

PATENT SPECIFICATION

(11)

1 494 867

1 494 867

(21) Application No. 15127/77 (22) Filed 25 Nov. 1975

(62) Divided out of No. 1494866

(44) Complete Specification published 14 Dec. 1977

(51) INT. CL.² G03B 17/08

(52) Index at acceptance

G2A 401 403 433 521 536 623 647 651 756 AB

(72) Inventors NORMAN WAH MAN KO

KWOK YAN CHAN



(54) CAMERA FOR UNDERWATER AND ABOVE WATER USE

(71) We, W. HAKING INDUSTRIES (MECHANICS & OPTICS) LIMITED, a Hong Kong Body Corporate, of Haking Building, 981 King's Road, Hong Kong 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:

10 This invention relates to cameras and is a divisional from our U.K. Patent Application No. 48387/75 (Serial No. 1494866).

The invention provides a camera adapted for underwater as well as above water use, the camera including a support frame with substantially all of the mechanism of the camera thereon and film receiving means located thereon, the improvement comprising: a one-piece housing formed throughout of a single piece body of transparent, water impermeable synthetic plastics material and having openings formed therein receiving in watertight relation with respect to the housing control means operable externally of the housing for actuating said camera mechanism encased in the housing, and an opening through which said support frame with said camera mechanism thereon is insertable into said housing, said housing being further characterised in that selected areas of the wall thereof are made non-light transmitting to hide most of the support frame from external view, the other still transparent areas of the housing forming objective and view finder window means for admitting picture forming and view finder light rays for exposing film carried by said support frame encased in the housing and for enabling the viewer to view an object to be photographed with the camera, a sealable closure member of water impermeable synthetic plastics material for said opening in said housing, and a means for sealing said closure member in said housing opening.

The closure member may have at least one selected area thereof which is light transmitting to form a window for enabling a use of the camera to determine the number of the film frames as they are exposed.

The following is a description of a specific embodiment of the invention reference being made to the accompanying drawings wherein:

Fig. 1 is a view in perspective of an embodiment of the camera of this invention;

Fig. 2 is a fragmentary view in elevation illustrating the releasable locking means provided on the main housing of the camera for holding the cover in watertight and dustproof locked relationship on the main housing;

Fig. 3 is a fragmentary view corresponding to the view of Fig. 2 as viewed from the back of the camera;

Fig. 4 is an exploded view of the camera shown in Fig. 1 in its disassembled state;

Fig. 5 is an exploded view with the components of the camera shown in reverse order to that illustrated in Fig. 4;

Fig. 6 is an enlarged fragmentary sectional view showing the shutter actuating controls of the camera;

Fig. 7 is a fragmentary top plan view partly in section showing the operating switch for the electronic flash light assembly;

Fig. 8 is a fragmentary view partly in section showing the film advancing arm in its operative position with respect to the camera mechanism mounted on the support frame, in addition to the detachable close-up lens mounted in front of the objective lens window of the main housing; and

Fig. 9 is an end view partly in section showing in somewhat schematic form the components of the electronic flash light

assembly of the camera.

DESCRIPTION OF EXEMPLARY EMBODIMENT OF INVENTION

Referring, now, in particular, to Figs. 4 and 5 of the drawings, the embodiment of the invention illustrated comprises a main housing 12, a camera mechanism sub-housing or support frame 14, and a closure member or cover 16. Each of the principal components, that is, the housing 12, the support frame 14, and the cover 16 advantageously are of unitary, or one-piece construction, formed from a synthetic plastics material. While each of the components can be formed from the same plastics material, the main housing 12 and the cover 16 most advantageously are formed from a transparent synthetic plastics material so that selected areas thereof may remain clear while other areas thereof are coated or plated to render them opaque; or non-light transmitting. As indicated hereinabove, in the preferred embodiment of the camera, the dimensions and configuration of the main housing, the support frame and the cover are such as to impart a horizontally elongated, vertically thin, compact profile to the camera which will enable it to be easily carried in the user's shirt pocket or handbag.

The main housing comprises a front wall 12a, a top wall 12b, a bottom wall 12c, and end walls 12d and 12e. The rear of the main housing is open to provide an entry into a chamber 18 defined by the walls of the main housing. The front wall 12a of the main housing 12 as illustrated has selected areas thereof which are clear to provide an objective lens window 20, a viewfinder window 22, and a flash diffuser window 24. The objective lens window 20 is recessed, and has inwardly converging side walls adapted to receive in snug engagement a detachable close-up lens 30. The close-up lens 30 has a central, convex, photographic light admitting portion 30a to each end of which is joined an outwardly and laterally extending L-shaped gripping portion 30b to facilitate attachment and detachment of the lens 30 on the main housing. The flash diffuser window 24 is formed with a plurality of longitudinal, inwardly extending, parallel ridges 24a which serve to more effectively diffuse the light emitted by the flash light means of the camera.

The top wall 12b of the main housing 12 is formed with a cylindrical, inwardly extending portion 32 having a bore 32a there-through, and a cylindrical upwardly extending portion 34 having a bore 34a there-through. As shown, the bore 32a is ringed by an upwardly extending, annular portion 36 which serves as a well for a shutter release control button 40. The button 40

has a head portion 40a joined to shaft 40b having an annular groove or recess formed therein for receiving an "O" ring 42. The lower end 40c of the shaft 40b is reduced, and is provided with an annular groove or recess 40d for receiving a spring clip 44. The bore 34a in the top wall 12b of the main housing 12 is adapted to receive an electronic flash light control knob 50. The knob 50 has a circumferentially ridged head portion 50a which is joined at its base to a shaft 50b. The shaft 50b has an annular groove or recess formed therein for receiving an "O" ring 52. The lower end 50c of the shaft 50b is reduced, and is provided with an annular groove or recess 50d for engaging a spring clip 54. As best shown in Fig. 1 of the drawings, the upper surface of the head portion 50a of the control knob 50 has an arrowheaded shaped marking 56 thereon for indicating the "on" and "off" position of the knob 50. A window 58, which comprises a clear area in the top wall 12b of the main housing 12, enables a user to view an electronic indicator mounted on the sub-housing or support frame 14.

The end walls 12d and 12e of the main housing 12 each has a releasable locking unit 60 positioned thereon adjacent to the rear of the main housing 12. Each unit 60 comprises a lever 61 which is pivotally mounted by means of a pin 64 between a pair of spaced, outwardly extending ears 66-66 formed on the main housing 12. The lever 62 comprises a handle portion 62a and a cover release portion 62b. A U-shaped locking member 68 is pivotally mounted by means of a pin 70 on the handle portion 62a of the lever 62 adjacent to the ears 66-66. The operation of the lever 62 and the locking member 68 will become clear as the description proceeds.

As best illustrated in Figs. 5 and 8 of the drawings, the end wall 12d and the bottom wall 12c of the main housing 12 are formed to provide a recess 72 for a film advancing control arm 74. The bottom wall 12c extends inwardly a short distance along each side of the opening 72 to provide a pair of guide rails 76-76 for the handle portion 74a of the film advancing control arm 74. At the inner end of the opening 72, the main housing 12 forms an elongated channel 78 through which the shaft 74b of the film advancing control arm 74 extends. The shaft 74b has an annular groove or recess which retains an "O" ring 80. The "O" ring 80 provides a watertight seal between the shaft 74b and the walls of the channel 78. A recess or notch 74c is provided at the distal end of the shaft 74b for engaging an extension on the film advancing means mounted on the support frame 14 of the camera.

The support frame 14, as indicated, is adapted to have mounted thereon substantially the entire camera mechanism, including an electronic flash light assembly. As viewed in Figs. 4 and 5 of the drawings, the support frame 14 is formed to receive an objective lens 82, and a shutter release control member which, as shown in more detail in Fig. 6, is in the form of a depressible plunger 86 positioned in a cylinder 88 which is integrally joined to support frame 14. The head 86a of the plunger 86 is maintained in engagement with the lower end 40c of the shaft 40b of the shutter release control button 40 by a compression spring 90 which receives the shaft 86b of the plunger 86. A downward force exerted on the button 40 is transmitted to the plunger 86 which is operatively connected to the shutter release mechanism (not shown) of the camera.

The support frame 14 also has compartments 92-92 formed therein for receiving a film cartridge (not shown). The end wall of each compartment 92-92 is provided with a hole 94 which is aligned with a hole 96 in the front wall 14a of the support frame 14. The holes 94-94 are of a size to enable fastening means such as screws 98-98, as well as the shaft of a screwdriver, to pass therethrough. The screws 98-98, as shown in Fig. 8, are then secured in position, through the holes 96-96 in the front wall 14a, in tapped posts 102-102 joined to the inner surface of the front wall 12a of the main housing 12.

As best shown in Fig. 5 of the drawings, the camera mechanism mounted on the support frame 14 comprises a film advancing member 110 having an extension 110a thereon adapted to be engaged in the recess or notch 74c formed in the lower end of the shaft 74b of the film advancing control arm 74. Joined to the member 110 is a rack 112 having a plurality of teeth 112a formed thereon for engaging the teeth of a transmission gear 114. The gear 114 is mounted for rotation about a common vertical axis with a film winding gear 116. A ratchet wheel 118 is positioned adjacent to the transmission gear 114. A locking pawl 120, connected to a stroke lever 122, is urged against the teeth of the ratchet wheel 118. A film sprocket opening engaging finger 124 is operatively connected to the stroke lever 122 for advancing each frame of a film cartridge.

The support frame 14 further is formed with viewfinder lens receiving portion 130 having an opening 132 at the forward end thereof and an opening 134 at the rear end thereof. The inner surfaces of the side-walls of the portion 130 are channelled inwardly of, and adjacent to, the opening 132 to enable a viewfinder lens 140 to be de-

tachably supported on the support frame 14.

As stated, the support frame 14 is formed in a manner to enable a complete electronic flash light assembly to be mounted on it. Thus, as shown in Figs. 4, 5, 7 and 9, the frame 14 is provided with a space 150 for accommodating batteries 152-152, and a compartment 154 for receiving a capacitor 156. A reflector 158, in which an electronic flash tube 160 is positioned, is also provided. An electronic indicator 162, which is visible through the window 58 in the top wall 12b of the main housing 12 when the support frame 14 is secured therein, is positioned above and to the rear of the reflector 158. The indicator 162 enables a user to determine the number of charges remaining in the capacitor 156. A switch 166, actuated by the control knob 50, is located between the compartment 154 for the capacitor 156 and a circuit board 168 for the electronic flash light assembly. The switch 166, as best shown in Fig. 7 of the drawings, comprises two pairs of metal contact strips 166a-166a, which are anchored in a non-conducting block member 170. The pairs of metal contact strips carry contacts 166b-166b which are positioned in opposed relation to one another. The lower end 50d of the control knob 50 is provided with flattened surfaces 50e-50e which are in parallel relation to the metal contact strips 166a-166a when the control knob 50 is in its "off" position. Turning of the knob 50 through an approximate 90° angle to its "on" position acts to close the pairs of contacts 166b-166b.

The closure or cover 16 for the rear of the main housing 12 is formed with clear areas to provide a viewfinder window 180 and film indicator window 182. The cover 16 has an annular skirt portion 16a having a peripheral groove or recess 184 formed therein for receiving an "O" ring 186 which provides a watertight and dust-proof seal between the cover 16 and the main housing 12. Joined to each end of the cover 16 is a locking projection or ear 16b. Each ear 16b is adapted to be engaged by the U-shaped locking member 68 of the locking devices 60-60 positioned on the end walls 12d and 12e of the main housing 12. Two pairs of film engaging springs 192-192 are secured in spaced apart relation on the inner surface of the cover 16 on opposite ends of the film indicating window 182.

The dimensions and configuration of the support frame 14, and the various components mounted on it, are such that the frame 14 can be easily and readily inserted into the compartment 18 defined by the main housing 12. In assembling the camera, it is preferable that the shaft of the

shutter release control button 40 and the electronic flash light knob 50 are first positioned in their respective receiving bores 32a and 34a, and spring clips 44 and 54 are secured in place thereon. The shaft of the film advancing control arm 74, similarly, is positioned in the channel 78 formed in the housing 12. To enable the support frame 14 to be positioned in the compartment whereby the lower end 40c of the control button 40 will abut the plunger 86, and the lower end 50d of the control knob 50 will be positioned between the metal contact strips 166a-166a, openings 200 and 202, respectively, are provided in the front wall 14a of the support frame 14. Also, to enable the support frame 14 to clear the shaft 74b of the film advancing control arm 74, a clearance space 204 (see Fig. 5) is formed on the underside of the support frame 14. When the support frame 14 is in position in the main housing 12, it is secured to the main housing 12 by means of the screws 98-98. The assembly of the camera is completed by placing the cover 16 on the back of the main housing 12, engaging each locking spring 68 on the outside surface of the locking tabs 16b-16b, and moving the lever 62 forwardly and against the end walls 12d and 12e of the main housing. To remove the cover 16, it is merely necessary to raise leg 62a of the lever 62. This will urge the leg 62b against its associated tab 16b thereby disengaging the cover 16 from the main housing 12.

While for purposes of illustration, a preferred embodiment of the invention has been shown and described, it should be understood that various modifications can be made therein within the scope of the claims. Thus, for example, the objective lens of the camera may be formed integrally with the main housing thereby eliminating the objective lens on the support frame. Also, the viewfinder lens may be formed integrally with the cover thereby eliminating the need for a detachable viewfinder lens on the support frame. The camera, furthermore, can be modified to convert it to a reflex-type camera, with the objective lens serving as a viewfinder lens as well as for admitting picture-forming light rays.

Attention is directed to our U.K. Patent Application No. 48387/75 (Serial No.

1494866) from which the present application is divided in which there is described and claimed a camera comprising a support frame for the camera mechanism and a water-impermeable housing having openings through which operating controls extend in water tight relation, and having an opening for insertion of a film provided with a closure to render the opening water tight and dust proof.

WHAT WE CLAIM IS:—

1. In a camera adapted for underwater as well as above water use, the camera including a support frame with substantially all of the mechanism of the camera thereon and film receiving means located thereon, the improvement comprising: a one-piece housing formed throughout of a single piece body of transparent, water impermeable synthetic plastics material and having openings formed therein receiving in watertight relation with respect to the housing control means operable externally of the housing for actuating said camera mechanism encased in the housing, and an opening through which said support frame with said camera mechanism thereon is insertable into said housing, said housing being further characterised in that selected areas of the wall thereof are made non-light transmitting to hide most of the support frame from external view, the other still transparent areas of the housing forming objective and view finder window means for admitting picture forming and view finder light rays for exposing film carried by said support frame encased in the housing and for enabling the viewer to view an object to be photographed with the camera, a sealable closure member of water impermeable synthetic plastics material for said opening in said housing, and a means for sealing said closure member in said housing opening.

2. A camera according to claim 1 wherein the closure member has at least one selected area thereof which is light transmitting to form a window for enabling a user of the camera to determine the number of the film frames as they are exposed.

W. HAKING INDUSTRIES
(Mechanics & Optics Ltd.).

Per: BOULT, WADE & TENNANT,
34 Cursitor Street,
London, EC4A 1PQ.



shutter release control button 40 and the electronic flash light knob 50 are first positioned in their respective receiving bores 32a and 34a, and spring clips 44 and 54 are secured in place thereon. The shaft of the film advancing control arm 74, similarly, is positioned in the channel 78 formed in the housing 12. To enable the support frame 14 to be positioned in the compartment whereby the lower end 40c of the control button 40 will abut the plunger 86, and the lower end 50d of the control knob 50 will be positioned between the metal contact strips 166a-166a, openings 200 and 202, respectively, are provided in the front wall 14a of the support frame 14. Also, to enable the support frame 14 to clear the shaft 74b of the film advancing control arm 74, a clearance space 204 (see Fig. 5) is formed on the underside of the support frame 14. When the support frame 14 is in position in the main housing 12, it is secured to the main housing 12 by means of the screws 98-98. The assembly of the camera is completed by placing the cover 16 on the back of the main housing 12, engaging each locking spring 68 on the outside surface of the locking tabs 16b-16b, and moving the lever 62 forwardly and against the end walls 12d and 12e of the main housing. To remove the cover 16, it is merely necessary to raise leg 62a of the lever 62. This will urge the leg 62b against its associated tab 16b thereby disengaging the cover 16 from the main housing 12.

While for purposes of illustration, a preferred embodiment of the invention has been shown and described, it should be understood that various modifications can be made therein within the scope of the claims. Thus, for example, the objective lens of the camera may be formed integrally with the main housing thereby eliminating the objective lens on the support frame. Also, the viewfinder lens may be formed integrally with the cover thereby eliminating the need for a detachable viewfinder lens on the support frame. The camera, furthermore, can be modified to convert it to a reflex-type camera, with the objective lens serving as a viewfinder lens as well as for admitting picture-forming light rays.

Attention is directed to our U.K. Patent Application No. 48387/75 (Serial No.

1494866) from which the present application is divided in which there is described and claimed a camera comprising a support frame for the camera mechanism and a water-impermeable housing having openings through which operating controls extend in water tight relation, and having an opening for insertion of a film provided with a closure to render the opening water tight and dust proof.

WHAT WE CLAIM IS:—

1. In a camera adapted for underwater as well as above water use, the camera including a support frame with substantially all of the mechanism of the camera thereon and film receiving means located thereon, the improvement comprising: a one-piece housing formed throughout of a single piece body of transparent, water impermeable synthetic plastics material and having openings formed therein receiving in watertight relation with respect to the housing control means operable externally of the housing for actuating said camera mechanism encased in the housing, and an opening through which said support frame with said camera mechanism thereon is insertable into said housing, said housing being further characterised in that selected areas of the wall thereof are made non-light transmitting to hide most of the support frame from external view, the other still transparent areas of the housing forming objective and view finder window means for admitting picture forming and view finder light rays for exposing film carried by said support frame encased in the housing and for enabling the viewer to view an object to be photographed with the camera, a sealable closure member of water impermeable synthetic plastics material for said opening in said housing, and a means for sealing said closure member in said housing opening.

2. A camera according to claim 1 wherein the closure member has at least one selected area thereof which is light transmitting to form a window for enabling a user of the camera to determine the number of the film frames as they are exposed.

W. HAKING INDUSTRIES
(Mechanics & Optics Ltd.),

Per: BOULT, WADE & TENNANT,
34 Cursitor Street,
London, EC4A 1PQ.