# United States Patent [19]

**Harvey**

[11] **3,751,256**

[45] **Aug. 7, 1973**


[54] **FLUID RECEIVING MEANS**


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



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[52] **U.S. Cl.** ..... **96/76 C**, 95/13

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

[58] **Field of Search** ..... 96/29, 76; 95/13



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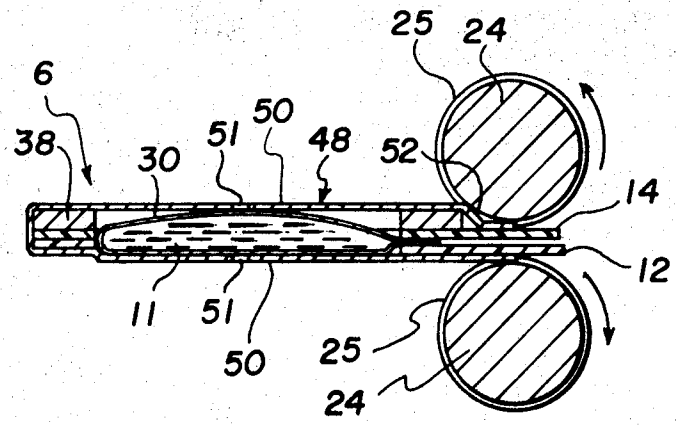
[57] **ABSTRACT**

An improved fluid receiving structure or trap for use with a self-processing photographic film unit or the like. The trap is best adapted for use in composite or integral film units in which it is permanently locatable entirely within the borders of the unit, making unnecessary its separation from the unit after processing. The trap comprises an inflatable bladder constrained by a substantially non-crushable framing structure.


**10 Claims, 6 Drawing Figures**



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SHEET 1 OF 2

FIG. 1

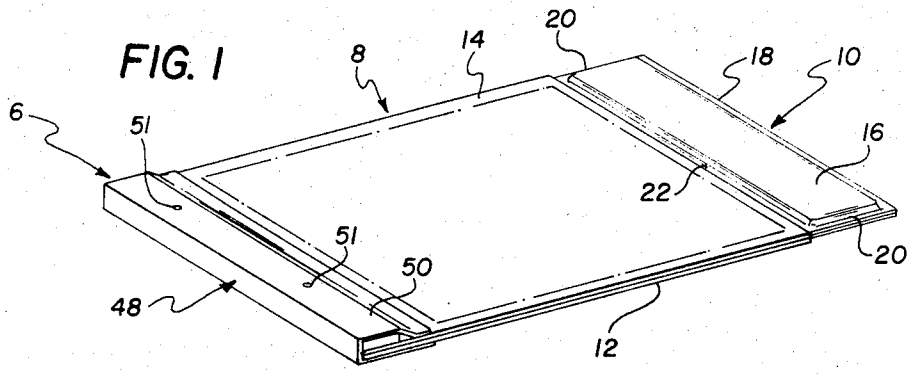


FIG. 2

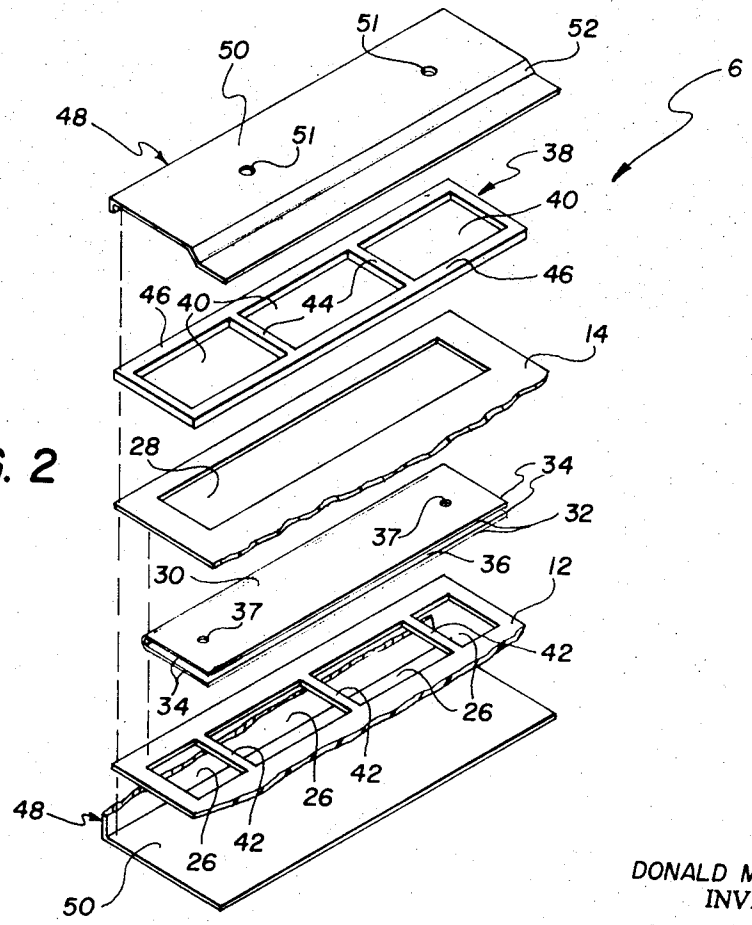


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FIG. 3

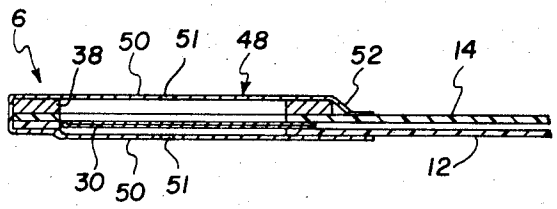



FIG. 4

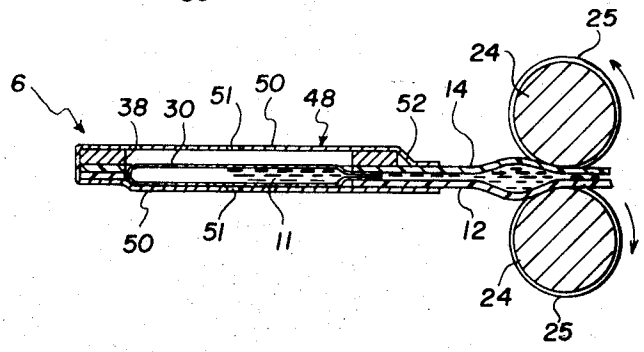
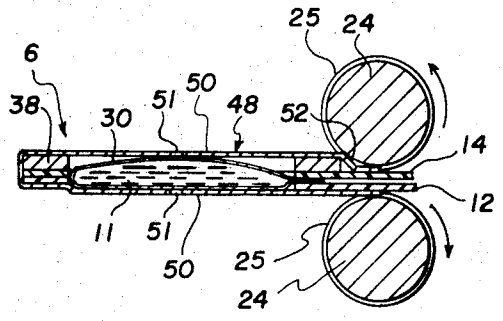



FIG. 5



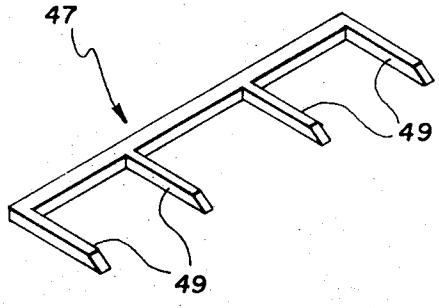




FIG. 6

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# FLUID RECEIVING MEANS

## BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention relates generally to fluid receptacles, and more specifically to an improved fluid receiving structure or trap for collecting any excess processing fluid spread within or across film units and photographic assemblages of the self-processing type.

2. Description of the Prior Art

It is well known in the photographic arts to provide film units and photographic assemblages incorporating the necessary materials for processing the units immediately after their exposure to produce positive photographic prints. Generally, such film units comprise a photosensitive element having a support layer for supporting at least one layer of photosensitive material, and an image receiving element adapted to be registered over the photosensitive element in face-to-face relation after exposure. A viscous processing composition or fluid is released from a rupturable pod for distribution between the photosensitive and image-receiving elements, by passing the unit between opposed pressure-applying members such as a pair of parallel rollers spring loaded for rolling engagement with the film unit. The rollers ideally effect an even distribution of the fluid in a layer of predetermined thickness and without excess. The processing fluid permeates the layers of the unit to effect or initiate development of each of the exposed photosensitive layers contained therein. An imagewise distribution of diffusible dye or silver then diffuses or is formed on an image-receiving layer in the receiving element which is then stripped from the film unit to provide a positive print.

Film units of a preferred type and with which the present invention will be described, generally are referred to as "preregistered" or "integral" units. In such units, a photosensitive sheet and a transparent process sheet are preassembled before processing with a rupturable container or pod of processing fluid at one end, and remain in a face-to-face composite or superposed relationship after processing. The "bottom side" of the photosensitive sheet is opaque to light actinic to the photosensitive layers; the process sheet is transparent for exposure of the photosensitive layers from the "top side" of the film unit; and the processing fluid includes an opacifying agent that covers the top side of the photosensitive element after the pod is ruptured and cooperates with the opaque "bottom side" after exposure to permit processing of the film unit in daylight. The image-receiving layer may be located either on the process sheet on the side closest to the photosensitive sheet, or preferably on the "bottom side" of the photosensitive sheet between an opaque layer and a transparent support.

In order to insure that a predetermined exposed area of the film unit to be processed is completely covered by a processing fluid layer of uniform thickness, it is generally ncessary to supply the container with a quantity of the processing fluid in excess of the minimum amount required. This practice is dictated by the inability to obtain the ideal uniform spreading conditions referred to above. Since the processing fluid is highly caustic, any undesired escape of excess fluid from the film unit within and also outside of the camera apparatus in which the unit is used may be detrimental to the camera and user. Accordingly, means are provided for



collecting and retaining the excess fluid at the end of the film unit opposite the pod end.

Previous collectors for excess processing fluid, generally referred to as "fluid traps" and disclosed, for example, in U.S. Pat. Nos. 2,644,755 and 2,686,717, have been provided on extended or end portions of the film units as illustrated in U.S. Pat. No. 3,080,805. Continuous emphasis has been placed on reducing the size of the film units to permit their use in more compact cameras, and on eliminating most stripping operations and waste materials remaining after processing. These efforts have met with only limited success, however, due in part to the fact that (1) the processing fluid is highly caustic, and hence must be completely enclosed to prevent damage to the apparatus and injury to its user, and (2) a significant amount of excess fluid has to be used to assure complete processing. In addition, the particular properties and configuration of the preferred composite film unit mentioned above further aggravates fluid trapping problems. By way of example, only, the fact that the film unit remains intact after processing, and only a relatively narrow margin is provided around pictures of this type, the use of built-in traps of the relatively large size usable with other types of units is prevented. In order to overcome some of these disadvantages and problems of prior film units, u.S. Pat. Nos. 2,644,755 and 2,686,717 teach film units in which the trailing portions of the respective sheet elements may have one or more spacing elements or lifters made of some rigid material, e.g. hard rubber, plastic, etc., secured to the surface adjacent the trailing end of one of the sheet elements. As the trailing portions of the sheet elements are drawn between the pressure-applying members in superposed relation during the distribution of the processing fluid, the spacing elements, or lifters force the pressure-applying members apart. The excess processing fluid, rather than being further advanced, is thus collected and retained in the space formed between the superposed portions of the sheet elements. In an effort to further reduce the size of the trap required with film units designed for use in film packs, U.S. Pat. No. 3,294,538 suggests forming a positive trap by folding the end of the receiver sheet upon itself and interposing a spring member between the folded-over end of the sheet element and the photosensitive element to maintain the two separated so that the excess fluid can readily enter the trap. As will be appreciated from the above description, the heretofore proposed excess trapping means have required the attachment of lifters and/or springs to the unit. Such construction not only complicates the fabrication and handling of a film product in a camera, but it has been found that these lifters have a tendency to become accidently detached from the sheet element during the handling of the film unit outside of the camera or during manipulation within the camera. If the lifter has become detached before the film product is processed, then they are not available to serve their intended function in the trapping of the excess fluid. Furthermore, if these lifters become detached from their sheet element for any reason during the manipulation of the film in the camera, they can shift from their intended position and even move up into the image area of the elements and prevent proper transfer of the image from the photosensitive sheet to the image-receiving sheet. In order to overcome the disadvantages of the fluid traps heretofore mentioned, copending U.S. Patent applications, Ser.

No. 841,865 by David A. Frost et al. and Ser. No. 104,713 by Stanley R. Schieven disclose trap constructions in which the trailing end of one or both of the sheet elements is provided with a plurality of protuberances embossed from its surface to separate the pressure-applying members and provide a space between the sheet elements for receiving excess processing fluid. Although such trap constructions are effective for their intended purpose, the trap construction of this invention accomplishes the same objectives, and results in still further advantages, by utilizing a new approach involving an expandable, pliable bladder.

## SUMMARY OF THE INVENTION

This invention includes within its scope an improved fluid receiving structure or trap preferably for use in a film unit for collecting any excess processing composition or fluid that is spread between and across superposed photosensitive and process sheets. In accordance with a preferred embodiment of the invention, an integral film unit comprising a photosensitive sheet, a rupturable container or pod, and a process sheet in superposed face-to-face relation with the photosensitive sheet is provided with an excess fluid trap that may be concealed within the borders of the unit. The trap comprises an inflatable bladder constrained by a substantially non-crushable framing or exoskeletal structure. In accordance with one aspect of the invention, the bladder can extend across registering ends of the photosensitive and process sheets with the mouth of the bladder in fluid communication with the space between the interfaces of the sheets. In accordance with another aspect of the invention, the bladder can be interposed between a sandwich of the photosensitive and process sheets adjacent one of the ends thereof, and such ends can be provided with cut-out portions or openings in register with the bladder to provide room for expansion of the bladder between the sheets. To provide additional room for bladder expansion, a spacer element provided with perforations or openings therethrough can be secured to one or both of the sides of the sandwich of photosensitive and process sheets in register with the bladder. To prevent the possible escape of processing fluid from the bladder which may damage the camera and/or injure the user, and to provide a writing surface on the film unit for recording data, the bladder end of the film unit can be enclosed within a somewhat stiff, crush resistant, elongated shell or exoskeletal structure of U-shaped cross section. The bladder and shell can be provided with suitable air vents, preferably out of alignment for permitting the escape of air from the bladder and shell as the processing fluid is forced therein. The vent openings are of a size sufficient to permit the flow of air, but insufficient to permit the flow of viscous processing fluid. Although the trap is integral with the film unit in its preferred form, it should be readily understandable that it may be formed as a unitary member and then releasably secured by any suitable means to the trailing end of a film unit, and detachable therefrom after use.

It is therefore one of the primary objects of the present invention to provide an improved fluid trap means for a film unit, comprising a flexible bladder constrained by a substantially crush resistant frame, for trapping or retaining any processing fluid which is in excess of that required to be spread between the elements for complete processing.

Another object of the invention is to provide a fluid trap means of increased capacity for collecting processing fluid in a film unit or the like.

Another object of the invention is to provide an improved fluid trap means for a film unit that is of a smaller size than prior known trap means, thereby reducing the overall size of film units which in turn facilitates the construction of more compact camera apparatus for using the film units.

Another object of the invention is to provide an improved fluid trap means for a photosensitive film unit that is of simple design and construction, thoroughly reliable and efficient in operation, and economical to manufacture.

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 DRAWING

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

FIG. 1 is a perspective view of a photographic film unit in which a fluid trap constructed in accordance with a preferred embodiment of the present invention is embodied;

FIG. 2 is a segmental exploded, perspective view of the fluid trap end of the film unit of FIG. 1;

FIG. 3 is a segmental enlarged view in section taken through the fluid trap of FIG. 1 prior to the processing operation;

FIG. 4 is a segmental enlarged view in section similar to FIG. 3 showing the film unit passing between pressure-applying rollers of a camera for spreading the processing fluid and forcing excess fluid into the inflatable bladder of the fluid trap;

FIG. 5 is a segmental enlarged section view similar to FIG. 4 showing the film unit after the processing operation has been completed in which all of the excess processing fluid has been forced into the expandable bladder by the pressure-applying rollers, and the rollers are about to be separated by the shell-like enclosure to prevent them from pressing upon the bladder and causing a backflow of the fluid therein; and

FIG. 6 is a perspective view of a modified form of spacer element.

## DESCRIPTION OF THE PREFERRED EMBODIMENT

Because photographic film units and assemblages are well known in the art, the present description will be directed in particular to elements forming part of or cooperating more directly with the present invention. Camera, film units and photographic assemblage elements not specifically shown or described herein should be understood to be selectable from those known in the art. U.S.

With reference to the drawings, a preferred embodiment of a fluid receiving structure shown as a processing fluid trap **6** of this invention is illustrated in connection with a film unit **8** and cooperating container or pod **10** containing a processing fluid **11**. Elements of the film unit are illustrated and described more completely in copending U.S. Patent application, Ser. No. 027,099 entitled Photographic Film Unit for Diffusion Transfer Processing, filed on Apr. 13, 1970, by Harold E. Cole. Briefly, film unit **8** is of the preferred composite or inte-

gral type and includes a photosensitive sheet **12** having an image recording section and a process sheet **14** to facilitate applying fluid to the image recording section. The sheets **12, 14** are supplied before exposure and remain after processing as a precut and laminated sandwich substantially in the form illustrated. More specifically, the photosensitive sheet **12** comprises a transparent support having thereon the following layers in sequence: an image-receiving or recording layer, an opaque reflecting layer, and at least one, and preferably three, silver halide emulsion layers having associated therewith a dye image-producing material. The process sheet **14** is formed of a transparent material, e.g., cellulose triacetate film base, and permits exposure of the photosensitive sheet from the top side of the unit (the side illustrated in FIG. **1**). The photosensitive and process sheets **12, 14** respectively are preferably, although not necessarily, rectangular and coextensive with one another and are maintained in registered or superposed facing relationship either by direct edge seals or by adhesive connections between the sheets and spacing members positioned along the two edges and the trailing end of the unit.

The rupturable pod **10** used in the film unit may be selected from any of several types and generally comprises a rectangular blank **16** of a vapor-impervious material that is folded along a medial line **18** and is securely sealed or closed along its sides **20.** The free ends of blank **16** opposite the medial fold **18** are in register and provided along substantially their entire length with a rupturable seal **22** adapted to release processing fluid **11** supplied in pod **10** upon the application of compressive pressure generated by passing the pod betweeen a pair of juxtaposed pressure-applying members such as rollers **24** (FIGS. **4** and **5**) as might be found in a camera. The pod **10** is attached to or cooperates with a leading end of film unit **8** in any suitable manner for discharging its fluid contents **11** between the photosensitive and process sheets **12, 14** respectively, and for this purpose may be provided with a flattened discharge mouth inserted into a space or slot provided between the photosensitive and process sheets at the leading end of the unit. After exposure of film unit **8** through process sheet **14** on the top side, the processing fluid **11** containing an opacifier is released from pod **10** and spread in a layer over at least a predetermined exposure frame of photosensitive sheet **12** by passing the entire unit between the pressure-applying rollers **24.** The thickness of the fluid layer is precisely controlled by engageable end rims **25** on rollers **24** which hold the rollers apart the required distance. Since the negative photosensitive portion of film unit **8** is surrounded by opaque material to render it insensitive to light, the unit can be removed from the camera during development. The processing fluid **11** then diffuses into photosensitive sheet **12** to either effect or initiate imagewise development of the silver halide emulsion layers. Imagewise distributions of diffusible dye image-providing material which is contained in each silver halide emulsion layer or in a layer contiguous thereto, are formed as a function of the imagewise exposure of each silver halide emulsion layer. At least a portion of the imagewise distribution of diffusible dye image-providing material is diffused to the image-receiving layer to provide a positive dye image. When the positive image is viewed through the transparent support layer of the photosensitive sheet, it will be a right-reading image on the opaque reflecting layer background. The image-receiving layer does not have to be stripped away from the rest of the film unit and no timing of development is required.

The processing fluid trap or fluid receiving structure **6** of this invention is provided at the trailing end of film unit **8** for collecting and confining any excess processing fluid **11** (FIGS. **4-15**) and hence preventing the fluid from contaminating the camera apparatus or the user. Accordingly, as best seen in FIG. **2,** the trailing ends of the photosensitive and process sheets **12, 14** respectively are provided with one or more openings **26, 28** respectively extending therethrough, and an inflatable bladder **30** is sandwiched or interposed between the sheet ends in register with openings **26, 28** therein. The bladder **30** comprises a rectangular blank of any suitable strong, pliable material such as polyethylene or the like that is inert to processing fluid. The free ends **32** of the blank are positioned in register and are secured by any suitable adhesive to the photosensitive and process sheets **12, 14** respectively. When the sides **34** of bladder **30** are sealed together by any suitable means, a pocket is formed for receiving excess processing fluid **11** fed therein through an open mouth **36** formed between the free ends of the bladder. The openings **26, 28** permit room for bladder **30** to expand forming an increased internal void for processing fluid forced therein. To facilitate fluid entry into bladder **30,** fluid back pressure is reduced by providing vent holes or slots **37** through which air can pass but fluid cannot. Normally, fluid back pressure should not be present in bladder **30** since the bladder in its normal flattened condition as seen in FIG. **3** is free of air. However, it is possible that air may be introduced into the bladder along with fluid **11.** To provide additional room for expansion, a spacer element **38** of any suitable material such as plastic or cardboard having one or more notches or openings **40** is secured by any suitable adhesive or the like to one or both of the outer surfaces of photosensitive and process sheets **12, 14** respectively in register with bladder **30** and openings **26, 28.** Although one of the sheets **12, 14** has a plurality of openings **26** forming strengthening ribs **42** therebetween, a single unitary opening may be preferable since it would provide greater room for bladder expansion. Although the openings **26** are generally of a rectangular configuration, they may be of any other suitable shape. The spacer **38** may also be provided with ribs **44** preferably spaced out of alignment with ribs **42** in photosensitive sheet **12** to facilitate lateral spreading of the fluid within the bladder. Although spacer **38** is shown as a rectangular member having openings **40** therein, one of the walls **46** of spacer **38** may be omitted to form a comb-shaped spacer **47** having a plurality of fingers **49** provided with beveled ends (FIG. **6**).

Since the expandable bladder **30** is soft and pliable, excess processing fluid **11** introduced therein causes the bladder to expand as best seen in FIG. **5** and extend into and/or through the spacer openings **40** and openings **26, 28** in the photosensitive and process sheets **12, 14** respectively. To prevent inadvertent rupture of the expanded bladder, and to provide a flat, stiff, substantially non-crushable surface onto which data may be recorded, a stiff elongated shell-like cover **48** of substantially U-shaped corss section is provided externally of the bladder and which may be slipped over the ends of the sheets **12, 14** and spacer **38.** The cover **48** is

made of any suitable substantially stiff material such as plastic and is preferably held in place by ultrasonically sealing the sides **50** of cover **48** to the photosensitive and process sheets **12, 14** and spacer **38,** or by any other suitable securing means. Since cover **48** has a thickness that is greater than the thickness of the laminated sheets **12, 14,** at least one of the top or bottom sides **50** of the cover is provided with an inclined ramp **52** for spreading rollers **24** and facilitating movement of the cover through the rollers. The cover is further provided with air vents **51** through which air from bladder **30** may escape. The sides **50** of cover **48** not only provide a rigid, preferably lined surface onto which data may be recorded, but in addition prevent rollers **24** from pressing on the filled bladder **30** causing fluid **11** in the trap to flow back between the photosensitive and process sheets **12, 14** respectively and deleteriously affect the processing action.

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 as described hereinabove.

I claim:

**1.** A self-processing photographic film unit including an image-recording portion, means for applying a fluent processing composition to the image-recording portion, and means for receiving excess processing composition including a bladder, and means outside the bladder for protecting the bladder against externally applied compressive forces.

**2.** A self-processing photographic film unit according to claim **1** wherein the means outside the bladder includes a skeletal structure.

**3.** A self-processing photographic film unit according to claim **2** wherein the skeletal structure is formed in part by an end portion of the image-recording portion which extends into the receiving means, said end portion having at least one aperture therein.

**4.** A self-processing photographic film unit according to claim **3** wherein a frame-like element is provided at the side of said end-portion remote from the bladder.

**5.** A self-processing photographic film unit according to claim **4** wherein the frame-like element is of comb form and that the spine of the comb-form element is at the trailing end of the unit and the teeth members of the comb-form element are directed towards the image-recording regions, and wherein the free ends of the teeth members have inclined surfaces to assist in parting pressure-applying member used in the initiation of processing.

**6.** A self-processing photographic film unit according to claim **1** wherein a cover is provided over the exterior of the means outside the bladder for protecting the bladder.

**7.** A self-processing photographic film unit according to claim **6** wherein the cover is formed of stiff material and is capable of accepting writing on an exterior surface.

**8.** A self-processing photographic film unit according to claim **6** wherein the cover is provided with vents allowing escape of air.

**9.** A self-processing photographic film unit according to claim **1** wherein the bladder has vent means which allows the escape of gas but not the passage of processing composition.

**10.** A self-processing photographic film unit according to claim **1** wherein the image-recording portion includes a photosensitive element and a process sheet, and the bladder is formed of a generally rectangular sheet of pliable material folded about its middle and with the sides contiguous with the fold being sealed and one of the free edges of the sheet being secured to the process sheet of the image-recording portion and the other of the free edges being secured to the photosensitive element of the image-recording element.

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