

July 24, 1973

D. M. HARVEY

3,748,139

PHOTOGRAPHIC FILM UNIT ASSEMBLY

Filed Sept. 7, 1971

3 Sheets-Sheet 1

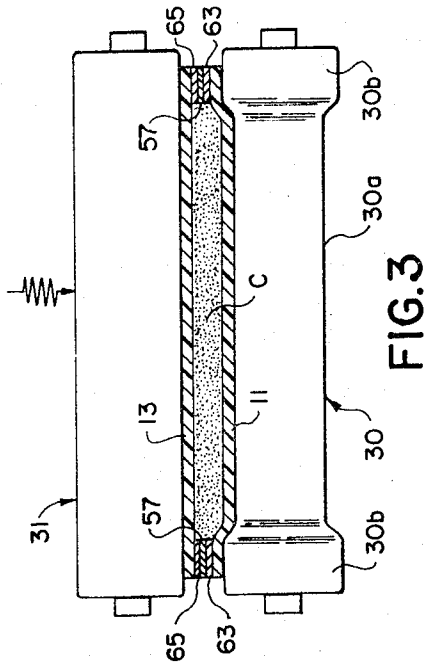


FIG. 3

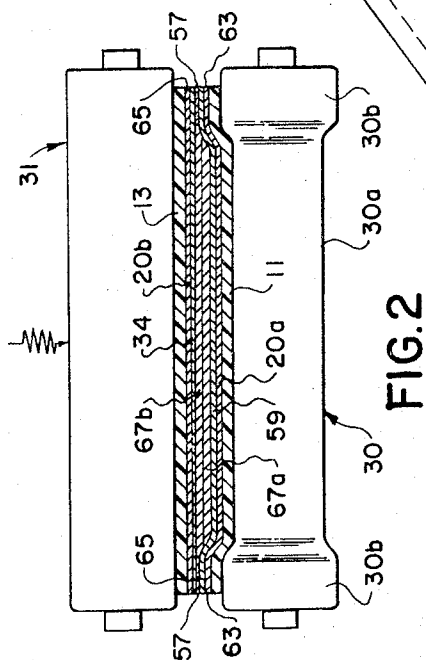


FIG. 2

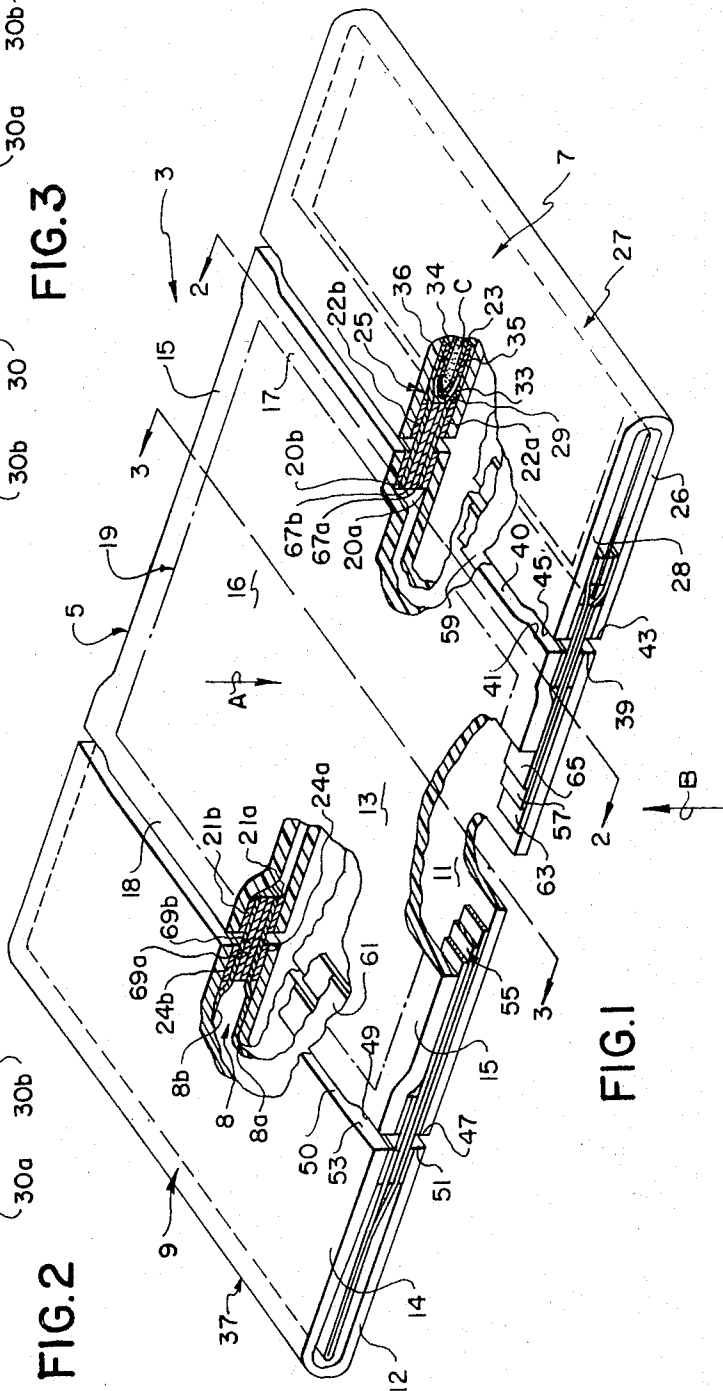


FIG. 1

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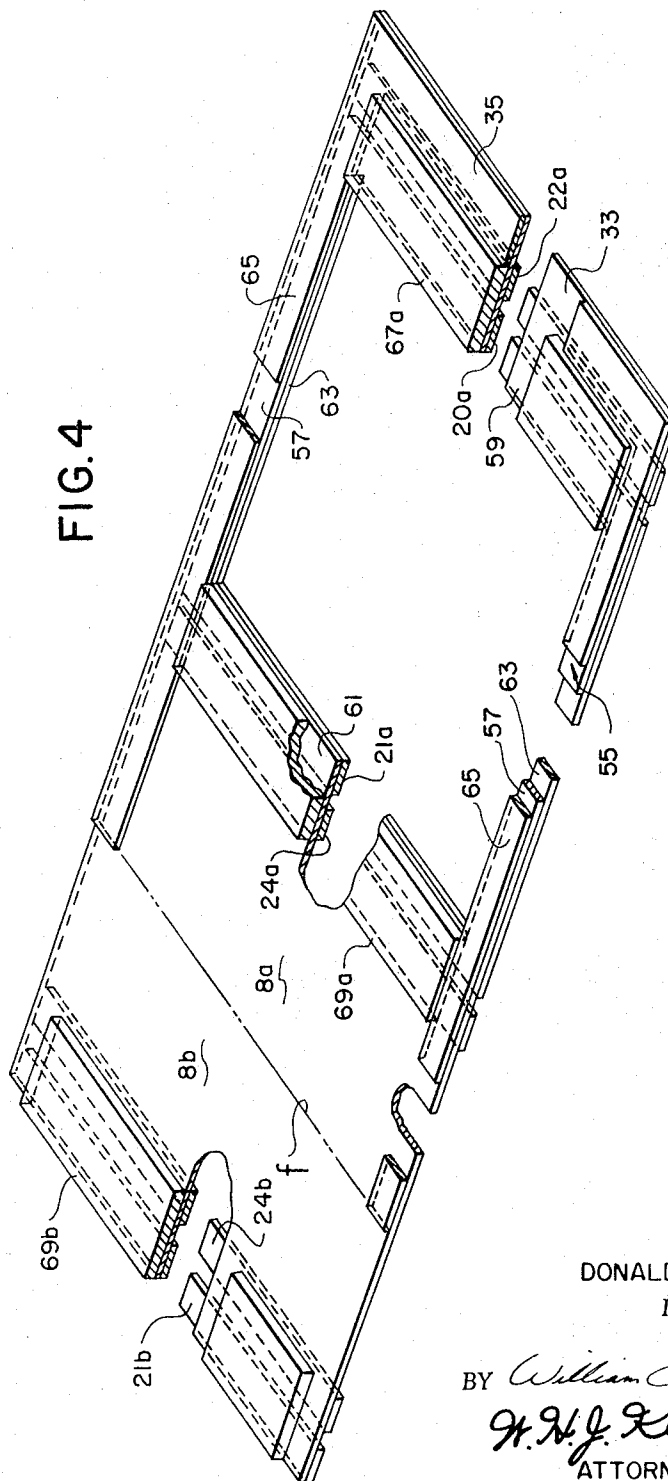
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PHOTOGRAPHIC FILM UNIT ASSEMBLY

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3 Sheets-Sheet 2



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3 Sheets-Sheet 3

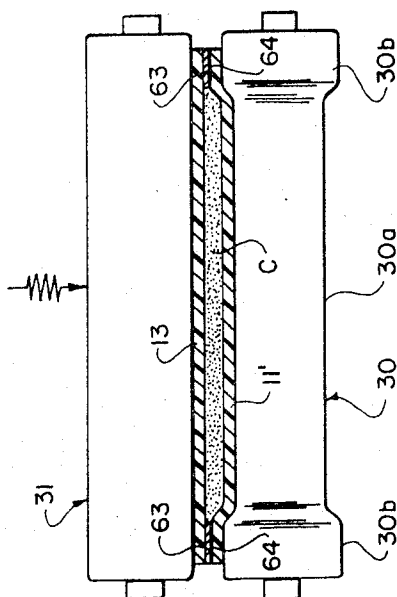


FIG. 6

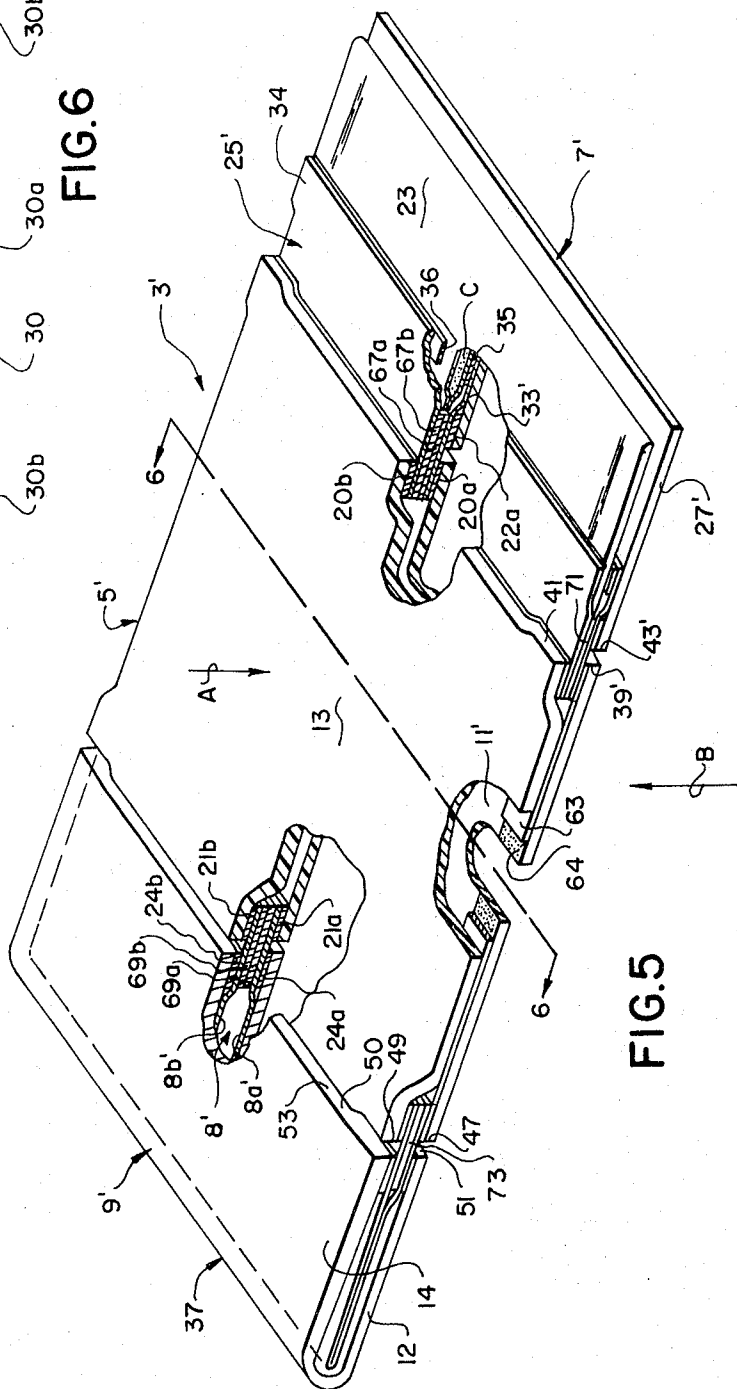


FIG. 5

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3,748,139

PHOTOGRAPHIC FILM UNIT ASSEMBLY
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Kodak Company, Rochester, N.Y.
Filed Sept. 7, 1971, Ser. No. 178,136
Int. Cl. G03c 1/48

U.S. Cl. 96—76 C

6 Claims

ABSTRACT OF THE DISCLOSURE

A film assembly of the self-processing type has certain of its component parts adapted to be separated by a severing device. The film assembly comprises a preregistered integral film unit including a photosensitive element and a superposed process element having image portions that are separable to admit a processing composition therebetween, a processing composition container for supplying the composition to the film unit, and a processing composition receiver for receiving any excess composition from the film unit. Interposed between and extending beyond the photosensitive and process elements is a masking member for defining the image portions and a predetermined space therebetween, for connecting the two elements with each other and the film unit with the container and receiver, and for directing the processing composition from the container to the image portions and the excess composition from said portions to the receiver. The receiver may be defined by one end of the masking member folded back upon itself to provide a main portion and a back-folded portion between which the excess composition is received. A processing-composition-activated adhesive is provided on appropriate surfaces of the masking member for sealing the two elements together and the receiver closed after the processing composition has been directed from the container to the image portions and the excess composition has been directed to the receiver. To facilitate separation of the film unit from the container and receiver, means are provided for guiding a severing device along predetermined paths between the film unit and container and between the film unit and receiver, the guiding means including opposing guide surfaces defining elongate slots extending across the masking member for defining the predetermined paths and for guiding the severing device therealong. The masking member is adapted to be flexible along the predetermined paths in order to permit alternative folding of the container and receiver over one of the two elements to provide a backing for the finished print.

CROSS-REFERENCE TO RELATED APPLICATIONS

Reference is made to commonly assigned, copending U.S. patent applications Ser. No. 033,677, entitled Photographic Apparatus and filed May 1, 1970, in the name of Donald M. Harvey; Ser. No. 070,835, entitled Photographic Film Unit and filed Sept. 9, 1970 now abandoned, in the name of Hubert Nerwin; Ser. No. 070,836, entitled Film Unit and filed Sept. 9, 1970, in the name of Hubert Nerwin; Ser. No. 111,465, entitled Photographic Film Unit and filed Feb. 1, 1971 in the name of Hubert Nerwin; Ser. No. 111,513, entitled Photographic Film Unit and filed Feb. 1, 1971, in the name of Hubert Nerwin; Ser. No. 178,235, entitled Film Unit and filed concurrently with this application in the name of John A. Mathews; and Ser. No. 178,137, entitled Photographic Film Unit Assembly and filed concurrently with this application in the name of Donald M. Harvey.

BACKGROUND OF THE INVENTION

Field of the invention

This invention relates generally to photographic film

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unit assemblies of the self-processing type, and particularly to such assemblies comprising preregistered photosensitive and process elements in combination with means for supplying a processing composition to said elements and means for receiving any excess of the composition from said elements.

General features and forms of self-processing film unit assemblies.—While a self-processing film unit assembly can take any of several different forms, such an assembly generally includes an image-recording unit that is defined by a photosensitive element and a process element. The photosensitive element includes one or more radiation-sensitive layers for recording a latent image that is processable to establish a visible image, while the process element is adapted to facilitate distribution of a fluid processing composition over the photosensitive element to effect processing. Such an assembly also generally includes means for supplying the processing composition to the two elements, such as a processing composition container or pod coupled to one end of the image-recording unit, and means for receiving any excess of the processing composition from the elements, such as a processing composition receiver or trap coupled to the opposite end of the image-recording unit.

In operation, the film unit assembly is moved through processing means that effect rupture of the container, distribution of the processing composition in a layer of appropriate thickness between the photosensitive and process elements, and movement of any excess composition to the receiver. The distributed processing composition then permeates the radiation-sensitive layers of the photosensitive element to process the latent image and establish the visible image.

In the most well known form of such a film unit assembly, the process element is initially separated or spaced apart from the exposure side of the photosensitive element in order to permit exposure of the photosensitive element, after which the process element is brought into a superposed or registered relationship with the exposed side of the photosensitive element for processing. The visible image is established in an image-receiving layer associated with the process sheet, and that sheet is then separated from the exposure side of the photosensitive element to define the final print. Such an arrangement may be identified by the terms "post-registered" and "peel-apart," with reference to the initial and final relative positions of the photosensitive and process elements. The term "post-registered" identifies the feature requiring registration of the two elements after exposure, while the term "peel-apart" identifies the feature requiring removal of the process element from the photosensitive element to obtain the final print. An example of the post-registered, peel-apart type of film unit assembly is illustrated and described in U.S. Pat. No. 3,080,805.

In other forms of self-processing film unit assemblies, the photosensitive and process elements are registered or superposed prior to exposure, preferably at the time of manufacture, and remain in substantially the same relative positions during and after exposure and processing. Ordinarily the process element is transparent to permit exposure of the photosensitive element therethrough, and the two elements remain permanently attached to each other in the final print. Such an arrangement may be identified by the terms "preregistered" and "integral," with reference to the initial and final relative positions of the photosensitive and process elements. Examples of the preregistered, integral type of film unit assembly wherein the image-receiving layer is most closely associated with the process sheet are disclosed in U.S. Pat. No. 3,415,644 and in British Patent No. 1,224,372. Examples of the preregistered, integral type of film unit assembly wherein the image-receiving layer is associated with the photosensi-

tive element are disclosed in commonly assigned U.S. patent applications Ser. No. 869,186, entitled Photographic Film Unit for Diffusion Transfer Processing and filed in the name of Harold E. Cole, and Ser. No. 43,322, entitled Photographic Film Unit and filed in the name of Harold E. Cole.

The present invention is illustrated and described with reference to a preregistered, integral film unit assembly, and has particular utility therein. Certain of its features, however, might also be applied to certain embodiments of peel-apart assemblies.

Exemplary problems often encountered with previously known self-processing film unit assemblies.—While self-processing film unit assemblies offer several advantages over "conventional" film, they also suffer from significant problems that have long avoided solution. Moreover, this has continued to be the case even though at least several of the problems relate to ecology, consumer convenience, and/or other areas that have been subjected to intense study.

By way of example only, considerable effort has been expended in attempts to provide improved means for handling certain materials such as the processing composition containers and receivers, which perform their primary functions during processing and thereafter comprise processing waste material. As a result, there have been presented numerous approaches ranging from relying on the user to properly separate and dispose of such materials to providing camera mechanisms to automatically separate and collect those materials.

Each of the above approaches has particular advantages, and generally operates satisfactorily for its intended purposes. However, each also suffers from certain disadvantages, at least under certain operating conditions. Relying entirely on the user to properly separate and dispose of the waste material permits substantial camera design simplification and cost reduction, but is not considered totally reliable in providing for proper waste disposal. Separation and collection of waste material by a camera mechanism may be reliable, but that approach requires a more complex and expensive camera mechanism and a larger and bulkier camera. Additionally, in almost all of the presently known film unit assemblies where waste material is intended to be separated from the final print, there is an added danger that processing fluid may leak from the waste materials or the print itself. This problem can be particularly troublesome because of the nature of the fluid, which usually is caustic and may be somewhat toxic.

SUMMARY OF THE INVENTION

A primary object of the present invention is to overcome certain or all of the aforementioned problems, as well as other problems that are known in the art or will become apparent from the description presented herein-after.

Another object of the invention is to provide a self-processing film unit assembly including improved means for managing the processing composition container and/or receiver after processing has been initiated.

A further object of the invention is to provide a self-processing film unit assembly wherein the processing composition container and/or receiver can be removed after processing without detracting substantially from its aesthetic appearance.

Yet another object of the invention is to provide a self-processing film unit assembly wherein there is little or no chance that any of the processing composition will escape to harm any sensitive environment.

Another object of the invention is to provide a preregistered, integral film unit assembly having an image-recording unit with a processing composition container, or pod, and a processing composition receiver, or trap, attached to the leading and trailing ends, respectively, of the unit wherein one or both of the container and re-

ceiver are either removable from the unit or foldable to a position engaging one side of the unit after processing has been initiated.

It is a further object of the invention to provide a film unit assembly of the above type wherein the container and receiver are readily and neatly removable by means of a severing device such as a pair of scissors or a knife or razor blade.

To meet these and other objects, the present invention provides a film assembly adapted to record a processable latent image and to process the latent image to establish a visible image, the film assembly having certain component parts that are adapted to be separated by a severing device.

The film assembly comprises an image-recording unit for recording the processable latent image, a processing composition container coupled to the image-recording unit for supplying a processing composition to the unit to process the latent image, and means for guiding the severing device along a predetermined path between the image-recording unit and the container to facilitate separation of the unit from the container. The image-recording unit includes a photosensitive element having an image portion for recording the latent image and a process element having a corresponding portion facing the image-portion, the two portions being separable from each other to admit the processing composition therebetween. The assembly further comprises means for directing the processing composition from the container to the image-recording unit and in between the two elements, the directing means having one end attached to the container and another end attached to the unit. The means for guiding the severing device includes a pair of guide surfaces defining an elongate slot, extending across the directing means between the unit and the container, for receiving the severing device, for defining the predetermined path, and for guiding the severing device therealong. The directing means may have processing-composition-activated means thereon for sealing the directing means closed after the processing composition has been directed from the container to the image-recording unit and in between the two elements. The directing means may also be flexible along the predetermined path to permit alternative folding of the container over one of the two elements.

The film assembly may further comprise a processing composition receiver coupled to the image-recording unit for receiving any excess of the composition from the unit and means for directing the excess composition from the unit to the receiver, the directing means having one end attached to the unit and another end attached to the receiver. Such an assembly may also include means for guiding the severing device along a predetermined path between the unit and the receiver to facilitate separation of the unit from the receiver, the guiding means including a pair of guide surfaces defining an elongate slot, extending across the directing means between the unit and the receiver, for receiving the severing device, for defining the predetermined path, and for guiding the severing device therealong. The directing means may have processing-composition-activated means thereon for sealing the directing means closed after the excess composition has been directed from the unit to the receiver, and it may be flexible along the predetermined path to permit alternative folding of the receiver over one of the two elements.

The invention, and its objects and advantages, will become more apparent in the detailed description of the illustrated embodiments presented below.

BRIEF DESCRIPTION OF THE DRAWINGS

In the detailed description of the illustrated embodiments of the invention presented below, reference is made to the accompanying drawings, in which:

FIG. 1 is a perspective view of a film unit assembly in accordance with the preferred embodiment of the pres-

ent invention, with portions thereof broken away for clarity of illustration;

FIG. 2 is a sectional view, taken along line 2—2 of FIG. 1, showing a leading end portion of the assembly as it is passing between juxtaposed pressure-applying members;

FIG. 3 is a sectional view, taken along line 3—3 of FIG. 1, showing a central portion of the assembly as it is passing between the pressure-applying members;

FIG. 4 is a perspective view of a masking member included in the assembly of the present invention, showing said member in an unfolded, outstretched condition;

FIG. 5 is a perspective view of a film unit assembly in accordance with an alternative embodiment of the present invention, with portions thereof broken away for clarity of illustration; and

FIG. 6 is a sectional view, taken along line 6—6 of FIG. 5, showing a central portion of the assembly as it is passing between the pressure-applying members.

DESCRIPTION OF THE ILLUSTRATED EMBODIMENTS

Because certain parts of photographic film unit assemblies are well known, the following description is directed in particular to those elements forming, or cooperating directly with, the present invention, elements that are not specifically shown or described herein being understood to be selectable from those known in the art.

The preferred embodiment

The preferred embodiment of the present invention is illustrated in FIGS. 1 through 4 of the drawings. With particular reference to FIG. 1, the preferred embodiment comprises a self-processing film unit assembly 3 which includes an image-recording unit 5 and processing composition accommodating means such as a composition supplying means 7 and an excess-composition receiving means 9.

The image-recording unit 5 is adapted to record a latent image that is processable by a fluid processing composition C, and for this purpose is provided with a photosensitive element 11, which is suitable for supporting the latent image, and a process element 13 for aiding in distributing the composition over the photosensitive element. The processing composition supplying means 7 provides the composition for distribution, usually with some excess, and the receiving means 9 receives any such excess for storage or disposal after the distribution is completed. Thus it should be apparent that the film unit assembly 3 includes all materials necessary for recording and processing a photographic image when used in appropriate photographic apparatus.

The image-recording unit 5 is of the preregistered, integral type, wherein the process element 13 is permanently coupled to the photosensitive element 11 along the lateral marginal portions 15 of the two elements. Unit 5 remains in substantially the same physical arrangement during exposure and after processing. Further details of such a unit are described and illustrated in commonly assigned, copending U.S. patent application Ser. No. 70,836, entitled film Unit and filed on Sept. 9, 1970, in the name of Hubert Nerwin.

The photosensitive element 11 is made of resiliently flexible materials and includes one or more radiation-sensitive layers for recording the latent image, as well as a mordant, or other appropriate layer, for receiving a visibly presentable image that is established during processing of the latent image. Since this element serves to support both the latent image and the visibly presentable image, it often is referred to as an integral negative receiver.

The process element 13 also is made of resiliently flexible materials and cooperates with the photosensitive element to provide a rectangular unit having straight edges and square corners as well as other properties facilitating its handling in photographic apparatus. While the lateral marginal portions 15 of the process element are per-

manently coupled to those of the photosensitive element, as previously mentioned, the central or image portions 16 of the two elements are resiliently separable to permit distribution of the processing composition therebetween. Transverse marginal portions 17 also are resiliently separable to permit introduction of the composition between portions 17, and transverse marginal portions 18 are resiliently separable to permit discharge of any excess composition between portions 18.

Further details of the photosensitive element and process element are described and illustrated in commonly assigned, copending U.S. patent application Ser. No. 869,186, entitled Photographic Film Unit for Diffusion Transfer Processing and filed in the name of Harold E. Cole, now abandoned.

Image-recording unit 5 is adapted to be exposed and viewed from opposite directions, the radiation-sensitive layers being exposable from the direction indicated by arrow A, the image-receiving layer or mordant being located where it is visible (in the case of a reflection print) from the direction indicated by arrow B. Such exposure and viewing are made possible by use of transparent materials for both the process element 13 and the support for the image-receiving or mordant layer to define the substantially clear protective coverings on both sides of the image-recording unit.

While the major area of image-recording unit 5 is occupied by the image portions 16 of the photosensitive and process elements, unit 5 also includes a white and preferably uniform border 19 that is formed by lateral marginal portions 15 and transverse marginal portions 17 and 18 of the two elements.

Although the present invention has particular utility with image-recording units of the above-described type, at least certain of its features also are applicable to other types, such as integral units that are adapted to be exposed and viewed from the same side, as disclosed in previously mentioned U.S. Pat. No. 3,415,644, or certain embodiments of peel-apart units.

The processing composition container means includes supplying means 7 for discharging the processing composition C between the photosensitive and process elements at the leading end of the unit and receiving means 9 for receiving any excess of the composition from between the two elements at the trailing end of the unit.

The supplying means 7 can take many different forms ranging from those having many different parts, with each serving a separate function, to those having only one or a few parts, with each serving a plurality of functions. As illustrated in FIG. 1, the supplying means 7 encompasses three basic parts comprising a container or pod 23 containing the processing composition C, means such as a funnel or conduit 25 for directing the processing composition from the container to the leading end of the image-recording unit and in between the photosensitive and process elements, and a support or cover 27 that is adapted to serve as a covering element in a manner to be described hereinafter.

Container 23 can be of any suitable type known to those skilled in the art and preferably includes various vapor-imperious and appearance-improving materials such as a plastic inner layer, a lead-foil intermediate layer, and an outer paper wrapping, which contribute to providing a relatively stiff or nonresilient structure as compared to the image-recording unit. Container 23 is sealed around its periphery to provide a cavity for the processing composition but is adapted to release the composition from one rupturable edge 29 upon application to the container of a mechanical stress usually provided by a pair of juxtaposed pressure-applying members such as rollers 30 and 31 (FIGS. 2 and 3) in cooperating photographic apparatus.

Funnel or conduit 25 is defined by superposed sheets 33 and 34 having disposed therebetween the rupturable edge 29 of container 23, the leading ends of sheets 33

and 34 being attached to container 23 by adhesives 35 and 36, respectively, the trailing ends of sheets 33 and 34 being inserted between and attached to the resiliently separable transverse marginal portions 17 of the photosensitive and process elements by adhesives 20a and 20b, respectively. Funnel 25 is particularly well adapted to direct the processing composition from the container to the image portions 16 with little or no possibility of leakage. Other features of the funnel are described hereinafter in connection with coupling of the supplying means to the image-recording unit by means of a masking member interposed between the photosensitive and process elements.

The support or cover 27 is constructed from a relatively stiff material, such as paper or cardboard, in the form of a substantially flat rectangular element, having straight edges and square corners, that is folded around container 23 and the leading end of funnel 25 to provide lower and upper portions 26 and 28 under and over, respectively, the container and funnel. Cover 27 has substantially the same width as the image-recording unit.

The excess-composition receiving means 9 includes a trap 8 for receiving the excess composition, trap 8 having a leading end portion inserted between and attached to the transverse marginal portions 18 of the photosensitive and process elements by suitable adhesives 21a and 21b, respectively. Receiving means 9 also includes a support or cover 37 that is substantially identical to cover 27, cover 37 also being constructed from a relatively stiff material in the form of a substantially flat rectangular element which has straight edges and square corners and which is folded around trap 8 to provide lower and upper portions 12 and 14 under and over, respectively, the trap. Cover 37 also has substantially the same width as the image-recording unit. Trap 8 is illustrated as a folded-over piece of flexible sheet material suitably sealed along its lateral edges in a manner ensuring confinement without leakage of any processing composition received therein. Since the illustrated film unit assembly is intended to be used with apparatus having a stepped pressure-applying member, as described in the aforementioned U.S. patent application Ser. No. 70,836, the trap 8 need not be provided with internal spacers or the like which often are used for separating the pressure members as the trailing end of the film unit assembly passes therebetween.

Funnel 25 and trap 8 are permanently attached to the image-recording unit by the adhesives 20a, 20b and 21a, 21b, respectively, and to covers 27 and 37 by similar adhesives 22a, 22b and 24a, 24b, respectively. Such adhesives are selected and applied to cooperate with the sealed lateral marginal portions 15 of the image-recording unit for providing a completely closed system that essentially eliminates any significant likelihood that deleterious components of the processing composition will escape therefrom. This is not meant, however, to preclude any desirable escape from the system of water or other possible neutral components of the composition.

The relatively stiff covers 27 and 37 are spaced slightly from the image-recording unit to provide means for guiding a severing device, such as a pair of scissors or a knife or razor blade, along the leading and trailing ends, respectively, of the image-recording unit to facilitate separation of the unit from the supplying and receiving means, respectively. The guiding means at the leading end of the unit is provided by edge surfaces 39 and 41 of the photosensitive and process elements, respectively, and edge surfaces 43 and 45 of the lower and upper portions 26 and 28, respectively, of cover 27. The pair of opposed surfaces 39 and 43 and the pair of opposed surfaces 41 and 45 each define an elongate slot 40 extending across funnel 25 between unit 5 and cover 27 for receiving and guiding the severing device along the leading end of unit 5. Similarly, the guiding means at the trailing end of the unit is provided by edge surfaces 47 and 49 of the photosensitive and process elements, respectively, and edge surfaces 51 and

53 of the lower and upper portions 12 and 14, respectively, of cover 37. The pair of opposed surfaces 47 and 51 and the pair of opposed surfaces 49 and 53 each define an elongate slot 50 extending across the leading end portion of trap 8 between unit 5 and cover 37 for receiving and guiding the severing device along the trailing end of unit 5.

Means for guiding a severing device along the leading and trailing ends of the image-recording unit are very desirable for the purpose of overcoming certain difficulties that might be encountered in attempting to sever the composition supplying and receiving means from the image-recording unit without benefit of such means. For example, it sometimes is difficult to obtain a straight-edge cut of satisfactory appearance where the cut is to occur adjacent to a well defined border such as that defined by the transverse marginal portions 17, since any deviation either in straightness or in parallelism with the well defined border becomes readily apparent in contrast with such a border. Moreover, such a cut might be difficult by having to go through lead-foil or a similar material especially conducive to containing or directing the processing composition, and any loose edges that might be left from an irregular cut through such material could cause leakage of any left-over composition. Hence, wherever it is desired to sever the composition supplying and/or receiving means from the image-recording unit, means such as those provided by the present invention are highly desirable if not necessary for the attainment of straight-edge cuts.

Referring now to FIGS. 1 and 4, it will be seen that interposed between the photosensitive and process elements and extending from their leading and trailing ends is a masking element or member 55. Member 55 is adapted to define the image portions 16 of the two elements and a predetermined space between those portions to provide for proper distribution of the processing composition. Masking member 55 comprises a pair of lateral border portions 57 for defining the lateral marginal portions 15 of the photosensitive and process elements and a pair of transverse border portions 59 and 61 for defining the transverse marginal portions 17 and 18, respectively. Lateral border portions 57 are attached to both the photosensitive and process elements along lateral marginal portions 15 by suitable adhesives 63 and 65, respectively, to permanently seal the two elements together along their lateral marginal portions. Transverse border portions 59 and 61, however are attached only to the photosensitive element along its transverse marginal portions 17 and 18, respectively, by the adhesives 20a and 21a, respectively, to permit resilient separation of the two elements along their transverse marginal portions.

Masking member 55 also comprises a first or leading end portion extending from transverse border portion 59, both the leading end portion and portion 59 forming sheet 33 of funnel 25 which is secured by adhesives 20a and 22a to element 11 and portion 26, respectively, and by adhesive 35 to container 23. As shown more clearly in FIG. 4, adhesive 65 on the upper surface of each lateral border portion 57 is extended beyond transverse border portion 59 to adhesive 35 to permanently seal sheet portion 33 of member 55 and sheet 34 together along their lateral portions. Sheet 34 thus serves as a connecting member interposed between and extending beyond portion 59 of member 55 and portion 17 of element 13 for further connecting unit 5 with container 23 and for further directing the processing composition from the container to image portions 16, the connecting member being coupled to portion 17 of element 13, to portion 28 of cover 27, and to the container as well as to the above-mentioned lateral portions of sheet portion 33 of member 55.

A processing-composition-activated adhesive is provided on at least one of the facing surfaces of sheet portion 33 of member 55 and sheet or connecting member 34 between image portions 16 and container 23 to seal

those surfaces, and hence the transverse marginal portions 17, together after the composition has been directed from the container to the image portions. In FIG. 1, processing-composition-activated adhesives 67a and 67b are shown on both of such surfaces for that purpose. Thus, if the processing composition directing means or funnel 25, composing sheet portions 33 and 34, is severed along the predetermined path defined by slot 40 to separate container 23 and cover 27 from image-recording unit 5 after the processing composition has been distributed between the image portions 16, the directing means or funnel will remain sealed closed on both sides of the cut to prevent any leakage of processing composition either from the container or from the leading end of the image-recording unit. No action on the part of the user is needed to effect the seal other than to cause passage of that part of the film unit assembly between the pressure-applying members, since the compressive force of those members urges together the surfaces to be sealed as shown in FIG. 2.

Masking member 55 further comprises a second or trailing end portion extending from transverse border portion 61. The trailing end portion is folded back upon itself, along an imaginary line designated *f* in FIG. 4, and over portion 61 to provide a lower or main portion 8a extending from portion 61 and an upper or back-folded portion 8b facing main portion 8a and coupled to transverse marginal portion 18 of process element 13 by adhesive 21b. Adhesive 65 on the upper surface of each lateral border portion 57 is extended beyond transverse border portion 61 to the imaginary line *f* to permanently seal portions 8a and 8b together along their lateral portions. The trap 8 is thus permanently sealed along its lateral edges and, of course, along its folded trailing end to provide a cavity for receiving any excess composition from between the photosensitive and process elements.

In a manner similar to that described above with reference to the directing means or funnel 25, a processing-composition-activated adhesive is provided on at least one of the facing surfaces of portions 8a and 8b between image portions 16 and the above-mentioned cavity to seal those surfaces, and hence both the transverse marginal portions 18 and the trap, closed after the excess composition has been directed from the image portions into said cavity. In FIGS. 1 and 4, processing-composition-activated adhesives 69a and 69b are shown on both of such surfaces for that purpose. Thus, if portions 8a and 8b are severed along the predetermined path defined by slot 50 to separate trap 8 and cover 37 from image-recording unit 5 after the excess composition has been received in the trap, portions 8a and 8b will remain sealed closed on both sides of the cut to prevent any leakage of processing composition either from the trap or from the trailing end of the image-recording unit. Here too, no action by the user is needed to effect the seal other than to cause passage of that part of the film unit assembly between the pressure-applying members, since the compressive force of those members urges together the surfaces to be sealed in the same manner as that shown in FIG. 2.

Masking member 55 and connecting member or sheet 34 are made of a thin, flexible, processing-composition-impermeable material that is readily foldable as well as severable. As an alternative, therefore, to severing the processing composition supplying means 7 and receiving means 9 from image-recording unit 5 after the composition has been distributed, the supplying means and receiving means can easily be folded upward and over the process element 13 and then secured to element 13 by suitable adhesives (not shown) provided on the lateral marginal portions 15 of element 13 and corresponding portions of covers 27 and 37. Covers 27 and 37, then, would provide a suitable backing for the finished print, which would be viewed from the opposite side of the unit, i.e., from direction B. Such folding of the supplying and receiving means over one of the two elements is described more fully in

commonly assigned, copending U.S. patent application Ser. No. 178,235, entitled Film Unit and filed concurrently with this application in the name of John A. Mathews.

A particularly useful feature of film unit assembly 3 is the ease of varying the desired gap or spacing between elements 11 and 13 by simply varying the thickness of masking member 55 during manufacture. It has been found that a gap of approximately 0.008 inch between the two elements is desirable to ensure complete processing of a latent image and formation of a finished print. Such a gap could be obtained by use of masking means having virtually no thickness, e.g., by applying a preflash or photoresist technique to the photosensitive element, for use with pressure-applying members one or both of which is (are) stepped, or undercut, to provide a total recess of 0.008 inch between their central portions. It has been found, however, that complete spreading of the processing composition to the very edges of the image portions is more readily attained when the masking means has sufficient thickness to provide between those edges a space into which the composition can pass. Alternatively, therefore, the 0.008 inch gap could be obtained by using a masking member 0.008 inch thick for use with plain, unstepped pressure-applying members having virtually no recess between their central portions. A masking member so thick, however, could cause a beauty defect in the finished print, in that the masking member could cause a visible surface irregularity along the edges of the image portions. To avoid that possibility and still facilitate complete spreading of the processing composition to the edges of the image portions, it has been found advantageous to use a masking member approximately 0.003 inch thick for use with a pair of pressure-applying members one or both of which is (are) stepped, or undercut, to provide a total recess of approximately 0.005 inch between their central portions. Such an arrangement is illustrated in FIG. 3, wherein lateral border portions 57 of masking member 55 are substantially 0.003 inch thick, pressure-applying member 30 is stepped to provide a recessed central portion 30a between flange portions 30b, and pressure-applying member 31 is unstepped, the recess between the central portions of members 30 and 31 being substantially 0.005 inch to provide a total gap of 0.008 inch between the image portions of elements 11 and 13. With the exception of the processing-composition-activated cohesive coatings 67a, 67b and 69a, 69b, all of the adhesives, such as adhesives 63 and 65, have virtually no thickness. Any thickness they may have, however, can readily be compensated for by making the masking member thinner. The cohesive coatings 67a, 67b and 69a, 69b, however, are made of such thickness that they fill in the 0.005 inch recess provided by the pressure-applying members and thereby enable said members to urge together the surfaces to be sealed by said coatings.

As mentioned above, a particularly useful feature of film unit assembly 3 is the ease of varying the desired gap between elements 11 and 13 by simply varying the thickness of masking member 55 during manufacture. For example, if it should be desired to vary the gap to compensate for a change in the chemistry of the processing composition, or a change in the processing of the latent image, or a change in the structure or material of the photosensitive and/or process elements, the gap can readily be varied by the simple expedient of using a masking member of a suitably different thickness, thereby requiring no change whatever to the pressure-applying members of the photographic apparatus in which the film unit assembly will be used.

Referring now to the operation of film unit assembly 3, the assembly is intended to be supplied in a laid-out condition with the processing composition supplying and receiving means 7 and 9 extending outwardly from and in substantially the same plane as the image-recording unit 5 at its leading and trailing ends, respectively, as shown in FIG. 1. After exposure in cooperating apparatus to

record a latent image in the photosensitive element, the assembly is transported between the pair of juxtaposed pressure-applying members 30 and 31 in the apparatus to effect processing of the latent image and formation of a visible image by rupturing container 23, distributing the processing composition between the photosensitive and process elements, and directing any excess composition into trap 8. As described in the aforementioned U.S. patent application Ser. No. 869,186, the processing composition preferably includes an opacifier that cooperates with an opaque layer in the photosensitive elements to permit immediate withdrawal of the film unit assembly from the apparatus, after which the processing can be completed.

During processing, the supplying and receiving means provide convenient appendages for handling the image-recording unit without contacting its image portions. After processing, however, such appendages tend to detract from the aesthetic appearance of the finished print, at least insofar as photographers have become used to conventional prints having uniform borders. Moreover, the appendages increase the overall length of the print, making its storage difficult or at least inefficient in albums, storage containers, or the like.

The present invention eliminates these and other problems by providing for movement of the processing composition supplying and receiving means from their positions shown in FIG. 1 to moved positions wherein such problems are overcome. The moved positions involve either separating the supplying and receiving means from the image-recording unit, by means of a severing device, or folding the supplying and receiving means over the image-recording unit to make them flatly engage and adhere to the back-side of the finished print. The separation or folding of the supplying and receiving means occurs along predetermined paths that are defined where said means are attached to the leading and trailing ends, respectively, of the image-recording unit. As previously described, the separation is effected by inserting a severing device, such as a pair of scissors or a knife or razor blade, into the slots 40 and 50 and cutting through the aligned portions of the funnel and trap along the predetermined paths defined by said slots, the opposing edge surfaces defining the slots serving as means for guiding the severing device along said paths.

If the user prefers to fold the supplying and receiving means over the image-recording unit, he simply does so along the same predetermined paths and then presses them against the back of the final print so that the above-mentioned adhesives will hold them in their folded positions.

An alternative embodiment

FIGS. 5 and 6 illustrate a film unit assembly constructed in accordance with an alternative embodiment of the present invention. Parts that are the same in both the preferred and alternative embodiments are referred to by the same reference numerals, whereas parts in the alternative embodiment that differ from those in the preferred embodiment are designated by the same reference numerals primed. The most significant difference between the two embodiments is that in the alternative embodiment there is no masking member between the photosensitive and process elements as there is in the preferred embodiment. In the alternative embodiment, the longitudinal marginal portions of the photosensitive and process elements are defined by one of the aforementioned photoresist and preflash techniques applied to the photosensitive element, as indicated in FIG. 5 by the reference numeral 64. The transverse marginal portions of the two elements are defined by the trailing end of funnel 25' and the leading end of trap 8' in a manner similar to that described for the preferred embodiment. Because of the absence of a masking member, the desired 0.008-inch gap between the two elements is provided by the recessed pressure-applying member 30 as shown in FIG. 6.

Another difference between the two embodiments is that in the alternative embodiment the supplying means support member 27' is not wrapped around the container and leading end portion of the funnel as cover 27 is in the preferred embodiment. Support member 27' simply comprises a sheet having the same thickness as that of photosensitive element 11' and supporting the funnel and container from below as shown.

The guiding means for receiving a severing device and guiding such device along a predetermined path adjacent to the leading end of the image-recording unit is defined by the edge surfaces 39' and 41 of elements 11' and 13, respectively, and edge surface 43' of member 27'. The guiding means at the trailing end of the assembly is identical to that described with reference to the preferred embodiment. Thus the processing composition supplying and receiving means can be separated from the image-recording unit in the same manner as that employed in the preferred embodiment, and alternatively, said means can be folded over process element 13 as in the preferred embodiment.

It can be seen that, with reference to both the preferred and alternative embodiments of the present invention, a self-processing film unit assembly is provided with processing composition supplying and receiving means that are alternatively separable from the image-recording unit and foldable thereover in order to overcome the problems encountered with self-processing film unit assemblies known heretofore.

The invention has been described in detail with particular reference to the illustrated preferred and alternative embodiments thereof, but it will be understood that variations and modifications can be effected within the spirit and scope of the invention.

What is claimed is:

1. A film assembly adapted to record a processable latent image and to process the latent image to establish a visible image, said film assembly having component parts adapted to be separated by a severing device, said film assembly comprising:

an image-recording unit including a photosensitive element having an image portion for recording the latent image and a process element having a corresponding portion facing said image portion, said portions being separable to permit passage of said processing composition therebetween;

a processing composition container means coupled to said image-recording unit for containing a processing composition which is supplied to the image-recording unit to process the latent image;

said container means including means for directing said processing composition between said container and the image-recording unit; and

means for guiding the severing device along a predetermined path between the image-recording unit and said container to facilitate separation of the image-recording unit from said container after processing, said guiding means including a pair of guide surfaces forming an elongate slot extending across said directing means for receiving the severing device between said surfaces and defining the predetermined path.

2. The film assembly claimed in claim 1 wherein said directing means has processing-composition-activated means thereon for sealing said directing means closed after said composition has been directed between said container and the image-recording unit.

3. The film assembly claimed in claim 1 wherein said directing means is flexible along the predetermined path to permit folding of said container over one of said elements.

4. The film assembly claimed in claim 1 wherein said container means is arranged to supply the processing composition to the image-recording unit.

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5. The film assembly claimed in claim 1 wherein said container means is a processing composition receiver which is arranged to receive the composition from the image-recording unit.

6. A film assembly adapted to record a processable latent image and to process the latent image to establish a visible image, said assembly having certain component parts adapted to be separated by a severing device, said film assembly comprising:

- (a) an image-recording unit for recording the processable latent image, said unit including a photosensitive element having an image portion for recording the latent image and a process element having a corresponding portion facing said image portion, said portions being separable to admit a processing composition therebetween;
- (b) a processing composition container for supplying said processing composition to said unit to process the latent image;
- (c) first directing means for directing said processing composition from said container to said unit, said first directing means having one end attached to said container and another end disposed between and attached to said elements, said first directing means having processing-composition-activated means thereon for sealing said first directing means closed after said composition has been directed from said container to said unit, said first directing means being flexible to permit folding of said container over one of said elements;
- (d) first guiding means for guiding the severing device along a first predetermined path between said unit and said container to facilitate separation of said unit from said container, said first guiding means including a pair of guide surfaces defining an elongate slot, extending across said first directing

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means between said unit and said container, for receiving the severing device and for defining the first predetermined path;

- (e) a processing composition receiver for receiving any excess of said composition from said unit;
- (f) second directing means for directing the excess of said composition from said unit to said receiver, said second directing means having one end disposed between and attached to said elements and another end attached to said receiver, said second directing means having processing - composition - activated means thereon for sealing said second directing means closed after the excess of said composition has been directed from said unit to said receiver, said second directing means being flexible to permit folding of said receiver over said one of said elements; and
- (g) second guiding means for guiding the severing device along a second predetermined path between said unit and said receiver to facilitate separation of said unit from said receiver, said second guiding means including a pair of guide surfaces defining an elongate slot, extending across said second directing means between said unit and said receiver, for receiving the severing device and for defining the second predetermined path.

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