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(54) PHOTOGRAPHIC CAMERA

(71) We, FRANKE & HEIDECHE G.M.B.H., a German Body Corporate, trading as ROLLEI-WERKE FRANKE & HEIDECHE, of 196 Salzdahlumerstrasse, Braunschweig, Germany, 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 a photographic roll film camera having a housing a part of which is telescopically extensible into a picture taking position and withdrawable parallel to the optical axis of the camera.

According to the present invention we provide a roll film camera comprising a camera housing, a first part of which is telescopically extensible into a picture taking position and retractable into a closed position, the direction of telescopic movement being perpendicular to the optical axis of the camera; the first part of the camera housing carrying a lens tube extensible in the direction of the optical axis of the camera to project from the housing in the picture taking position and withdrawable within the housing, and a covering shutter for the lens tube movable between a closed position in which it covers the withdrawn lens tube and an open position in which it leaves a free passage for the lens tube to extend from the housing and locking means to hold the lens tube in its extended picture taking position; a second housing part having a lug cooperating with actuating mechanism on the first housing part for the movement of the covering shutter, lens tube and locking means, whereby preliminary extending telescopic movement between the first and second housing parts causes the lug to cooperate with the actuating mechanism to act against spring bias to move the covering shutter to the open position and further extending telescopic movement causes the lug to further cooperate with the actuating mechanism to

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extend the lens tube from the housing into the picture taking position, the locking means being biased to hold the tube in the picture taking position; and on retracting telescopic movement of the housing parts the actuating mechanism initially acting to move the locking means away from its holding condition against the bias thereon to non-holding condition, and thereafter sequentially allowing the lens tube to return to withdrawn position and the covering shutter to return to closed position.

The tube is preferably guided non-rotatably on the camera housing in the direction of the optical axis and the locking means comprises at least one lever each having a locking surface, each lever being spring biased to engage a corresponding lug on the lens tube to hold it in picture taking position and being movable by the actuating mechanism against the spring bias into a non-holding condition when the housing parts are retracted.

The present invention preferably provides a camera of the stated kind which possesses the advantages of a folding camera in as much as a completely smooth exterior is obtained in the carrying condition. Nevertheless only one single manual action should be necessary to arrange the camera ready for picture-taking.

A constructional embodiment of the present invention will now be described, by way of example, with reference to the accompanying drawings, wherein:—

Figure 1 shows a front view of the camera ready for picture taking;

Figure 2 shows the associated plan view;

Figure 3 shows the plan view with the camera closed;

Figures 4, 5 and 6 show the drive of the covering slider, namely

Figure 4 with lens passage opening closed,

Figure 5 in an intermediate position in which the lens opening is already cleared, and

Figure 6 in the final position of readiness for picture-taking; and

Figures 7, 8 and 9 show the drive of the lens tube displacement, namely

Figure 7 in the position of picture-taking readiness and

Figure 9 in the rest position, that is to say the retracted position, and

Figure 8 in the associated lateral elevation.

In the example of embodiment the camera consists of the first housing part 1, which contains all essential parts of the camera, including the lens tube 2 and the shutter release 3. A second housing part of the camera comprises a cap 4 pushable telescopically over first part 1. The two camera parts are adapted to one another in such a way that in the pushed-together condition (Fig. 3) they form a compact entity, the lens tube is situated in the interior of the camera and the release 3 is covered.

In the example of the embodiment a wall of the camera housing on part 1 is not carried through smoothly, but provided with a small stepped part 5 which contains a passage opening 6 for the lens tube. Within the stepped part 5 is a slide or covering shutter to close and open the passage opening 6 and drive means for opening and closing the slider. The drive means is illustrated in detail in Figures 4, 5 and 6. All these parts illustrated in Figures 4 to 6 are situated on the first part 1, with the exception of drive member 17 which is fitted on the second part 4. The slider 7 for the closure of the lens passage opening 6 has the form of a circular disc which is movable in an oval guide 8 into two limit positions. In the left position (Figure 4) the lens tube passage opening 6 is closed and in the right limit position (Figures 5 and 6) it is open. The slider 7 is articulately connected by a pin 9 with a lever arm 10 which is rotatable about a fixed journal 11. In this connection "fixed" or "non-displaceable" are to be understood to mean that these parts are situated on the stepped portion 5 on the housing part 1 respectively. With the lever 10 a toothed segment 12 is fixedly connected which engages in a toothed segment of a lever 13 which is pivotable about the pin 14. A spring 15 tensions the lever 13 in the counter-clockwise direction, so that this spring seeks to transfer the circular slider disc into the position according to Figure 4. A further lever 16 is pivotable about a non-displaceable pin 16'. This lever 16 extends into the path of a lug 17 which is provided on the housing part 4. This lever 16 carries a lug 16'' which cooperates with a step 18 and a cammed part 19 of the lever 13. In the rest position all the parts are situated in the position according to Figure 4. If now the camera is telescopically extended, the lug 17 presses upon the lever 16 and pivots the latter in the clockwise direction, entraining the lever

13 and likewise pivoting it in the clockwise direction by means of the lug 16'' and the edge 18. This movement is transmitted by the toothed segment of lever 13 and the toothed section 12 and the lever 10 to the slider 7, so that the latter is drawn to the right in the direction of the arrow A and opens the lens passage opening 6. This position is reached in Figure 5. At this moment the lug 16'' has slid down from the step 18 and up on to the cam surface 19, which is formed so that on further movement of the lug 17 in the direction B no further entraining of the lever 13 takes place. The lug 17 finally reaches the position according to Figure 6 when the housing parts 1 and 4 have been telescopically fully extended. This further movement of lug 16'' in the direction B with the passage opening 6 fully opened serves to push the lens outwards through the opening 6, in dependence upon the telescopic movement of the parts 1 and 4, and to lock it in the position of picture-taking readiness. Conversely in the pushing together of the two camera parts 1 and 4 the lens tube is unlocked and drawn into the camera housing, before the lens passage opening 6 is closed by the slider 7 in the final pushing together of the two parts 1 and 4.

According to Figure 7 the lens tube 2 is guided for displacement in the axial direction but non-rotatably by means of lugs 20 in grooves 21 of the housing part 1. Figure 7 shows the parts in the picture-taking readiness position, that is to say with the lens pushed out and locked, and thus corresponds to the position of the lug 17 in Figure 6. In the pushing together of the parts 1 and 2 pivot pins 22 fixed to housing part 4 move together with the lug 17 (Figures 4, 5 and 6) in the direction of the arrow C (Figure 7). One pivot pin 22 is provided for each lug 20. Each pin 22 is coupled through a draw rod 23 by means of a pin-slot connection 24, 25 with a double lever 26 which is rotatable about a pin 27 which is non-displaceable on housing part 1. The lever 26 is in turn articulately connected through a draw rod 28 at pin 31 with a fork lever 29 which is rotatable with a connecting shaft 30 on part 1. At the end of this fork lever 29 there is a two pronged fork 32 which cooperates with the guide lug 20 of the lens tube. The fork is widened out so that a certain play can take place in the pivoting movement of the lever 29 before either prong of the fork comes into engagement with the respective guide lug 20 in the one or the other direction. Furthermore on the lever 29 a cam extension 33 is provided which cooperates with a pin 34. This pin 34 is seated on one end of a bell-crank lever 35 which is rotatable about the pin 36 on the part 1. The other end of bell-crank lever 35, when the lens tube 2 is in the picture-taking readiness position, can slide

with a locking wedge surface 37 behind the respective guide lug 20 of the lens carrier under the influence of a spring 38 which acts upon the pin 34 of the lever 35. The lens tube 2 is thus held in picture-taking readiness position by locking wedge surfaces 37 acting against lugs 20. If each pin 22 moves out of the picture-taking readiness position (Figure 7) to the right, then by means of each lever 26 and draw rod 28 each fork lever 29 is pivoted in the counter-clockwise direction, whereby its fork 32 liberates the respective lug 20 on the inner side. However before the other prong of the fork places itself upon the lug 20 and draws the lens tube inwards, the cam extension 33 slides up on the pin 34 of the bell-crank lever 35, pivots the latter clockwise and liberates the respective lug 20 from engagement with the respective locking wedge surface 37. On further movement then the forks 32 draw the lens carrier inwards on the lugs 20 until the limit position of the parts according to Figure 9 is reached. If now the movement is reversed, that is the camera housing is drawn outwards again, pin 22s move initially to the left. However the system then remains at rest, because firstly a groove 25 prevents entraining of the pin 24 and the lever 26. Only when the end of the groove 25 places itself upon the pin 24 is the lever system set in motion. The interval of movement which has elapsed until then corresponds to the interval which is necessary according to Figures 4, 5 and 6 for the opening of the lens tube opening, that is to say the movement of the parts out of the position in Figure 4 into the position according to Figure 5. When the parts and the lug 17 have reached this position according to Figure 5, the lever system according to Figure 9 also comes into motion. The lever 26 is pivoted in the clockwise direction, in turn through the push rod 28 pivots the fork lever 29, and the forks 32 push the lens tube outwards by the lugs 20. As soon as it has reached the picture-taking readiness position, the cam extension 33 liberates the pin 34 of the bell-crank levers 35, each of which now slides with its locking wedge edge 37 behind the respective guide lug 20 of the lens tube 2 and locks the latter. All these functions and actions are controlled merely by the pushing together and drawing apart of the two housing parts 1 and 4.

A reciprocatingly movable film winding drive, possibly shutter cocking drive, already present can also be used for the drive of the slider opening and closing the passage opening 6 and of the lens tube movement, so that all the manipulations connected with the constitution of picture-taking readiness and the exposure can be reduced to one single manual action.

In order to avoid the complete pushing together of the camera, including counter-

sinking of the lens tube and closure of the opening, in the case of several exposures in rapid succession in which it is only necessary to effect the film winding and shutter cocking between the exposures, a device can be provided which interrupts the gear connection between the lug 17 and the lens tube and locking drive. One simple solution would be for example that the lug 17 and the pivot pins 22 are not directly connected with the movable camera part 4, but are connected through an unlockable engaging device which uncouples after actuation and automatically engages again after execution of the film-winding and shutter-cocking stroke.

WHAT WE CLAIM IS:—

1. Photographic roll film camera comprising a camera housing, a first part of which is telescopically extensible into a picture taking position and retractable into a closed position, the direction of telescopic movement being perpendicular to the optical axis of the camera; the first part of the camera housing carrying a lens tube extensible in the direction of the optical axis of the camera to project from the housing in the picture taking position and withdrawable within the housing, and a covering shutter for the lens tube movable between a closed position in which it covers the withdrawn lens tube and an open position in which it leaves a free passage for the lens tube to extend from the housing and locking means to hold the lens tube in its extended picture taking position; a second housing part having a lug cooperating with actuating mechanism on the first housing part for the movement of the covering shutter, lens tube and locking means, whereby preliminary extending telescopic movement between the first and second housing parts causes the lug to cooperate with the actuating mechanism to act against spring bias to move the covering shutter to the open position and further extending telescopic movement causes the lug to further cooperate with the actuating mechanism to extend the lens tube from the housing into the picture taking position, the locking means being biased to hold the tube in the picture taking position; and on retracting telescopic movement of the housing parts the actuating mechanism initially acting to move the locking means away from its holding condition against the bias thereon to non-holding condition, and thereafter sequentially allowing the lens tube to return to withdrawn position and the covering shutter to return to closed position.

2. Photographic roll film camera according to claim 1, in which the lens tube is guided non-rotatably on the camera housing in the direction of the optical axis and the locking means comprises at least one lever each having a locking surface, each lever



with a locking wedge surface 37 behind the respective guide lug 20 of the lens carrier under the influence of a spring 38 which acts upon the pin 34 of the lever 35. The lens tube 2 is thus held in picture-taking readiness position by locking wedge surfaces 37 acting against lugs 20. If each pin 22 moves out of the picture-taking readiness position (Figure 7) to the right, then by means of each lever 26 and draw rod 28 each fork lever 29 is pivoted in the counter-clockwise direction, whereby its fork 32 liberates the respective lug 20 on the inner side. However before the other prong of the fork places itself upon the lug 20 and draws the lens tube inwards, the cam extension 33 slides up on the pin 34 of the bell-crank lever 35, pivots the latter clockwise and liberates the respective lug 20 from engagement with the respective locking wedge surface 37. On further movement then the forks 32 draw the lens carrier inwards on the lugs 20 until the limit position of the parts according to Figure 9 is reached. If now the movement is reversed, that is the camera housing is drawn outwards again, pin 22s move initially to the left. However the system then remains at rest, because firstly a groove 25 prevents entraining of the pin 24 and the lever 26. Only when the end of the groove 25 places itself upon the pin 24 is the lever system set in motion. The interval of movement which has elapsed until then corresponds to the interval which is necessary according to Figures 4, 5 and 6 for the opening of the lens tube opening, that is to say the movement of the parts out of the position in Figure 4 into the position according to Figure 5. When the parts and the lug 17 have reached this position according to Figure 5, the lever system according to Figure 9 also comes into motion. The lever 26 is pivoted in the clockwise direction, in turn through the push rod 28 pivots the fork lever 29, and the forks 32 push the lens tube outwards by the lugs 20. As soon as it has reached the picture-taking readiness position, the cam extension 33 liberates the pin 34 of the bell-crank levers 35, each of which now slides with its locking wedge edge 37 behind the respective guide lug 20 of the lens tube 2 and locks the latter. All these functions and actions are controlled merely by the pushing together and drawing apart of the two housing parts 1 and 4.

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sinking of the lens tube and closure of the opening, in the case of several exposures in rapid succession in which it is only necessary to effect the film winding and shutter cocking between the exposures, a device can be provided which interrupts the gear connection between the lug 17 and the lens tube and locking drive. One simple solution would be for example that the lug 17 and the pivot pins 22 are not directly connected with the movable camera part 4, but are connected through an unlockable engaging device which uncouples after actuation and automatically engages again after execution of the film-winding and shutter-cocking stroke.

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2. Photographic roll film camera according to claim 1, in which the lens tube is guided non-rotatably on the camera housing in the direction of the optical axis and the locking means comprises at least one lever each having a locking surface, each lever

being spring biased to engage a corresponding lug on the lens tube to hold it in picture taking position and being movable by the actuating mechanism against the spring bias into a non-holding condition when the housing parts are retracted.

3. Photographic roll film camera according to claim 1 or 2, in which the actuating mechanism comprises drive means for the covering shutter geared to a toothed segment of a member which is rotatable by means of a projection engaging a detent of the member the projection being movable to rotate the members by means of the lug on the second housing part; and said member also having a cammed surface which co-operates with said projection which is disengaged from said detent during further extending telescopic movement between the housing parts to drive the lens tube into its extended picture taking position.

4. Photographic roll film camera according to claim 3, in which the lug on the second housing part is temporarily disengageable from the lens tube drive means.

5. Photographic roll film camera according to any of the preceding claims, in which the covering shutter consists of a circular disc which is guided on a wall of the first housing part in an oval groove which defines the limited positions of the disc.

6. Photographic roll film camera having the features substantially as described with reference to and as illustrated by the accompanying drawing.

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