

PATENT SPECIFICATION (11)

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(54) IMPROVEMENTS IN/OR RELATING TO PHOTOGRAPHIC CAMERAS

(71) We, EASTMAN KODAK COMPANY, a Company organized under the Laws of the State of New Jersey, United States of America of 343 State Street, Rochester, New York 14650, United States of America, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

The present invention relates to photographic cameras.

An object of the present invention is to provide an improved bellows-type film pack camera.

According to the present invention, there is provided a photographic camera arranged to be loaded with a generally rectangular film pack including a casing provided with a forwardly facing exposure window, the camera comprising a door carrying a lens at one end thereof, the door being hinged at its opposite end to a housing of the camera for movement between a closed position and an open position, film pack support means for supporting the film pack within the housing with the exposure window in optical alignment with the lens when the door is in the open position, a light-tight bellows extending between the door and the housing, the bellows being collapsible by movement of the door to the closed position, and recess defining means providing a bellows receiving recess within the housing adjacent three sides of the film pack the recess being arranged to receive a substantial portion of the bellows in the collapsed condition when the door is in the closed position.

The invention will be described further by way of example, with reference to the accompanying drawings in which like reference numerals denote like elements and in which:

Fig. 1 is a perspective view of a photographic film pack camera according to a

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preferred embodiment of the present invention, depicted in closed condition;

Fig. 2 is a view similar to Fig. 1 but showing the camera in its open or operative condition;

Fig. 3 is a perspective view of a film pack of the type adapted to be accommodated in the camera shown in Figs. 1 and 2;

Fig. 4 is a broken away and part sectional view of the open camera depicted in Fig. 2;

Fig. 5 is a perspective rear view showing the camera in phantom lines and depicting the relation of the bellows to the film pack when the camera is in its closed condition; and

Fig. 6 is a perspective view of the bellows in an extended state before they are installed in the illustrative camera.

Referring to the drawings, a photographic film pack camera according to preferred embodiment of the invention comprises a boxlike housing 11 having a forwardly facing opening 12 provided with a lens supporting door 13 coupled to the housing by a hinge 14 (Fig. 4) for movement between a closed or inoperative position shown in Fig. 1 and an open or operative position shown in Figs. 2 and 4. The camera's lens 15 and its shutter, not shown, are carried by a sloped end portion 16 of the door 13 opposite the hinge 14 thereof. When the lens support door is in its closed position, shown in Fig. 1, it protrudes only slightly beyond a flat front wall 17 of housing 11. Accordingly, the camera can be carried conveniently in a photographer's pocket or in an appropriate carrying case with the lens protected by its reception within the opening 12.

The lens support door is connected to the camera housing by a light-tight bellows 18, which is described in greater detail below. A jointed strut 19 comprising pivotally supported legs 20 and 21 extends between the lens support door and the camera housing and is enclosed within the latter when door

13 is closed. A spring wire 22 (Fig. 4) bears against a toggle pin 23 on the rearward strut leg 20 resiliently to maintain the lens support door in its closed position shown in Fig. 1. To open the door a photographer pulls it forwardly against the resistance of spring 22 by means of a finger grip lip 24 adjacent the camera lens. As the strut unfolds, the toggle pin 23 moves along spring wire 22 to a position at which the spring wire biases the strut toward its fully extended position at which an ear 25 of the front strut leg engages the adjacent edge of the rear strut leg. Consequently, the fully extended strut locates the lens support door at a predetermined open position in which the lens is in fixed parallel relation to the camera housing. To close the camera, the photographer manually moves the lens support door rearwardly in opposition to spring wire 22, which then resiliently holds the door in its closed position as previously explained.

The illustrative camera is adapted to be loaded with a film pack 26 of the type illustrated in Fig. 3. Briefly, the film pack comprises a box or casing 27 provided with a front exposure opening or window 28 and with a slot 29 in its end wall 31. A plurality of film units are initially stacked inside the casing behind an opaque masking strip 32 which covers the exposure opening and extends out of the casing through the slot 29. The film units are provided with respective leader strips and are connected to each other and to the masking strip in such a way that the withdrawal of the masking strip pulls the leader strip of the first available film unit through the slot 29 to an accessible position and the withdrawal of each successive film unit similarly brings the leader strip of the next film unit to that same position.

To load the film pack into the camera, the hinged loading door 33 at the rear of the camera housing is opened and the film pack is inserted into a mating compartment 34 in the camera housing which is defined by end walls 35 and 36 joined by tapered lateral walls (not shown). A lip 38 projects inwardly from the end and side walls of compartment 34 and supports the front surface of the film pack casing surrounding exposure opening 28. When the loading door is latched in its closed position by appropriate latch means, not shown, a leaf spring 39 carried by that door urges the film pack forwardly against the lip 38 so that the emulsion surface of a film unit to be exposed is positioned in coincidence with a focal plane of the extended camera lens.

When the film pack is positioned in the camera as described above, the leader end of the opaque masking strip extends past

the compartment end wall 35 and through an exit slot 41 provided between the adjacent confronting edges of the loading door and the camera housing. Inside the closed camera housing, the strip passes between a pressure roller 42 mounted in the housing and an opposing pressure roller 43 carried by the loading door. By pulling on the externally accessible end of the masking strip, the photographer can remove that strip from the camera and thereby bring the leader strip of the first available film unit to the same accessible position. After each film unit has been exposed, it is withdrawn by means of its accessible leader strip, as previously described, and is thereby pulled between the opposed pressure rollers, which rupture a fluid container and distribute the processing fluid over the exposed photosensitive sheet surface in the manner well known in the self-processing camera art. The camera bellows 18 is preferably made of a flexible opaque plastics material such as polypropylene and is moulded or otherwise formed in one piece. As best shown in Fig. 6, the bellows is of generally U-shaped profile comprising a thin accordion pleated wall 44 joining similar accordion pleated walls 45. Because its fourth side is open, the illustrative bellows obviously can be formed in a relatively simple two-part mould comprising a cavity which defines the external bellows surfaces and a core or plug which defines the internal bellows surfaces. Alternatively, the bellows might be made from a single piece of sheet plastic material by employing a pressure or vacuum forming technique.

After the bellows has been formed, it is squeezed to a collapsed condition and the free ends 46 of its lateral walls are cemented together or otherwise permanently held in that condition so that they can no longer expand and contract in accordion fashion. The bellows is then installed in the camera with its end face 47 cemented to a confronting face 48 of a flat support web 40, 49 which defines the back wall of a forwardly facing U-shaped recess 51 surrounding three sides of the film pack compartment. The opposite end face 52 of the bellows is similarly cemented to a rearwardly facing flat U-shaped surface 53 surrounding three sides of recess 54 in the lens support door. A strip of flexible opaque material 55 or the equivalent is also cemented between the hinged end of the lens support door and the camera housing to provide a light seal at the door hinge. Thus, it should be readily apparent that completely light-tight cooperation is provided between the camera housing and the lens support door so that only light entering through lens 15 can reach the photosensitive film.

When the lens support door is in its closed position, as shown in broken lines in Fig. 4, the film pack is partially received within door recess 54 and the bellows is collapsed into the U-shaped housing recess 51. As best illustrated in Fig. 5, the collapsed bellows therefore lies almost entirely in lateral relation to the film pack and thus allows the closed camera to be considerably thinner than a camera in which a collapsed bellows is stored forwardly of the film pack.

Although the preferred embodiment of the invention employs a one-piece accordion pleated plastic bellows, it should be apparent that the bellows could be made in the conventional manner by cementing stiffening members to a piece of flexible opaque fabric. Also, it should be recognized that the bellows need not necessarily be of the accordion type but could comprise a plurality of U-shaped wall members pivotally connected at their free ends and adapted to telescope relative to each other.

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 scope of the invention as defined in the appended claims.

WHAT WE CLAIM IS:—

1. A photographic camera arranged to be loaded with a generally rectangular film pack including a casing provided with a forwardly facing exposure window, the camera comprising a door carrying a lens at one end thereof, the door being hinged at its opposite end to a housing of the camera for movement between a closed position and an open position, film pack support means for supporting the film pack within the housing with the exposure window in

optical alignment with the lens when the door is in the open position, a light-tight bellows extending between the door and the housing, the bellows being collapsible by movement of the door to the closed position, and recess defining means providing a bellows receiving recess within the housing adjacent three sides of the film pack the recess being arranged to receive a substantial portion of the bellows in the collapsed condition when the door is in the closed position.

2. A camera according to Claim 1 in which the bellows comprising three collapsible wall members joined to each other in a generally U-shaped cross sectional configuration and adapted when collapsed to be received in the recess laterally adjacent two opposed sides of the film pack and a third side thereof opposite an end of the film pack provided with a casing opening for removal of successive film units.

3. A camera according to Claim 2 including means defining a housing opening in the housing in operative alignment, in use, with the casing opening to permit removal of successive film units from the housing through the openings.

4. A camera according to Claim 1, 2 or 3 in which the bellows wall members are pleated to collapse in accordion fashion.

5. A camera according to any preceding Claim in which the bellows comprises a single piece of opaque flexible plastics material.

6. A photographic film pack camera substantially as hereinbefore described with reference to and as illustrated in the accompanying drawings.

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