustment, making high speed production of film units extremely difficult.

Processing time for the production of color prints by the diffusion transfer process is presently about sixty seconds, which requires the use of an adhesive bond between the mask and the image-receiving sheet which can withstand the contact of the developer solution for approximately thirty-five to fifty seconds. The color film material presently utilizes a different mask adhesive than used for the black and white films, which requires the use of different machinery for the coating of the mask from that used to coat the mask for the black and white films. The adhesive also suffers from temperature-pressure problems with regard to heat sealing, as noted above.

The adhesive bond between the mask and the image-receiving sheet must be resistant to weather conditions, such as wind and humidity, in that the bond should not be degraded until the photographic image has been substantially formed. The adhesive used in providing the bond between the mask and the image-receiving sheet must, therefore, be able to withstand for critical periods of time the high alkalinity of the developing solution, and yet be degradable by the developer solution so that, after a specified time period, the separation of the mask and the image-receiving sheet may be facilitated. Further, the adhesive should be of such a nature that variation of the degradation or release time may be accomplished in a simple manner. The adhesive should also be easily applied to the mask, preferably from a non-aqueous solution, and should act consistently throughout the wide ranges of heat and pressure which may be used during the sealing operation in the manufacturing process, since, as noted, criticality in this area severely limits high speed production.

It is, therefore, an object of the present invention to provide an improved mask adhesive for use in a diffusion transfer photographic process, which can be used over a wide range of temperatures and pressures to provide desired adhesive qualities and release times.

It is also an object of the present invention to provide an improved photographic product utilizing the adhesive of the present invention.

Other objects of the present invention are to provide a sheet of image-receptive material for receiving a photographic transfer image and having means thereon which frame the image and which are bonded to said image-receiving sheet, and especially to provide framing means in the form of a mask which is temporarily secured to said image-receiving sheet and to provide a bond between said image-receiving sheet and a mask superposed thereon, adapted to be released upon the application of moisture to said bond.

Further objects of the present invention are to provide means of effecting the temporary adhesive application of a predeterminedly shaped mask to an appropriate image-receiving stratum and to provide a means of disconnecting said mask from said image-receiving stratum.

Still further objects of the present invention are to

provide suitable means of contacting a moisture-releasable bond with an appropriate adhesive-capacity-decreasing liquid as, for example, a photographic processing composition, wherein said means comprises contacting said bond with said liquid processing composition concurrently with the superpositioning of an exposed negative element upon an image-receiving stratum to provide release of an adhered mask from said image-receiving stratum substantially simultaneously with the dissociation of said image-receiving stratum from contact with said negative element.

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

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

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

FIG. 1 is a diagrammatic perspective view of one embodiment of the invention and illustrates the use thereof in conjunction with photosensitive sheet material;

FIG. 2 is a diagrammatic exaggerated sectional view along the line 2—2 of FIG. 1; and

FIG. 3 is a diagrammatic exaggerated sectional view similar to FIG. 2 wherein the image-receiving sheet is shown in superposition to the photosensitive sheet.

The term "moisture-releasable" as used herein is intended to signify that property of a bond whereby a consequential reduction of said bond's exhibited adhesive capacity occurs upon liquid permeation of said bond.

In a preferred embodiment of the invention, it is desirable to provide framing means in the form of a mask, preferably of a relatively thin flexible material, on the surface of the image-receiving sheet or film which is adapted to receive the transfer image. This mask is provided with an aperture adapted to define the picture area on the image-receptive material while the portions of the mask which surround the aperture confine the transferred material thereto. It is necessary to temporarily bond or adhere this mask to the surface of the image-receiving sheet in such a way so that the image-receiving sheet may be displaced from the mask in providing the finished positive print. At the same time, the bond between the mask and the image-receiving sheet must have sufficient strength to hold the mask on the sheet during handling, storage and use of the film.

For purposes of illustration, the invention is disclosed in the form of a film unit normally associated with film packs disclosed in U.S. Pat. No. 3,080,805, issued Mar. 12, 1963, though the present invention may also be applied to other forms of film.

Referring to FIG. 1, 1 represents a photosensitive sheet having its photosensitive surface extending upward. A positive image-receiving sheet, as illustrated, comprises a support, 2, and an image-receiving layer, 3, having its reception area, 13, defined by mask, 4, said layer, 3, comprising, for example, a thermoplastic material. Mask, 4, is adhesively secured to the image-receiving sheet by means of an adhesive layer, 5. A spacer strip, 6, may, optionally, be adhered to the mask to allow a larger quantity of developing fluid to be interposed between the positive image-receiving sheet and the photosensitive sheet when in superposed position, to compensate for dimensional variations in the photosensitive layer. Spacer blocks, 7, are secured to the spacer strip, if used, or to the mask to provide a raised area at the end of the film for accommodating excess developer fluid which may be present. The remainder of the film comprises an extension of the mask denoted by 8, secured to leader end sheet, 9, which

is secured to the photosensitive sheet, and a pull tab, 10, secured to the leader end sheet. The components 8, 9 and 10 are elements of structure for film pack use described in U.S. Pat. No. 3,080,805. Attached to the leader end sheet is a rupturable container, 11, containing developer fluid, 12.

In use, the photosensitive layer is exposed to record the desired image thereon and is then brought into contact with the positive image-receiving layer, the position of the elements being shown by FIG. 3. The developer fluid container is ruptured by drawing the film through a pair of pressure-applying rollers (not shown). The developer fluid then occupies the area between the photosensitive sheet and the positive image-receiving sheet as indicated in FIG. 3, and allows transfer-image-providing components to be transferred from the photosensitive sheet to the positive image-receiving sheet. It also permeates mask and image-receiving strata and causes the adhesive bond between the mask and the positive image-receiving sheet to swell and be eroded so that, after the processing is accomplished, the positive image-receiving sheet may be removed from the mask without tearing the mask or leaving adhesive residues on the positive print. Wetting of the mask serves not only to erode the adhesive bond, but also sets up a preferential bond between the mask, the processing composition, and the photosensitive sheet so that, in attempting to remove the positive image-receiving layer from the mask, the mask tends to adhere more firmly to the processing composition and the photosensitive sheet than to the positive image-receiving sheet thereby facilitating removal of the image-receiving sheet from the mask. This adherence is also desirable to prevent light damage to the photosensitive sheet during processing, for example, as the film is removed from the camera during the said process.

It has been found that the utilization of a moisture-release system results in a remarkably clean separation when the print-receiving element is removed from contact with the mask. This may be attributed to the substantially uniform decrease in the exhibited adhesive capacity of the moisture-releasable bond upon permeation by the liquid photographic processing composition. The separation of the print from contact with the mask by reduction of the adhesive forces has the singular advantage in that there is exhibited no tendency for laceration of the print occurring due to variances in the adhesive binding forces inherent in pressure stripping methods.

It should be pointed out, in connection with the diagrammatic representation of FIG. 3, that the layer of spread liquid, both during and after the photographic processing, dries rapidly to form a thin film. Thus, when imbibition time has been completed and the removable print section is ready to be detached from the remainder of the film unit, the film formed by the spread liquid is considerably thinner than shown, although it is not completely dry within a minute of spreading. Drying is completed by evaporation of solvent from the surface of the spread composition, which is exposed as a result of removal of the image-receiving sheet.

Referring more particularly to the film structure, the mask is made of any liquid permeable material such as tissue paper, glassine paper, kraft paper, etc. The paper is preferably used in a thickness of 0.00125 inch, though other thicknesses from 0.001 to 0.002 of an inch can be used. It is evident that variances in gauge or porosity will have a marked effect on bond degradation time since they would be prime parameters in determining how long it would take for developing solution to come in intimate contact with the bonded surfaces. Accordingly, uniformity in mask material properties is necessary to achieve optimum results with any given liquid-degradable adhesive composition.

It is preferred to use the aforementioned spacer strips to attain, where needed, increased thickness. The spacer strips may be made of the same material as the mask and are firmly adhered to the mask by means of a pressure-sensi-

tive adhesive such as a blend of unvulcanized rubber and a tack-producing resin.

The rupturable container may be of the type shown and described in Pat. No. 2,543,181, issued Feb. 27, 1951, and, in general, comprises a rectangular blank of fluid- and air-impervious sheet material folded longitudinally upon itself to form two walls which are sealed to one another along their longitudinal and end margins to form a cavity in which the processing fluid is contained. The longitudinal marginal seal is made weaker than the end seal so as to become unsealed in response to hydraulic pressure generated within the fluid contents of the container by the application of compressive pressure to the walls of the container. The container is mounted on the leader end sheet with its longitudinal marginal seal directed toward the leading edge of the photosensitive sheet.

According to the present invention, the mask is adapted to be directly bonded or sealed to, for example, a thermoplastic top layer of the image-receiving sheet by thermal-activation of the thermoplastic layer and adhesive layer. The term "thermal-activation" as utilized herein is intended to signify that property whereby adhesion of the opposed strata is promoted by heat. It may be accomplished by means of, for example, contact infrared, dielectric heating, etc.

Where thermal-activation is employed, preferably, the sealing is carried out by the use of a heated platen having a width dimension somewhat greater than the masking sheet and a length dimension approximating the length of the picture frame portion. For example, an image-receiving sheet with a mask superposed thereon in registered relation may be placed on a flat support and the heated platen pressed into the outer surface of the mask. With a platen having dimensions of 7 x 3 and $\frac{5}{8}$ inches, temperatures above 200° F. for 0.30 second at 300 pounds per square inch pressure have proved satisfactory for sealing a 0.00125 of an inch high-porosity, adhesive-coated mask paper to the image-receiving sheet.

The direct sealing of the mask to the image-receiving sheet by means of the adhesive layer results in a substantially complete and uniform bonding of the opposed strata. The bond is of sufficient strength to hold the mask flat and smooth on the surface of the image-receiving sheet during manufacture, storage and use of the product until such time as the mask and image-receiving sheet are to be separated.

In accordance with the present invention, there is provided an improved adhesive for adhering the mask to the image-receiving sheet used in diffusion transfer photographic processes comprising, in admixture, a vinyl pyrrolidone resin having a molecular weight of, preferably, more than one hundred thousand, and a copolymer of about 80% to 95% vinyl acetate and about 20% to 5% of a low molecular weight mono-ethylenically unsaturated mono-carboxylic acid. Variations in the concentration of the copolymer in relation to the vinyl pyrrolidone resin concentration provides variations in developer degradation time of the adhesive of from approximately five seconds to about two minutes, so that this one adhesive mixture can be easily modified to accommodate the release times of numerous diffusion transfer products. Also, the heat sealing temperature is not critical and the adhesive qualities are not affected by humidity nor variations in thickness.

The vinyl pyrrolidone resin which is used in the present invention is preferably a homopolymer having a molecular weight of at least three hundred thousand. While the homopolymers are preferred, copolymers may also be used which contain a major proportion of the vinyl pyrrolidone and preferably at least 90%. The vinyl pyrrolidone may be copolymerized with any mono-ethylenically unsaturated monomeric material such as styrene, ethyl acrylate, methyl methacrylate, etc., though it is preferred that the material have no functional group other than the $>C=C<$ group. A suitable polyvinyl pyrrolidone

resin having a molecular weight of 360,000 is available commercially from General Aniline and Film Company, under the designation K-90.

The copolymer which is admixed with the vinyl pyrrolidone resin is a copolymer of vinyl acetate with a low molecular weight mono-ethylenically unsaturated mono-carboxylic acid. These acids may be illustrated by acrylic acid, methacrylic acid, crotonic acid, etc., crotonic acid being preferred. A suitable vinyl acetate-crotonic acid copolymer containing 90% vinyl acetate is commercially available from National Starch Company, under the designation Resyn 28-1300.

It must be noted that, where desired, the image-receiving sheet may have coated thereon a moisture-permeable, thermoplastic polymer layer functioning not as an image-receiving layer but, for example, as a strip and/or protective coating to prevent adherence of the photographic processing composition to the print-receiving element and/or to provide protection of said element against abrasion and laceration.

The preferred seal exhibits wet strength failure upon contact of said bond with a liquid; that is, it results in a linear reduction of the adhesive force according to the degree of liquid permeation. It is especially desirable that the aforementioned bond be one in which substantially complete release of the adhesive capacity between the respective mask and image-receiving strata occurs within the desired optimum photographic processing interval of approximately one minute for color diffusion transfer processes. However, where it is desired that the processing interval be increased or decreased to compensate for temperature variations, utilization of various photographic processing reagents or to permit utilization of imbibition techniques requiring a longer or shorter duration, as for example, in certain diffusion transfer color processes, the component ratio of the mask adhesive may be varied over a wide range to suit the requirements of the operator or an image-receiving stratum may be selected such that wet strength failure of the direct seal occurs in substantially the time interval desired.

The particular physical admixture of polymers which is found to be especially useful in keeping the mask adhered to the positive receiving sheet for a sufficient time to complete development of the image is a mixture of a copolymer of vinyl acetate and crotonic acid with polyvinyl pyrrolidone. It is theorized that the polyvinyl pyrrolidone actually contributes good heat sealing characteristics to the structure over wide temperature and pressure ranges. The polyvinyl acetate-crotonic acid copolymer appears to act as a valve or timing mechanism and results in allowing intimate contact between the adhesively bonded surfaces and the developing fluid for approximately the desired time. The bond must not degrade prematurely due to vibrations, wind, or other externally acting forces.

Since the copolymer of vinyl acetate and crotonic acid probably acts as a timing valve, it is evident that for a given desired development time the proportion of copolymer in the polyvinyl pyrrolidone-copolymer admixture will be somewhat critical. It has empirically been found that for a desired separation time of forty-five seconds the preferred amount of copolymer in the admixture is about 40% by weight. An admixture with only 35% copolymer results in bond degradation too soon while an admixture containing 45% copolymer does not degrade quickly enough. It is evident, therefore, that the ratio of polyvinyl pyrrolidone to vinyl acetate-crotonic acid copolymer in the admixture will depend upon the desired bond release time and may be easily determined by people of ordinary skill in this art.

The utilization of mask paper base stock treated with the adhesive admixture of the present invention permits the bonding of the mask to the top layer of the image-receiving sheet at a temperature considerably lower than the temperature generally employed to bond raw, un-

treated stock masks. For example, a temperature within the approximate range of 350 to 375° F. would generally be required to adequately laminate a raw stock mask to a thermoplastic top layer of a typical color-image-receiving sheet. However, as noted above, it has been found that a satisfactory lamination can be accomplished with the treated mask paper of the instant invention at temperatures as low as 220° F. Utilization of such low temperatures allows the employment of print-receiving elements which would ordinarily be adversely effected by the temperatures necessarily employed in the lamination of raw stock masks.

The previously mentioned liquid processing composition for forming a silver transfer image comprises a silver halide developer, a silver halide solvent and a viscous solution of a film-forming material, such, for example, as sodium carboxymethyl cellulose, and an alkaline material soluble therein. Suitable compositions are described in U.S. Pats. Nos. 2,759,825 and 2,823,122.

It necessarily follows from the nature of the invention herein disclosed that the processing composition may be modified over a wide range to suit the requirements of the operator and to provide, in the preferred embodiment, moisture from the aqueous and/or organic solvent, sufficient to cause wet strength failure of the adhesive bond within the desired time interval upon contact of said bond with said processing composition.

It is to be understood that in carrying out the process of this invention, dispensing the moisture necessary to effectuate a decrease in the exhibited adhesive force of the bond may, where desired, be accomplished, for example, by immersing, coating, spraying, flowing, etc., and the exposed photosensitive element may be superposed prior to, during or after wetting, onto the print-receiving element.

The precise mechanism through which the mask adheres to the image-receiving sheet is not known. Two theories are proposed in order to explain the adhesive effect. Firstly, the vinyl pyrrolidone admixture with the vinyl acetate-crotonic acid copolymer, for example, may actually form adhesive bonds with the uppermost layer on the receiving sheet. These bonds would be moisture degradable, probably as a result of the swelling action provided by intimate contact with a liquid solution which, in this case, would be an alkaline processing composition. A second theory is that the admixture coated upon the mask material acts as a plasticizer for a thermoplastic top layer on the image-receiving sheet to which it is adhered. The use of the admixture as a plasticizer for the thermoplastic material effects an activation of the thermoplastic surface whereby lamination is affected by the application of heat and pressure. It is probable that the plasticized top layer of the image-receiving sheet provides a tacky surface which facilitates lamination of the mask directly thereto.

The bond degradation between the receiving sheet and mask probably takes place due to a mechanism comprising both swelling and solvation. The erosion of the polyvinyl pyrrolidone bond is inhibited by the presence of the vinyl acetate-crotonic acid copolymer—the vinyl acetate inhibiting permeation of the developing fluid due to its natural hydrophobicity. The crotonic acid constituent aids in determining release time due to the solubilization of its carboxyl groups in, for example, an alkaline processing solution. It is known that both the polyvinyl pyrrolidone and a thermoplastic top layer of the receiving sheet which may be polyvinyl alcohol and may contain a polyvinyl pyridine, such as poly-4-vinyl pyridine, as disclosed in U.S. Pat. No. 3,148,061, issued Sept. 8, 1964, will swell appreciably when contacted with the developing solution. This would provide an additional mechanism for bond degradation since the swollen polymers would be substantially non-adherent and would exert little holding force upon the fibers of the mask material.

The polyvinyl pyrrolidone admixture with the vinyl acetate-crotonic acid copolymer may be applied to the face of the mask by various coating techniques, such as with a doctor blade, flexograph, gravure roll, spraying, immersion, etc. Generally, it may be applied at room temperature and dried in warm air.

The invention will be illustrated in greater detail in conjunction with the following specific examples which set out representative processes for masking the transfer image by utilizing a preferred mask paper exhibiting a high porosity with high density and surface roughness and which has been determined to be especially useful in the practice of this invention. These examples, however, are not limited to the details therein set forth and are intended to be illustrative only.

EXAMPLE I

A composition containing the following constituents was prepared:

	Parts
Polyvinyl pyrrolidone, approximate molecular weight 360,000 (commercially available from General Aniline & Film Company, polyvinyl pyrrolidone resin K-90) -----	3
Vinyl acetate-crotonic acid copolymer (commercially available from National Starch Company as Resyn 28-1300) -----	2
Isopropanol -----	6
Methylethyl ketone -----	4

The solvents were mixed at room temperature and the polymers were added slowly with agitation. Mixing was for about 4 hours until a viscosity of 150-250 cps. was attained.

The treated mask material was laminated to a standard receiving sheet used in the commercially available Type 108 Polaroid color film packs at various temperatures and at 300 p.s.i. for 0.3 sec. dwell to determine; (1) temperature ranges at which adequate lamination is achieved; and (2) temperature ranges which provide desired wet-release characteristics. The following chart indicates the degree of lamination achieved at varying temperatures:

Temperature of—	Lamination quality
200 -----	Poor.
220 -----	Fair.
240 -----	Good.
260 -----	Do.
280 -----	Very good.
300 -----	Do.
320 -----	Excellent.
340 -----	Do.
360 -----	Do.
380 -----	Do.

Wet-release tests of the sample laminated at 280° F. when contacted with an alkaline developing solution used in commercially available Type 108 Polaroid Color film packs provided the following tabulated results:

Seconds:	Release
10 -----	Very poor.
20 -----	Poor.
30 -----	Fair.
40 -----	Good.
50 -----	Very good.
60 -----	Do.

Wet release tests of the sample laminated at 320° F. when contacted with the alkaline developing solution provided the following tabulated results:

Seconds:	Release
10 -----	Very poor.
20 -----	Do.
30 -----	Poor.
40 -----	Fair.
50 -----	Good.
60 -----	Very good.

EXAMPLE II

The procedure of Example I was carried out using the following mixture:

	Parts
Polyvinyl pyrrolidone, approximate molecular weight 360,000 (commercially available from General Aniline & Film Company, polyvinyl pyrrolidone resin K-90)	5
Vinyl acetate-crotonic acid copolymer (commercially available from National Starch Company as Resyn 28-1300)	7
Isopropanol	10
Methylethyl ketone	3
	6
	4

The intimately mixed composition was coated onto the paper used in Example I at a weight of 5 pounds per 3,000 square feet and was laminated to the receiving sheet as described above.

The following table indicates the degree of lamination achieved at varying temperatures:

Temperature of—	Lamination quality
200	Poor.
220	Fair.
240	Good.
260	Do.
280	Very good.
300	Do.
320	Excellent.
340	Do.
360	Do.
380	Do.

Wet release tests for the sample laminated at 280° F. when contacted with the alkaline developing solution provided the following tabulated results:

Seconds:	Release
10	Very poor.
20	Fair.
30	Good.
40	Very good.
50	Excellent.
60	Do.

Wet release tests of the sample laminated at 320° F. when contacted with the alkaline developing solution provided the following tabulated results:

Seconds:	Release
10	Very poor.
20	Fair.
30	Good.
40	Very good.
50	Excellent.
60	Do.

EXAMPLE III

The procedure of Example I was carried out using the following mixture:

	Parts
Polyvinyl pyrrolidone, approximate molecular weight 360,000 (commercially available from General Aniline & Film Company, polyvinyl pyrrolidone resin K-90)	1
Vinyl acetate-crotonic acid copolymer (commercially available from National Starch Company as Resyn 28-1300)	1
Isopropanol	6
Methylethyl ketone	4

The intimately mixed composition was coated onto the paper used in Example I at a weight of 6.4 pounds per 3,000 square feet and was laminated to the receiving sheet as described above.

The following table indicates the degree of lamination achieved at varying temperatures:

Temperature of—	Lamination quality
200	Poor.
220	Fair.
240	Good.
260	Do.
280	Very good.
300	Do.
320	Excellent.
340	Do.
360	Do.
380	Do.

When release tests for the sample laminated at 280° F. when contacted with the alkaline developing solution provided the following tabulated results:

Seconds:	Release
10	Very poor.
20	Poor.
30	Fair.
40	Do.
50	Good.
60	Do.

Wet release tests of the sample laminated at 320° F. when contacted with the alkaline developing solution provided the following tabulated results:

Seconds:	Release
10	Very poor.
20	Do.
30	Poor.
40	Do.
50	Fair.
60	Good.

EXAMPLE IV

The procedure of Example I was carried out using the following mixture:

	Parts
Polyvinyl pyrrolidone, approximate molecular weight 360,000 (commercially available from General Aniline & Film Company, polyvinyl pyrrolidone resin K-90)	3
Vinyl acetate-crotonic acid copolymer (commercially available from National Starch Company as Resyn 28-1300)	2
Methanol	10

The intimately mixed composition was coated onto the paper used in Example I at a weight of 3.5 pounds per 3,000 square feet and was laminated to the receiving sheet as described above.

The following table indicates the degree of lamination achieved at varying temperatures:

Temperature of—	Lamination quality
200	Poor.
220	Fair.
240	Good.
260	Do.
280	Very good.
300	Do.
320	Excellent.
340	Do.
360	Do.
380	Do.

Wet release tests for the sample laminated at 280° F. when contacted with the alkaline developing solution provided the following tabulated results:

Seconds:	Release
10	Very poor.
20	Poor.
30	Fair.
40	Do.
50	Do.
60	Good.

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Wet release tests of the sample laminated at 320° F. when contacted with the alkaline developing solution provided the following tabulated results:

Seconds:	Release	
10	Very poor.	5
20	Do.	
30	Poor.	
40	Do.	
50	Fair.	
60	Good.	10

EXAMPLE V

Standard mask paper as described in Example I was immersed in glycerin and allowed to dry. It was then laminated to a type 108 Polaroid color film pack receiving sheet at various temperatures and at 300 p.s.i. for a 0.3 second dwell. The following table indicates the degree of lamination achieved at varying temperatures:

Temperature of—	Lamination quality	
200	Very poor.	20
220	Do.	
240	Do.	
260	Poor.	
280	Do.	25
300	Fair.	
320	Do.	
340	Good.	
360	Very good.	
380	Excellent.	30

Wet release valuations for the composition laminated at 360° F. are as follows:

Seconds:	Release	
10	Very poor.	35
20	Fair.	
30	Good.	
40	Very good.	
50	Excellent.	
60	Do.	40

The preceding examples clearly demonstrate the wide range of temperatures which may be used to satisfactorily laminate the mask sheet of the instant invention to an image-receiving sheet for use in a photographic diffusion transfer process.

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

What is claimed is:

1. A masked image-receiving sheet for use in a diffusion transfer photographic process, said sheet comprising:

- (a) an elongated image-receiving element adapted to receive a photographic transfer image by imbibition from an exposed photosensitive sheet;
- (b) an elongated mask sheet directly adhered in superposed relation to the reception surface of said image-receiving sheet, said mask sheet having at least

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one aperture therein which defines a picture area on said image-receiving sheet when said mask sheet is superposed thereon, said mask sheet being bonded to said image-receiving sheet by;

(c) a moisture-degradable heat-sealable adhesive comprising, in admixture, a vinyl pyrrolidone polymeric material having a molecular weight of at least 100,000 and containing a major proportion of vinyl pyrrolidone; and a copolymer of vinyl acetate and a mono-ethylenically unsaturated monocarboxylic acid wherein said vinyl acetate comprises 80 to 95% of the copolymer and said mono-ethylenically unsaturated monocarboxylic acid comprises 20 to 5% of said copolymer.

2. The image-receiving sheet of claim 1 wherein said surface comprises a thermoplastic polymer.

3. The image-receiving sheet of claim 2 wherein said thermoplastic polymer comprises polyvinyl alcohol.

4. The image-receiving sheet of claim 3 wherein said thermoplastic polymer additionally comprises poly-4-vinyl pyridine.

5. The invention of claim 1 wherein said mono-ethylenically unsaturated monocarboxylic acid is crotonic acid.

6. The invention of claim 1 wherein said vinyl pyrrolidone polymeric material is a vinyl pyrrolidone homopolymer.

7. The invention of claim 1 wherein said vinyl pyrrolidone polymeric material has a molecular weight of about 360,000.

8. The invention of claim 1 wherein said mask sheet comprises tissue paper.

9. A moisture degradable heat sealable adhesive comprising, in admixture, a vinyl pyrrolidone polymeric material having a molecular weight of at least 100,000 and containing a major proportion of vinyl pyrrolidone; and a copolymer of vinyl acetate and a mono-ethylenically unsaturated monocarboxylic acid wherein said vinyl acetate comprises 80 to 95% of the copolymer and said mono-ethylenically, unsaturated monocarboxylic acid comprises 20 to 5% of said copolymer.

10. The invention of claim 9 wherein said mono-ethylenically, unsaturated, monocarboxylic acid is crotonic acid.

11. The invention of claim 9 wherein said vinyl pyrrolidone polymeric material is a vinyl pyrrolidone homopolymer.

12. The invention of claim 9 wherein said vinyl pyrrolidone polymeric material has a molecular weight of about 360,000.

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