

CAMERA

5 This invention relates to a camera with a lens of fixed focal length. More particularly, this invention relates to means for making the fixed lens bifocal or multi-focal.

10 In conventional cameras including popular or compact cameras, certain mechanisms such as helicoids are utilized for moving a lens along its optical axis so as to adjust its focus in accordance with the object distance. Such mechanisms make the cameras structurally and operationally complex. The present invention aims to provide a bifocal or multi-focal lens camera, in which the lens is fixed and does not employ the aforementioned complex arrangements.

15 The present invention provides a camera with a fixed lens, comprising one or more plane sheets of transparent material, the sheet or sheets each being movable to an active position behind and adjacent the lens and substantially at right angles to the optical axis thereof and an inactive position away from the optical path through the lens, the sheet or sheets of transparent material causing a substantial change in the effective focal length of the camera, when in the active position.

25 An embodiment of the invention will now be described by way of example only and with reference to the accompanying drawings, in which:

Figure 1 is a perspective view of an embodiment of a camera according to the invention;

30 Figure 2 is an enlarged perspective view, cut away, of the camera shown in Figure 1, with the front enclosure removed; and

Figures 3(A) and (B) show the working principle of the invention.

In brief, the embodiment employs a plane sheet of glass which extends in parallel with a lens and a film surface and is movable in a direction at right angles with the optical axis of the lens, on account of which plane sheet of glass, the optical path distance between the lens and the film surface is substantially changeable, whereby objects a different distance from the camera can be focused correctly to a certain extent.

The working principle of the invention will be explained with reference to Figs. 3(A) and (B). In Fig. 3(A), numeral 1 indicates a lens having an optical axis c. Solid lines a show rays from an object at a comparatively short distance from the lens, while chained lines b show rays from an object at a comparatively long distance. Rays a emitted from the lens 1 which is fixed focus at F, which focus is presumed to produce a correctly focused image on a film surface. On the other hand, focal point F' of the rays b emitted from the lens 1 can not give a correctly focused image on the film surface but present a faded or blurred image on the film as the focal distance is less than the focal distance of F by as much as a length represented by d in the drawing.

As illustrated in Fig. 3(B), a plane sheet of glass 3 is placed removably behind _____

the fixed lens 1 and parallel thereto. The rays b (of chained lines) emitted from the lens 1 are refracted by the plane sheet of glass 3 as shown by chain-dotted lines, so that the refracted rays are now focused correctly at the point F, as in the case of rays a in Fig. 3 (A). The functional relationship between a thickness (t) of the glass sheet 3 and the difference of focus distance d may be expressed by the following equation.
$$t = \frac{3d}{2}$$

Focusing the image for the rays b of objects at a long object or shot distance can therefore be changed by properly selecting the thickness t of the glass sheet 3. While a single glass sheet 3 is shown in the drawing, it can consist of a plurality of sheets of either same or different thicknesses so that in accordance with a particular shot distance, a selected number of the sheets can be employed adjacent one another behind the lens 1. The glass sheet may be made from plastic resins or other transparent material. It should be noted, also, that the lens 1 may consist of a plurality of lenses so far as they are fixed.

In Figs. 1 and 2, the above working principle of this invention, that is, the employment of a flat sheet of glass behind the lens is embodied in a camera.

A flash unit or stroboscopic lamp unit 2 mounted in the camera having a fixed lens 1 is settable either to an operative position or an inoperative position by contact means 7. The contact means is operated by a lever pin 4

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which projects from a slide 5 at one end thereof. This slide is movable against the camera transversely to the optical axis c of the lens 1 between an inactive position and an active position, by means of a slot 10 provided thereto and a guide pin 9 which is fixed to the camera. The plane sheet of glass 3 which is fitted to another end of the slide 5 so as to extend behind a lens aperture 8 and at a right angle to the optical axis c of the lens 1, moves together with the slide to the inactive position where the glass sheet 3 does not cover the lens aperture 8, or the active position where the sheet 3 covers the lens aperture. Numeral 6 indicates a finger stem by which the slide 5 is movable from its inactive position to the left side in Fig. 2 so that it is brought to the active position. At the inactive position of the slide 5, the flash unit is at its operative position, while at the active position of the slide 5, the flash unit is at the inoperative position.

Thus, for example, when the focus F is obtainable by the lens 1 (without the glass sheet 3) for an object at a shot distance of say 2.5 metres, and also by the lens 1 (with the glass sheet 3) for an object at a shot distance of 4 metres, the flash unit 2 is operable only at the inactive position of the slide 5 where the lens 1 is uncovered by the glass sheet 3 for taking an object at the shot distance of 2.5 metres, because the flash unit 2 would be ineffective at a shot distance of 4 metres on account of its flash capacity.

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As described above, the present invention can make, without a complicated mechanism and without complex operation, a fixed lens at least bifocal and even multi-focal. In addition, a flash unit is operative only when 5 an object to be pictured is positioned within the capacity of the flash unit, and only when the slide is at the position suitable to take a picture of such object.

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Claims:-

1. A camera with a fixed lens, comprising one or more plane sheets of transparent material, the sheet or sheets each being movable to an active position behind and adjacent the lens and substantially at right angles to the optical axis thereof and an inactive position away from the optical path through the lens, the sheet or sheets of transparent material causing a substantial change in the effective focal length of the camera, when in the active position.

2. A camera as claimed in claim 1, in which the sheet or sheets are fitted to sliding means manually movable transversely to the optical axis of the lens.

3. A camera as claimed in claim 2, including a flash unit having switching means, wherein actuating means are provided on the sliding means with the actuating means operating the switching means to place the flash unit in an operative condition when the sliding means positions the sheet or sheets at the inactive position or to place the flash unit in an inoperative condition when the sliding means positions the sheet or sheets at the active position.

4. A camera substantially as hereinbefore described with reference to the accompanying drawings.