PATENT SPECIFICATION

666,498

Date of Application and filing Complete Specification Nov. 3, 1948.

No. 28603/48.

Complete Specification Published Feb. 13, 1952.

Index at acceptance:—Class 98(i), A2(a9: f: g).

COMPLETE SPECIFICATION

Improvements in Focussing Devices for Photographic Cameras

I, LUCIEN JULES EMILE ANDRE DODIN, a French Citizen, of rue Tixador, Canet-Plage, Pyrénees Orientales, France, do hereby declare the nature of this invention and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

The present invention relates to a focussing device for photographic cameras.

Focussing devices are known which comprise a ground glass screen on which the whole image, corresponding to the photographic field recorded by the camera, is observed, and a system of crossed prisms, through which a part only of the object is observed, the prisms enabling in-focus and out of focus conditions to be readily detected. Such focussing devices may be associated with an adjustable objective, the movements of which can be read and used for focussing the exposure objective of the camera, or such adjustable objective may be mechanically coupled to the said exposure objective so that one objective is focussed by the act of focussing the other.

It is possible instead of the aforesaid ground glass screen, to use a field lens in combination with a crossed prism focussing device as aforesaid.

These devices, as also the device according to the invention, may be employed in so-called " twin-lens cameras ", and may also be employed in reflex cameras. In a reflex camera a single objective serves alternately as an objective for the view finder and as an exposure objective.

The defect of the said known devices is that the prism system promoting more accurate focussing is confined to a small part of the field of view.

The object of the present invention is to provide an improved focussing device and to this end it provides a device having in combination:—

1. A group of prismatic elements assembled as hereinafter described, occupying the whole field of view; and

2. A finely ground surface disposed in a single plane within this prism assembly, the fine grain giving the surface a light diffusing power for the formation of true images thereon and a sufficient transparency to enable the transmitted rays to be deflected by the prisms so that the image will appear divided when the object is out of focus, the divided parts only uniting to form the correct image when the rays are properly focussed on the said ground surface within the prism assembly. A central or other portion of the ground surface may be provided with a greater degree of transparency than the remainder of the surface, or it may be completely transparent, for a purpose which will be described.

The prismatic elements are assembled to form two identical symmetrical wedge prisms with a fine wedge angle of not more than 20° superimposed in end for end inverted relationship and with the said ground surface located within the prism assembly in a plane bisecting the fine wedge angle of each symmetrical wedge prism.

The prismatic elements may be four in number. Thus each symmetrical wedge prism may be composed of two identical prismatic elements having their mating faces lying substantially in the said bisecting plane and one or both of the mating faces of each pair of prism elements may be finely ground so as in the assembly to form one half of the finely ground surface aforesaid.

With such a device, if the object to be photographed is out of focus its image on the ground surface will appear divided, due to the action of the prisms. The camera objective may then be moved until the image is undivided. An undivided image is only obtained when the object is correctly in focus.

Because of their fragile nature the apex ends of the prisms will preferably not be made sharp but the prisms will be of blunt ended wedge form.

[Price 2/-]

The invention will be more clearly understood with reference to the accompanying diagrammatic drawings, in which: Fig. 1 is a side elevational view showing the superimposed symmetrical wedge prisms occupying the whole rectangular field of view as framed by the camera view finder;

Fig. 2 is an end elevational view of the prisms shewn in Fig. 1;

Fig. 3 is a sectional plan view on the line A—A¹ of Fig. 1 and Fig. 4 shows two identical prism elements which assemble to form one of the wedge-like prisms shown in Figs. 1 to 3.

In the drawings, 1 designates the upper symmetrical wedge prism formed by two identical assymetrical prism elements 1a and 1b (Fig. 4) and 2 the lower symmetrical wedge prism which is identical with the prism 1 and is likewise formed by two prism elements 2a and 2b.

The symmetrical prisms 1 and 2 have their apex ends formed blunt. Their wide end faces are denoted by references 12 and 14 respectively, while their apex end faces are denoted by references 13 and 15 respectively.

The prisms 1 and 2 are superimposed, their contacting faces lying in the horizontal plane H—H, and their wide and apex end faces 12, 13 and 14, 15 are situated in parallel planes perpendicular to the plane H.H and to the bisector plane B.B common to the superimposed prisms. The prism assembly is disposed so that the optical axis of the camera view finder passes through the centre O and in a direction perpendicular to the bisector plane B.B.

The inclined side faces, 3, 7 and 6, 11 of the two prisms of the prism assembly, intersect at O_1 and O_2 on the line corresponding to the optical axis of the view finder. The half sections of each of the symmetrical prisms 1 and 2, all of which sections have a wedge angle of $\alpha/2$ (to give a wedge angle of α for the symmetrical prisms) are held together with their contacting faces, 4, 5 and 8, 9 lying in the plane B—B.

The faces 5 and 9 of the prism sections 1b and 2b are finely ground before assemblage with the companion prism sections so as to be semi-transparent, and while diffusing sufficient light to enable an image to be seen, they are sufficiently transparent for the rays of light to traverse the prisms and enable them to perform their focussing function.

It is found that a single field lens, in combination with the focussing device, will serve for use with objectives of various focal lengths.

By "field lens" I means a lens which operates to concentrate image forming rays on the pupil. Theoretically it is normally necessary to use a different field lens for each different objective but experiment has shown that when using a field lens in combination with the ground surface focussing device according to the invention it is possible to change the objective power within certain limits without changing the field lens.

However, when the camera is provided with several interchangeable objectives or when it is not possible for example on account of space requirements, to use an auxiliary field lens strong enough for use with the objectives with the shortest focal distances, it is necessary to provide a ground glass with sufficiently coarse grain to enable the image to be seen in all cases. It may then happen however, that the grain may be too coarse to permit satisfactory focussing if the light is feeble, and in this case it is desirable to provide a more finely grained area in the centre of the ground surface. This central area may then be used for focussing an image sighted on the ground surface as a whole.

In Fig. 1 there is diagrammatically represented a tree trunk in the course of being focussed. The tree trunk image is divided at T1, T2. When correct focussing is achieved, the divided parts of the image join together. The whole of the image is seen, inasmuch as the ground surface extends over the whole field of view. The ground surface may be obtained by any known means.

Transparency may be increased by coating the ground surface with a very thin layer of paraffin oil and then carefully wiping over the surface, the remaining traces of paraffin oil being sufficient for greatly improving the transparency.

The prism sections of wedge angle $\alpha/2$ joined together to form the prisms of wedge angle α may be held in contact with each other, without interposition of any adhesive.

In this case if there is an air gap between the mating surfaces of each pair of prism sections, the transparency may be undesirably decreased. This may be remedied by interposing between the two faces, a material having a refractive index, with respect to air, of greater than 1.

Advantageously the interposed material will be an adhesive for causing the contacting faces of each pair of prism sections to adhere, e.g., fish-glue, containing such an amount of water that its index of refraction is not very different from that of the water, that is to say considerably different from that of the

glass from which the prisms are made.

Gelatine is another example of material which may be interposed and this may be combined with products usually employed for rendering it particularly hygrometric.

Having now particularly described and ascertained the nature of my said invention and in what manenr the same is to be performed, I declare that what I claim is:—

1. In a photographic camera, a focussing device comprising a finely ground light diffusing and light transmitting surface extending over the field of view sighted through the camera, and a group of prismatic elements, the said elements being assembled to form two identical symmetrical wedge prisms with a fine wedge angle of not more than 20° superimposed in end for end inverted relationship and with the said ground surface located within the prism assembly and in a plane bisecting the fine wedge angle of both symmetrical wedge prisms.

2. Device as claimed in claim 1, wherein each symmetrical wedge prism is formed by two identical prism elements, the mating faces of which lie substantially in the said bisecting plane, one or both of the mating faces of each pair of prism elements being finely ground so as to form in the assembly half of the said semi-transparent ground surface.

3. Device as claimed in claim 2 wherein the contacting faces of each pair of prism elements are caused to adhere by means of a material whose index of refraction is different from that of the prism elements.

4. Device as claimed in any one of the preceding claims wherein the ground surface is provided with a central portion of a finer grain than the remainder of the said ground surface.

5. A focussing device for use in a photographic camera comprising a finely ground light diffusing and light transmitting surface adapted to extend over the field of view sighted through the camera and a group of prismatic elements, the said elements being assembled to form two identical symmetrical wedge prisms with a fine wedge angle of not more than 20° superimposed in end for end inverted relationship and with the said ground surface located within the prism assembly and in a plane bisecting the fine wedge angle of both symmerical wedge prisms.

6. A focussing device for use in a photographic camera substantially as herein described with reference to and as illustrated in the accompanying drawings.

7. A photographic camera embodying a device according to claim 6, the said device being arranged in the camera substantially as herein described.

Dated this 3rd day of November, 1948.

HYDE & HEIDE,
2, Broad Street Buildings,
Liverpool Street, London, E.C.2,
Patent Agents for the Applicant.

Leamington Spa: Printed for His Majesty's Stationery Office, by the Courier Press.—1952.
Published at The Patent Office, 25, Southampton Buildings, London, W.C.2, from which copies, price 2s. per copy; by post 2s. 1d. may be obtained.

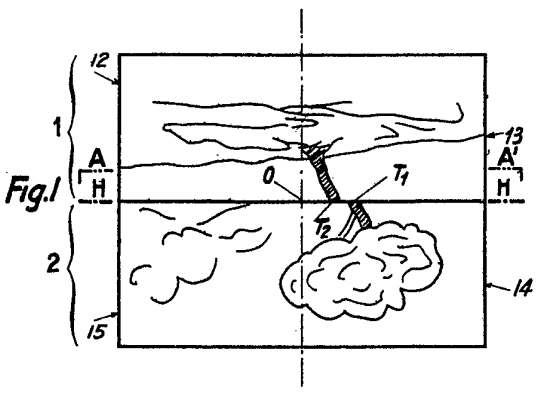

Fig.1

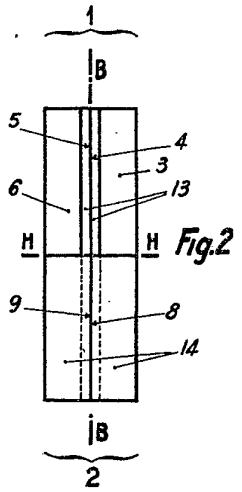

Fig.2

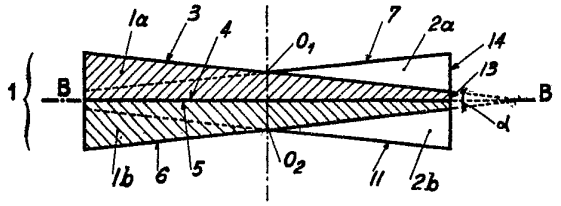

Fig.3

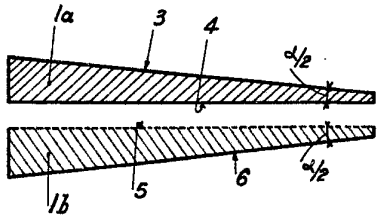

Fig.4

Charles & Read Ltd.