

PATENT SPECIFICATION

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(54) CAMERA

(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.
 The invention provides a camera having a main housing enclosing most of the components of a camera and formed by top and bottom walls, vertical front and rear walls extending between the front and rear margins of said top and bottom walls, said vertical rear wall being movable between a housing closing position and a housing opening position when a film cartridge can be inserted into a cartridge-receiving compartment in the main housing, and an end wall extending between one side margin of the top, bottom, front and rear walls, said front wall having adjacent thereto an objective lens window therein for receiving picture-forming light rays and which has an exposed transparent surface on which dust can accumulate, the side margin of said main housing opposite the one including said end wall having mounted thereat for horizontal sliding movement on said main housing a viewfinder assembly, said viewfinder assembly being mounted for movement between a retracted position where it is retracted to a point adjacent the end margin of said vertical rear wall of said main camera housing and provides an overall relatively compact assembly and an operative extended position where it extends horizontally substantially beyond said end margin of said vertical rear wall and said viewfinder assembly including rear viewing means to be placed adjacent one of the eyes of the user to view the scene, to be photographed, said rear viewing means

being located opposite said rear wall and said cartridge-receiving compartment so it is covered over by said rear wall of said main housing when the viewfinder assembly is in its retracted position and is exposed to be placed next to the viewer's eye when the viewfinder assembly is in its extended position.

Preferably said rear viewing means includes a lens element located between said rear wall and said cartridge-receiving compartment so it is covered over by said rear wall of said main housing when the viewfinder assembly is in its retracted position and is exposed to be placed next to the viewer's eye when the viewfinder assembly is in its extended position.

It is further preferred that said viewfinder assembly has a housing forming a continuation of at least the top, bottom and front walls of said main housing.

In any of the arrangements referred to above, said viewfinder assembly may have dust cover forming means for providing a dust cover for said light receiving surface of said objective lens window and for exposing the same when the viewfinder assembly is in said extended position.

Also in any of the preceding arrangements, said main housing may have film winding mechanism which advances the film one frame distance, and said viewfinder assembly includes means which impart movement to said film winding mechanism when said viewfinder assembly is moved between said positions.

The top and bottom walls of the main housing may be closely spaced relative to the front to back dimensions thereof to provide a relatively thin and narrow camera housing which can be readily placed in a shirt pocket.

In any of the arrangements referred to above, said viewfinder assembly may have a housing including a front wall with an

inner dust cover forming portion which covers over and acts as a dust shield for said transparent surface of said objective lens window to prevent the build-up of dust thereon, and an outer portion with a viewfinder light passage opening therein, said viewfinder assembly having means supporting a rear lens element located between said rear wall and said cartridge-receiving compartment in alignment with said opening so it is covered over by said rear wall of said main housing when the viewfinder assembly is in its retracted position and is exposed to be placed next to the viewer's eye when the viewfinder assembly is in its extended position.

The following is a specific description of one embodiment of the invention, reference being made to the accompanying drawings in which:—

Fig. 1 is a top perspective view of a preferred form of retractable camera of the present invention when the viewfinder section thereof is in its retracted position, making the overall camera dimensions a minimum;

Fig. 2 is a view corresponding to Fig. 1 when the viewfinder section has been moved into its operative extended position;

Fig. 3 is a bottom perspective view of the camera of Figs. 1 and 2, with the housing portions thereof removed to expose the interior of the camera, and shows the camera when the viewfinder section is in its extended position;

Fig. 4 is a reduced bottom view of the camera of Figs. 1-3 broken away to show in a horizontal plane section portions of the retractable camera of Figs. 1-3 when the viewfinder section thereof is in its retracted position;

Fig. 5 is a view corresponding to Fig. 4 when the viewfinder section is in its extended position;

Fig. 6 is an enlarged central horizontal sectional view through the front of the camera of Figs. 1-5;

Fig. 7 is an enlarged central horizontal sectional view through the rear of the camera of Figs. 1-6;

Fig. 8 is a vertical sectional view through the front of the camera, taken along section line 8-8 in Fig. 6; and

Fig. 9 is a rear view of the camera of Figs. 1-8 when the viewfinder section is in its extended position.

Referring now more particularly to Figs. 1-4, as there-shown the camera 2 comprises a main camera section 2a and a viewfinder section 2b. The main camera and viewfinder sections 2a and 2b respectively include sub-assemblies 4 and 6 (see Fig. 3) and associated housings 8 and 10 which are secured by screws like 11-11 to the associated sub-assemblies. The hous-

ing 8 for the main camera section 2a comprises relatively closely spaced top and bottom walls 8a and 8b, a front wall 8c which extends between the front margins of the top and bottom walls 8a and 8b, and an end wall 8d extending between the contiguous margins of the top, bottom and front walls 8a, 8b and 8c. The top, bottom and front walls 8a, 8b and 8c extend horizontally only a fractional part of the overall length of the camera housing. A Flash Cube socket 9 is exposed through an opening in the top wall 8a. The housing 8 of the main camera section includes a rear cover-forming wall 8e closing off the rear of the camera, which rear wall forms a cover which is pivotally mounted for movement between the vertical position shown in solid lines in Figs. 1 and 2 and the dash line position shown in Fig. 1 to expose an opening in the rear of the camera to enable the insertion of a typical 110 camera cartridge (not shown). The rear cover-forming wall 8e extends for the full length of the camera 2, unlike the other walls of the housing 8 of the main camera section 2a.

The housing 10 of the viewfinder section 2b includes a top wall 10a which is in generally the same plane as the top wall 8a of the housing 8 of the main section 2a of the camera, a bottom wall 10b which is in approximately the same plane as the bottom wall 8b of the housing of the main section 2a of the camera, a front wall 10c which is approximately in the same plane as the front wall 8c of the housing of the main section 2a of the camera and an end wall 10d which is secured by the screws 11-11 to the sub-assembly 6 of the viewfinder section, as best shown in Fig. 6. A recess 16 is formed in the front wall 8c of the housing 8 of the main section of the camera which recess extends slightly into the upper and bottom walls 8a and 8b thereof to form a laterally facing recessed edge 16a and forwardly facing edges 16b and 16b' (see Fig. 2) which receive in confronting relationship corresponding edges 18a, 18b and 18b' (see also Fig. 8) respectively of a projecting portion 10' of the housing 10 of the viewfinder section 2b, formed by the shortening of the top wall 10a of the housing 10 so that the housing sections interleave as best shown in Fig. 1. The end wall 10d of the housing 10 of the viewfinder section is then in a position slightly within the outer margin of the pivotally mounted rear wall 8e of the housing 8 of the main section of the camera.

In the retracted position of the viewfinder section 2b, the top wall 10a of the viewfinder section housing covers over a manually depressible shutter release button

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13 exposed on a downwardly depressed extension 8' of the top wall 8a of the housing of the main section of the camera. The front wall 10c of the housing 10 of the viewfinder section has a recessed cover-forming portion 14 which together with the adjacent portions of the front wall 10c covers a recess 17 in a preferably plastic moulded part 24 of the sub-assembly 4. The recess 17 exposes an objective lens 19 also forming part of the sub-assembly 4. The front wall 10c of the viewfinder section housing 10 thus acts as a dustcover for the objective lens 19.

Laterally positioned adjacent the recessed cover-forming portion 14 of the front wall 10c of the housing 10 is a cut-out portion 15 forming a window which, when the viewfinder section is in its extended position, exposes a front viewfinder lens 21, and when it is in a retracted position, is in front of a cover plate forming part of the plastic moulded part 24. The cover plate acts as a dust cover for the front viewfinder lens 21 which passes behind the cover plate when the viewfinder section is in its retracted position. In the retracted position of the viewfinder section, the pivotally mounted rear wall 8e of the housing 8 of the main camera section covers over and acts as a dust shield for a rear viewfinder lens element 23.

As best shown in Fig. 3, the main camera section sub-assembly 4 includes apertured guide-forming members 25-25 in which is slidably disposed a slide rod 26 forming part of the viewfinder section sub-assembly 6. The slide rod 26 is immovably anchored in any suitable way to an actuator plate 28a forming part of a frame member 28 which has a rack-forming extension 28a' with teeth 29 engaging the teeth of a film winding gear 30 mounted for rotation about a vertical axis on the main camera section sub-assembly 4. This gear may effect a one frame film winding operation upon its rotation in any suitable way found in presently available pocket (110) cameras. As illustrated, adjacent to the film winding gear 30 is a ratchet wheel 31 against which is urged a locking pawl 35. A one-way slip clutch (not shown) interconnects the film winding wheel 30 with the ratchet wheel 31 which clutch couples the counterclockwise rotation of the film winding gear 30 to the ratchet wheel 31 and permits the film winding gear 30 to be moved in the other direction with respect to the ratchet wheel 31. Secured to the ratchet wheel 31 is a drive gear 32, in turn, coupled to a small gear 33 which engages a gear in the film cartridge (not shown) to effect a film winding operation. Accordingly, as the viewfinder section is moved from its retracted position shown in Fig. 1

to its extended position shown in Fig. 2, the rack-forming extension 29 of the actuator plate 28a will impart counterclockwise rotation to the film winding gear 30, the ratchet wheel 31 and the drive gear 32, in turn, imparting clockwise rotation to the gear 33. When the viewfinder section is moved from its extended to its retracted position, while the film winding gear 30 will rotate in a clockwise direction, the ratchet wheel 31, the drive gear 32 and the gear 33 will remain stationary.

The viewfinder section 2b is retained in fixed retracted and extended positions by suitable detent means, such as by a detent spring 38 (Figs. 3-5) which enters respectively slots 34 and 36 formed in an edge of the actuator plate 28a when the viewfinder section is respectively in its retracted and extended positions.

In the preferred form of the invention, the actuator plate 28a extends from a vertical plate 28b having threaded apertures 39-39 which receive the aforementioned screws 11-11 which anchor the viewfinder section housing 10 to the frame member 28. The vertical plate 28b terminates at its forward end in a transversely extending wall 28c in which the forward viewfinder lens 21 is mounted. In the retracted position of the viewfinder section, the front wall 28c of the frame member 28 moves behind the cover plate 24 forming part of the main camera section sub-assembly. The rear end of the vertical plate 28b terminates in a lens holding member 40 which holds the rear viewfinder lens 23. When the viewfinder section is in its retracted position, the lens holding member 40 moves behind a portion 42 of the main camera section sub-assembly 4 which forms recesses for receiving the film cartridge and, therefore, blocks the passage of the film cartridge through the rear opening of the housing 8 of the main camera section. Therefore, to insert a film cartridge within the camera, it is necessary to move the viewfinder section 2b into its extended position which moves the lens holding member laterally to one side of the main camera section 2a to remove the obstruction to the passage of the film cartridge through the rear of the camera housing 8 after the rear housing wall 8e is pivoted into a horizontal position. The rear wall 8e has a releasable latch (not shown) which is released by depression of a lever 41 on the rear wall 8e (see Fig. 9). As also shown in Fig. 9, the rear wall has a window 43 through which a number is visible on the film cartridge indicating the particular frame which is in position for exposure.

In the extended position of the viewfinder section, the front and rear lenses 21 and 23 of the viewfinder section are

unobstructed so that the viewer can view the scene to be photographed. The view through these lens elements is obstructed by the cover plate 24 and the rear housing wall 8e when the viewfinder section is in its retracted position. As previously indicated, in the retracted position of the viewfinder section all light passing surfaces on which dust can accumulate are covered over by the various cover elements previously described, and the shutter release button 13 is covered so that an accidental exposure is not possible.

The camera described above also forms the subject of our U.K. Patent Applications Nos: 18670/77 (Serial No. 1 495 412) 18671/77 (Serial No. 1 495 413) and 18673/77 (Serial No. 1 495 414) all of which are divisionals from the present application.

It should be understood that numerous modifications may be made in the most preferred form of the invention described without deviating from the broader aspects of the invention.

WHAT WE CLAIM IS:—

1. A camera having a main housing enclosing most of the components of a camera and formed by top and bottom walls, vertical front and rear walls extending between the front and rear margins of said top and bottom walls, said vertical rear wall being movable between a housing closing position and a housing opening position when a film cartridge can be inserted into a cartridge-receiving compartment in the main housing, and an end wall extending between one side margin of the top, bottom, front and rear walls, said front wall having adjacent thereto an objective lens window therein for receiving picture-forming light rays and which has an exposed transparent surface on which dust can accumulate, the side margin of said main housing opposite the one including said end wall having mounted thereat for horizontal sliding movement on said main housing a viewfinder assembly, said viewfinder assembly being mounted for movement between a retracted position where it is retracted to a point adjacent the end margin of said vertical rear wall of said main camera housing and provides an overall relatively compact assembly and an operative extended position where it extends horizontally substantially beyond said end margin of said vertical rear wall and said viewfinder assembly including rear viewing means to be placed adjacent one of the eyes of the user to view the scene to be photographed, said rear viewing means being located opposite said rear wall and said cartridge-receiving compartment so it is covered over by said rear wall of said

main housing when the viewfinder assembly is in its retracted position and is exposed to be placed next to the viewer's eye when the viewfinder assembly is in its extended position.

2. A camera as claimed in claim 1 wherein said rear viewing means includes a lens element located between said rear wall and said cartridge-receiving compartment so it is covered over by said rear wall of said main housing when the viewfinder assembly is in its retracted position and is exposed to be placed next to the viewer's eye when the viewfinder assembly is in its extended position.

3. A camera as claimed in claim 1 or claim 2 wherein said viewfinder assembly has a housing forming a continuation of at least the top, bottom and front walls of said main housing.

4. A camera as claimed in any of claims 1 to 3 wherein said viewfinder assembly has dust cover-forming means for providing a dust cover for said light receiving surface of said objective lens window and for exposing the same when the viewfinder assembly is in said extended position.

5. A camera as claimed in any of the preceding claims wherein said main housing has film winding mechanism which advances the film one frame distance, and said viewfinder assembly includes means which impart movement to said film winding mechanism when said viewfinder assembly is moved between said retracted and extended positions.

6. A camera of any of the preceding claims wherein the top and bottom walls of the main housing are closely spaced relative to the front to back dimension thereof, to provide a relatively thin and narrow camera housing which can be readily placed in a shirt pocket.

7. A camera of any of the preceding claims wherein said viewfinder assembly has a housing including a front wall with an inner dust cover-forming position which covers over and acts as a dust shield for said transparent surface of said objective lens window to prevent the build-up of dust thereon, and an outer portion with a viewfinder light passage opening therein, said viewfinder assembly having means supporting a rear lens element located between said rear wall and said cartridge-receiving compartment in alignment with said opening so it is covered over by said rear wall of said main housing when the view

unobstructed so that the viewer can view the scene to be photographed. The view through these lens elements is obstructed by the cover plate 24 and the rear housing wall 8e when the viewfinder section is in its retracted position. As previously indicated, in the retracted position of the viewfinder section all light passing surfaces on which dust can accumulate are covered over by the various cover elements previously described, and the shutter release button 13 is covered so that an accidental exposure is not possible.

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It should be understood that numerous modifications may be made in the most preferred form of the invention described without deviating from the broader aspects of the invention.

WHAT WE CLAIM IS:—

1. A camera having a main housing enclosing most of the components of a camera and formed by top and bottom walls, vertical front and rear walls extending between the front and rear margins of said top and bottom walls, said vertical rear wall being movable between a housing closing position and a housing opening position when a film cartridge can be inserted into a cartridge-receiving compartment in the main housing, and an end wall extending between one side margin of the top, bottom, front and rear walls, said front wall having adjacent thereto an objective lens window therein for receiving picture-forming light rays and which has an exposed transparent surface on which dust can accumulate, the side margin of said main housing opposite the one including said end wall having mounted thereat for horizontal sliding movement on said main housing a viewfinder assembly, said viewfinder assembly being mounted for movement between a retracted position where it is retracted to a point adjacent the end margin of said vertical rear wall of said main camera housing and provides an overall relatively compact assembly and an operative extended position where it extends horizontally substantially beyond said end margin of said vertical rear wall and said viewfinder assembly including rear viewing means to be placed adjacent one of the eyes of the user to view the scene to be photographed, said rear viewing means being located opposite said rear wall and said cartridge-receiving compartment so it is covered over by said rear wall of said

main housing when the viewfinder assembly is in its retracted position and is exposed to be placed next to the viewer's eye when the viewfinder assembly is in its extended position.

2. A camera as claimed in claim 1 wherein said rear viewing means includes a lens element located between said rear wall and said cartridge-receiving compartment so it is covered over by said rear wall of said main housing when the viewfinder assembly is in its retracted position and is exposed to be placed next to the viewer's eye when the viewfinder assembly is in its extended position.

3. A camera as claimed in claim 1 or claim 2 wherein said viewfinder assembly has a housing forming a continuation of at least the top, bottom and front walls of said main housing.

4. A camera as claimed in any of claims 1 to 3 wherein said viewfinder assembly has dust cover-forming means for providing a dust cover for said light receiving surface of said objective lens window and for exposing the same when the viewfinder assembly is in said extended position.

5. A camera as claimed in any of the preceding claims wherein said main housing has film winding mechanism which advances the film one frame distance, and said viewfinder assembly includes means which impart movement to said film winding mechanism when said viewfinder assembly is moved between said retracted and extended positions.

6. A camera of any of the preceding claims wherein the top and bottom walls of the main housing are closely spaced relative to the front to back dimension thereof, to provide a relatively thin and narrow camera housing which can be readily placed in a shirt pocket.

7. A camera of any of the preceding claims wherein said viewfinder assembly has a housing including a front wall with an inner dust cover-forming position which covers over and acts as a dust shield for said transparent surface of said objective lens window to prevent the build-up of dust thereon, and an outer portion with a viewfinder light passage opening therein, said viewfinder assembly having means supporting a rear lens element located between said rear wall and said cartridge-receiving compartment in alignment with said opening so it is covered over by said rear wall of said main housing when the view



finder assembly is in its retracted position and is exposed to be placed next to the viewer's eye when the viewfinder assembly is in its extended position.

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8. A camera substantially as hereinbefore described with reference to and as illustrated in the accompanying drawings.

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