

Sept. 30, 1952

E. H. LAND
PHOTOGRAPHIC PRODUCT, INCLUDING A CONTAINER AND
MEANS FOR RUPTURING SAID CONTAINER

2,612,451

Filed Nov. 29, 1946

3 Sheets-Sheet 1

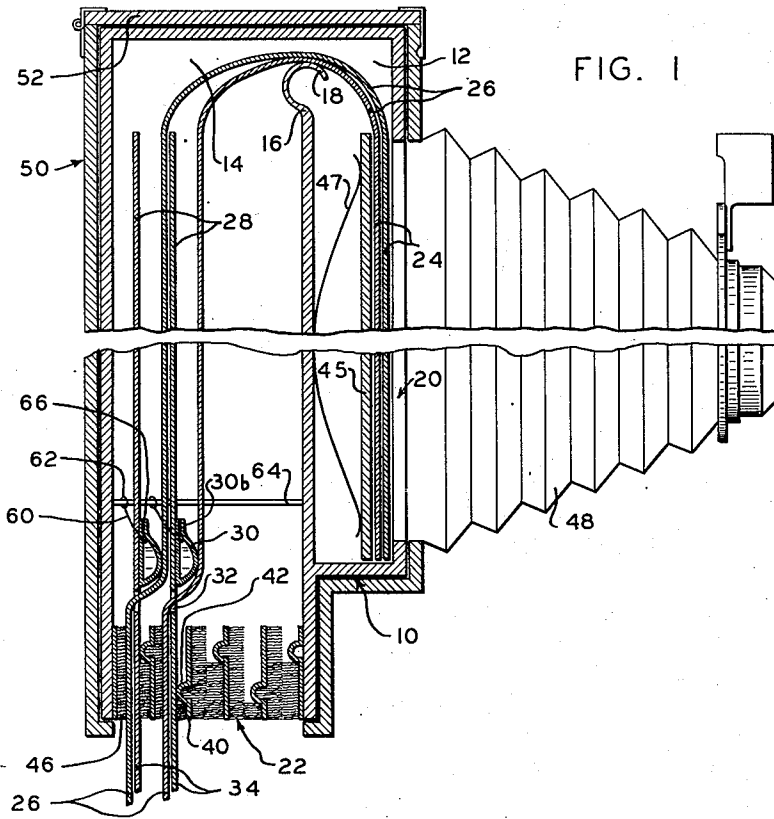


FIG. 1

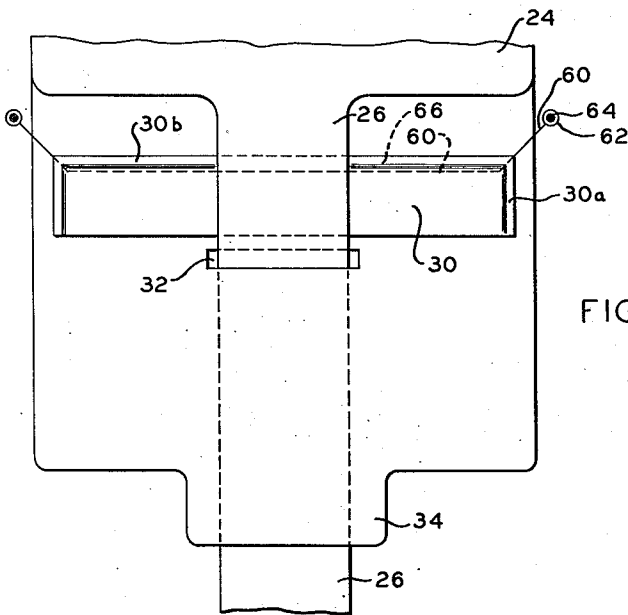


FIG. 2

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3 Sheets-Sheet 2

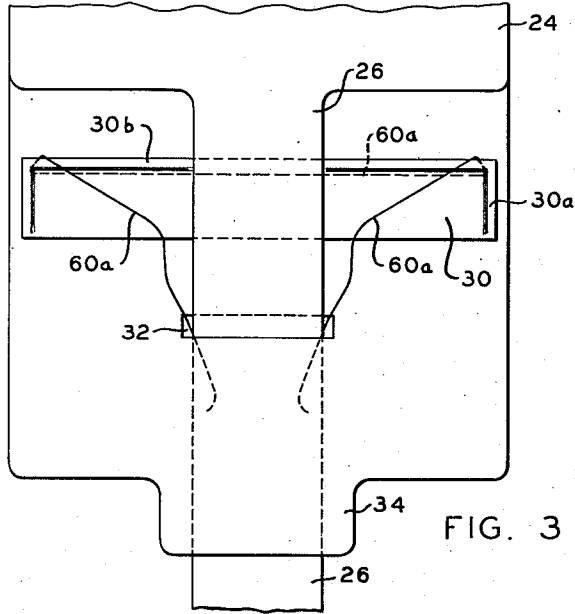


FIG. 3

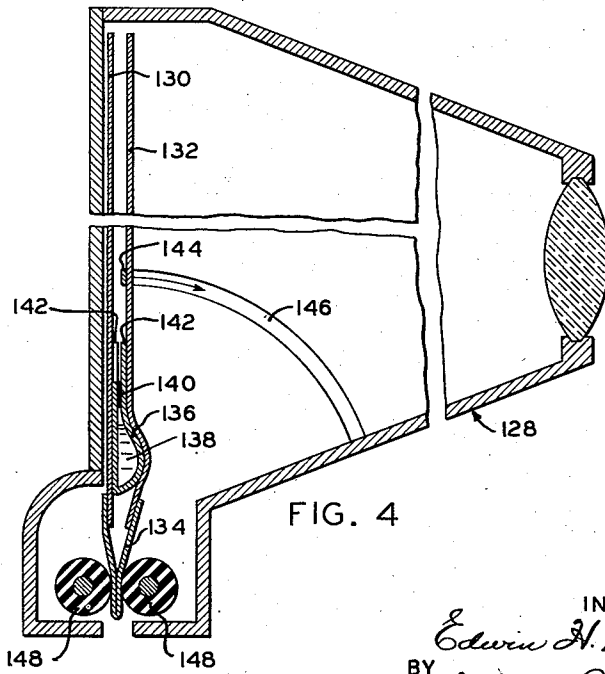


FIG. 4

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3 Sheets-Sheet 3

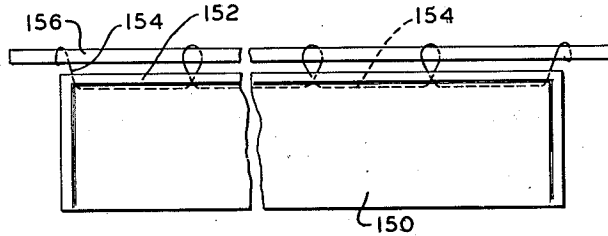


FIG. 5

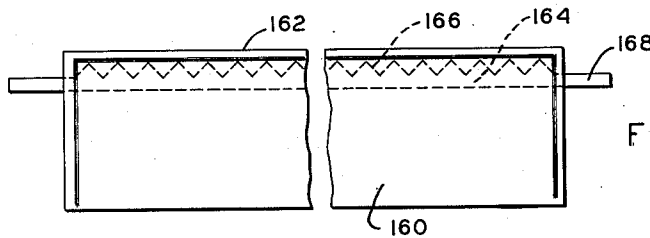


FIG. 6

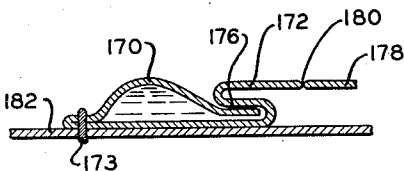


FIG. 7

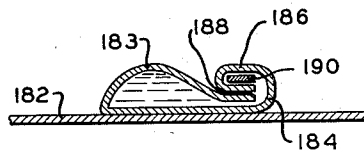


FIG. 8

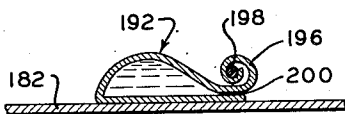


FIG. 9

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UNITED STATES PATENT OFFICE

2,612,451

PHOTOGRAPHIC PRODUCT, INCLUDING A CONTAINER AND MEANS FOR RUPTURING SAID CONTAINER

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Application November 29, 1946, Serial No. 712,887

20 Claims. (Cl. 95—8)

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This invention relates to photography and more particularly to novel photographic film units and containers for use in said film units.

It is a principal object of this invention to provide a photographic film unit having associated therewith a container for a liquid composition, wherein the container is capable of being opened to release its contained liquid as the result of relative movement between the container and a portion of a magazine or camera with which said film unit is associated.

Another object of the invention is to provide a film unit of the above character wherein relative movement of one part of the film unit with respect to another part thereof, or with respect to the container, causes the container to be opened to release the liquid.

Another object of the invention is to provide a novel liquid container for use in photography, which may be opened to release the liquid therein by moving a severing member associated with the container and forming a part thereof.

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

For a fuller understanding of the nature and objects of the invention, reference should be had to the accompanying drawings wherein:

Figure 1 is a diagrammatic exaggerated cross-sectional view of a preferred embodiment of the invention;

Fig. 2 is a fragmentary exaggerated diagrammatic plan view of one of the film units shown in section in Fig. 1;

Fig. 3 is a plan view of a modified form of the invention shown in Figs. 1 and 2;

Fig. 4 is a diagrammatic exaggerated sectional view of still another modification of the invention;

Fig. 5 is an exaggerated diagrammatic plan view of another modification of a severing member for a container of the type shown in Figs. 1 through 3;

Fig. 6 is an exaggerated diagrammatic plan view of still another modification of the invention;

Fig. 7 is an exaggerated diagrammatic sectional view of still another modification of the invention;

Fig. 8 is an exaggerated diagrammatic sectional view of still another modification of the invention; and

Fig. 9 is an exaggerated diagrammatic sectional view of still another modification of the invention.

In general this invention relates to improved photographic products, and apparatus for use

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therewith, of the type wherein the photographic product has associated therewith a container for a liquid composition. The product preferably comprises several layers forming a film unit which may be advantageously employed in processes of the type where a desired processing of at least a photosensitive layer included in the unit is obtained in a camera. This processing is preferably accomplished by releasing the liquid composition from the container between adjacent surfaces of a photosensitive layer and another layer, this liquid composition being spread between these two surfaces in a uniform thin film.

In film units of the above type the liquid composition is included in a container which is preferably formed of a strip of oxygen and water-vapor impervious material folded upon itself to provide a cavity therein which is sealed at both ends along the edge opposite the fold. This invention relates primarily to an improved container, product and apparatus for accomplishing the opening of the container by causing one portion of the container to move with respect to another portion of the container or by otherwise applying a severing stress to a severable portion of the container.

This invention contemplates a number of means for accomplishing this opening of the container, such as by creating a relative movement between parts of the container, or between a part thereof and a portion of the camera or other apparatus in which the container is positioned, or by causing relative movement between a part of the container and the magazine, or between a part of the container and one of the layers of the film unit. In a preferred form of the invention, the container is provided with a portion through which the liquid is adapted to be released and which normally is operative to confine said liquid. A member is preferably associated with said container which is capable of rendering said portion inoperative to confine said liquid when said member is moved relative to said portion. The portion of the container through which the release is accomplished is preferably the sealed edge of the container. The member for rendering this portion inoperative to confine the liquid is preferably a severing member extending through the sealed end of the container. The severing member is preferably so positioned with respect to the sealed edge that, when this member is moved, it acts to sever completely this sealed edge to release the liquid composition.

The present invention has certain advantages which result from the novel construction and arrangement of parts. One of these advantages

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is the positive opening of the container along a predetermined portion thereof, thus assuring an even distribution of liquid throughout a predetermined area of a film unit embodying such a container. Another advantage lies in the fact that the seal may be made as strong as any other portion of the container so that the container may have great resistance to inadvertent hydraulic bursting during handling thereof. An additional advantage of the invention resides in the positive opening of the container to release the liquid, with the means causing the release being trapped within a disposable magazine, and the opening motion being incident to a motion required in the handling of the film unit.

A preferred form of severing member comprises a piece of light metal wire or string which is fixedly secured to the magazine in which the film unit embodying the container is positioned. In this modification of the invention, as the film unit is moved within or from the magazine, a severing force is exerted on the sealed edge of the container due to the relative movement between the container and the severing member (i. e., the piece of wire). Thus, after a relatively small distance of travel, the container is opened to permit the release of the liquid composition and the liquid is free for spreading throughout the film unit.

Referring now to Fig. 1, there is shown an exaggerated diagrammatic sectional view of such a preferred form of the invention. In this embodiment of the invention there is provided a novel film unit comprising several layers with which there is associated one of the novel fluid containers of the present invention. In this embodiment of the invention the photosensitive layer of the film unit is mounted in a novel magazine so as to permit exposure thereof. After exposure, it is moved by the user of the camera into a predetermined face-to-face relationship with another layer of the unit and the novel container. The film unit so assembled is then moved from the camera or magazine by the user of the camera. As a result of this further movement of the composite film unit, a severing member provided in the container is caused to move relatively to the container, causing a severing force to be exerted on a portion of the container, thus opening the container to release the liquid therefrom. This severing member is preferably held stationary by a portion of the magazine so that movement of the film unit and container causes the opening of the container.

Referring now to the specific details of Fig. 1, there is provided a camera which is schematically shown at 48. This camera has a magazine holder generally indicated at 50 and has a top door 52 through which the magazine, generally indicated at 10, is adapted to be inserted. The magazine 10 comprises a front portion 12 and a rear portion 14 separated by a wall 16 having a curved top shown at 18. An exposure opening 20 is provided in the front portion of the magazine. At the rear bottom portion of the magazine there is provided a withdrawal opening, generally indicated at 22. Positioned in the magazine are a plurality of composite film units. These film units are also shown in Fig. 2, where like numbers correspond to like elements of Fig. 1, Fig. 2 being a fragmentary plan view of one of the film units shown in section in Fig. 1. As seen in Figs. 1 and 2, there are provided a plurality of photosensitive layers 24 mounted in parallel relationship in the front portion 12 of the magazine. In the rear portion 14 of the magazine there are pro-

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vided a plurality of other layers 28. These other layers are preferably adapted to receive and carry a positive image of a latent negative image produced in the photosensitive layer, and are hereinafter called image-carrying layers. Associated with each photosensitive layer 24 is a leader 26 which, as can be seen in Fig. 1, extends from the front portion of the magazine to the rear portion thereof, where it extends through a slit 32 formed in the image-carrying layer 28. The leader 26 then extends to the outside of the magazine through the opening 22. The image-carrying layer 28 is also provided with a leader, which is shown at 34, this leader also extending to the outside of the magazine.

For the purpose of holding the photosensitive layers 24 flat in the focal plane of the camera as these layers are brought into exposure position, there is provided a backing plate 45 under a spring pressure exerted by spring 47.

Associated with each image-carrying layer 28, and preferably adhesively secured thereto, is a container 30 having therein a liquid composition. This container is preferably formed of an oxygen and water-vapor impervious material such as a paper-backed metal foil. This container is formed by folding a strip of this material upon itself and sealing the ends 30a, shown in Fig. 2, and the edge 30b opposite the fold. As shown in Figure 1, there is preferably provided a layer 66 of an adhesive between the sealed lips of the container along the edge 30b and also the edge 30a. This adhesive 66 may be an alkali-inert inner coating on the interior of the container which is formed into a unitary bond at the adjoining surfaces of the container edge by heat and pressure. The seal may also comprise an additional coating of a thermoplastic or thermosetting adhesive. Positioned within the container is a severing member diagrammatically shown as a piece of wire 60. As can be seen, the two ends of this wire 60 extend to the outside of the container where the ends of the seal 66 of the sealed edge 30b join the sealed ends 30a. These outwardly extending ends of the wire 60 are preferably formed with engaging means on their outer ends, shown as loops in the wire at 62. Each of these loops 62 is engaged by a means in the magazine. In a preferred form, the loops 62 are positioned around a stationary engaging means provided in the magazine and shown as a rod or pin 64 fixedly secured to the walls of the magazine.

Positioned within the opening 22 from the magazine are a plurality of members 40 defining a plurality of withdrawal openings therefrom. In a preferred form, these members 40 are formed of metal strips having a raised ridge 42 thereon. Certain portions of these members 40 are also provided with a resilient light seal material shown schematically at 46. These members 40 are positioned within the mouth of the magazine so as to form a light-tight withdrawal opening therefrom. They also serve the function of applying a sufficient pressure to the outer surfaces of the composite film unit, as it is withdrawn therethrough, to cause the liquid to be spread from the container 30 in a uniform film between the photosensitive layer 24 and the image-carrying layer 28.

In a preferred form of the invention, the elements in the combination described above are made of the following materials: The camera and the magazine are preferably formed of metal, plastic, or opaque heavy cardboard. The photosensitive layer 24 preferably comprises a silver halide photosensitive emulsion coated upon an

opaque black paper base. The image-carrying layer 28 preferably comprises a sheet of paper, for example, the paper known in the art as baryta paper, and is preferably opaque to actinic light. The leaders 26 and 34 are preferably formed integrally with the layers 24 and 28, respectively.

The container 30 preferably comprises a paper-backed metal foil coated on its inner surface with a resin, such as polyvinyl butyral, which is inert to alkalis. The end seals 30a in this container are preferably formed by pressing the two layers together, under heat and pressure, thus causing the polyvinyl butyral lining to form a tight seal for these ends. The seal 30b may be formed as above or may be formed by coating one of the two longitudinal edges of the container, to be joined into the seal 30b, with a plastic such as ethyl cellulose which can also be heat sealed. The heat seal created by sealing the edge 30b, by means of ethyl cellulose, does not form quite as strong a seal as the seal 30a formed by heat sealing the adjacent ends by the means of the polyvinyl butyral lining. The severing member 60 preferably comprises a piece of fine wire which is inserted before or during the operation of forming seal 30b of the container. This wire should have a sufficiently high tensile strength with respect to the severing resistance of the seal 66, along the edge 30b of the container, so as to permit this member 60 to sever the seal 66 of the container when relative movement is created between the member 60 toward the seal 66 of the container 30. The container 30 is preferably secured to the image-carrying layer 28 by a bond which is sufficiently strong to permit the layer 28 to move the container 30 against the severing stress exerted by the member 60.

The engaging portion 62 in the end of the severing member 60 is preferably formed by making a loop in the end of this wire. It may, however, comprise some other member secured to the end of the member 60. The engaging means 64 in the magazine preferably comprises a metal pin secured to opposite walls of the magazine.

The liquid composition in the container 30 is preferably formed of an alkaline aqueous viscous solution of a developer and a silver halide solvent.

In the use of the modification of the invention shown in Fig. 1, the photosensitive layer 24 is exposed to actinic light such as by actuating the shutter mechanism of the camera 48. The user of the camera then withdraws the leader 26 from the magazine, thus moving the photosensitive layer 24 from the front portion 12 of the magazine to the rear portion 14, where this layer 24 is brought into a predetermined face-to-face relationship with the image-carrying layer 28 and the container 30. The user of the camera then engages leaders 26 and 34 and pulls both of these leaders together, thus moving the whole film unit as a composite assembly. As the film unit starts to move, the container 30, secured to layer 28, starts to move with respect to the severing member 60. As can be seen more clearly in Fig. 2, the motion of the container 30 in a downward direction in Fig. 2 causes the member 60 to commence severing the seal 66 along the edge 30b of the container. This severing commences at the two corners of the container and works uniformly toward the middle. After a predetermined amount of travel, depending upon the amount of slack in the member 60 and the resilience thereof, the seal along the sealed edge 30b is completely severed and the container 30

is opened to permit the release of the liquid therefrom for spreading between the layer 28 and the layer 24. As the film unit moves down through the withdrawal opening defined by the pairs of members 40, the resilient pressure applied by this pair of members, particularly in that portion adjacent the ridge 42 thereof, causes the liquid to be spread from the container in a uniform thin layer between the photosensitive layer 24 and the image-carrying layer 28.

When this uniform layer of liquid exists between the photosensitive layer and the image-carrying layer, it subjects the photosensitive layer to a desired processing. When the preferred liquid composition is employed, the developer in the liquid develops the latent negative image in the photosensitive layer and the silver halide solvent forms soluble image-forming complexes with undeveloped silver halide. These complexes are transferred from the photosensitive layer to the image-carrying layer where they are converted to a visible positive image by means of unused developer. The photosensitive layer 24 is next preferably stripped from the image-carrying layer 28 to reveal, on the surface of the latter layer, a positive image of the subject image to which the photosensitive layer 24 had been exposed.

In the above discussion of the invention, the severable portion of the container is preferably that portion comprising the seal 66 along the edge 30b. It is apparent that other portions of the container may be severed. For instance, the severing member 60, instead of being placed between two layers of material constituting the sealed edge thereof, may be threaded through one of these layers. In this case, the severable portion of the container might be one of the layers of the container. With some methods of forming the container, this modification of the invention is preferred. It is decidedly advantageous to be sure that the point of exit of the severing member from the container is securely sealed so as to prevent the entrance of oxygen or the escape of water vapor. The various materials from which the severing member may be formed may be varied considerably, depending upon the tensile strength necessary therefor in relation to the severance strength of the severable portion of the container. Thus, if the seal 66 along the edge 30b of the container is relatively easily severed, a light piece of string may constitute the severing member 60. If this seal is strong and requires a high severing force, the severing member 60 must, of necessity, be considerably stronger, and in this latter case is preferably formed of a metal wire or other material having a high tensile strength capable of imparting a high severing force to the severable portion of the container.

The embodiment of the invention shown in Figs. 1 and 2 may be considerably altered, such as by rearranging the portions thereof so that movement of one layer with respect to another layer of the film unit may be employed to cause a movement of a severing member with respect to a severable portion of the container associated with one of the layers. An example of this concept of the invention, as applied to the modification shown in Figs. 1 and 2, is shown in Fig. 3, where like numbers correspond to like elements of Figs. 1 and 2. In this Fig. 3 the severing member, indicated at 60a, is secured to the leader 26 associated with the photosensitive layer 24. With such rearrangement of parts, it is pre-

ferred that this connection be of such a nature that the severing member will not act to sever the severable portion of the container until movement of the leader 26 has brought the photosensitive layer 24 almost into its final position. If this is not done, there is a possibility that when the container is opened, the movement of the leader 26 thereacross may act to draw some of the liquid from the container and waste this liquid.

As can be seen from Fig. 3, the severing member 60a extends from the sealed edge 30b up and over the top of this sealed edge and the top of the container 30. A considerable amount of slack is provided in the outer portion of the member 60a so as to allow a considerable motion between the leader 26 and the container 30 before tension is exerted on the member 60a, thus causing it to sever the sealed edge 30b of the container 30.

In the use of the modification of the invention of Fig. 3, the user of the camera pulls the leader 26, after the photosensitive layer 24 has been exposed. As this leader moves downwardly in the rear portion of the magazine, it reaches a point where all of the slack in the ends of the member 60a is taken up. Thereafter, movement of the leader 26 causes the member 60a to be placed under a tension and to sever the sealed edge 30b. This severing operation should occur as the photosensitive layer 24 moves into its predetermined position with respect to the image-carrying layer 28. During this severing of the seal in the container, the image-carrying layer 28 is held by frictional or other resistance. This resistance to movement of the image-carrying layer must be greater than the tension necessary to shear the seal. This resistance may be increased by supplying a pin for temporarily holding the image-carrying layer in the magazine. Thus as the film unit is assembled for withdrawal from the magazine, the seal of the container is broken and the liquid may be readily spread therefrom.

In another modification of the invention, the severing member associated with the container may be so arranged that a portion thereof extends outside of the magazine so that this portion may be pulled by the user of the camera to cause an opening of the container and a release of the liquid composition. Such a modification of the invention is less preferred, however, since it requires an extra operation on the part of the user of the camera. It is preferred that the release of the liquid from the container be accomplished as a result of some operation which is essential to the use of the film unit. In those cases where the severing member extends to the outside of the camera, suitable means must be provided for furnishing a light seal at the point of exit of the severing member from the magazine.

While the preferred modification of the invention contemplates the use of a severing member which, during its use, completely severs a seal for the liquid in the container, this function is not absolutely essential. For instance, referring to Figs. 1, 2, and 3, it is seen that the severing member 60 extends behind the seal 66 so that, when the member 60 is moved with respect to this seal 66, the seal is completely destroyed. In some cases it may be desirable to imbed the severing member within the material constituting the seal 66. This is a convenient way of securing the severing member to the container

blank before the container is filled with the liquid composition, and in some methods of forming a container, it is a preferred way of introducing the shear member into the container. With such a modification of the invention, the severing member severs only that portion of the seal between itself and the outside. This, however, reduces the effectiveness of the remainder of the seal so that the container may be ruptured by the application thereto of a relatively low pressure. With such a modification of the invention applied to the invention of Figs. 1, 2 and 3, most of the seal 66 is destroyed as a result of the operation of the severing member and the remainder of the seal is destroyed due to the increased hydraulic pressure of the liquid in the container as the result of the film unit passing through the narrow portion of the withdrawal opening defined particularly by the ridge portion 42 associated with the member 40.

The preferred modification of the engaging means associated with the magazine for securing, at least temporarily, the outer ends of severing member 60 may be considerably modified. This means may take the form of a slot wide enough for the member 60 to pass therethrough but not sufficiently wide to permit the portion 62 on the end of the member 60 to pass therethrough. The ends of all the members 60 may also be fastened together such as by the use of a drop of solder, this drop of solder being secured to the magazine by a solder bond or by a mechanical connection such as a slot. It is also possible for the engaging means in the magazine to comprise a clamp or other suitable means adapted to secure the outer ends of the members 60 by means of a frictional force. Other modifications of this concept of the invention should be apparent to those skilled in the art, in view of the above description.

In the preferred embodiments of the invention discussed in connection with Figs. 1 and 2, the severing member associated with the container comprises a flexible member such as a piece of wire, both ends of which extend to the outside of the container and both ends of which are secured to some means causing relative movement between the severing member and a severable portion of the container. It is equally possible to have only one end of the severing member extend to the outside of the container and to have the other end thereof secured internally with respect to the container or secured to the layer associated with the container. In this case, only one end of the severing member is pulled to cause a relative motion between the severing member and the severable portion of the container.

As mentioned previously in the specification, it is feasible to provide means in a camera adapted to move relatively to a film unit, while the film unit is held stationary. These means may be engaging means such as the rods 64 which are movable and adapted to engage a portion of the severing members associated with the individual containers. The movement of these means causes the severing members to move with respect to the containers, thus severing a severable portion of the container to accomplish the release of the liquid composition from the container. When such means are employed, the various severing members should be of different lengths so that movement of the engaging means in the camera only severs one container at a time. The modification of Figs. 1 and 2 is pre-

ferred; however, since it does not require an extra operation on the part of the user of the camera.

In still another modification of the invention, there is provided a film unit of the type wherein one layer thereof is ordinarily moved relatively to another layer thereof in order to permit exposure of a photosensitive layer in the film unit. This modification of the invention is shown in Fig. 4, wherein the film unit comprises several layers, one of which is a photosensitive layer and the other of which may be an opaque image-carrying layer. In order that the inner surface of the photosensitive layer may be exposed to actinic light, it is preferable to move one of the layers with respect to the other layer so as to permit this exposure. In this modification of the invention, one lip of the sealed edge of the container is preferably secured to one of the layers of the film unit and the other lip of the sealed edge of the container is secured in the other layer of the film unit. Thus, when relative movement of these two layers is accomplished, for the purpose of permitting exposure of the inner surface of the photosensitive layer, the two lips of the sealed edge of the container are separated and the liquid therein can be spread therefrom between these two layers when they are rejoined, such as by passing through a pair of suitable pressure-applying means such as a pair of pressure rollers.

Referring now to Fig. 4, which is a sectional view of a preferred modification of this form of the invention, there is provided a film unit comprising a photosensitive layer 130 and an image-carrying layer 132. Suitably joining these two layers there may be provided a hinge 134. Mounted near the hinged connection between these two layers, there is provided a container 136 having therein a liquid composition 138. As can be seen, this container is preferably formed of a single fold of material, the edge opposite the fold being sealed by an adhesive, for example, as shown at 140. Extending from each lip of the container adjacent the seal 140 are several tabs 142 serving as means for severing the seal 140. Tabs extending from the left-hand lip of the container 136 are suitably secured, by means such as an adhesive or staple, to the photosensitive layer 130, while the tabs 142, extending from the right-hand lip of the container, are secured to the image-carrying layer 132.

In the use of such a film unit, the film unit is preferably mounted within a camera 128 so that the photosensitive layer 130 is ordinarily in the focal plane of the camera. For permitting exposure of the inner surface of this photosensitive layer, the image-carrying layer 132 is preferably rotated to the right, as shown in Fig. 4. This rotation can be accomplished by means such as a swinging arm 144 adapted to travel in groove 146 in the camera; or this rotation can be accomplished by means such as a spring in the film unit. As this image-carrying layer 132 is moved with respect to the photosensitive layer, it pulls the tab 142 secured thereto, thus severing the seal 140 along the sealed edge of the container. This allows the liquid composition to be subsequently spread throughout the film unit by means such as a pair of pressure rollers 148.

In the modification of the invention shown in Figs. 1 through 3, there is provided a severing member built into the container and adapted to be moved with respect to a severable portion of the container. A preferred form of this severing member comprises a single strand of wire or thread which, as described, exerts only one or two

severing forces upon the container at one time. In some cases, where it is desired that the member sever the container with the shortest possible relative movement between the member and the container, a modification of the invention, such as shown in Fig. 5, is preferred. In this modification of the invention a single strand of wire may be utilized as the severing member. This strand of wire, however, enters the container at a plurality of points, thus giving a plurality of severing points as the member moves with respect to the container. Referring specifically to Fig. 5, there is shown a diagrammatic, exaggerated plan view of a container embodying such a severing member. This container is represented at 150 and is provided with a sealed edge 152 constituting a severable portion thereof. For severing the sealed edge 152 of the container, there is provided a severing member 154, preferably comprising a wire which is threaded in and out of the sealed edge 152 a number of times. This member 154 is preferably secured to an engaging means 156 at a plurality of points. A preferred form of this engaging means comprises a wooden or metal rod around which the member 154 may be wrapped each time it leaves the sealed edge of the container. In one preferred form of the invention, the engaging means 156 is formed somewhat longer than the transverse dimension of the container 150 so that it may engage a portion of a magazine or camera, with which a container of this type is used, so as to cause a relative motion between this engaging means and the container 150, thus creating a relative motion between the severing member 154 and the severable portion 152 of the container. This engaging means may be actuated as the result of the movement of the container due to the withdrawal of the film unit from the magazine, as contemplated by the modification of Fig. 1.

In the use of the modification of the invention shown in Fig. 5, the movement of the engaging means 156 with respect to the container 150 causes an increased tension on the member 154 which starts to sever the seal, or severable portion 152, of the container at a number of points. After a relatively short travel of the engaging means 156 with respect to the container 150, all of the sealed edge 152 of the container is severed and the liquid released for spreading within the film unit.

In another modification of the invention it is contemplated to use, as a member for severing a severable portion of the container, a relatively rigid knife-like member placed within the container. This knife-like member preferably has a portion thereof extending to the outside of the container, this portion being adapted to be engaged by some means for causing a relative motion between the container and the rigid member. One preferred modification of this form of the invention is shown in Fig. 6 wherein there is provided a container 160 having a sealed edge 162. Positioned behind this sealed edge is a severing member 164 which can be formed of a metal stamping having a number of cutting teeth 166 formed therein. Extending outside of the container there is an engaging portion 168 on the member 164 adapted to engage a means associated with the camera or magazine for causing a relative motion between the container and the severing member. Teeth 166, on the member 164, permit this member to apply a severing force to the seal at the edge 162 in a number of separate points.

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In the use of the modification of the invention shown in Fig. 6, relative motion is created between the severing member 164 and the container 160 such as by moving the container relative to a fixed stop in a magazine adapted to prevent movement of member 164. This relative motion of the container, with respect to the severing member 164, causes the member to destroy completely the seal along the severable portion 162.

In another modification of the invention the severing member for causing the severing of a severable portion of a container may be a continuation of one of the walls of the container. This portion of the container may be so designed with respect to the container that movement of this portion of the container with respect to the remainder of the container operates to sever the severable portion, thereby opening the container to allow the liquid to be spread therefrom. Such a modification of the invention is shown in Figs. 7, 8 and 9. In a preferred form of this modification of the invention, one of the walls defining the container may be folded up over the top of the other wall and then folded back upon itself to provide a tab extending therefrom. The seal, which is the severable portion of the container, is provided, in this case, between the top of the top wall of the container and the inner surface of the bottom wall; thus, as the tab is pulled, the folded-over bottom wall of the container is pulled away from the seal, thus allowing the liquid composition to be spread from the container.

This particular feature of the invention is shown in Fig. 7 wherein there is provided a novel container 170 for a liquid. As can be seen in Fig. 7, the bottom wall 172 of the container is folded up and over the top wall of the container and then folded back upon itself to form an extension or tab 178. Between the top wall of the container and the first fold of the bottom wall 172, there is provided a seal 176 which may be formed of numerous plastic adhesives, such as ethyl cellulose or polyvinyl butyral. The container 170 is preferably secured to a layer 182, which may be either the image-carrying layer or the photosensitive layer, by the use of a staple 173 or a suitable adhesive. Between the tab 178 and the turned-over portion 172 of the bottom layer there is provided a weakened portion indicated generally at 180. This weakened portion is preferably stronger than the seal 176, but weaker than the bond between the container 170 and the layer 182. Thus, if there is a tension created on the leader 178 as a result of relative movement between this leader and the rest of the container, a sufficient force is transmitted to the portion 172 to cause a severing of the seal 176. Further increase in the tension on the leader 178 causes the weakened portion 180 to tear.

In the use of the modification of the invention shown in Fig. 7, the leader portion 178 of the container may be secured to the magazine so as to provide a relative motion between the leader 178 and the container 170 during the use of a film unit embodying this type of construction. This leader 178 may be secured to a stationary pin of the type shown in Figs. 1 and 2. In this case, motion of the container incident to removal of the film unit and the container from the magazine causes the leader 178 to transmit a tension to portion 172 of the container to exert a severing force on the seal 176, thus severing this seal to permit the liquid to be spread from the container. In order that the container 170 may not be loosened from the layer 182 as the result of the continued pull by the leader 178 on the container

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170, the weakened portion 180 is adapted to separate prior to the time when the bond between the container 170 and the layer 182 is adapted to give way.

Another form of this modification of the invention contemplates the use of a severing member of a rigid type which has a severing action similar to that described in connection with the discussion of the modification of the invention shown in Fig. 7. In this case the bottom wall of the container is folded over the top wall thereof and is sealed to the outer surface of this top wall. Within the fold thus created there is provided a relatively rigid member adapted to be moved relatively to the container to cause a severing of the seal between the two walls of the container by exerting a force on the upturned bottom wall of the container. Such a modification of the invention is shown in Fig. 8, where like numbers correspond to like elements in Fig. 7. In this modification of the invention there is provided a container 183 having a bottom wall 184 which is folded over the top wall, as at 186, and secured thereto by means of a seal 188, which may be similar to the seal discussed in connection with the seal 176 of Fig. 7. Included within the folded-over bottom portion 186 of the bottom wall, there is provided a rigid severing member 190 which may be a strip of metal extending beyond the ends of the container 183. When this member 190 moves to the right, as shown in Fig. 8, it can be seen that a force is exerted upon the portion 186 of the lower wall, tending to move this portion to the right. This motion of the portion 186 exerts a severing force on the seal 188 and causes this seal to rupture. The member 190 can be left in the magazine as the container leaves the magazine. Container 183 is secured to a layer 182 which may be an image-carrying layer or a photosensitive layer, depending upon the conditions of the use of the film unit in which such a container is embodied.

In still another form of this modification of the invention, there is provided a severing member associated with a container and positioned near the edge adapted to be sealed and which, by motion away from that edge and across the main body portion of the container, is adapted to sever the sealed edge. This modification of the invention is of particular utility where the motion, which it is desired to employ for severing the severable portion of the container, is a motion in a direction similar to the direction of motion of the container during its use. This modification of the invention is particularly applicable for use with a motion of the type described in connection with the discussion of Fig. 3, where the severing member is secured to a leader which moves in a direction extending from the sealed edge of the container to the folded edge of the container. This modification of the invention is shown in Fig. 9, wherein the top wall of the container is sealed to the bottom wall thereof and then is curled back upon itself and secured to a severing member which may be positioned within this backwardly extending curl. In this modification of the invention there is provided a container 192 suitably secured to an image-carrying or photosensitive layer 182. The top wall 194 of the container is sealed to the bottom wall thereof by means of a seal 200. The top wall is then preferably curled back upon itself as shown at 196, and within this curl there is positioned a severing member which may comprise a wooden or metal rod shown at 198. This metal rod preferably extends beyond the ends of the

container so as to be engageable by some means which is moved relatively to the container during the use of the film unit. This relative motion may be a straight translatory motion in a plane parallel to the seal 200 or it may be a translatory movement plus a rotary movement adapted to wind the portion 196 of the top layer 194 around the severing member 198 as this member rotates.

While the modification of the invention shown in Fig. 9 is preferred for this concept of the invention, it is equally possible to utilize the curled up portion 196 of the container as the severing member by providing a tab thereof of the general type shown at 178 in Fig. 7. With this alternative construction, the tab portion of layer 196 may be secured to a leader of the type shown in Fig. 3; or it may be positioned so as to be engaged by some means operating within the camera. It is also possible for this tab portion to be extended to the outside of the camera so that it may be pulled by the user of the camera to sever the seal 200 and thus release the liquid.

In all of the preceding discussions of the various modifications of the invention, it is preferred that the container be formed of a metal foil backed with paper, having on its inner surface a coating of an alkali-inert resin, such as polyvinyl butyral. Such a material has been found to have excellent oxygen and water vapor impervious characteristics and has the additional advantage that the polyvinyl butyral coating on the inner surface may be utilized for forming strong seals by the application of heat and pressure to the outer surface of the container. Where a less strong seal is desired, the polyvinyl butyral may be covered with a layer of a plastic, such as ethyl cellulose, which is also capable of being formed into a seal by means of the application of heat and pressure.

In all of the above modifications of the invention a preferred form of liquid composition comprises one containing a developer, such as hydroquinone, a preservative, such as sodium sulfite, an alkali, such as sodium hydroxide, a film-forming material, such as sodium carboxymethyl cellulose, and a silver halide solvent, such as sodium thiosulphate. It is possible, however, that the liquid composition in the container may comprise only water or an aqueous solution of a film-forming material. The other elements of the liquid may be positioned in solid form upon one of the layers of the film unit with which the container is to be used. In some other cases it is desirable to include portions of the active ingredients within the liquid composition and to place other portions thereof in solid form upon one or more of the layers of the film unit.

The liquid composition may also include only materials useful in developing, or developing and fixing a latent negative image with no emphasis on the production of a positive image.

In the modification of the invention shown in Figs. 5 through 8, the relative motion between the severing member and the severable portion is preferably accomplished by providing a connection between the severing member and a magazine, the severing member being left in the disposable magazine. However, this motion may be accomplished by a means in the camera adapted to move relative to the film unit while the film unit is held stationary. This motion may also be provided by extending a connection from the severing member to the outside of the magazine where it may be engaged by the user of the camera.

While the various modifications of the invention have been described in their preferred forms, i. e., as novel magazines and film assemblages for insertion in a camera having a lens, it is contemplated that the invention may be employed in other devices having no lens or shutter.

Since certain changes may be made in the above product without departing from the scope of the invention herein involved, it is intended that all matter contained in the above description or shown in the accompanying drawings shall be interpreted as illustrative and not in a limiting sense.

What is claimed is:

1. A photographic product comprising a rupturable container holding a liquid, said liquid including a developer for silver halide and having dispersed therein a thickening agent, a sheet support upon which said container is mounted, said sheet support providing a spreading surface having a liquid-receiving area adjacent said container onto which said liquid is spreadable directly from said container, said liquid-receiving area being greater than the area covered by said container and comprising a silver halide photosensitive material, said container comprising means, including walls, defining a cavity for confining said liquid, said means having a rupturable portion thereof through which said liquid is adapted to be released and which is normally operative to confine said liquid, and a member secured to said container and so associated with said rupturable portion as to be capable of rupturing said rupturable portion when said member is moved relative to said rupturable portion of said container, said container being secured to said sheet support by a bond having a strength sufficient to prevent movement between said container and said sheet support when said member is moved with respect to said rupturable portion to rupture said portion.

2. A photographic product comprising a rupturable container holding a liquid, said liquid having dispersed therein a thickening agent and at least one substance from the class consisting of silver halide solvents and silver halide developers, a sheet support upon which said container is mounted, said sheet support providing a spreading surface having a liquid-receiving area adjacent said container onto which said liquid is spreadable directly from said container, said liquid-receiving area being greater than the area covered by said container, said container being relatively flat and elongated and comprising means, including walls, defining a cavity for confining said liquid, said means having a rupturable portion extending along one long edge thereof through which said liquid is adapted to be released and which is normally operative to confine said liquid, said rupturable portion being adjacent one edge of said liquid-receiving area, and a member secured to said container and so associated with said rupturable portion as to be capable of severing said rupturable portion when said member is moved relative to said rupturable portion of said container, said container being secured to said sheet support by a bond having a strength sufficient to prevent movement between said container and said sheet support when said member is moved with respect to said rupturable portion to sever said portion, application of compression to said walls of said container being operative to force said liquid from said container through said severed portion onto said liquid-receiving area.

3. The product of claim 2 wherein the rupturable portion of said container comprises a longitudinal sealed edge thereof, said edge being sealed by a plastic and said member comprising a flexible element at least a portion of which is embedded in said plastic.

4. The product of claim 2 wherein said container has a sealed edge, the seal of the edge constituting said rupturable portion and an extension of one of the container walls beyond said sealed edge constituting said member.

5. The product of claim 2 wherein said liquid-receiving area comprises a silver halide photosensitive portion.

6. The product of claim 2 wherein said liquid comprises a viscous aqueous alkaline solution of a silver halide developer and a silver halide solvent.

7. A composite photographic film unit comprising a first layer, a second layer, a container having therein a liquid composition, one of said layers including a photosensitive silver halide portion, said container comprising means, including walls, defining a cavity for confining said liquid, said means having a rupturable portion thereof through which said liquid is adapted to be released and which is normally operative to confine said liquid, and a severing member secured to said container and so associated with said rupturable portion as to be capable of severing said rupturable portion of said container, said layers and container being connected together so that said layers may be superposed with said container positioned therebetween, said container being secured to said first layer by a bond having a strength sufficient to prevent movement between said container and said first layer when said member is moved with respect to said rupturable portion to cause said severing.

8. The product of claim 7 wherein said member is secured to said second layer.

9. The product of claim 7 wherein said member is connected to a leader for said second layer, said severing member comprising a flexible element extending from within said container to the outside thereof, said element having a predetermined length so as to permit a predetermined movement between said leader and said container before a severing stress is applied to said rupturable portion of said container.

10. The product of claim 7 wherein said member comprises an extension of one of the walls of the container, said extension being secured to said second layer.

11. A composite photographic product comprising at least one film unit, said film unit including a first layer, a second layer and a container, said second layer being adapted to be superposed on said first layer, said container being positioned between said first and second layers when said first and second layers are superposed, said first layer comprising a photosensitive material, said container defining a cavity having therein a liquid composition for processing said photosensitive material, said container having a predetermined portion which, when ruptured, is adapted to permit release of said liquid composition from said cavity for spreading between said first layer and said second layer, first means attached to said container for rupturing said predetermined portion upon relative movement between said first means and said predetermined portion, said container being secured to one of said layers by a bond having a strength sufficient to prevent movement be-

tween said container and said one layer when relative movement between said first means and said predetermined portion occurs, a magazine for housing said film unit, and second means secured to said magazine, said film unit being movable with respect to said magazine, said second means being adapted to engage said first means upon movement of said film unit with respect to said magazine, whereby relative movement between said first means and said predetermined portion is caused and rupturing of said predetermined portion occurs.

12. A photographic product comprising a magazine, at least one film unit positioned in said magazine, said film unit including a first layer, a second layer and a container, said second layer being adapted to be superposed on said first layer, said container being positioned between said first and second layers when said first and second layers are superposed, said first layer comprising a photosensitive material, said container defining a cavity having therein a liquid composition for processing said photosensitive material, said container having a predetermined portion which, when ruptured, is adapted to permit release of said liquid composition from said cavity, a pair of pressure-applying members associated with said magazine, said film unit being movable with respect to said magazine and between said pressure-applying members, first means attached to said container for rupturing said predetermined portion upon relative movement between said first means and said predetermined portion, said container being secured to one of said layers by a bond having a strength sufficient to prevent movement of said container with respect to said one layer when relative movement between said first means and said predetermined portion occurs, and second means secured to said magazine, said second means engaging said first means upon movement of said film unit with respect to said magazine, whereby relative movement between said first means and said predetermined portion is caused and rupturing of said predetermined portion occurs, movement of said film unit between said pressure-applying members thence causing release of said liquid composition from said cavity and spreading of said liquid composition between said first and second layers.

13. A photographic product comprising at least one film unit, said film unit including a first layer, a second layer and a container, said second layer being adapted to be superposed on said first layer, said container being positioned between said first and second layers when said first and second layers are superposed, said first layer comprising a photosensitive silver halide material, said container defining a cavity having therein a liquid composition including a developer for silver halide, said container having a predetermined portion which, when ruptured, is adapted to permit release of said liquid composition from said cavity for spreading between said first layer and said second layer, first means attached to said container for rupturing said predetermined portion upon relative movement between said first means and said predetermined portion, said container being secured to one of said layers by a bond having a strength sufficient to prevent movement between said container and said film unit when relative movement between said first means and said predetermined portion occurs, a magazine for housing said film unit, second means secured to said magazine,

said film unit being movable with respect to said magazine, said second means being adapted to engage said first means upon movement of said film unit with respect to said magazine, whereby relative movement between said first means and said predetermined portion is caused and rupturing of said predetermined portion occurs.

14. The product of claim 13 wherein said first means comprises a length of wire, at least one end of said wire extending outside of said container and engaging said second means.

15. The product of claim 13 wherein the predetermined portion of said container provides a mouth and comprises a seal closing said mouth, and wherein said first means comprises a flexible element, at least a portion of which is embedded in said seal.

16. The product of claim 13 wherein said first means comprises a flexible element extending from within said cavity through a portion of said container, at least a portion of said first means being positioned outside of said container and being adapted to engage said second means.

17. The product of claim 13 wherein said predetermined portion includes a pair of sealed lips and wherein said first means comprises an extension of one of said sealed lips.

18. The product of claim 13 wherein said container comprises a first wall and a second wall, the inner surfaces of said walls defining said cavity and wherein said predetermined portion includes a continuation of said second wall, the inner surface of which is secured by means of a seal to the outer surface of said first wall, there being a weakened region in said continuation, said weakened region being stronger than said seal and weaker than said bond.

19. The product of claim 13 wherein said container comprises a first wall and a second wall, the inner surfaces of said walls defining said cavity and wherein said predetermined portion

includes a section of said second wall, the outer surface of which is secured to the outer surface of said first wall, and said first means includes a member connected to said section.

20. The product of claim 13 wherein said container comprises a first wall and a second wall, the inner surfaces of said walls defining said cavity and wherein said predetermined portion includes a section of said second wall, the inner surface of which is secured to the inner surface of said first wall and the extremity of which is secured to said first means.

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