United States Patent

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[54] LIGHT LOCK FOR THE ENTRANCE/EXIT PASSAGEWAY OF A CONTAINER FOR LIGHT-SENSITIVE MATERIAL

8 Claims, 2 Drawing Figs.

[52] U.S. Cl. 95/67
[51] Int. Cl. G03b 17/26
[50] Field of Search 95/67

[56] **References Cited**

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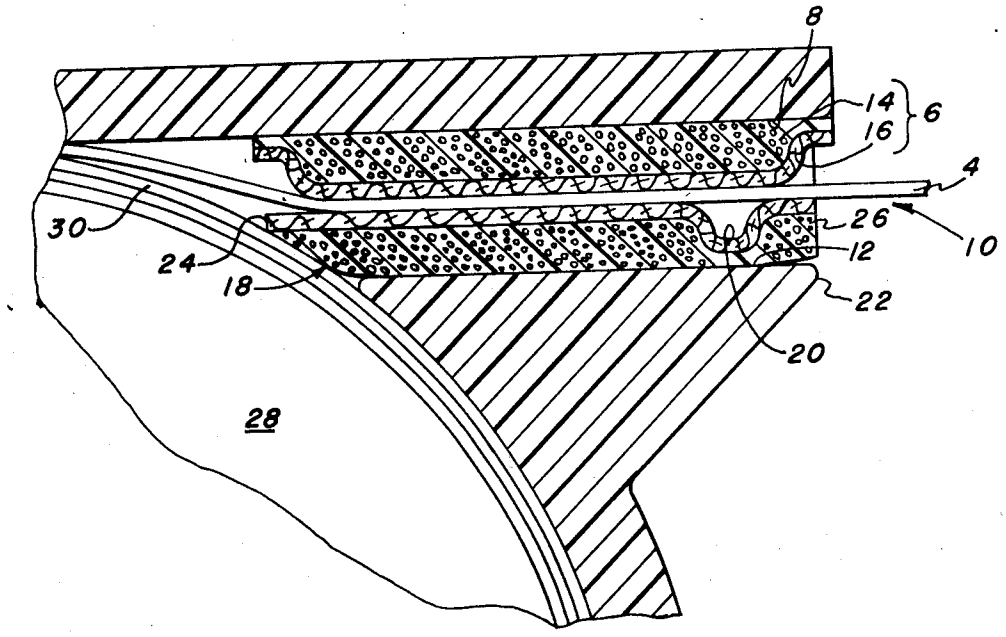
ABSTRACT: A layer of foam-cloth laminate is attached to both the upper and lower lips of the passageway to provide an effective light lock. The layer attached to the upper lip (the pad) is sealed at both the front and rear edges while the layer attached to the lower lip (the flap) is sealed only along a single line. The length of the line does not extend the full width of the passageway whereby the sides of the layers bulge toward the opposite lip to provide a light lock at the sides of the passageway. The inwardly extending end of the flap can extend into the chamber in which case it may be hemmed or pinched.



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Sheet 1 of 2

FIG. 1

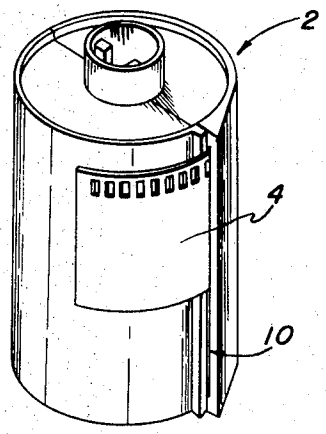
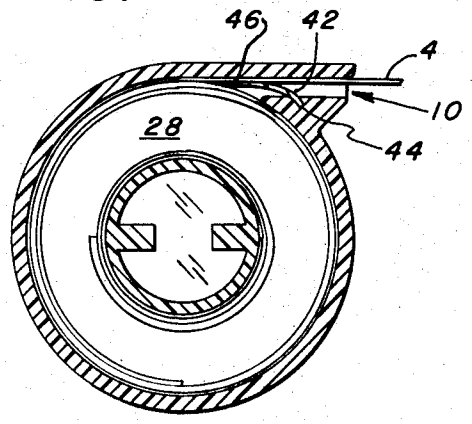


FIG. 6



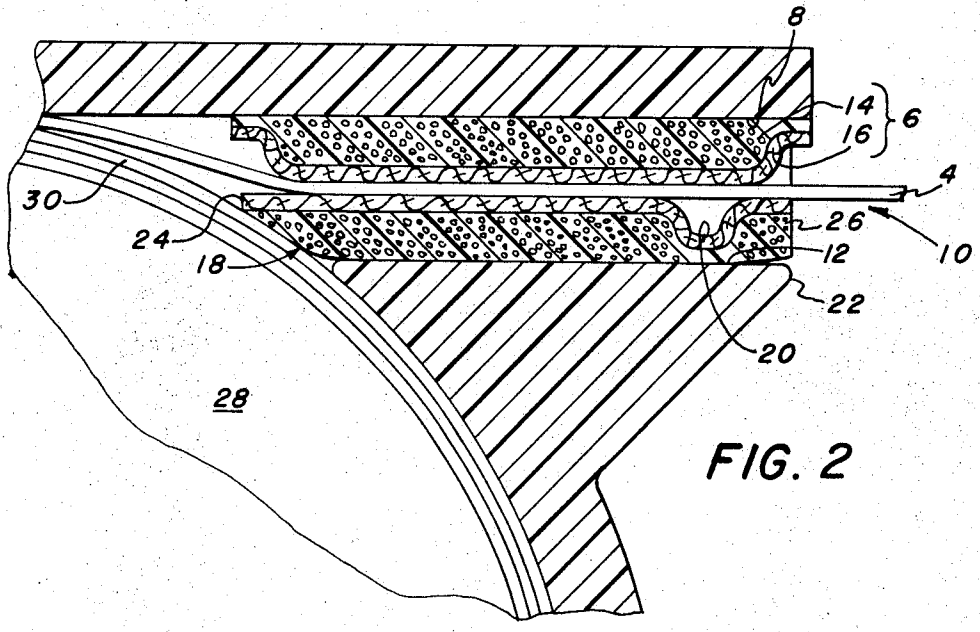


FIG. 2

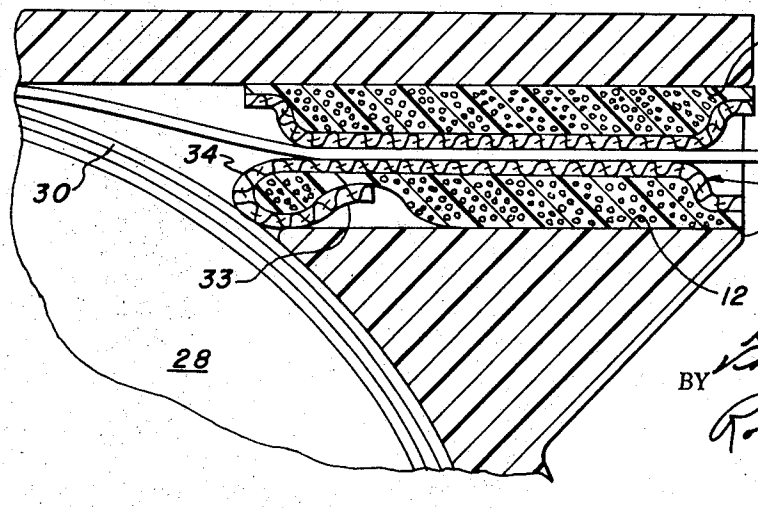


FIG. 3

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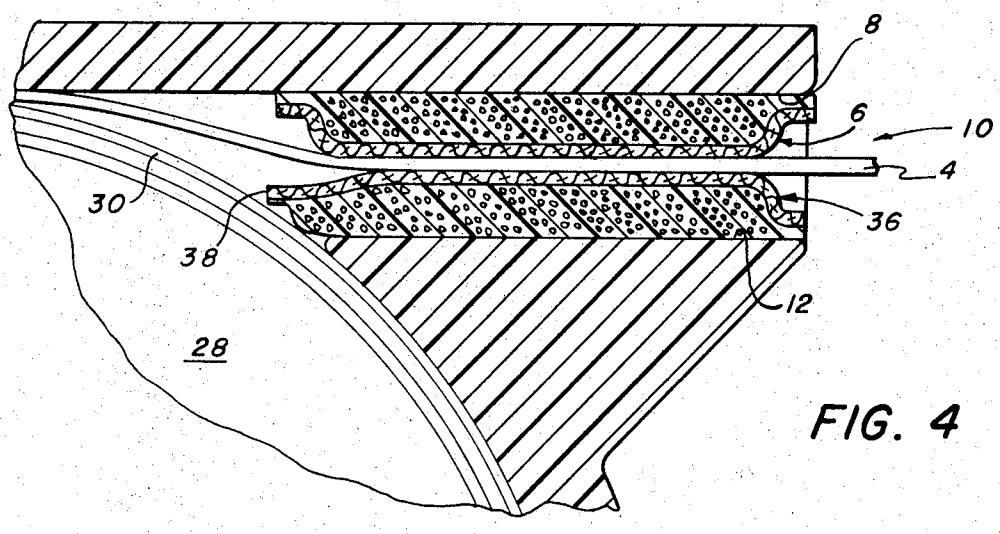

FIG. 4

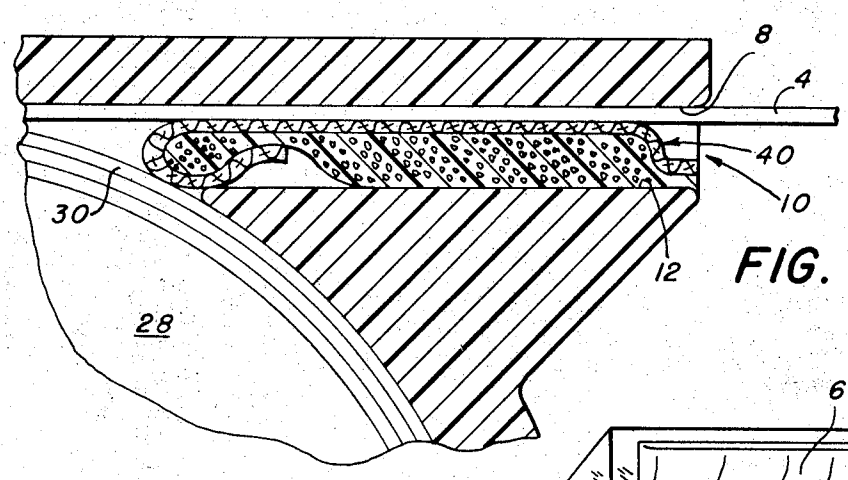

FIG. 5

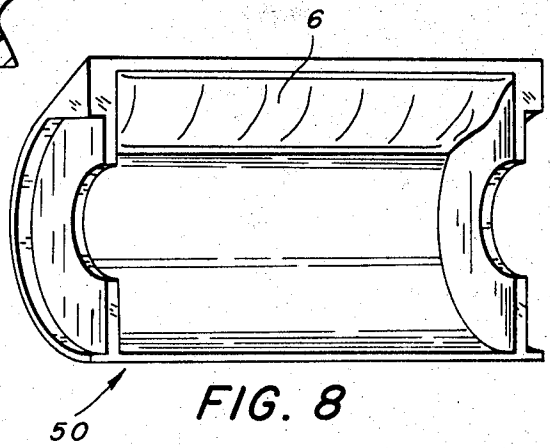

FIG. 8

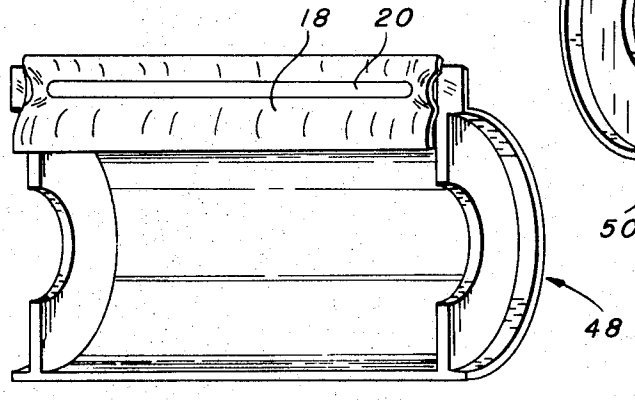

FIG. 7

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LIGHT LOCK FOR THE ENTRANCE/EXIT PASSAGEWAY OF A CONTAINER FOR LIGHT-SENSITIVE MATERIAL

BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention relates to a light lock for containers for light-sensitive materials and in a preferred embodiment to a light lock for the film gate of a photographic film cartridge.

2. Description of the Prior Art

To prevent light from entering through the lips of a conventional photographic film and/or paper magazine, it is customary to attach fabric of various types to the lips. The fabric closes the opening, but is resilient enough to allow the light-sensitive material to pass through. This method of light locking, unfortunately, results in loose fabric particles depositing on the film. Also, variations in lip opening and fabric thickness and resilience combine to result in a wide range of pull-out forces.

SUMMARY OF THE INVENTION

It is an object of the present invention to provide a light lock for the entrance and/or exit passageway of a container for light-sensitive material which light lock eliminates the dirt problem, provides a low, uniform, pull-out force, maintains lighttightness regardless of the normal variations in width of the passageway and reduces manufacturing cost.

These and other objects of the present invention are accomplished as follows. The pair of lips defining the container entrance or exit passageway are covered with a layer of foam-cloth laminate. The pad, or layer attached to the upper lip, is attached at both the front and rear edges while the flap, or layer attached to the lower lip, is attached along a single longitudinal line, preferably closer to the front edge of the lower lip than to the rear edge. The lines of attachment of the pad and the flap terminate short of the side walls of the passageway whereby the layer bulges toward the opposite lip to ensure an effective light lock at the sides of the passageway. In another embodiment the pad and flap can be sealed over the entire area from edge to edge and side wall to side wall. The inwardly extending free end of the flap may extend into the chamber. This free end can be square cut although it is preferably hemmed or pinched to aid in assuring a low, uniform pull-out force and to reduce the generation of dirt particles as the light-sensitive material passes over the free end. The pad and flap are sufficiently thick so as to cooperate to provide a light lock across the height of the passageway. The width of the flap and pad is greater than the width of any perforation which may be provided in the light-sensitive material. In the case of a cartridge for roll film, the inwardly extending end of the flap is urged toward the upper lip by the outer convolution of the roll, especially when in clock-spring condition, to add to the effectiveness of the light lock.

BRIEF DESCRIPTION OF THE DRAWINGS

These and other objects of the present invention will be more fully understood by reference to the following detailed description when read in conjunction with the attached drawings, in which like reference numerals refer to like elements, and in which:

FIG. 1 is a perspective view of a cartridge provided with the light lock of the present invention;

FIGS. 2—5 are enlarged cross-sectional views through the film gate of a cartridge such as is shown in FIG. 1 showing various embodiments of the present invention;

FIG. 6 is a cross-sectional view through the cartridge of FIG. 1 showing a light lock according to another embodiment of the present invention;

FIG. 7 is a perspective view of the bottom half of the cartridge of FIG. 1 with the flap of FIG. 2 attached; and

FIG. 8 is a perspective view of the top half of the cartridge of FIG. 1 with the pad of FIG. 2 attached.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

The light lock of the present invention will be described below by reference to its use in a cartridge 2 for roll film 4. It is to be understood, however, that the light lock of the present invention is not limited in use to this particular application but is useful in any type of container for light-sensitive material. The container can be a cassette, cartridge, magazine, box; etc., and the material can be roll film, sheet film, photographic paper, or any other light-sensitive material.

Referring first to the embodiments shown in FIGS. 2—4, the light lock of the present invention will be seen to comprise a pad 6 attached to the upper lip 8 of the film gate 10 and a flap attached to the lower lip 12 of the gate.

The differences between the three embodiments shown in FIGS. 2—4 are differences in the flap. In all three embodiments the pad 6 is identical. Both the pad 6 and the flap are constructed of a flexible layer 14 of material, such as polyurethane foam, laminated to a facing layer 16 of material having a low coefficient of friction such as nylon cloth. When using the above-named materials, they are preferably flame-laminated together, although other adhesive methods can be used. The pad 6 can be attached to the upper lip 8 by any convenient attaching method. Whatever method is used it is preferred that the front and rear edges of the pad have the facing layer 16 curved upwardly toward the upper lip 8 to provide a smooth surface across which the strip of film can pass when leaving the cartridge. By providing such a smooth surface having no rough edges, the generation of dirt particles is reduced and the pull-out force is reduced and made more uniform. The remaining central portion of the pad 6 bulges toward the lower lip 12. The flexible layer 14 has sufficient thickness (greater than half the height of the film gate passageway) to provide, in cooperation with the flap to be described hereinafter, an effective light lock for the film gate of the cartridge.

In the embodiment shown in FIG. 2, the flap 18 is attached to the lower lip 12 along a single longitudinal line 20 which is substantially parallel to and adjacent the front edge 22 of the lower lip 12 but preferably spaced rearwardly (or inwardly) a short distance therefrom. By so attaching the flap 18 at a point intermediate its longitudinal (inner and outer) edges 24 and 26, the edges 24 and 26 are free and unattached to the lip 12. This construction not only simplifies manufacture and reduces manufacturing cost, it also provides a flap having a large area of contact with the film 4 in the film gate 10 whereby the light lock is made as effective as is possible.

In the embodiment of FIG. 2 the inwardly extending edge 24 of the flap 18 projects into the chamber 28. This construction takes advantage of the small, unused space in the chamber 28 to increase the area of contact between the flap 18 and the film 4 and to thus increase the effectiveness of the light lock of the present invention. As shown in FIG. 2 the outer convolution of the roll of film contained in the chamber 28 is in contact with the free edge 24 of the flap. This outer convolution compresses the foam layer 14 thus urging the edge 24 of the flap upwardly toward the upper lip 8. This feature, along with the extended length of the flap, adds to the light locking effectiveness of the light lock of the present invention.

The embodiments shown in FIGS. 3 and 4 are similar to the embodiment shown in FIG. 2 but are modifications thereof. One problem which may be associated with the embodiment of FIG. 2, at least when the flap does extend somewhat into the chamber 28, is that as the strip of film is pulled out of the cartridge the perforations in the film may tend to catch on the free edge 24 of the flap and possibly generate dirt particles. Another possible problem with the embodiment shown in FIG. 2 is that the outer convolution 30 of the roll of film rides across the surface of the polyurethane foam, which foam has a coefficient of friction which is somewhat higher than that of the nylon facing, thus increasing the pull-out forces in the system. The friction generated between the foam and the outer convolution of film may tend to delaminate the flap 18

and may also pull the free edge 24 of the flap downwardly with the rotating outer convolution 30 of the film thus producing a build-up of the flap material which could jam the system.

The embodiments shown in FIGS. 3 and 4 overcome the above-mentioned possible disadvantages in the embodiment of FIG. 2. FIG. 3 shows a flap 32 attached to the very front edge 22 of the lower lip 12. The flap 32 extends a short distance into the chamber 28. The free edge 34 of the flap has been hemmed to eliminate any rough edge and to put the facing layer in contact with the outer convolution 30 of the film in the chamber 28. The hem 33 can be achieved by turning the facing layer around and under and sealing the end, for example, ultrasonically.

FIG. 4 shows a flap 36 which is similar to the flap 32 of FIG. 3 except that its free edge 38 has been pinched. This embodiment, depending on the length which the flap 36 extends into the chamber 28, eliminates at least one of the above-mentioned problems; that is, the generation of dirt particles. This is because the outgoing strip of film does not slide over the edge 38 but rather "bridges" over the edge as shown. However, depending upon the length which the flap extends into the chamber 28, the construction of FIG. 4 may or may not overcome the above-mentioned problem with respect to the friction generated between the polyurethane foam and the outer convolution 30 of the film.

In the embodiment of FIG. 5 the pad has been eliminated by making the thickness of the hemmed flap 40 sufficient to fill up the entire height of the passageway or film gate 10. This embodiment can use any of the flaps shown in FIGS. 2—4 and is useful when dirt is not a problem. However, it is usually desirable to provide the pad at the upper lip in order to eliminate any defects in the final product which result from dirt having collected on the film. The pad 6 of the present invention not only cooperates with the flap to provide an effective light lock but also operates to pick up and remove dirt from the back side of the film as the film is wound back into the cartridge. This is important since as the film is wound back into the chamber 24, the emulsion side of the film contacts the back side of the preceding convolution and any dirt on the back side can be transferred to or abrade the emulsion and can result in a defect in the finished product.

Another light lock of the present invention (See FIG. 6) does not include a pad but employs a flap 42 formed as a single piece of semirigid plastic or other material. In this embodiment the flap 42 is preferably attached to the lower lip by being inserted permanently in a groove 44 in the lower lip. In this embodiment there is no pad and no foam to close the film gate. However, the usual need for a light lock is only when the cartridge is out of the camera and completely filled with a roll of film (after the cartridge has been inserted into a camera, the light-tight housing of the camera provides the light lock for the film). The embodiment shown in FIG. 6 does provide an effective light lock in this case as follows. The flap 42 is an effective light lock by virtue of the fact that the outer convolution 30 of film urges the flap upwardly toward the emulsion surface of the strip of film in the film gate. The pressure on the flap from the outer convolution of the roll of film is enhanced due to the fact that the film usually exists in a clock-spring condition in the chamber 28. The inwardly extending edge 46 of the flap 42 preferably terminates just short of the point of the tangency of the exiting film strip and the outer convolution 30. If the flap 42 is too short there may be insufficient pressure on the flap and insufficient area of contact. If the flap is too long it may be cinched and may bind between the convolutions of film resulting in a jam or in an extremely high pull-out force.

FIGS. 7 and 8 are perspective views showing the lower half 48 and the upper half 50 of the cartridge 2 with the pad 6 and the flap 18 of FIG. 2 attached to the upper and lower lips respectively. As can be seen in FIGS. 7 and 8, the lines of attachment of the flap and pad to the lips do not extend across the entire width of the film gate or passageway but rather terminate just short of the side walls 48 and 50 thereof. By this means the flap and the pad are allowed to bulge away from their respective lips to provide an effective light lock at the sides of the film gate 10.

The material of which the flap and the pad can be made is not restricted to any particular materials. Other flexible materials can be used in place of the polyurethane foam and other facing materials of low coefficient of friction can be used in place of the nylon. For example, plastic, plastic foam, cloth, paper, metal, rubber, etc., or a combination of such materials can be used. The method of attaching the flap and the pad can be, for example, molding, crimping, tacking, gluing, riveting, staking, ultrasonic sealing, dielectric sealing, heat sealing, etc. and the sealing area not confined to a line.

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

We claim:

1. In a light-tight container comprising a wall defining an interior chamber for the storage of light-sensitive material, said wall including an upper and a lower lip, said pair of lips defining an elongated slot through the wall for providing a passageway into said chamber for said material, said passageway having a relatively large width and a relatively small height and length, and a light lock affixed to said lips for preventing the passage of light into said chamber while allowing the passage of said material through said passageway, the improvement wherein said light lock comprises:

an elongated pad comprising a layer of resilient material laminated to a layer of facing material, said facing material having a relatively low coefficient of friction, said pad being affixed to said upper lip with the resilient layer in contact with said upper lip, said pad having a length at least equal to the width of said passageway, said pad having a thickness greater than half the height of said passageway, said pad having a width at least as great as the length of said passageway, and said facing layer curving toward said upper lip at both of the elongated edges of the pad; and

an elongated flap comprising a layer of resilient material laminated to a layer of facing material, said facing material having a relatively low coefficient of friction, said flap being affixed to said lower lip along a single longitudinal line with the resilient layer in contact with said lower lip, said line terminating short of the side walls of said passageway, said flap having a length at least as great as the width of said passageway, said flap having a thickness greater than half the height of said passageway, and said pad having a width at least as great as the length of said passageway.

2. The improvement according to claim 1 wherein said container wall is substantially cylindrical and said material is stored in roll form and wherein the inwardly extending edge of said flap extends beyond said wall and into said chamber.

3. The improvement according to claim 2 wherein said inwardly extending edge of said flap is hemmed so as to provide a smooth layer of said facing material to the outer convolution of the roll of light-sensitive material in said container.

4. The improvement according to claim 2 wherein said inwardly extending edge of said flap is pinched whereby the light-sensitive material as it is withdrawn from said container bridges over said inwardly extending edge so as to not come into contact therewith.

5. The improvement according to claim 1 wherein said single longitudinal line of affixation is adjacent the front edge of said other of said lips but spaced inwardly a distance therefrom such that both of the elongated edges of said flap are free and unattached to said lower lip.

6. In a light-tight film cartridge of the type comprising a wall defining an interior chamber for the storage of a roll of film, the container wall having an upper and a lower lip, said lips defining an elongated slot providing a passageway through

said wall and into said chamber for said material, and a light lock for preventing the passage of light into said chamber while allowing the passage of said material through said passageway, the improvement wherein said light lock comprises:

an elongated flap comprising a layer of resilient material laminated to a layer of facing material, said facing layer having a relatively low coefficient of friction, said flap being affixed to the lower lip, with the resilient material in contact with the lower lip only along a single longitudinal line, said line terminating short of the side walls of the passageway for allowing said flap to bulge toward the upper lip at both sides of said passageway, said flap extending across the entire height and width of the passageway to provide an effective light lock.

7. The improvement according to claim 6 wherein the inwardly extending longitudinal edge of said flap extends into said chamber beyond the interior edge of said lower lip.

8. The improvement according to claim 7 wherein said inwardly extending edge of said flap is hemmed.