United States Patent [19]

Harvey

[11] **3,767,404**

[45] **Oct. 23, 1973**

[54] **FILM UNIT**

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[73] Assignee: **Eastman Kodak Company**, Rochester, N.Y.

[22] Filed: **Mar. 31, 1972**

[21] Appl. No.: **240,098**

Related U.S. Application Data

[63] Continuation-in-part of Ser. No. 111,471, Feb. 1, 1971.

[52] **U.S. Cl.** ..... **96/76 C**, 96/29

[51] **Int. Cl.** **G03c 1/48**

[58] **Field of Search** ..... 96/76 C, 29

[56] **References Cited**

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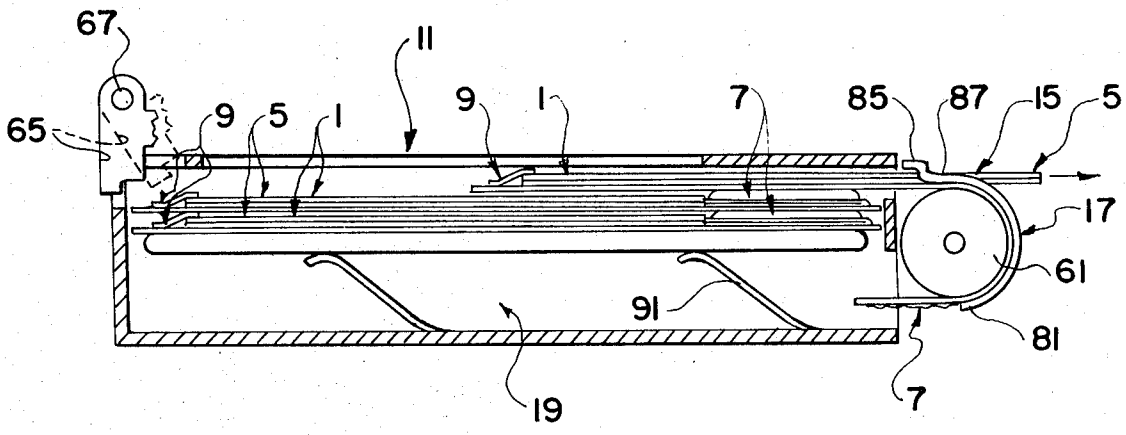
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Primary Examiner—Norman G. Torchin
Assistant Examiner—John L. Goodrow
Attorney—W. H. J. Kline et al.

[57] **ABSTRACT**

A photographic film unit of the self-processing type includes a resiliently flexible carrier or card for facilitating handling of the film unit and separation of waste materials from remaining picture-recording portions after processing of the film unit has been initiated.

20 Claims, 10 Drawing Figures



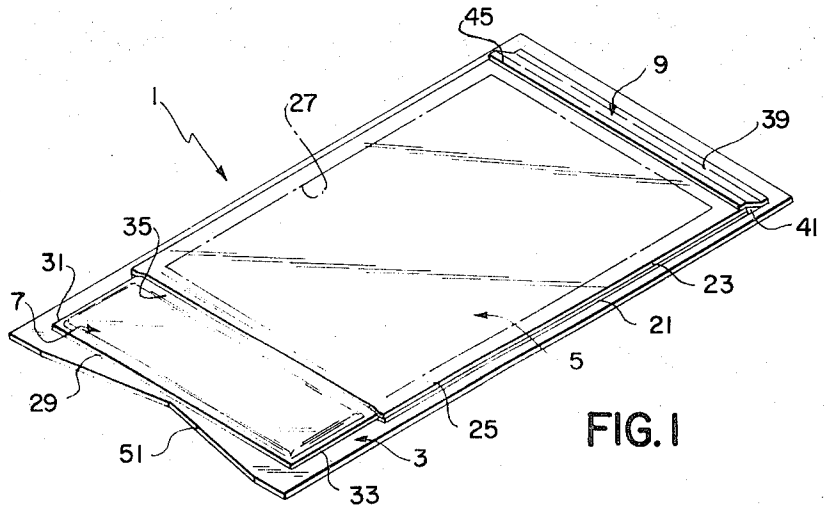

45
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1
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39
35
41
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7
21
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51
3
33

FIG. 1

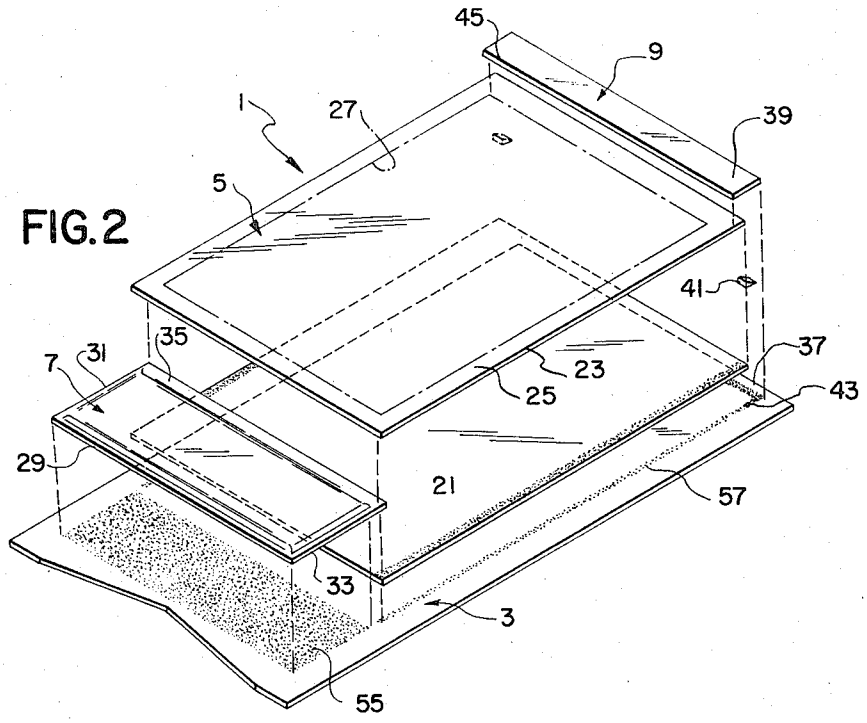

45
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55

FIG. 2

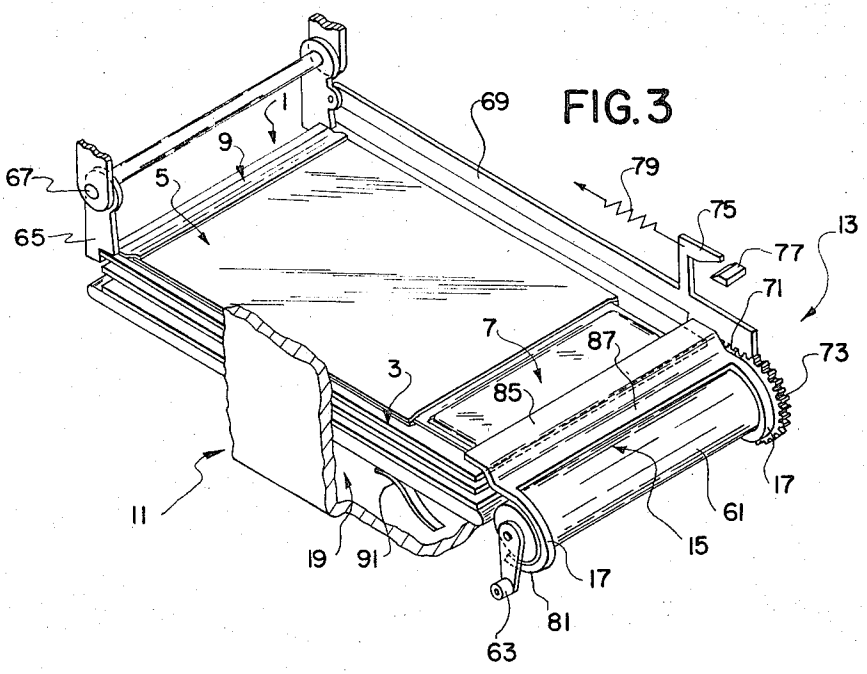

1
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17
61
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17
81
63

FIG. 3

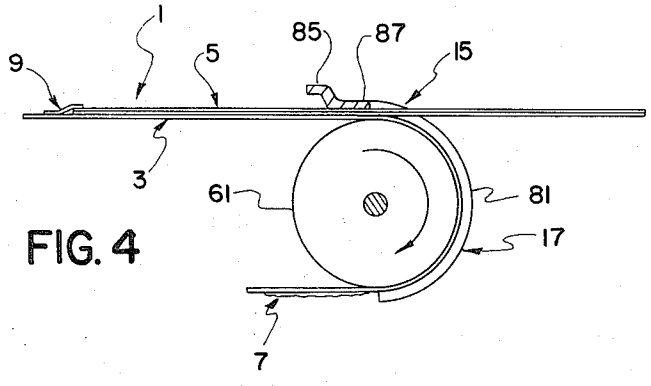

1
9
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61
81
17
7

FIG. 4

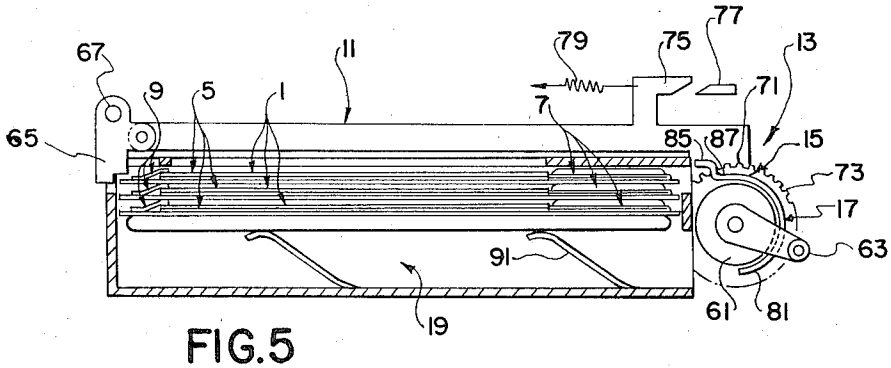


FIG.5

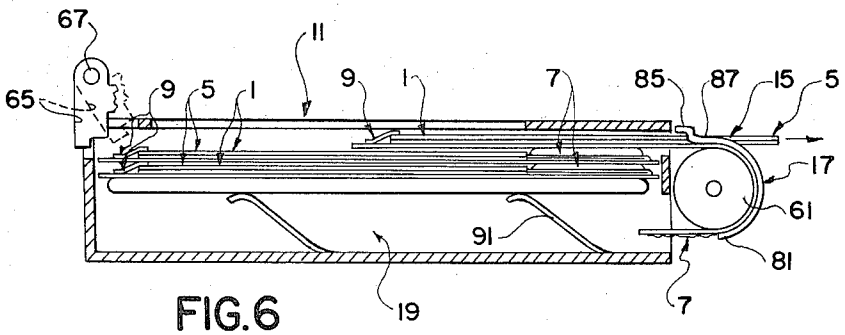


FIG.6

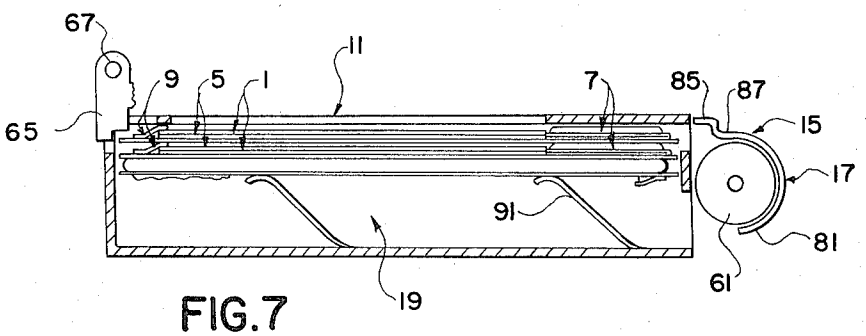


FIG.7

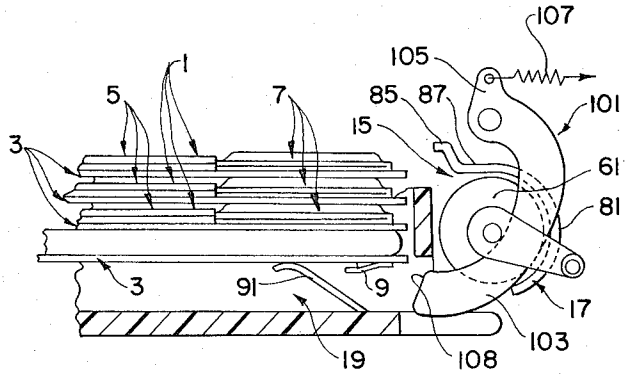


FIG.8

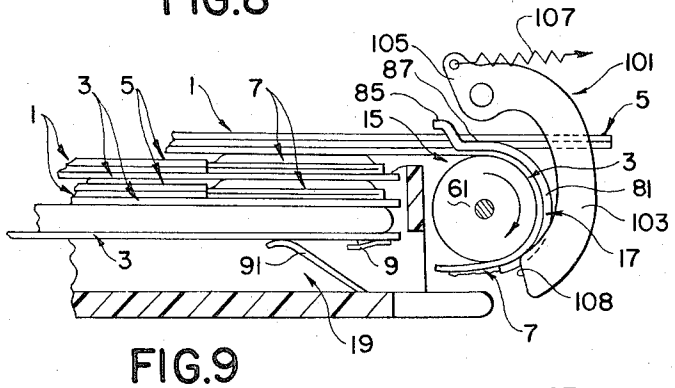


FIG.9

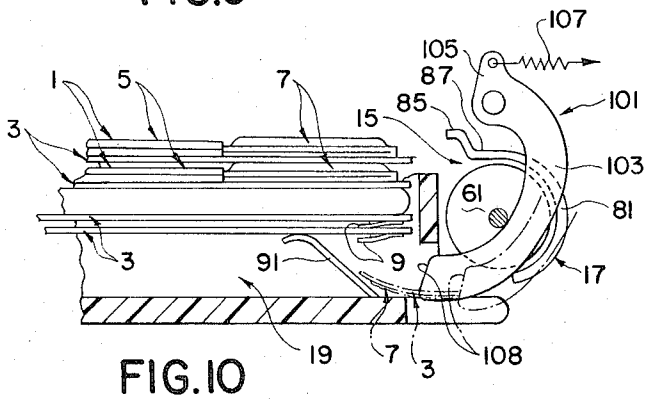


FIG.10

FILM UNIT

This application is a continuation-in-part of my U.S. application Ser. No. 111,471, entitled FILM UNIT, filed on Feb. 1, 1971.

CROSS-REFERENCE TO RELATED APPLICATIONS

Reference is made to commonly assigned, copending U.S. Pat. applications Ser. No. 33,677, entitled PHOTOGRAPHIC Film Unit Assemblage, filed in my name on May 1, 1970; Ser. No. 70,835, entitled PHOTOGRAPHIC FILM UNIT, filed in the name of Hubert Nerwin on Sept. 9, 1970 and now abandoned; and Ser. No. 111,467, entitled PHOTOGRAPHIC APPARATUS FOR HANDLING FILM UNITS OF THE SELF-DEVELOPING TYPE, filed in my name on Feb. 1, 1971 and now abandoned.

BACKGROUND OF THE INVENTION

The present invention relates to film units of the "self-processing" type, and more particularly to such film units that are especially adapted for convenient handling, preferably including the separation of waste material from an image-recording portion of each film unit after its processing has been initiated.

The commercial development of self-processing film units has presented a plethora of unique problems that have long avoided fully satisfactory solutions. Convenient handling of the film units in photographic apparatus has been particularly troublesome, especially when attempting to provide mechanisms for automatically separating waste materials from an image or picture-recording portion of each film unit after its processing has been initiated.

Numerous different approaches to film handling have been tried, and many have been considered successful when weighed against the important advantages they permit in self-processing photography. However, none of these previously tried approaches have been able to provide the convenience, simplicity and reliability desired, such as presently is available in conventional photography.

SUMMARY OF THE INVENTION

It is an object of the present invention to provide a self-processing film unit that easily can be handled in a convenient, uncomplicated and reliable manner.

It is a further object of the invention to provide such a film unit including means for facilitating its transport by associated photographic apparatus.

Another object of the invention is to provide a film unit that is particularly well adapted for the separation of image-recording portions of the unit from other portions thereof after processing has been initiated.

Still another object is to provide a film unit wherein processing waste materials can be separated automatically from the rest of the unit without requiring direct contact with such materials by the photographer.

In accordance with a preferred embodiment of the invention, an image-recording portion of the film unit is coupled to a resiliently flexible carrier or card strip for facilitating both handling of the film unit in photographic apparatus and transporting of at least portions of the film unit within and from such apparatus. The image-recording portion comprises a photosensitive element and a permanently attached process sheet, together defining a preregistered, integral structure that

is adapted to cooperate with a container or pod, for supplying a fluid processing composition to the leading end of the recording portion, and/or with a fluid collecting trap, for receiving any excess of the composition from the trailing end of the recording portion. The pod and trap are permanently attached to the card, while the image-recording portion is only strippably coupled thereto, such that the card, pod and trap easily can be separated from the recording portion, after processing has been initiated, to provide a print of pleasing aesthetic appearance that is not encumbered by the separated materials. The film unit can be handled in a number of different ways, but has particular utility in apparatus including a mechanism for directing the card from a first generally planar initial position, between a pair of juxtaposed pressure-applying members, and in an arcuate path to a second generally flat position behind the first position. During such movement, the processing composition is distributed between the photosensitive element and process sheet, and the card, pod and trap automatically are deflected away from the image-recording portion, while the latter is directed or permitted to move along a substantially straight line path from the apparatus. This operation further can be facilitated by providing the card with a width dimension that is greater than the corresponding dimension of the image-recording portion.

The invention, and its objects and advantages, will become more apparent from the detailed description of the preferred embodiment presented below.

BRIEF DESCRIPTION OF THE DRAWINGS

In the detailed description of the preferred embodiment presented below, reference is made to the accompanying drawings, in which:

FIG. 1 is a pictorial view of a film unit in accordance with the present invention;

FIG. 2 is an exploded view of the film unit depicted in FIG. 1;

FIG. 3 is a pictorial view of a portion of a mechanism in photographic apparatus for transporting the film unit depicted in FIGS. 1 and 2;

FIG. 4 is a schematic view of a portion of the apparatus depicted in FIG. 3, illustrating the manner in which image-recording portions of the film unit are separated from processing waste materials after processing of the film unit has been initiated;

FIGS. 5–7 are partial cross-sectional views of apparatus usable with the present invention, and illustrate various stages in the operation of such apparatus for handling the film unit and for separating processing waste materials from an image-recording portion of the unit; and

FIGS. 8–10 are partial cross-sectional views of photographic apparatus usable with the present invention, illustrating one manner in which the processing waste materials can be moved into their final positions in a waste storage chamber.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Because photographic cameras and film units of the self-processing type are well known, the present description will be directed in particular to elements forming part of, or cooperating more directly with, the present invention. Camera and film elements not spe-

cifically shown or described herein are selectable from those known in the art.

Referring now to the drawings, and particularly to FIGS. 1 and 2, a preferred embodiment of the invention is illustrated comprising a film unit 1, including a resiliently flexible carrier or card member 3, an image-recording portion 5, a container or pod 7 for fluid processing composition, and a fluid collector or trap 9 for receiving any excess of the composition. As will be described more fully hereinafter, the image-recording portion 5 of the film unit is strippably coupled to the resiliently flexible card 3 and to the container 7 and fluid collector 9, while the container and collector permanently are attached to the card. This arrangement permits separation of the card, container and collector from the image-recording portion of the unit, to provide a finished print that is unencumbered by such materials that have served their purpose after processing has been initiated.

The film unit is highly adaptable for use in many different types of photographic apparatus, but has particular utility in a camera that includes mechanisms for automatically stripping the image-recording portions of the film unit from the waste portions, such as the card, pod and trap, after processing has been initiated. A camera 11 of this type is represented in FIGS. 3 and 4 of the drawings, and generally comprises a film transporting mechanism 13, a pair of juxtaposed pressure-applying members 15, stripping and guiding fingers 17, and a waste storage chamber 19. These elements are intended to cooperate with the film unit for transporting the card 3 from a first generally planar position, through the pressure-applying members, and then in an arcuate path to the waste storage chamber. During such movement of the card, the image-recording portion of the film unit travels with the card until its leading end passes between the pressure-applying members, but then continues to move along a substantially straight path exiting from the apparatus as depicted in FIG. 4. In this manner the card, container and fluid collector are stripped from the image-recording portion and directed into the waste storage chamber, while the recording portion is directed from the camera or to some other position where it will be accessible to the camera operator.

Referring to the film unit more specifically, and again to FIGS. 1 and 2, the image-recording portion or smaller unit 5 includes a photosensitive element 21 and a process sheet 23 that are preregistered and permanently secured together along their lateral marginal edges 25 to define an integral film unit. As used in the present application, the term "preregistered" refers to a film unit in which the photosensitive element and process sheet are superposed or registered prior to exposure, preferably at some stage during manufacture of the film unit or before its sale to the customer. The term "integral," on the other hand, is intended to connote a film unit wherein the photosensitive element and process sheet are permanently maintained in superposed or registered relationship during and after processing. Thus, in a film unit that is both preregistered and integral, the photosensitive element and process sheet are superposed prior to exposure and define a composite, permanently registered structure that remains substantially in the same physical form after processing.

Generally, such image-recording units include one or more layers of photosensitive material, such as silver halide, for recording a processable latent image, a mechanism for distributing a processing composition to effect processing of the latent image, and a mordant layer for supporting or receiving a visible image.

These various materials and mechanisms can be associated in any number of different arrangements, but generally have taken either of two forms. In one, illustrated and described in French Pat. Nos. 2,006,255 and 2,006,256, the photosensitive material is included in a photosensitive element; the distributing mechanism includes a second element or process sheet; and the mordant layer is located in the second element, to which materials for establishing the visible image diffuse. The second and preferred form is illustrated and described in German Offenlegungsschrift 2,052,145, filed in the name of H. E. Cole and published on Apr. 29, 1970. In this case, the photosensitive and mordant layers both are in a single element, often referred to as an integral-negative-receiver (INR), while a second element is provided for distributing the processing composition. It is with the second and preferred image-recording unit that the present invention will be described.

Photosensitive element 21 comprises a substantially flat, resilient support of transparent cellulose triacetate film base, approximately 0.004 inches thick, or some other suitable material for supporting the appropriate photosensitive and other layers. At least the central portion supports respective layers of image-receiving material, opaque reflecting material, and a silver-halide emulsion with associated dye-image providing material. Such layers preferably are arranged in the sequence given, with the support located near a first face not visible in FIGS. 1 and 2, where it can protect that side of the unit, and with the silver-halide emulsion located near the opposite or inside face, where it is protected by the process sheet 23. As will become more apparent hereinafter, the silver-halide emulsion is adapted to be exposed through the process sheet, from the top side of the unit, and the developed print is adapted to be viewed through the transparent support, from the bottom side of the unit.

The photosensitive element further includes appropriate means depicted schematically as a border or margin 27 that extends entirely around the circumferential portions of the element. Such border or margin provides a sharp boundary defining both an exposure frame, within which the latent image is adapted to be recorded, and a print frame, that preferably is white and within which the finished print is adapted to be formed.

The process sheet or second element 23 also defines a resilient, substantially flat sheet formed of transparent cellulose triacetate film base, approximately 0.004 inches thick, or some other material suitable for distributing the processing composition and protecting the top side of the photosensitive element while permitting exposure of the silver halide emulsion.

The photosensitive element and process sheet 21 and 23 accurately are constructed to define sheets having straight edges, square corners and appropriate borders, and properly are registered during manufacture to provide a uniformly flat, aesthetically pleasing structure that will maintain its integrity after processing. Except for the pod, trap and card, included in the more comprehensive structure to be described hereinafter, the

image-recording portion of the film unit is intended to be supplied with all parts necessary for establishing a positive reflection print, when used with the intended apparatus, and all such parts permanently are retained together without adversely affecting that print.

Photosensitive element **21** and process sheet **23** preferably are coextensive with one another, and can be maintained in registered or superposed facing relationship by any permanent seal or connection to define the image-recording portion **5**. Preferably, the connection extends in a longitudinal direction at the lateral edges of the recording unit from its leading end to its trailing end, for securing the element and sheet in direct contacting relationship, or the equivalent, while permitting resilient separation of the elements during distribution of the processing composition.

Additional features and advantages of this preferred image-recording portion of the unit are illustrated and described more fully in commonly assigned, copending U.S. application Ser. No. 70,836, entitled FILM UNIT, filed on Sept. 9, 1970 in the name of Hubert Nerwin and now abandoned.

The image-recording portion of the unit described above, comprising the photosensitive element **21** and process sheet **23**, particularly is adapted to cooperate with various elements of the more comprehensive film unit **1** with which it has been illustrated. The latter unit includes the supporting card **3**, the container **7**, and the excess fluid collector **9**, all of which cooperate for recording and developing a latent image when used with the intended apparatus.

The container **7**, often referred to as a pod, can include various cooperating parts together defining a suitable process composition supplying mechanism, and preferably including a rupturable containing part, generally comprising a rectangular blank of vapor-impervious material, that is folded along a first side edge **29**, and that is securely sealed or closed along its ends **31** and **33**. A second side **35**, opposite from the folded side, is provided along substantially its entire length with a rupturable seal adapted to release a fluid composition from the container upon the application of hydraulic forces generated by passing the container between a pair of juxtaposed pressure-applying members. The containing part is coupled to or cooperates with a leading end of the image-recording portion in a suitable manner for discharging its fluid contents between the photosensitive element and process sheet. For this purpose, the container has been illustrated with lips inserted into a space or slot provided between the photosensitive element and process sheet at the leading end of the image-recording unit.

The fluid collector **9**, often referred to as a trap, generally comprises a first part **37** (FIG. 2) defined by a trailing end or skirt portion of card **3**, a second part **39** for covering the first part and defining a collecting void or chamber, and lifters **41** adapted to separate the pressure-applying members of associated photographic apparatus and to maintain the collecting void or chamber as the trap passes between the pressure applying members. Preferably, one or more apertures or holes may be provided in the trap or between the trap parts to permit the escape of air from the image-recording unit and from the trap as the processing composition is spread and the trap is filled. The first and second trap parts permanently are secured together by a suitable adhesive depicted at **43** in FIG. **2**, while a leading portion **45** of the second part is adapted to overlie the trailing end of the image-recording unit to enclose or confine that trailing end in a manner insuring that all of the excess processing composition expelled from the image-recording unit will be directed into the trap.

The carrier or card member **3** is adapted for supporting the pod **7**, trap **9** and image-recording portion **5**, to facilitate handling of the film unit, as well as separation of the image-recording portion **5** from the other portions of the unit that comprise waste material after processing has been initiated. For this purpose, the card is defined by a substantially flat, preferably imperforate sheet of resiliently flexible material, such as plastic sheeting. The effective resiliency and flexibility of the card must be within certain maximum and minimum limits so it will return to a substantially flat condition after being separated from the image-recording portion and bent around a radius. However, it should be apparent that these resiliency and flexibility parameters can be established by separate stiffners associated with the card, rather than by the card itself. Further, it is not necessary, although it is preferred, that the card be of uniform resiliency throughout its entire area.

The card cannot be rigid and should be bendable in an arcuate path, such as 180° about a ⅛ to ⅜-inch radius, without significantly exceeding its elastic limit. While this is a function of many parameters, including the radius of bending, the thickness of the card, its flexibility and its resiliency, the card should tend to return substantially immediately, or at least within a short period of time, and without assistance, to a substantially flat condition after traveling in the intended arcuate path. As will become more apparent hereinafter, from a description of the preferred apparatus with which the film unit is adapted to be used, the card also should be transportable against a moderate resistance by pushing the card from a position spaced from that resistance, and without requiring confinement of the card in a completely closed channel of the apparatus.

Further limits on the resilient flexiblity are more difficult to define. The word "resilient" has been used with "flexibility" to differentiate the card from materials, such as thin paper stocks, that are flexible but also are somewhat limp, and have little tendency to maintain a substantially flat condition without additional support, or to return to a flat condition after bending. Also intended to be excluded are materials that take a permanent or long-lasting set after bending as described above, such as certain paper stocks often compared to the heavy cardboard variety. However, this does not eliminate all paper materials, since some might be constructed to satisfy the necessary conditions, especially when treated or coated with plastic or the like.

Still more specifically, the preferred card is intended for use with a film unit having an image-recording portion that might be a 3½-inch square or a3⅜-inch × 4¼-inch rectangle. In such case the card is about 1½ inches longer and one-fourth inch wider than the image-recording portion, and is constructed from a 0.005-inch-thick sheet of a polyester film base material such as polyethylene terephthalate. Polyester sheets ranging in thickness from 0.003 to 0.007 inch, or slightly thicker acetate sheets (e.g., 0.005 to 0.009 inches), are examples of other structures having the desired properties. The preferred pressure roller with such materials has a bending diameter of about three-eighths of an inch.

As set forth above, the dimensions of the card preferably are selected to be somewhat wider than the image-recording portion of the unit, and longer than the image-recording portion with its attached pod and trap, for cooperating with the transporting mechanisms of the associated photographic apparatus to be described more fully hereinafter. Similarly, the leading end of the card includes a V-shaped cutout or perimeter **51** to facilitate proper bending at that end.

The pod **7** and trap **9** permanently are attached to the card, but only releasably or strippably are coupled to the image-recording portion **5.** Similarly, the image-recording portion is only releasably or strippably coupled to the card. Such couplings can be effected by any appropriate adhesives, cohesives, seals, or the like, as depicted schematically at **43, 55** and **57** on FIG. **2** of the attached drawings. As will become more apparent hereinafter, such an arrangement of permanent and releasable couplings permits stripping after processing of the image-recording unit (then defining the finished print) from the card, pod and trap. The latter three elements, comprising waste material after processing has been initiated, then can be collected in one packet, preferably by directing them in an arcuate path to a chamber behind the other film units in the pack, and can be discarded after exhaustion of the exposed film units in the pack with little possiblity of damage to any sensitive environment (e.g., clothing or person) by any remaining processing composition in the waste material.

The preferred strippable or releasable coupling between the card member or carrier strip **3** and the image-recording portion **5** is strong in shear but weak in peel. Thus, substantial transporting forces can be exerted in the plane defined by the image-recording portion with little danger of the card separating from the image-recording portion, while much smaller forces acting on the card at a significant angle to such plane can easily separate the card, and with it, the pod and trap, from the image-recording portion.

Photographic Apparatus

The above-described film unit, or a pack including a plurality of such film units, can be used in photographic apparatus, such as the camera depicted in FIGS. **3** and **4,** comprising the film transporting mechanism **13,** the pressure members **15** and the stripping and guiding fingers **17.**

Movement of the film units within and from the photographic apparatus is effected mainly by frictional contact between one of the pressure members **61** and the film unit. For this purpose one of the pressure members is adapted to be rotated by a motor or other appropriate means, such as the winding lever **63,** that is activatable from a position accessible from the camera exterior. However, an additional mechanism is provided for effecting initial movement of the film units from their exposure position to the bite of the pressure members, at which time the latter can take over. This additional mechanism comprises a pair of kickers or lever arms **65** that are coupled for simultaneous movement and are pivotally supported to the camera body at **67.** The kickers also are operatively coupled to the driven pressure member **61** by an arm **69** terminating in a rack **71** for cooperating with a corresponding gear **73** rotatable with the pressure member. After serving its function, the rack **71** is disengaged from gear **73** by engagement between a first camming surface **75** on the arm **69,** and a second camming surface **77** immovably attached to the camera body. Such disengagement then permits the eventual return of the kickers **65** under the influence of spring **79.** Premature feeding of the next successive film unit can be prevented by delaying the return of arm **69** in any convenient manner. By way of example only, the arm can be held in its disengaged position by the shutter releasing mechanism until that mechanism is actuated to expose the next successive film unit, at which time the arm can be released to return to its film advancing position. Alternatively, the rack **71** and gear **73** could be both disengaged and returned in response to movement of the camera shutter release or a similar mechanism.

The stripping and guiding fingers **17** include a pair of arcuate guiding surfaces **81** that are spaced apart by an amount slightly greater than the width of the image-recording portion for engaging the lateral edges of the card without interfering with substantially straight-line movement of the image-recording portion. At one end the stripping and guiding fingers are located adjacent to the nip of the pressure members for engaging the card at about the same time it enters between the pressure members. The other end of the fingers, on the other hand, are located and configured to direct the card back into the film stack behind the unexposed film units or previously used cards, in which position the card is retained for later disposal after exhaustion of the pack. In the embodiment illustrated, the first mentioned end of the stripping and guiding fingers conveniently terminates at and is integrally formed as a part of a plate **85** serving as the second pressure member **87.**

Operation of the Preferred Embodiment

Referring now to the operation of the preferred embodiment, and to FIGS. **5–7,** a plurality of the film units are positioned in the photographic apparatus with the forwardmost unit located in a film plane behind the camera exposure aperture. After exposure in the usual manner, the driven pressure-applying member is rotated through winding lever **63** and initial movement of the film unit into the bite of the pressure-applying members is effected by the kickers **65** operated through arm **69,** rack **71** and gear **73.** Once the film unit has entered between the pressure members the cooperating cams **75** and **77** disengage arm **69** and rack **71** from gear **73,** and the kickers **65** are returned to their initial position under the action of spring **79** sometime before the next successive film unit in the stack is ready for processing. After entering between the pressure-applying members, further movement of the unit is effected by frictional pressure between the driven pressure member **61** and the film unit card **5.** This frictional pressure is sufficient to pull the card from the stack and to push the card in an arcuate path defined by the arcuate guiding surfaces **81** and into the waste storage chamber defined behind the remaining film units in the pack. At the same time, and because of the strippable coupling between the image-recording portions of the unit and the card, the recording portions is pulled from the stack and between the pressure-applying members for rupturing the pod and distributing the processing composition between the photosensitive element and process sheet. After passing between the pressure-applying members, however, the image-recording portion of the unit continues to move in a

substantially straight line through an exit and to the exterior of the camera. While separate stripping or guiding surfaces could be utilized to insure such straight-line movement of the image-recording portion, the inherent resiliency or flexible stiffness of the recording portion itself usually is sufficent to resist arcuate movement of the recording portion. In this manner the image-recording portion of the unit is separated from the card without any intervention by the camera operator. Moreover, since the pod and trap permanently are attached to the card, but only releasably are coupled to the image-recording portion (e.g., only through the card and without any positive direct attachment), the pod and trap also will be separated from the recording portion and will follow the card into the waste storage chamber behind the remaining units in the pack. As the spent pod, card and trap are directed into the waste storage chamber, a pair of resilient springs **91** engage the then lowermost surface of the card and urge the card in an upward direction against a dividing wall defining the uppermost portion of the waste storage chamber. In this manner the spent card, pod and trap are moved to a position where they will not interfere with the entrance of similar cards from successive film units into the waste storage chamber.

Additional Waste Handling Mechanism

An additional waste handling mechanism for use with film units in accordance with the present invention has been illustrated in FIGS. **8–10.** This additional mechanism **101** includes a supplemental kicker **103** that is pivotally attached at one end **105** to the camera body and is resiliently urged in a clockwise direction about that pivot point by the spring **107.** This additional kicker also is adapted to engage the lateral edges of the card as the card moves in its arcuate path from the exposure position to the waste storage chamber. During such movement of the card, engagement between the additional kicker and the card will move the additional kicker in a counterclockwise direction against the action of the resilient spring. In this manner the additional kicker is set or cocked for its intended operation. Referring now to FIG. **10,** it will be seen that the passing of the trailing end of the card beyond a predetermined point **108** of the additional kicker will release the kicker from its set position to impart an additional final movement of the card into the waste storage chamber.

While the present invention resides in a film unit, and is not intended to be limited to use in any particular apparatus, the properties of the film unit can be understood better by considering its use in the preferred apparatus. In FIGS. **4–7,** for example, it can be seen that the carrier or card member can be bent into an arcuate configuration around roller **61,** and still will return to a generally flat configuration in waste collecting chamber **19.** Moreover, the card will return to and maintain that configuration in response to its own resiliency, without substantial assistance from elements of the apparatus.

At the same time, the card should be transportable by pushing it against a moderate resistance from a location spaced from that resistance. Referring again to FIGS. **4–7,** the card can be pushed into the waste storage chamber by rotation of roller **61,** and has sufficient stiffness or resiliency (sometimes referred to as column strength) to move between the spring **91** and the pressure platen without completely buckling or collapsing. The same properties of the card permit pushing on its trailing end to effect its initial feeding into the nip between the pressure-applying members, pushing on the card at the nip to effect its movement against the fingers or shoes **17,** and pushing on the card by the additional kickers **103** to effect its final movement into the waste chamber. Again, however, it should be remembered that the invention is not limited to such manner of use, and the film unit could be pulled, instead of pushed, at the initial feeding or final movement stages, for example.

In all of the above-mentioned operations, movement of the card is constrained and directed to some extent by the apparatus. In accordance with the invention, however, constraint by the apparatus is minimized in the sense that completely closed or closely confined channels or passageways are not necessary, as would be the case with a limp, non-resilient paper carrier of the type generally used for pulling leaders.

It should also be understood that various elements having substantially different properties, such as the container **7,** might be permanently attached to the card and will effect the desired operation of the card. The container, for example, generally includes various layers of material, including lead foil, that will resist straightening of the card at certain locations after being bent into the previously mentioned arcuate configuration. Thus, the card may not straighten itself completely at that location after such bending. Still, the card resiliency will be a substantial aid to straightening even such elements, both substantially immediately, as they are fed into the waste chamber, and shortly thereafter, such as within one to thirty seconds, or before the next successive card ordinarily will be fed into the waste chamber.

It should now be apparent to those skilled in the art that an unusually adaptable film unit has been provided by the present invention that greatly facilitates the handling of such film units in photographic apparatus, especially where image-recording portions of the film unit are intended to be separated from other portions comprising waste material after processing has been initiated.

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

I claim:

1. A self-processing film unit comprising:

a photosensitive element for recording a latent image, the latent image being processable by distributing a processing fluid over said photosensitive element to effect formation of a visibly presentable image representative of the latent image;

a process element permanently attached in face-to-face relation to said photosensitive element for aiding in distribution of the processing fluid over said photosensitve element to effect processing of the latent image; and

a resiliently flexible card strippably coupled to said photosensitive and process elements for facilitating handling of said film unit while permitting separation of said photosensitive and process elements from said card after initiation of the processing, said card having sufficient resilience, after being flexed by an applied bending force arcuately from

a generally planar condition through an angle of approximately 180° to effect a return of said card substantially to said generally planar condition in response to removal of said force from said card.

2. A film unit as claimed in claim 1 further comprising:

a container of the processing fluid for supplying the processing fluid to and between said photosensitive and process elements, said container being releasably coupled to said elements and permanently attached to said card for separation from said elements with said card after the initiation of the processing.

3. A film unit as claimed in claim 2 further comprising:

a trap for collecting any excess of the processing fluid from between said photosensitive and process elements, said trap being releasably coupled to said elements and permanently attached to said card for separation from said elements with said card after the initiation of the processing.

4. A film unit as claimed in claim 1 wherein said photosensitive and process elements together define an image-recording unit having two lateral edges and an end edge, and wherein said card underlies said image-recording unit and extends outwardly from said image-recording unit beyond said lateral edges and said end edge.

5. A film unit as claimed in claim 1 wherein said photosensitive and process elements define a plane, and wherein said card is strippably coupled to said photosensitive and process elements by means providing a coupling that strongly resists separation of said card from said elements by forces acting substantially in said plane, but that only weakly resists separation of said card from said elements by forces acting at a significant angle to said plane.

6. A film unit as claimed in claim 1 wherein said card is strippably coupled to said photosensitive and process elements by means providing a coupling that is strong in shear but weak in peel.

7. A film unit as claimed in claim 1 wherein said card comprises a sheet of polyester material at least 0.003 inches thick.

8. A film unit as claimed in claim 1 wherein said card comprises a sheet of polyester film base material approximately 0.005 inches thick.

9. A film unit as claimed in claim 1 wherein said card comprises a sheet of acetate material at least 0.005 inches thick.

10. A film unit as claimed in claim 1 wherein said card comprises a sheet of acetate material approximately 0.007 inches thick.

11. A self-processing film unit comprising:

an image-recording unit, including a photosensitive element and a process sheet, for recording a photographically useful image; and

a resiliently flexible card strippably coupled to said image-recording unit, said card having sufficient resiliency to return, without assistance, to a generally flat condition after being bent from such condition through an angle of approximately 180° about a radius of from one-eighth to three-eighths of an inch.

12. A film unit as claimed in claim 11 wherein said radius is one-eighth of an inch.

13. A self-processing film unit comprising:

an image-recording unit for recording a photographically useful image, said image-recording unit including a photosensitive element and a process sheet permanently attached to said photosensitive element; and

a resiliently flexible card strippably coupled to said image-recording unit, said card having a bending resiliency equal to or greater than that of a 0.003-inch-thick sheet of polyester film base material.

14. A self-processing film unit comprising:

an image-recording section including a photosensitive element for recording a processable latent image and a process sheet permanently attached to said photosensitive element for aiding in processing the latent image; and

a resiliently flexible card strippably coupled to said image-recording section for facilitating handling of said film unit, said card having a bending resiliency approximately equal to that of a 0.005-inch-thick sheet of polyester film base material.

15. A film unit as claimed in claim 14 including means for supplying a processing fluid to said image-recording section between said photosensitive element and said process sheet, said supplying means being permanently attached to said card and releasably engaging said image-recording section between said photosensitive element and said process sheet.

16. A self-processing film unit comprising:

an image-recording portion including a photosensitive element for recording a processable latent image and a process sheet permanently attached to said photosensitive element for aiding in processing the latent image;

a container for supplying a processing fluid to said image-recording portion between said photosensitive element and said process sheet to effect processing of the latent image, said container being substantially empty and generally flat after supplying the processing fluid to said image-recording portion; and

a sheet of resiliently flexible material strippably coupled to said image-recording portion and permanently attached to said container for strippably coupling said container to said image-recording portion, said sheet having sufficient resiliency in flection to return said sheet and said container, without assistance, to a generally flat condition after the processing fluid has been supplied to said image-recording portion and said sheet and said container have been bent from such condition for a short duration into an arcuate configuration having a radius of approximately three-eighths of an inch.

17. A film unit as claimed in claim 16 wherein said image-recording portion has two lateral edges defining a width dimension, and wherein said sheet has a width dimension greater than said width dimension of said image-recording portion to facilitate stripping of said sheet from said image-recording portion.

18. A self-processing film unit comprising:

an image-recording portion for recording a latent image that is processable to establish a visibly presentable image, said image-recording portion including permanently registered photosensitive and image-receiving layers for recording the latent image and for supporting the visibly presentable image, respectively;

means for supplying a processing fluid to said image-recording portion to initiate processing of the latent image; and

a resiliently flexible strip of sheet material underlying and attached to said supplying means and releasably coupling said supplying means to said image-recording portion, said strip, with said supplying means attached thereto, having sufficient flexibility to be bent, after the processing has been initiated, from a generally planar configuration into a semi-cylindrical configuration having a radius of approximately one-eighth of an inch, without significantly exceeding its elastic limit, and sufficient resiliency to return itself, with said supplying means still attached thereto, from said semi-cylindrical configuration to substantially such generally planar configuration.

19. A self-processing film unit comprising:

a preregistered, integral image-recording portion including a photosensitive element for recording a processable latent image and a process sheet for aiding in distributing a processing composition over siad photosensitive element to effect processing of the latent image;

supply means for supplying the processing composition to said image-recording portion, said supply means including a rupturable containing section for the processing composition and means extending from said containing section into removable engagement with said image-recording portion for directing the processing composition from said containing section to said image-recording portion between said photosensitive element and said process sheet; and

a substantially straight strip of resiliently flexible sheet material securely attached to said supply means and strippably coupled to said image-recording portion for facilitating removal of said supply means from said image-recording portion and for facilitating handling of said supply means after said removal, said strip having sufficient resiliency to become substantially straight again, without external assistance, after said strip has been bent into a semi-cylindrical configuration and said supply means has been substantially exhausted of the processing composition.

20. A film unit as claimed in claim **19** wherein said strip has a resiliency approximately within the range of resiliency of polyester film base material between 0.003 and 0.007 inches thick.

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