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COMPLETE SPECIFICATION.

Photographic Cameras.

We, VOIGTLÄNDER & SOHN AKTIEN-GESELLSCHAFT, a joint stock company organized under the Laws of Germany, of 7, Campestrasse, Brunswick, in the State of Brunswick, Germany, 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:—

10 This invention relates to photographic cameras, and more particularly to cameras of the type comprising a finder disposed laterally of or above the exposure lens and adapted to be inclined with its axis 15 relatively to the optical axis of the exposure lens according to the distance of the subject to be photographed, so that parallax is avoided and the same portion of the scene is reproduced in the finder 20 and on the sensitized surface.

In cameras of this type in which the lenses are brought to a focus by axially shifting the lens front the slides carrying the said lens front are guided in guide 25 ways which are inclined relatively to the axis of the camera, so that the optical axes of the exposure and finder lenses are inclined relatively to each other more or less when the said slides are moved out- 30 wardly or inwardly for focussing. This invention more particularly relates to cameras in which the mountings of the exposure and finder lenses are shifted inwardly and outwardly by means of rotary 35 members which are coupled with each other so that both lenses are simultaneously focussed, and the invention consists in connecting said rotary members with the means for inclining the finder lens 40 relatively to the optical axis of the exposure lens for preventing parallax.

Other objects of the improvements will appear from the following description of the invention.

45 In the accompanying drawings

Fig. 1 is a sectional elevation showing the camera,

Fig. 2 is a plan view showing a ring for axially shifting the finder lens and 50 inclining the finder,

[Price 1/-]

Fig. 3 shows a diagram,

Fig. 4 is a sectional elevation showing a modification of the camera, and

Fig. 5 is a plan view showing the ring for axially shifting the finder lens and 55 inclining the finder.

In the example shown in Figs. 1 to 3 of the drawings the camera comprises a body or case 1 formed with a partition 2 dividing the same into an exposure chamber 3 and a finder chamber 4. The exposure chamber is provided with a lens or lens system 5, and it has an opening 6 at its rear which is normally closed by a lid 7. In the example shown in Fig. 1 65 the camera is provided with film spools 8, and the film 9 is passed across the opening 6, as is known in the art.

In the finder chamber 4 a finder 10 is located which comprises a casing 11 having a bottom 12 inclined at an angle of 70 45° and having a mirror 12¹ mounted thereon. The casing 11 is hinged to the top part of the front wall 22 at 13, and it is acted upon by a spring 14 tending to incline the same with its front wall 15 75 forwardly. The finder comprises a lens or a system of lenses 16 and a focusing screen 17. Preferably the lenses or lens system 5 and 16 and their focal lengths are alike so that equal pictures are produced on the sensitized surface 9 and the 80 screen 17.

The carrier 18 of the exposure lens 5 comprises a tube 19 which is formed with external screw-threads 20 of large pitch, and which is in engagement with an internally screw-threaded ring 21 mounted in the front wall 22. The ring 21 is provided with a flange 23 formed with gear teeth 24 and embedded in a recess 25 made in the front wall 22, a plate 26 90 being fixed to the front wall for holding the flange 23 in position. The flange 23 is made integral with an arm 27 carrying a finger piece 28. From the plate 26 an arm 29 projects forwardly which is formed with a slot 30 engaged by a pin 31 secured to the shutter housing 32, the said pin and slot preventing rotary movement of 100

the shutter housing, the lens 5 and its mounting. When the flange 23 is turned by means of the finger piece 28 the tubular member 19 and the lens 5 carried thereby 5 are shifted inwardly and outwardly for focusing.

The front wall 15 of the finder casing 11 is formed with a hole and it has a tubular member 35 secured thereto which 10 projects through the said hole outwardly and is formed at its outer end with external screw-threads 34 of large pitch. On the tubular member 35 an internally screw-threaded ring 36 is mounted to 15 which the tube 37 supporting the lens or lens system 16 is secured. Between the front wall 22 and the top part of the plate 26 a gear wheel 38 is rotatably mounted which is in mesh with the gear 20 wheel 23, 24 and which is made integral with a ring 39. To the said ring a pin 40 is secured which loosely engages in a longitudinal slot 41 made in the wall of the tubular member 36. Therefore, when 25 the gear wheel 38 is turned such rotary movement is transmitted to the ring 36 which is screwed outwardly or inwardly on the tubular member 35.

By reason on the gear wheels 23, 24 30 and 38 the lenses 5 and 16 are shifted outwardly and inwardly in unison, and the numbers of the teeth of the said gear wheels and the pitches of the screw-threads 20 and 34 are such that whenever 35 the picture has been focused in the finder system also the exposure system is in focusing position. Thus, when the lenses or lens systems 5 and 16 are alike, the gear wheels 23, 24 and 38 have equal numbers of teeth, and the pitches of the screw-threads 20 and 34 are alike, but they are 40 of opposite turning, because the rings 21 and 36 rotate in opposite directions.

At its inner end the ring 39 is formed 45 with a cam face 42 which is in engagement with a pin 43 secured to the front wall of the casing 11, the object of the said cam face and pin being to incline the finder 10 when the finder lens is 50 shifted inwardly or outwardly, and the shape of the cam face is such that whenever the lenses 5 and 16 are shifted inwardly or outwardly according to the distance of the subject to be photographed, 55 their optical axes intersect in the plane of the said subject, so that exactly the same part of the scene appears on the focusing screen 17 and the sensitized surface 9. The cam 42 and the ring 39 are 60 shown in Fig. 2. As is shown in the said figure the ring carries scale marks 46 cooperating with a pointer 47 made on a relatively fixed part such as the plate 26, the said scale marks and pointer indicating the axial adjustment of the lens 65

16 and the distance of the subject to be photographed.

The pitch of the cam face 42 is such that the optical axis of the finder lens is inclined relatively to the optical axis of the exposure lens at a certain angle β 70 when the exposure lens has been set into position corresponding to a distance a of the subject to be photographed. In Fig. 3 the distance between the optical axes 75 has been indicated b . The relation of the said values follows from the following equation.

$$\text{tang } \beta = \frac{b}{a}$$

If both lenses are set to the infinite 80 the optical axes of the lenses are parallel, and if a subject is to be photographed which is nearer the camera both lenses are uniformly adjusted in the direction of the optical axes, and simultaneously 85 the finder casing and the optical axis of the finder lens are inclined according to the said distance of the subject. In Fig. 1 the optical axes A—A and B—B of the exposure and finder lenses are 90 directed to a subject located in the infinite and the optical axis B¹—B¹ of the finder lens directed to a subject located near the camera and inclined relatively 95 to the optical axis of the exposure lens.

The pin 40 has sufficient play in the groove 41 to permit the finder to be inclined relatively to the axis A—A while the ring 39 is turned about its axis.

In the modification shown in Figs. 4 100 and 5 the construction of the case 1, the chambers 3, 4 and the finder 10 have the same construction as the corresponding parts described with reference to Figs. 1 to 3, and the same letters of reference 105 have been used to indicate corresponding parts. However, the screw-threaded tubular members for shifting the exposure lens and its carrier in the direction of the optical axis are constructed in a different 110 way.

The front wall 22 of the case 1 is formed with an internally screw-threaded tubular extension 50 in which an externally and internally screw-threaded ring 51 is 115 mounted, and within the said ring an externally screw-threaded tubular extension 52 of the shutter casing 53 is mounted. A slotted arm 29¹ fixed to the front wall 22 is in engagement with a pin 31¹ carried 120 by the extension 52. The ring 51 is formed at its front end with gear teeth 54 meshing with gear teeth 55 formed on a tubular member 39¹ rotatably mounted in a hole of the front wall 22. As shown 125 in Fig. 4, the tubular member 39¹ is formed at its inner end with a reduced portion 56 carrying an annular nut 57,

the reduced portion 56 and the nut 57 holding the tubular member 39¹ in position on the front wall of the case while permitting rotary movement thereof. By means of the tubular member 39¹ rotary movement is imparted to the ring 36 for shifting the finder lens inwardly or outwardly as has been described above.

For shifting the lenses 5 and 16 inwardly or outwardly for focusing the scene on the sensitized surface 9 and the focusing screen 17 the ring 51 is rotated, for example by means of the hand of the operator engaging the gear teeth 54. Thereby the ring is shifted inwardly or outwardly within the tubular extension 50 and simultaneously the shutter casing 53 is shifted in the same direction because its rotary movement is prevented by the arm 29¹. The external screw-threads of the ring 51 have a comparatively small pitch, so that the axial displacement of the ring within the limits of the rotary movement needed for setting the lens 5 in position is small, and the teeth 54 and 55 do not get out of engagement with each other.

Also in the construction shown in Fig. 4 the mechanism for shifting the lenses 5 and 16 is constructed so that the subject is always focused simultaneously on the sensitized surface 9 and the screen 17. The lens systems 5 and 16 are alike, and the diameters of the tubular member 39¹ and the ring 51 are different. Accordingly the pitch of the screw-threads of the parts 44, 36 is small as compared to the pitch of the screw-threads of the ring 51, the dimensions being such that by the rotary movement of the ring 51 equal axial displacements are imparted to both lenses.

By the rotary movement of the tubular member 39¹ the finder 10 is turned about its pivotal axis 13 through the intermediary of the cam 42, as has been described with reference to Fig. 1. The tubular member 39¹ is provided with scale marks 58 cooperating with a pointer 59, as has been described with reference to Fig. 1.

The iris diaphragm 69 is adapted to be set by means of a ring 60 which is rotatably mounted on the carrier of the exposure lens and connected with the laminations of the diaphragm by pins 70. The ring 60 is provided at its inner end with gear teeth 61 which are in engagement with a comparatively long pinion 62 rotatably mounted on a pin 63 fixed to the front wall 22 and made integral with a gear wheel 64. The gear wheel 64 is in mesh with a gear wheel 65 rotatably mounted on a bolt 66 and located in a slit 67 made in the tubular extension 50.

Having now particularly described and ascertained the nature of our said inven-

tion and in what manner the same is to be performed, we declare that what we claim is:—

1. A photographic camera comprising a finder and coupled rotary members for axially shifting the exposure and finder lenses for focussing, in which said rotary members co-operate with means (42, 43) for inclining the finder lens relatively to the optical axis of the exposure lens for preventing parallax.

2. A camera as claimed in Claim 1, in which the member for axially shifting the finder lens takes the form of a ring (39, 39¹) disposed concentrically of the finder lens and adapted to be turned about its axis, said ring being connected with the mounting (36, 37) of said finder lens for screwing the same inwardly and outwardly, and being formed with a cam face (42) engaging the finder for inclining the same.

3. A camera as claimed in either one of Claims 1 and 2, in which the said rotary member or ring (39) for axially shifting the finder lens is connected with the mounting (36, 37) of the finder lens by means of a pin and slot connection (40, 41) having sufficient clearance to permit the finder to be inclined relatively to the said rotary member or ring.

4. A camera as claimed in any one of claims 1 to 3, in which the mounting of the exposure lens (5) is connected with the ring (39) imparting axial displacement to the finder lens and rocking movement to the finder by means of gear wheels (23, 38 and 54, 55) disposed concentrically of the lenses, one of the said gear wheels (38) being rigidly connected with the ring (39) for imparting axial displacement to the finder lens and the other one (23) being rigidly connected with a screw-threaded ring (21) which is in screwing engagement with the axially shiftable and non-rotatable mounting (20) of the exposure lens.

5. A camera as claimed in Claim 4, in which the gear wheels are disposed within the double front wall (22, 26) of the case of the camera.

6. A camera as claimed in any one of Claims 1 to 5, in which the ring (39, 39¹) imparting axial displacement and rocking movement to the finder lens carries scale marks (46, 58) adapted to indicate after focusing the distance of the subject to be photographed and to be read from above.

7. A photographic camera as claimed in any one of Claims 1 to 6, in which the shutter casing (53) of the exposure lens (5) is provided with external screw-threads (52) engaging in an internally screw-threaded ring (51) which is rotatably mounted in a tubular extension (50)

of the camera case, and which is formed with gear teeth (54) meshing with the gear teeth (55) carried by the ring (39) for axially displacing the finder lens.

5 8. A photographic camera as claimed in any one of Claims 1 to 7, in which the gear wheels (23, 38 and 51, 55) have different diameters, and the screw-threads provided for axially displacing the lenses
10 have different pitches, the ratios of the said gear teeth and pitches being such that both lenses are adapted for uniform axial displacement.

9. A photographic camera as claimed in
15 any one of Claims 1 to 8, in which the diaphragm (69) of the exposure lens (5) is adapted to be set in position by means

of a pinion (62) engaging in gear teeth (61) carried by the setting ring (60) of the diaphragm.

10. A photographic camera as claimed in Claim 9, in which the said pinion is connected with a gear wheel (64) meshing with a gear wheel (65) located in a slot of the said tubular extension (50) and partly protruding outwardly therefrom.

11. A photographic camera as claimed in any one of Claims 7 to 10, in which the ring (51) for axially shifting the exposure lens is in screwing engagement with the said tubular extension.

Dated this 25th day of October, 1933.
MARKS & CLERK.

[This Drawing is a reproduction of the Original on a reduced scale.]

Fig. 1

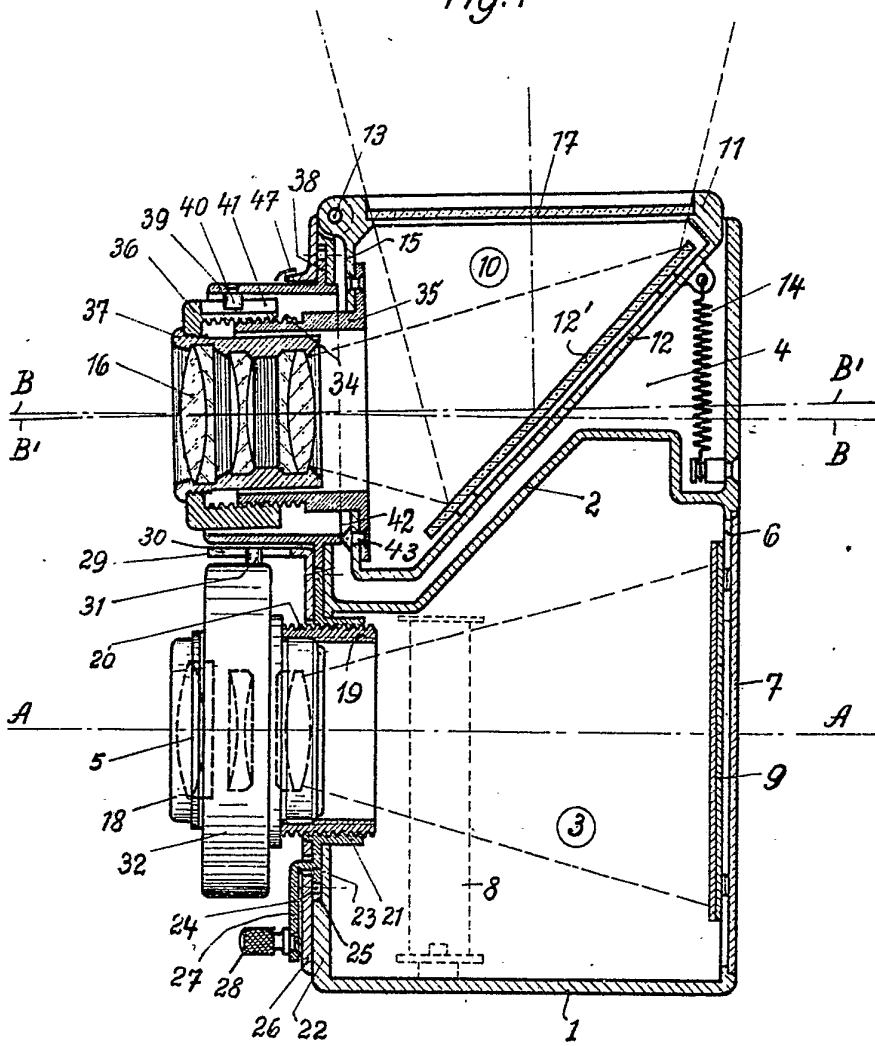


Fig. 2

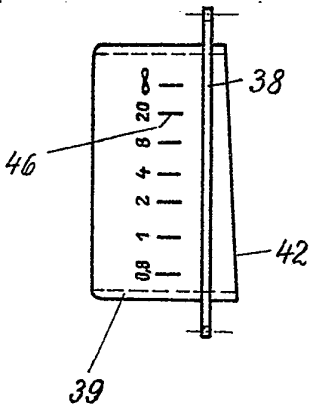
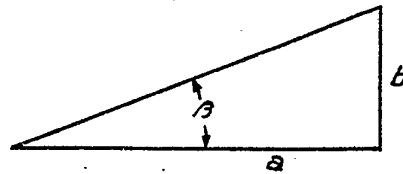


Fig. 3



39'

B'
|
B

A

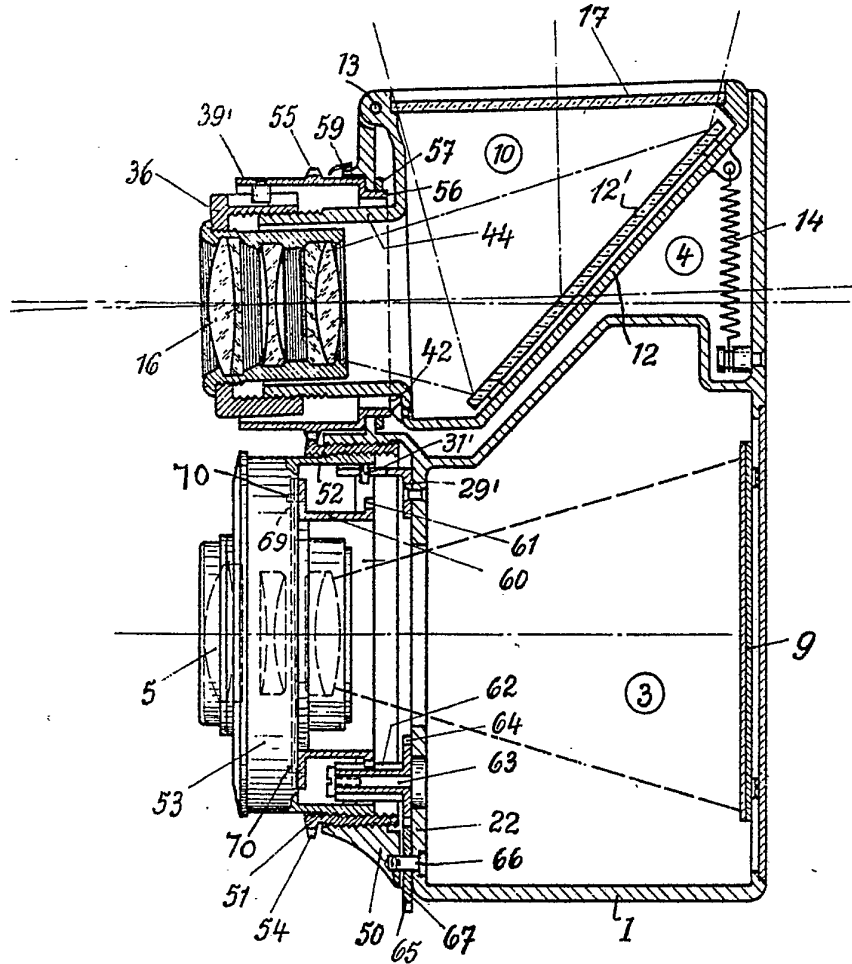


Fig. 4

b

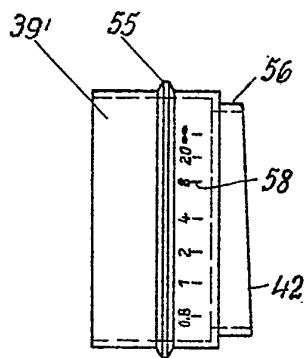


Fig. 5

409,217 COMPLETE SPECIFICATION

[This drawing is a reproduction of the Original on a reduced scale.]

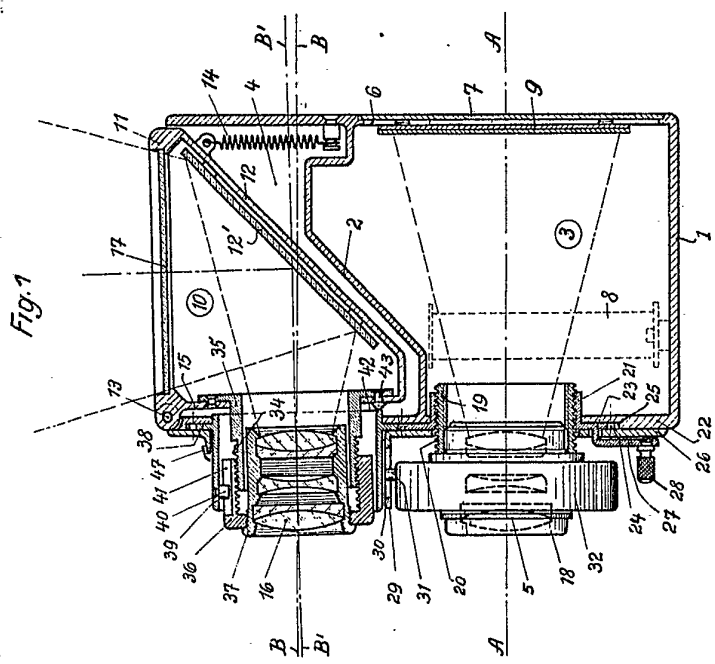


Fig. 1

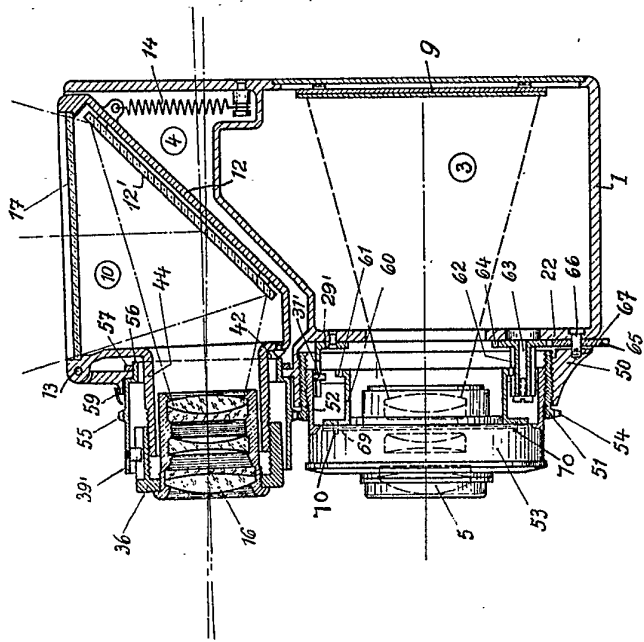


Fig. 4

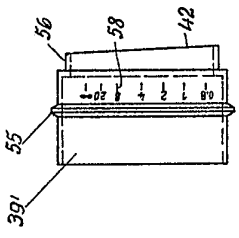


Fig. 5

Fig. 2

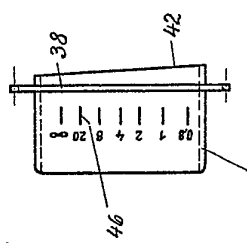


Fig. 3

