

[54] **ERECTING LINKAGE**

[75] Inventor: **Lawrence M. Douglas**, Eastondale, Mass.

[73] Assignee: **Polaroid Corporation**, Cambridge, Mass.

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[51] Int. Cl. **G03b 17/04**

[58] Field of Search **95/39, 11 R, 13, 14**

[56] **References Cited**

UNITED STATES PATENTS

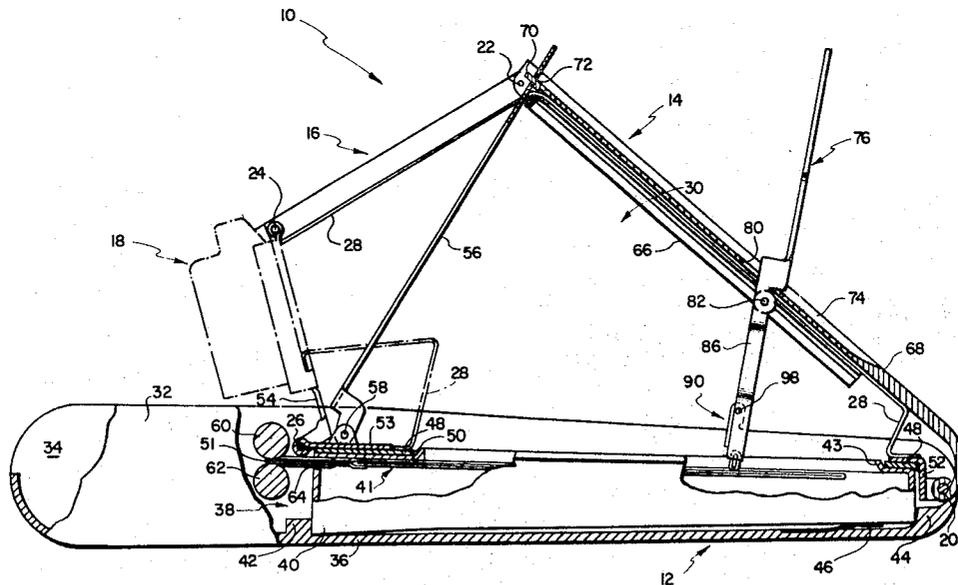
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Primary Examiner—Robert P. Greiner
Attorney—Alfred E. Corrigan et al.

[57] **ABSTRACT**

Photographic apparatus of the collapsible type including a plurality of sections movable between a compact, collapsed position and an extended, operative position. An erecting link is pivoted at one end to one of the sections and is adapted to be detachably secured to another of the sections for maintaining and supporting the sections in the erected, operative position. One of the sections includes a recess for receiving a hand-engageable portion of a film-advancing apparatus when not in use. When the photographic apparatus is collapsed, the erecting link is pivoted into the recess in overlying relation to the hand-engageable portion of the film-advancing apparatus to prevent actuation of the latter.

8 Claims, 4 Drawing Figures



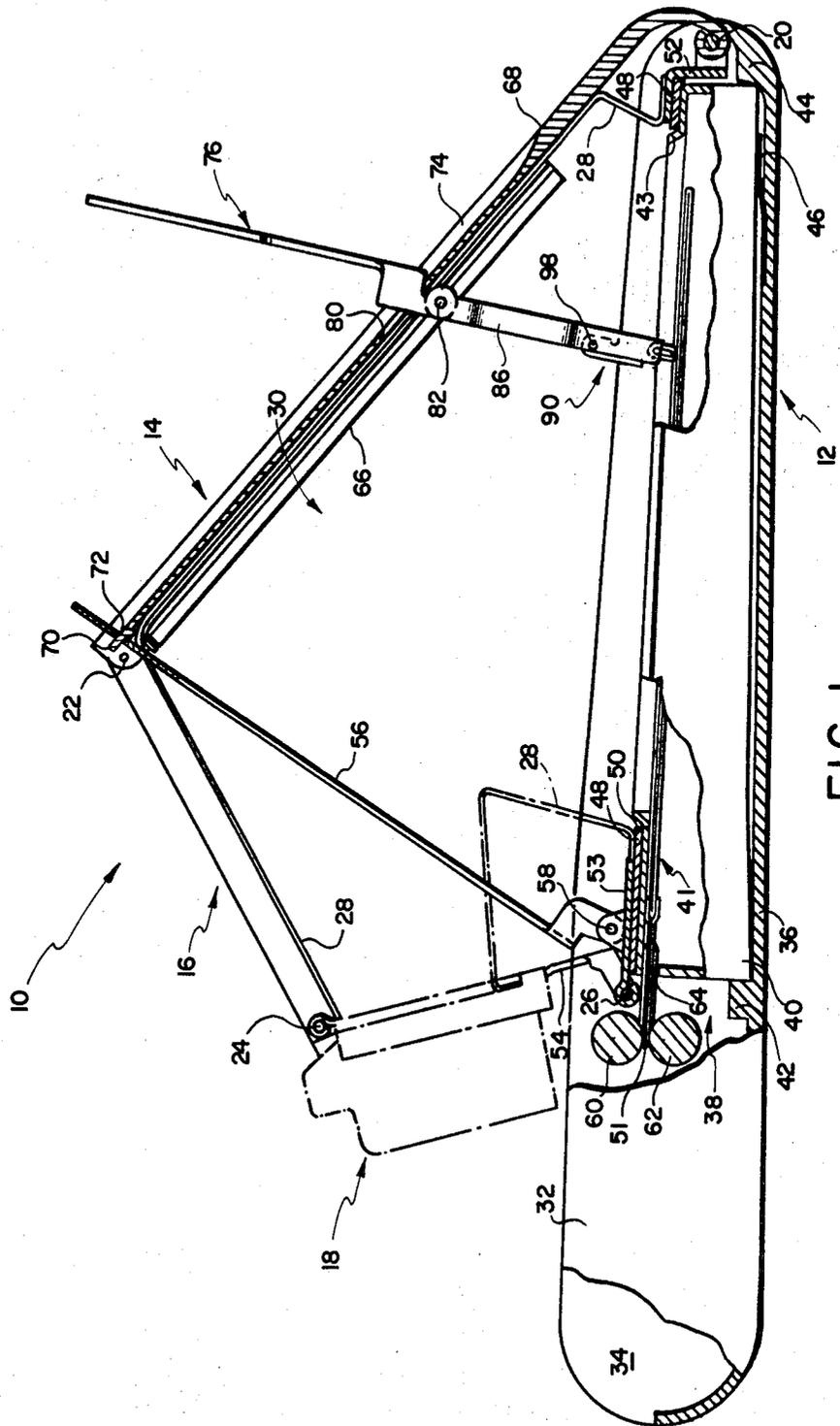


FIG. 1

INVENTOR
LAWRENCE M. DOUGLAS
BY *Brown and Mulla*
and
Alfred E. Corrigan
ATTORNEYS

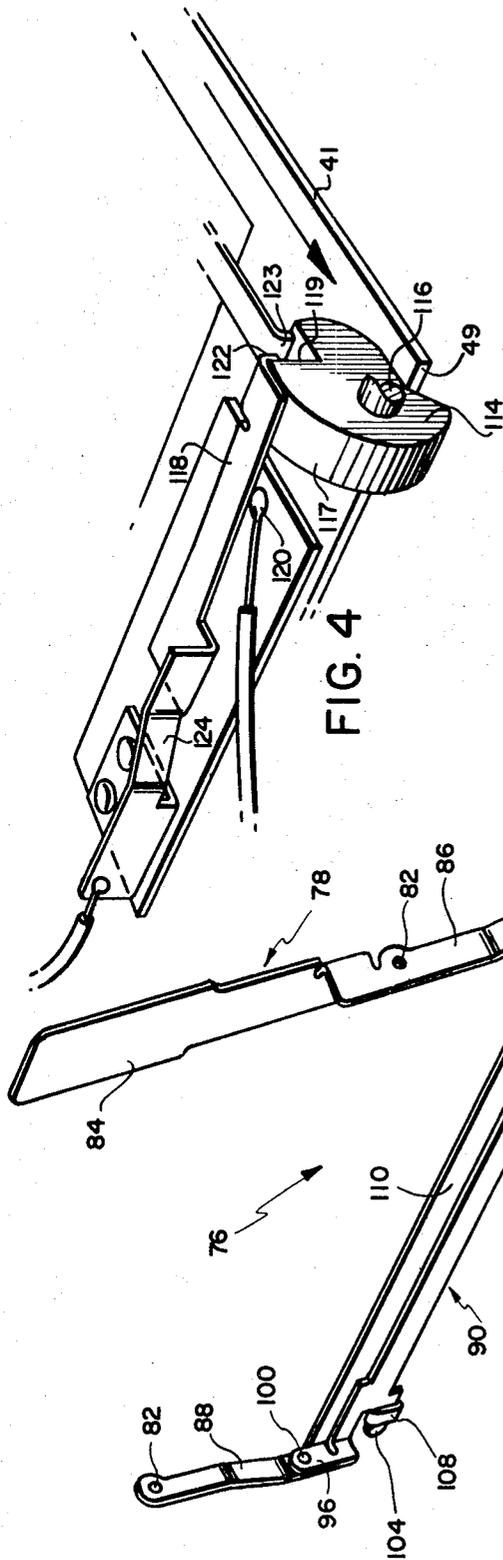


FIG. 4

FIG. 3

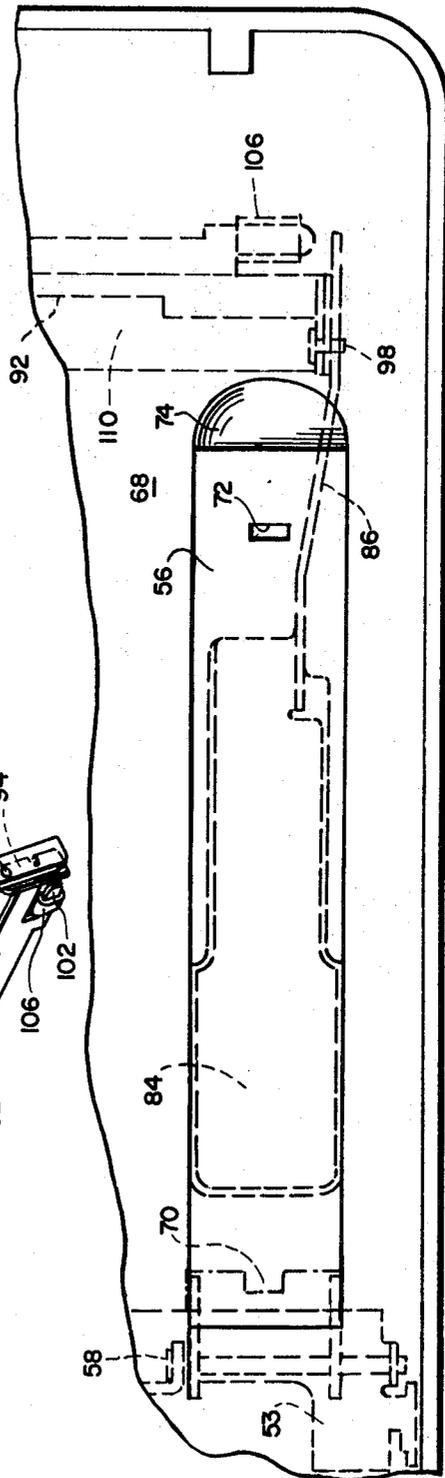


FIG. 2

INVENTOR
 LAWRENCE M. DOUGLAS
 BY *Brown and Mikulka*
and
Alfred E. Corrigan
 ATTORNEYS

ERECTING LINKAGE

BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention relates to photographic apparatus of the collapsible type.

2. Description of the Prior Art

One of the basic components of many photographic apparatus. e.g., cameras, is a film-advancing system which is adapted to move an exposed film unit out of its exposure position to enable subsequent film units to be located in position for exposure. Where these systems have been incorporated into cameras of the folding or collapsible type, a problem arises, i.e., actuation of the system when the camera is collapsed, thereby subjecting the system to possible damage due to the close proximity of the camera parts when the camera is in the collapsed position. Solutions have been proposed to this problem but are generally unacceptable in that they entail additional structures, with their attendant additional costs, for preventing actuation of the film-advancing system when the camera is in the collapsed position.

SUMMARY OF THE INVENTION

The present invention relates to photographic apparatus of the collapsible type, e.g., folding type cameras, and more particularly to one having a film-advancing system and means for preventing actuation thereof when the camera is in a collapsed condition or position. The camera includes a plurality of housing sections pivotally coupled for movement between a compact, inoperative position in which the camera assumes a generally parallelepipedal configuration and an extended, operative position. An erecting link is pivotally connected at one end to one of the housing sections and has its other end detachably connected to another of the housing sections for maintaining and supporting the housing sections in the extended position. A film-advancing system is pivotally mounted on the other housing section and includes a hand-engageable portion which extends exteriorly of the camera. The other housing section also includes an elongated recess which is adapted to receive the hand-engageable portion of the film-advancing system when the latter is not in use, i.e., the latter is in an inoperative position. After the camera has been collapsed or folded, the erecting link is pivoted to a position wherein it is located within the elongated recess in overlying relation to the hand-engageable portion of the film-advancing system, thereby preventing actuation of the latter when the camera is in the folded position.

An object of the invention is to provide photographic apparatus of the collapsible type having film-advancing apparatus with means for preventing actuation of the latter when the photographic apparatus is in a collapsed position.

Another object of the invention is to locate an erecting link and a hand-engageable portion of a film-advancing apparatus in an exteriorly located recess in a housing section when the photographic apparatus is collapsed such that the erecting link forms a continuation of the exterior surface of the housing section.

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

The invention accordingly comprises the apparatus possessing the construction, combination of elements and arrangement of parts which are exemplified in the following detailed disclosure, and the scope of the application of which will be indicated in the claims.

BRIEF DESCRIPTION OF THE DRAWINGS

For a fuller understanding of the nature and objects of the invention, reference should be had to the following detailed description taken in connection with the accompanying drawings wherein:

FIG. 1 is an elevational view, partly in section of photographic apparatus embodying the instant invention;

FIG. 2 is an enlarged fragmentary view of the apparatus in a folded position with an erecting link shown overlying a portion of the apparatus' film-advancing system;

FIG. 3 is a perspective view of the film-advancing system; and

FIG. 4 is an enlarged perspective view of a cam operated switch.

DETAILED DESCRIPTION OF THE INVENTION

Reference is now made to FIG. 1 of the drawings wherein is shown photographic apparatus in the form of a camera 10. Camera 10, which is of the compact, folding type, includes first, second, third and fourth housing sections 12, 14, 16 and 18, respectively, pivotally coupled at 20, 22, 24, and 26 for movement between an extended operative position as shown in FIG. 1 and a collapsed or folded, compact position wherein the camera assumes a generally parallelepipedal configuration. A flexible bellows 28, made from any suitable opaque material, is attached at its lower end to an inner frame positioned within housing section 12 and to housing sections 14 and 18. Bellows 28 defines an exposure chamber 30 for directing light admitted into the chamber by a shutter and lens assembly mounted in fourth housing section 18 toward a film unit located in position for exposure within first housing section 12.

Housing section 12 includes a pair of side walls 32 and 34 connected to each other by a wall 36 to define three sides of a U-shaped chamber 38 adapted to receive a film cassette 40. Wall 36 is provided with a pair of laterally extending, longitudinally spaced ribs 42 and 44 which provide a means for locating the film cassette 40 in position for exposure of the foremost film unit 41 located therein, and a pair of resiliently mounted contacts 46 (only one of which is shown). Contacts 46 are adapted to extend into apertures in a rear wall of film cassette 40 to make electrical contact with a battery located therein for operating various components of the camera, and to urge the film cassette upwardly (as viewed in FIG. 1). Mounted within the confines of first housing section 12 is an inner frame comprising a sheet 48 of resilient material; e.g., spring steel, having a generally rectangular shaped opening 50, an angle bracket 52 having one leg secured to sheet 48 and its other leg attached to pivot 20, and a support plate 53 secured to the end of sheet 48 opposite to that at which the angle bracket 52 is secured. Support plate 53 pivotally supports a pair of shutter housing brackets 54 (only one of which is shown)

about hinge 26 and one end of an erecting link 56 about a hinge 58. Pressure-applying members, e.g., rollers 60 and 62, are suitably supported by wall 36 and extend across an open end of the chamber 38 in position to receive a film unit 41 as it is moved out of cassette 40 via opening 64.

Second housing section 14 includes means (not shown) for mounting a reflecting surface, e.g., a mirror 66, in position to receive light from the lens and shutter assembly in housing section 18 and redirect it towards housing section 12 and film unit 41. An exterior surface 68 of housing section 14 is provided with a tang 70 which is adapted to be located in an aperture 72 in erecting link 56 for maintaining the housing sections of the camera in an erect condition. Erecting link 56 is resiliently biased by suitable means in a clockwise direction as viewed in FIG. 1 and may be disengaged from housing section 14 by rotating link 56 in a counterclockwise direction until tang 70 moves out of aperture 72. Housing section 14 is first rotated in a counterclockwise direction and then the erecting link 56 is rotated in a clockwise direction until the camera is collapsed and erecting link 56 lies on top of housing section 14. Exterior surface 68 also includes a recess 74 for receiving a portion of the camera's film-advancing system and the erecting link 56, as will be more fully explained hereinafter.

Camera 10 is provided with film-advancing means for moving a film unit 41, subsequent to exposure, from cassette 40 into the bite of rollers 60 and 62. The film-advancing means includes a generally U-shaped member 76, having a leg 78 which extends through an aperture 80 in housing section 14. Aperture 80 is provided with means (not shown) for preventing the passage of light therethrough. U-shaped member 76 is provided with a pair of laterally spaced apertures 82 for pivotally coupling it to an interior surface of housing section 14. Leg 78 includes a first portion 84 which functions as an actuating means and is adapted to be grasped by the user and rotated in a clockwise direction to move a film unit out of the exposure position shown in FIG. 1 and a second portion 86 which extends into the camera and cooperates with leg 88 to pivotally carry film-engaging means 90. Film-engaging means 90 includes a transverse member 92 having brackets 94 and 96 attached at each end thereof. Brackets 94 and 96 are pivoted to legs 78 and 88 by pins 98 and 100, respectively, and spring means (not shown) are provided for resiliently biasing member 92 in a counterclockwise direction, as viewed in FIG. 3. Transverse member 92 includes a pair of oppositely facing, laterally spaced, fingers 102 and 104 on which are mounted film-engaging members 106 and 108. Film-engaging members 106 and 108 are adapted to frictionally engage the foremost film unit in cassette 40 and accordingly are made of any suitable material having a high coefficient of friction, e.g., rubber or plastic. Also extending between legs 78 and 88 is a flange 110 which functions as a stop to limit rotation of transverse member 92 in a counterclockwise direction, as will be more fully explained hereinafter.

OPERATION

The camera is adapted to receive a film cassette in either the folded or extended position. To insert a fresh

cassette into the camera, the user uncouples a latch (not shown) between housing section 12 and inner frame member 48 and rotates housing section 12 in a counterclockwise direction about hinge 20 to a position wherein a film cassette 40 can be inserted between ribs 42 and 44 in chamber 38. Housing section 12 is then rotated in a clockwise direction until it is again latched to inner frame 48. As can be seen in FIG. 1, ribs 42 and 44 locate the film cassette such that an endless rib 43 on cassette 40, which defines a generally rectangular exposure aperture, is guided into alignment with aperture 50 in inner frame 48, thereby properly locating film unit 41 in position for exposure.

The user moves the various housing sections to the erect position shown in FIG. 1 by first pivoting erecting link 56 in a counterclockwise direction until housing section 14 can be rotated to the position shown in FIG. 1 without interference from erecting link 56. Housing section 14 is then rotated in a clockwise direction until housing sections 14, 16 and 18 assume the position shown in FIG. 1. At this time tang 70 on housing section 14 enters aperture 72 in erecting link 56 (erecting link 56 being biased in a clockwise direction by suitable spring means) to maintain and support the various housing sections in the erect or operative position.

After the scene to be photographed is properly focused, the user actuates the camera's shutter release, thereby allowing the lens and shutter to admit light from the scene to be directed into exposure chamber 30. The lens directs the light toward mirror 66 which redirects it toward film unit 41. The exposed film unit is then moved out of the exposure position and toward rollers 60 and 62 by actuating the film-advancing means 76; i.e., the user grasps the hand-engageable portion 84 of leg 78 and rotates it in a clockwise direction from a first position in which the film-advancing means lies in a plane substantially parallel with a plane containing housing section 14 to a second position (see FIG. 1) wherein the film-engaging members 106 and 108 extend into the cassette's exposure aperture and frictionally engage and move the exposed film unit toward rollers 60 and 62.

As the exposed film unit 41 is moved by the film-advancing means through slot 64 in cassette 40, the leading end 49 of the film unit (see FIG. 4) engages a cam 114 pivotally mounted at 116 to the camera structure at a position between slot 64 and rollers 60 and 62 and rotates the cam in a clockwise direction. Cam 114 is configured such that the aforementioned clockwise rotation thereof will move surface 117 of cam 114 in a direction to allow a resilient contact member 118 to move downwardly under its own bias until it engages a contact 120 to complete an electrical circuit between the battery located in the cassette and the motor (not shown) for driving the rollers 60 and 62. Cam 114 also includes a second surface 119 which engages a flange 122 on contact member 118 to flex member 118 in a counterclockwise direction about a vertical section 124 of member 118 during the aforementioned clockwise rotation of cam 114, thereby providing a source of energy for rotating cam 114 back to the position shown in FIG. 4 upon film unit 41 moving out of engagement with the cam. Stated another way, clockwise rotation of cam 114 results in contact member 118 being (1) displaced in a counterclockwise manner due to the en-

gagement between surface 119 and flange 122 and (2) allowed to move toward contact member 120 under the influence of its own bias. The exposed film unit is then moved into the bite of the rotating rollers 60 and 62. Rollers 60 and 62 continue to advance the film unit toward the exterior of the camera while simultaneously rupturing a container 51 of processing liquid and spreading its contents between elements of the film unit 41 to initiate a diffusion transfer process. It should be noted that the rollers 60 and 62 may advance the exposed film unit while it is still in engagement with the film-advancing means without any resulting relative movement between the film unit and the film-engaging members 106 and 108 causing damage to the film unit. Specifically, relative movement between the film unit and the film-engaging members 106 and 108 will cause transverse member 92 to rotate about pins 98 and 100 in a clockwise manner, thereby decreasing the frictional engagement between the film unit and the film-engaging members. Pins 98 and 100 also provide a means for decreasing the frictional engagement between the film-engaging means or members 106 and 108 and the next succeeding film unit to be positioned for exposure as the film-advancing means moves from the aforementioned second position to the first position, thereby preventing damage to the next succeeding film unit by being jammed against the cassette's trailing end wall (to the right in FIG. 1).

The exposed film unit continues to be advanced by the motor driven rollers 60 and 62 toward the exterior of the camera until the trailing end of the film unit (the end opposite to that at which container 51 is located) moves out of engagement with cam 114. As soon as the trailing end of the film unit moves out of engagement with cam 114, resilient contact member 118 and its flange 122 will automatically rotate in a clockwise direction to rotate cam 114 in a counterclockwise direction until cam 114 assumes the position shown in FIG. 1. A stop 123 is provided for limiting counterclockwise rotation of cam 114. During this latter rotation of cam 114, the high point on cam 114, which is located at the intersection of cam surfaces 117 and 119, will deflect contact member 118 upwardly out of electrical engagement with contact 120 to open the electrical circuit to the motor, thereby stopping rotation of rollers 60 and 62. The point at which the exposed film unit is moved out of engagement with the cam is selected such that the rollers will be stopped while the trailing end of the film unit is still frictionally retained in the bite of the rollers. This feature allows the user of the camera to remove the exposed film unit from the bite of the rollers at his convenience rather than catching the film unit as it is propelled by the rollers toward the exterior of the camera.

After the film-advancing means has been manually actuated to move the exposed film unit into the bite of the rollers, the hand-engageable or actuating portion 84 of leg 78 may be released and the film-advancing means will be returned to its first or non-operative position by suitable means, e.g., a spring. As noted hereinbefore, portion 84, which is the only component of the film-advancing means which extends exteriorly of the camera, is located wholly within recess 74 in housing section 14 when the film-advancing means is in the first position, thereby preserving the existing configuration

of the camera when the film-advancing means is not in use. The various housing sections may then be moved to return the camera to its compact, folded position wherein the first and second housing sections 12 and 14 and the film-advancing means lie in generally parallel planes. Erecting link 56 may then be rotated in a clockwise direction until it lies fully within recess 74 on top of actuating portion 84 and forms a continuation of exterior surface 68 of housing section 14. With the erecting link thus positioned, it is impossible for the user to actuate the hand-engageable portion 84 and possibly damage the camera due to the close proximity of the various parts of the camera when in the folded position. Further, since the hand-engageable portion 84 may be mistaken for the erecting link 56, positioning the erecting link 56 on top of the hand-engageable portion 84 insures operation of the two in the proper sequence.

Since certain changes may be made in the above apparatus 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. Photographic apparatus comprising:

first and second housing sections coupled to each other for movement between extended and collapsed positions;

film-advancing means mounted on said second housing section for movement between operative and inoperative positions; and

erecting means coupled between said first and second housing sections for maintaining said first and second housing sections in said extended position, said erecting means being movable to a collapsed position overlying a portion of said film-advancing means when said film-advancing means is in said inoperative position and said first and second housing sections are in said collapsed position whereby premature operation of said film-advancing means is prevented.

2. Photographic apparatus as defined in claim 1 wherein said second housing section includes means defining a recess for receiving said portion of said film-advancing means when said film-advancing means is in said inoperative position.

3. Photographic apparatus as defined in claim 2 wherein said recess has a depth sufficient to receive said portion of said film-advancing apparatus and said erecting means when said film-advancing means is in said inoperative position and said first and second housing sections and said erecting means are in said collapsed positions.

4. Photographic apparatus as defined in claim 3 wherein said erecting means forms a continuation of an exterior surface of said second housing section when located in said overlying position.

5. Photographic apparatus as defined in claim 4 wherein said erecting means and said film-advancing means are mounted for rotation in opposite directions as they are moved out of said recess.

6. Photographic apparatus as defined in claim 1 wherein said erecting means is detachably connected to said second housing section.

7. Photographic apparatus as defined in claim 6 wherein said erecting means includes means defining an opening for supportedly receiving a portion of said second housing section when said first and second housing sections are in said extended position. 5

8. Photographic apparatus as defined in claim 7 wherein said erecting means is an elongated link.

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