

1,284,980.

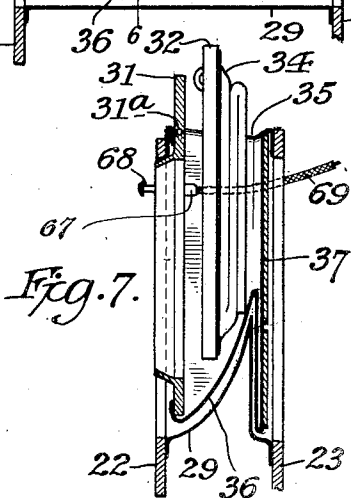
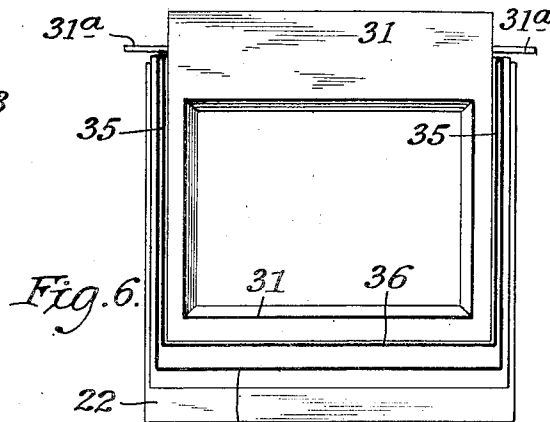
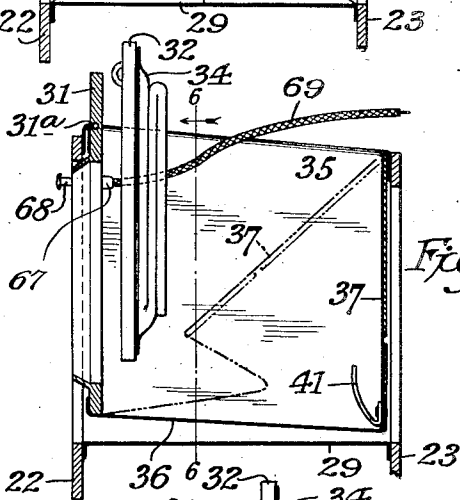
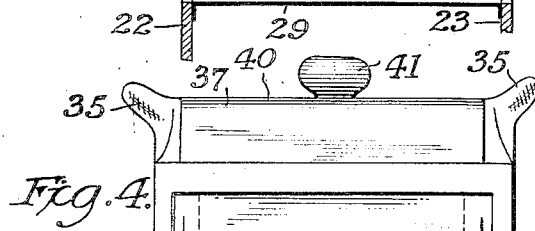
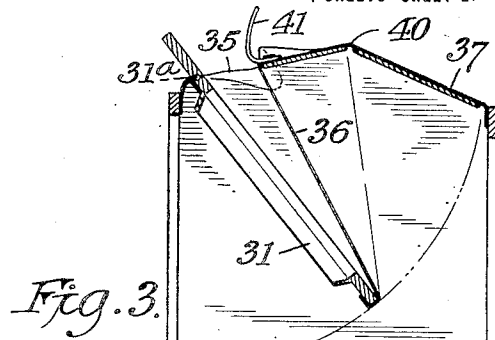
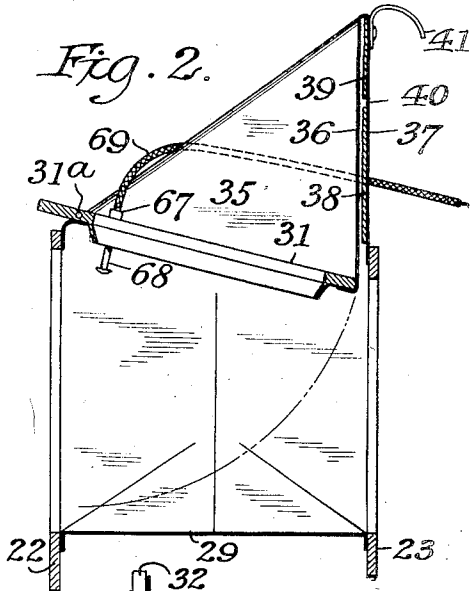
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O. E. S. & C. AZZONI.
 REFLECTING CAMERA.
 APPLICATION FILED NOV. 24, 1917.

1,284,980.

Patented Nov. 19, 1918.

4 SHEETS—SHEET 2.



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4 SHEETS—SHEET 3.

Fig. 8.

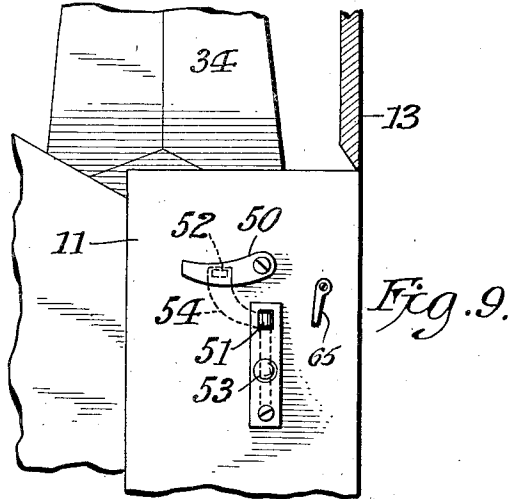
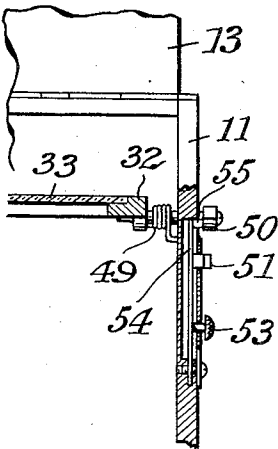


Fig. 10.

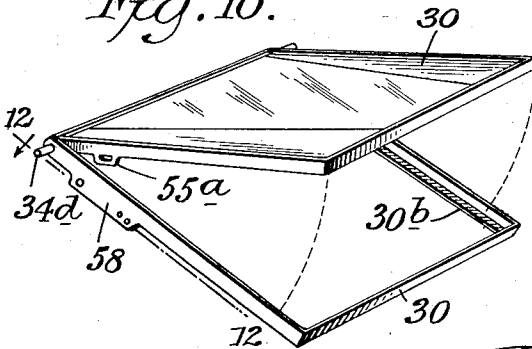


Fig. 12.

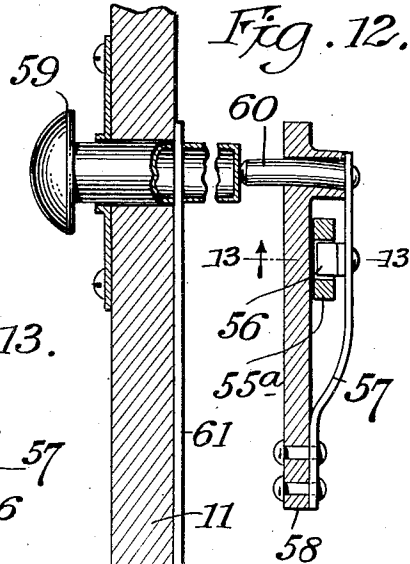


Fig. 13.

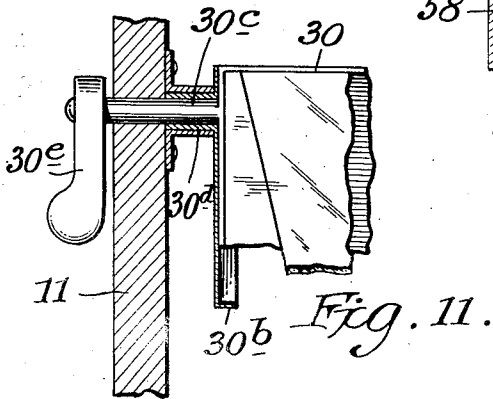
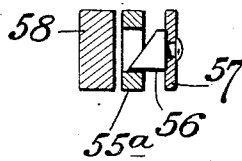


Fig. 11.

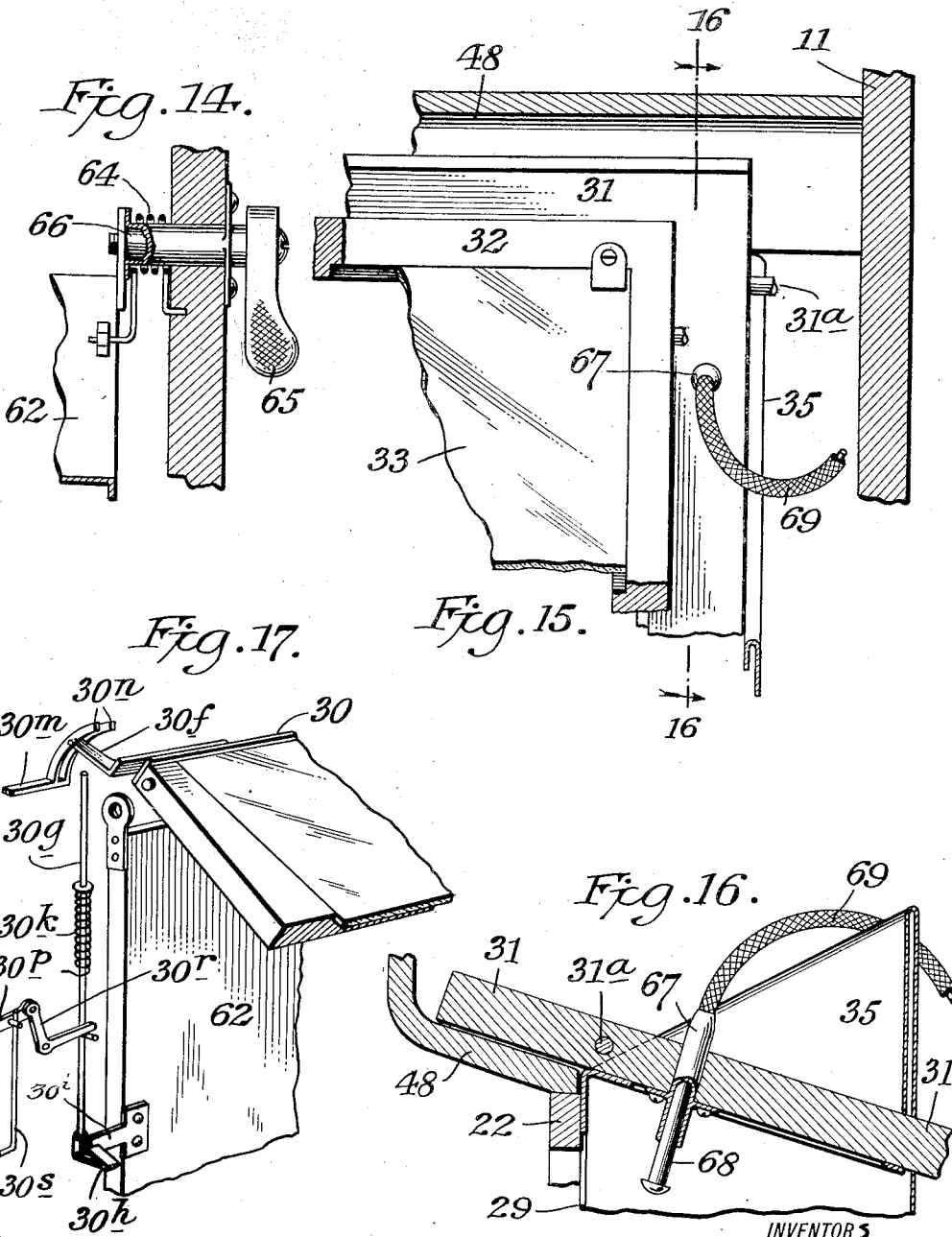
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1,284,980.

Patented Nov. 19, 1918.

4 SHEETS—SHEET 4.



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UNITED STATES PATENT OFFICE.

ORESTE E. S. AZZONI AND CESARE AZZONI, OF NEW YORK, N. Y.

REFLECTING-CAMERA.

1,284,980.

Specification of Letters Patent.

Patented Nov. 19, 1918.

Application filed November 24, 1917. Serial No. 203,694.

To all whom it may concern:

Be it known that we, ORESTE E. S. AZZONI and CESARE AZZONI, subjects of the King of Italy, residing at New York, county and State of New York, have invented certain new and useful Improvements in Reflecting-Cameras, of which the following is a full, clear, and exact description.

This invention relates to reflecting or "reflex" cameras of the folding type, in which the front and back of the camera are connected by walls of flexible material capable of being folded or collapsed at will, with the mirror and upper focusing screen swung down upon or close to the back. The chief object of the invention is to provide improved means, of simple and thoroughly effective character, for preventing entrance of light into the camera body through or around the upper focusing screen after the mirror has been lifted or swung up out of the path of the rays from the lens. To this and other ends the invention consists in the novel features and combinations hereinafter described.

One embodiment of the invention is illustrated, somewhat diagrammatically, in the accompanying drawings, in which—

Figure 1 is a longitudinal section of the camera in open or operative position.

Fig. 1^a is an elevation showing the right side of the closed camera.

Fig. 2 is a longitudinal section of the body-bellows and the pivoted light-trap frame against which the mirror seats when raised.

Fig. 3 is a similar view but showing the light-trap frame partially depressed.

Fig. 4 is a front view of Fig. 3.

Fig. 5 is a view similar to Fig. 2 but showing the light-trap frame and focusing screen depressed and in position for collapsing the body-bellows.

Fig. 6 is a cross section about on line 6—6 of Fig. 5.

Fig. 7 is a longitudinal section showing the body bellows collapsed, with the light-trap frame, focusing screen, and focusing hood folded inside the collapsed bellows.

Fig. 8 is a detail front view, partly in section, showing means for depressing the focusing screen and light-trap frame.

Fig. 9 is a side view of Fig. 8.

Fig. 10 is a detail perspective view of the mirror and its stop-frame, in which it is seated when in position to reflect the light rays from the exposure lens to the upper focusing screen.

Fig. 11 is a detail sectional view showing a simple means for depressing the mirror to its reflecting position.

Fig. 12 is a detail section, about on line 12—12 of Fig. 10, showing manually releasable means for holding the mirror in its down or reflecting position.

Fig. 13 is a detail section on line 13—13 of Fig. 12.

Fig. 14 is a detail section showing simple means for depressing the light-tight closure or cap for the opening in the back of the camera to protect the plate or film from light until the exposure is made.

Fig. 15 is a detail plan view showing a convenient and effective method of employing the well known "Antinous" or "cable" release for discharging the shutter at the proper time.

Fig. 16 is a detail section about on line 16—16 of Fig. 15.

Fig. 17 is a detail perspective view showing simple and effective means for releasing the safety cap by the upward swing of the mirror.

The operative parts of the camera are mounted in or upon a shallow box having a bottom 10, side walls 11 and back wall 12. The top 13 and front wall 14 are hinged at their rear and bottom edges respectively. When swung down or lowered as shown the said front wall serves as a base or bed for the camera front, and may be provided with the usual struts 15 and springs 16 to hold the bed in rigid alinement with the bottom 10 in the well understood way. The springs 16 also serve to urge the bed outwardly from its closed position. A spring, as 17, may be provided to swing the top 13 upwardly toward the position shown, and manually releasable means (not shown) may be employed to lock the hinged top and bed when in closed position. Any suitable means, such as a revolving back 18, may be mounted on the back wall 12 to support the plate-holder or dark slide, interchangeable with the usual rear focusing screen, film-pack

adapter, etc. A focal plane shutter is indicated at 19, inclosed by a vertical housing 20 having an opening 21 for the passage of the light to the sensitive plate or film. The shutter winding key is shown at 19^a, Fig. 1^a.

In front of the housing 20 and in light-tight connection therewith is a back frame 22, and in front of the latter is a front frame 23 having its lower portion constructed to slide in rails 24—25 on the bottom 19 and bed 14. Any convenient and suitable means, not shown, may be provided for advancing and retracting the front frame and for locking it in either position at will. It will be understood, of course, that in its rear position the said front frame is inside of the camera box and close to the shutter housing 20.

The front board 26, which carries the lens, not shown, is also mounted to slide on the rails 24—25 and may be provided with the customary rack and pinion, indicated at 27, for focusing. The front board is connected to the front frame 23 by means of a light-tight bellows 28.

The front and rear frames, 23, 22, are connected by a housing 29 of opaque or light-tight material of a flexible or pliable character, which for convenience may be termed the body-bellows inasmuch as it forms the body of the camera when the same is opened for use.

The mirror 30, by which the rays from the lens are reflected to the upper focusing screen, is pivoted to the walls 11 at its upper end so that it may swing up out of the path of the rays, thereby permitting the latter to pass to the sensitive plate or film at the rear. The mirror may also be swung down close to the shutter housing 20 when the camera is to be folded or collapsed. When the mirror swings up it comes into light-tight engagement with a forwardly and rearwardly extending, substantially horizontal, upper frame 31, which is itself connected in a light-tight manner (as described hereinafter) to the body-bellows 29. It will therefore be seen that when the mirror is raised no light can enter the camera body except through the exposure lens. The aforesaid frame 31 is pivoted at 31^a to the walls 11 near its rear so that it may be swung down to its depressed position like the mirror 30, when the camera is to be closed. The mirror itself is surrounded by a light frame 30^a, Figs. 1 and 10, pivoted co-axially with the mirror and provided at its lower side-edges with inwardly extending flanges 30^b which serve as stops to limit the downward movement of the mirror when the camera is opened for use; at which time the mirror frame 30^a is fixed in the position shown, in a plane bisecting the angle between the focusing screen and the sensitive plate or film. Said frame 30^a also serves

to prevent unintentional collapse of the sides of the body bellows when the camera is in use. A small stop 22^a, Fig. 1, which may be fixed in the edge of the rear frame 22 to overhang one side of the mirror-frame, 70 serves to prevent upward movement of said frame beyond the normal position.

Above the frame 31 is a frame 32 carrying the usual focusing screen 33 and provided with a folding hood 34 of any convenient and suitable type. The said frame 32 is also pivoted to the side walls 11 near its rear so that it may be folded down between the front and rear frames 23—22 like the mirror 30 and the light-trap frame 31. 80 It will of course be understood that the focusing hood is folded down flat upon the focusing screen before the latter is depressed.

The open-topped body-bellows 29 is shown 85 detached in Fig. 2. It will be seen that the sides, front, back and bottom of the bellows are joined to the frames 22—23. The sides and front of the bellows extend above the tops of the frames and are folded inwardly 90 and downwardly to the pivoted frame 31, to which they are connected in any suitable manner to prevent the passage of light around or outside of the frame.

When it is desired to collapse the camera 95 the focusing screen, frame 31, and mirror 30 are swung downwardly and rearwardly to their depressed positions. The frame 31 being attached to the lower edges of the inner or top side-folds 35 and inner front-fold 100 36 of the body-bellows, the downward and rearward movement of said frame draws the said folds in the same direction, into the body-bellows. The outer top or front-fold 37 is stiffened in any convenient manner, 105 preferably by affixing two pieces of stiff material, such as fiber board, 38, 39, Fig. 2, permitting flexure along a horizontal line between the two, indicated at 40. As the frame 31 is depressed (its forward edge 110 swinging in the arc-shaped path indicated by the dotted line) the folds 35 bend outwardly and the folds 36, 37, move downwardly. When the frame comes to about the middle of its path the folds are about in 115 the positions shown in Figs. 3 and 4. Continued movement of the frame 31 (followed, of course, by the focusing screen 32) brings the former to the position shown in Figs. 5 and 6. In the former figure the position of 120 the outer front-fold 37 at this stage is shown in dotted lines. The operator now passes his hand into the body-bellows and presses the said front-field 37 forwardly toward the front frame 23 to the position shown in full 125 lines in Fig. 5. The body-bellows is now in the form of an open-topped rectangular box with flexible sides and bottom, and can be collapsed by moving the front frame 23 rearwardly, the flexible sides and bottom 130

folding inwardly in bellows fashion, as in Fig. 7.

To open the body-bellows, the operation described above is reversed. The front frame 23 is first drawn forward till it locks in the tracks 25. The tab 41 is grasped and the fold 47 is drawn out, and the light-trap frame 31, mirror 30 and frame 30^a, and focusing screen frame 32 are swung up.

The focusing screen frame 32, mirror-seating or light-trap frame 31, and mirror-frame 30^a, may be connected in any convenient manner to limit their angular separation, as for example by means of toggle links 42—43, 44—45, the links 42 and 43 being provided with lugs 46, 47, extending laterally under the lower edges of links 43, 45, so as to prevent further straightening of the toggles when the parts have reached their normal or operative positions shown in Fig. 1. The frame 31 is arrested, in the position indicated, by the stop 48, and the toggle 42—43 then holds the focusing screen frame 32 against further upward movement.

The two frames may be raised by a spring, as 49, Fig. 8, on the pivot of the frame 32, and on the outside of the camera box the said pivot may be provided with a finger lever 50, see also Fig. 9, by which the focusing screen and the frame 31 can be depressed when it is desired to collapse the camera as described. The parts mentioned can be held in depressed position by means of a spring catch 51 adapted to snap into a recess 52 in the underside of the lever 50 and having a finger-release button 53. The spring catch has an arm 54 carrying a beveled lug 55 (Fig. 8) adapted to snap into the recess 52 when the arm 50 is in its upper position, thereby positively holding the focusing screen (and through the medium of the toggle links 42, 43, 44, 45, holding the light-trap frame 31 and mirror frame 30^a) in position and preventing depression of the parts named unless the arm 50 is first released by pressure on the button 53. To depress the mirror and seat it upon the stop-flanges 30^b one of the mirror pivots, 30^c, Fig. 11, extending outwardly through the tubular pivot 30^d of the mirror frame 30^a and through the side wall 11 of the camera box, may be provided with an arm 30^e, and to hold the mirror in its depressed position against the tension of its spring 54 until released to make the exposure the devices shown in Figs. 10, 12 and 13 may be employed. In these figures 55^a is a lug on the edge of the mirror, having a recess to receive a beveled finger 56 carried by a blade spring 57 on the inner face of the lug 58 depending from the mirror-stop-frame 30^a. When the mirror is swung down by the arm 30^e Figs. 1^a and 11, the lug 55 cams the finger 56 inwardly until it snaps into the recess. Pressure on the release button 59, ex-

tending through the box wall 11 into contact with or close proximity to the pin 60 on the end of spring 57, carries the finger 56 out of the recess in lug 55, thereby allowing the spring 54, Fig. 1, to swing the mirror up against the light-trap 31. A wire spring 61, extending through the stem of the release button 59, holds the said button yieldingly in its outer position.

If the focal plane shutter is of the "self-capping" type no provision need be made for protecting the plate or film from light during the setting of the shutter, but with a permanent-slit focal plane shutter the lens must be capped and the mirror raised (to prevent entrance of light from above) or other means must be provided to protect the light-sensitive surface. Preferably I provide a swinging safety closure 62, Fig. 1, behind the mirror, fitting in a light-tight manner the opening 21 in the vertical plate 63 which in the present instance forms the front wall of the focal plane shutter housing 20. The safety cap or closure 62 is raised by a spring 64, Fig. 14, and is swung down into operative position by an arm 65 fixed to its pivot 66 on the outside of the box-wall 11; or, if a focal plane shutter is used, the cap may be connected to the setting knob of the shutter (by any suitable means, not shown) so that the first effect of turning the knob will be to depress the cap, then set the shutter, followed by release of the cap to permit it to swing up against the mirror and follow the latter (through the frame 30^a) when the mirror is released by pressure on the button 59, Fig. 12, to make the exposure. With a "front" or "lens" shutter the cap must remain in its down position until the mirror is swung up against the light-trap 31, and means may therefore be provided to hold the cap in the down position and release it when the mirror seats itself against the light trap. Convenient means for the purpose is shown in Fig. 17, in which the mirror 30 is provided at its near edge with a finger 30^f extending laterally and rearwardly over a vertical rod 30^g having at its lower end an inclined lug 30^h to engage a finger 30ⁱ on the cap 62. A light expansible spring 30^k with one end bearing on a collar encircling the rod and the other suitably anchored, holds the rod yieldingly in its upper position. When the mirror swings up the finger 30^f depresses the rod, thereby releasing the cap, as will be readily understood. The finger 30^f may be mounted to slide on the mirror and a stem 30^m provided, extending out through the adjacent side of the camera box for manual control and having curved arms 30ⁿ embracing said finger but permitting the latter to swing with the mirror. When the stem is in position shown the finger lies over the rod 30^g, and the mirror must be set before the cap

62 can be locked in its lower or operative position. To permit time exposures without using the mirror, and to allow the back ground glass to be used for focusing (the mirror in that case being up) and to allow the shutter to be set without capping the lens, the stem 30^m is drawn out by means of the button 30^l, Fig. 1^a, thereby carrying the finger 30^f to the left of the rod so that when the mirror is up, the rod will not be held down by the finger. Any convenient means, manually actuated, may be provided to release the cap under these conditions as for example a sliding stem 30ⁿ extending out through the adjacent side of the camera box and connected inside the latter to a light bell-crank 30^r overhanging a stud on the side of the rod 30^s. Pressure on button 30^u, on the stem 30ⁿ outside of the camera, then depresses the rod and releases the cap 62. A light spring 30^s holds the stem and bell-crank yielding in their normal positions. When the rod is depressed by the finger on the mirror the bell-crank and its actuating stem are unaffected.

Release of the shutter (whether a focal plane or a "lens" shutter) when the mirror 30 or the cap 62, as the case may be, is raised, can be conveniently effected through the medium of the well known "wire," "Antinous," or "cable" release, as it is variously called. For this purpose the tubular guide 67 (Figs. 15 and 16) forming the actuating end of the cable can be fitted into one side of the light-trap frame 31 with the end of the plunger 68 extending downwardly into the path of the corresponding side of the cap 62, so that as the latter approaches its upper position it will strike the plunger and advance the same. The flexible portion of the cable, 69, passes upwardly and outwardly over the upper edges or bend of the adjacent side fold 35 of the body bellows 29, as indicated also in Fig. 1, and thence extends downwardly and rearwardly to the focal plane shutter mechanism, or forwardly (as in Figs. 2 and 5) to the front shutter if one of the latter type be used. In the latter case when the camera is closed the cable lies in front of the lens board as in the ordinary camera. With a focal plane shutter the cable lies between the collapsed body-bellows 29 and the adjacent side 11 of the outer box.

We have not attempted to show the relative proportions of the various parts of the camera and their positions with respect to each other, except in a very general way, as these and kindred matters are more properly left to the judgment of the skilled camera designer who undertakes to embody the principles of the invention in a full-size working apparatus. It is to be understood, also, that the structure shown and described herein is merely illustrative and can be modified

widely in practice, particularly in respect to such details as are shown in Figs. 8 to 17 inclusive, without departure from the spirit of the invention as defined by the following claims:

We claim:

1. In a folding reflex camera, the combination with a pivotally mounted forwardly and rearwardly extending frame, of an open-topped body-bellows inclosing said frame and having its upper portion folded inwardly and downwardly into light-tight connection with said frame and adapted to follow the pivotal movement thereof to permit collapse of the body-bellows.

2. In a folding reflex camera, in combination, a forwardly and rearwardly extending light-trap frame pivoted to swing downwardly; a pivoted mirror below the frame, normally occupying an inclined position but adapted to be swung upwardly into light-tight connection with said frame and downwardly to depressed position; and an open-topped body-bellows inclosing the frame and mirror and having its upper portion folded inwardly and downwardly into light-tight connection with said light-trap frame to exclude light around the same; said upper portion of the body-bellows being drawn downwardly into the bellows when said frame is swung down.

3. In a folding reflex camera, in combination, a forwardly and rearwardly extending frame pivoted to swing downwardly; a mirror-frame below the first-named frame, pivoted to swing downwardly and normally occupying an inclined position; a mirror pivoted in said mirror-frame to swing upwardly into light-tight cooperation with the first-named frame; and an open-topped body-bellows inclosing the said frames and mirror and having its upper portion folded inwardly and downwardly into light-connection with the first-named frame to exclude light around the same, said upper portion being adapted to be drawn down into the body-bellows when the first-named frame is swung down.

4. In a folding reflex camera, in combination, a forwardly and rearwardly extending light-trap frame pivoted to swing downwardly to a depressed position; a focusing screen arranged above the light-trap frame and pivoted to swing downwardly to a depressed position; a mirror below the light-trap frame, normally occupying an inclined position but pivoted to swing upwardly into light-tight cooperation with said light-trap frame and downwardly to a depressed position; and an open-topped body bellows inclosing the light-trap frame and mirror, having its upper portion extended above said light-trap frame and folded inwardly and downwardly outside of the focusing screen into light-tight connection with said

frame so as to be drawn down into the body-bellows when the said frame is swung down to its depressed position.

5 5. In a folding reflex camera, in combination, a forwardly and rearwardly extending light-trap frame pivoted to swing downwardly to a depressed position; a mirror-frame below the light-trap frame, normally occupying an inclined position but pivoted
10 to swing downwardly to a depressed position; a mirror pivoted in the mirror-frame to swing upwardly from the mirror-frame into light-tight cooperation with the light-trap frame and downwardly with the mirror-frame to the depressed position of the
15 latter; a connection between the light-trap frame and the mirror-frame whereby depression of one of the frames depresses the other also; and an open-topped body-bellows inclosing the said frames and mirror, having
20 its upper portion folded inwardly and downwardly into light-tight connection with the light-trap frame, said upper portion being drawn down into the body-bellows when the
25 light-trap frame is swung down to its depressed position.

6. In a folding reflex camera, the apparatus set forth in claim 5, in combination with a focusing screen above the light-trap frame,
30 pivoted to swing downwardly to a depressed position; and a connection between the focusing screen and the light-trap frame whereby depression of one of the parts named depresses the other.

35 7. In a camera, the combination with a light-tight inclosure having a rear opening, of a shiftable member normally preventing the passage of light from the front through said opening, and a shutter-operating device
40 of the cable type, having an actuating part in the path of said shiftable member for actuation thereby when said member is shifted to uncover said rear opening.

8. In a camera, the combination with a
45 light-tight inclosure having a rear opening, of a pivoted member normally preventing the passage of light from the front through said opening, and an Antinous shutter-operating device having its actuating end in the

path of the pivoted member for actuation
50 thereby when said member is swung to uncover said rear-opening.

9. In a reflex camera, in combination, a light-tight inclosure having a rear opening, a shiftable member for preventing the pas-
55 sage of light from the front through said opening, and an Antinous shutter-operating device outside of said light-tight closure but having its actuating end extending into said inclosure and into the path of the shiftable
60 member for actuation thereby when the same is shifted to uncover the rear opening.

10. In a reflex camera, in combination, a light inclosure having a rear opening and an upper frame, a pivoted member for pre-
65 venting the passage of light from the front through said opening and adapted to swing upwardly toward said frame, and an Antinous shutter-operating device outside said inclosure but having its actuating end ex-
70 tending through said frame into the path of the pivoted member for actuation thereby when the same is swung up to uncover said rear opening.

11. In a reflex camera, in combination, a
75 light-tight inclosure having a rear opening and an upper light-trap frame, a pivoted mirror adapted to swing up into light-tight cooperation with said frame, a spring-actuated pivoted closure for said rear opening to
80 prevent the passage of light therethrough from the front and adapted to swing upwardly to uncover said opening, means normally holding said closure over said opening but releasable by the upward movement
85 of the mirror, and an Antinous shutter-operating device outside of said light-tight inclosure but having its actuating end extended through the light-trap frame and alongside of the path of the mirror into the
90 path of said closure for actuation thereby as the same swings up to uncover the said rear opening.

In testimony whereof we hereunto affix our signatures.

ORESTE E. S. AZZONI.
CESARE AZZONI.