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(54) PHOTOGRAPHIC CAMERA

(71) We, EASTMAN KODAK COMPANY, a Company organized under the Laws of the State of New Jersey, United States of America of 343 State Street, Rochester, New York 14650, United States of America 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:—

This invention relates to a folding photographic camera having a pivotable housing portion which carries a lens and is movable from an inoperative position in which it lies against the front of the camera housing into an operative position in which it is arranged at an angle with respect to the camera housing and *vice versa*, and also having actuated means for focussing the lens, the actuating means being coupled to the lens by a transmission means.

It is an object of the present invention to provide such a camera having an actuating means of improved construction such that it is protected and yet allows for easy handling.

According to the present invention, there is provided a photographic camera having a body, a pivotable housing portion which carries the objective lens and is movable from an inoperative position in which it lies against a front of the camera body, into an operative position in which it is arranged at an angle to the camera housing and *vice versa*, and also having focussing means for adjusting the lens, the focussing means being coupled to the taking lens by a transmission means, and wherein the transmission means are rotatably mounted on the pivotable housing portion, hidden from sight, between the camera body and/or a distance measuring device and the taking lens, and the focussing means is connected to the transmission means, is mounted on the pivotable housing portion, preferably in the range of a release button of the camera, and is manually accessible.

The invention will be described further, by way of example with reference to the accompanying drawings.

Fig. 1 is a perspective view, part broken away, of a camera according to the present invention; 50

Figs. 2, 3 and 4 are fragmentary views of a focussing means of the camera of Fig. 1, seen from the direction of the arrow C sectioned on the line A-A and sectioned on the line B-B of Fig. 2 respectively. 55

Figs. 5 and 6 are a detailed view and a section respectively of a transmission shaft forming part of the focussing means; 60

Fig. 7 is a view similar to Fig. 1 of a camera, according to the invention, having a rangefinder; 65

Fig. 8 is a schematic view of the rangefinder of the camera shown in Fig. 7;

Figs 9 and 10 are respectively a part sectional side view and an end view of a focussing means according to the present invention. 70

A camera according to the present invention comprises a housing 11 and two movable housing portions 1 and 13 which can be pivoted from a ready-for-use, operative position (shown in Fig. 1) wherein the housing portion 13 can be locked to the camera housing 11, into an inoperative position wherein they are folded against the camera housing 11. 75

The housing portions 1, 13 are attached to a hingedly mounted metal plate 10 shown in Fig. 1. An objective lens 6 and a gear wheel 5 meshing with a gear ring (not shown) of the lens 6, are mounted on a bent-over portion 10a of the plate 10. 80

The lens 6 can be focussed either *via* a knurled actuating ring 6a directly arranged on the taking lens 6 or *via* a focussing element 2, arranged in an externally opening recess 1b in the portion 1 adjacent a release button 12, in the form of a knurled wheel. 85

The focussing element 2 is secured on a transmission shaft 3 for rotation therewith, the shaft consisting of a flexible wire hidden from sight within the housing portion 1. The connection, for co-rotation, is achieved by a flattened portion 3a of the wire (see Figs. 2 and 4). 90

The transmission shaft 3 is mounted to 95

facilitate assembly of the camera. For this purpose, the housing portion 1 comprises two recesses 1a, which are arranged one at each side of the focussing element 2 (see Fig. 3), and into which the transmission shaft 3 is placed. The mounting plate 10 is provided with two projections 10b, 10c (see Figs. 1 and 2) which are also arranged one at each side of the focussing element 2 and hold the transmission shaft 3 in the recesses 1a.

A slot 10d and the flanges 10e, 10f of the mounting plate 10 also serve for guiding and mounting the transmission shaft 3 (see Fig. 1).

A gear wheel 4 is connected for rotation with that end of the transmission shaft 3 adjacent the taking lens 6. This gear wheel 4 engages with the gear wheel 5 and transmits rotation of the focussing element 2 to a focussing mount of the taking lens 6.

The gearing engagement of the gear wheels 4 and 5 can be accurately adjusted by further bending of the flange 10f. The mountings for the transmission shaft 3 are, moreover, so designed and arranged that the entire unit of the transmission means (transmission shaft 3, gear wheel 4 and focussing element 2) can be mounted in a simple manner upon insertion into the camera.

If the setting means are mishandled the taking lens 6, 6a may reach an end of its focussing movement whilst an operator continues to try and rotate the focussing element 2 (e.g. knurled roller). In order to ensure that the arrangement is not subjected to an overload in such a case, the transmission shaft 3 is made of spring steel and can compensate for such load due to its torsional and elastic properties.

Thus, manufacture and assemblage of the transmission means 2, 3, 4 is achieved with the minimum expenditure of components possible in that a conventional torque coupling, and complicated mountings are avoided.

Figs. 5 and 6 show a further feature of the invention; the mounting for the gear wheel 4, which is unaffected by inclination of the transmission shaft 3 relative thereto. As is shown in Fig. 5, the gear wheel 4 is pressed onto an axle 7 for rotation therewith. The axle 7 is rotatably arranged on the bent-over portion 10a of the mounting plate 10. The transmission shaft 3 has a right-angled end element 3c (see Figs. 5 and 6) which engages in a slot 7a of the axle 7 so that rotation of the focussing element 2 is transmitted to the gear wheel 4 through the semi-flexible coupling so formed and thus to the focussing mount of the taking lens 6.

In the embodiment according to Figs. 7 and 8, the manner of coupling the distance setting means 2 to 6 to a rangefinder is diagrammatically illustrated. For this purpose, a lens 9 (see Fig. 8) is moved in response to the rotation of the setting element 2 *via* a move-

ment transmission means 8—not shown in detail—which engages and cooperates with an end 3b of the transmission shaft 3 to set the viewfinder image correctly when the taking lens is set to a particular distance.

In the embodiment described in relation to Figs. 1 to 4, the focussing element 2 would normally be moulded onto the shaft 3.

In order that the focussing element 2 can, for instance, be chromium-plated independent of the transmission shaft 3, it is necessary that a connection for rotation should be established only when the elements 2 and 3 are assembled. Figs 9 and 10 describe a connection where these conditions have been taken into account. For this purpose, a focussing element 20 is sleeve-shaped and comprises a radially inward projection 20a which also extends axially of the cylindrical focussing element 20 (see Fig. 10). The transmission shaft 3 is provided with an offset portion 3d (see Fig 9) which extends into a recess 21a of a holding portion 21. The holding portion 21 comprises a pip 21b by which upon insertion into the sleeve-shaped element 20, it engages with a corresponding groove therein and thus mounts the focussing element 20 to the transmission shaft 3 in such manner that the element is prevented from relative rotation and axial shift.

Upon assembly, the offset portion 3d of the transmission shaft 3 is inserted into the recess 21a of the holding portion 21 and the focussing element 20 is slid over the portions 3, 21 in the direction of the arrow X until the pip 21b engages in the groove.

The invention is not confined to the described embodiment. For example, other transmission means can also be used instead of the transmission shaft 3, such as a Cardan shaft, or gear wheels placed one after the other, or a pulley, or a belt drive (toothed, to avoid slippage, if a rangefinder is coupled thereto) or sliders.

WHAT WE CLAIM IS:—

1. A photographic camera having a body, a pivotable housing portion which carries the objective lens and is movable, from an inoperative position in which it lies against a front of the camera body, into an operative position in which it is arranged at an angle to the camera housing and *vice versa*, and also having focussing means for adjusting the lens, the focussing means being coupled to the taking lens by a transmission means, and wherein the transmission means are rotatably mounted on the pivotable housing portion, hidden from sight, between the camera body and/or a distance measuring device and the taking lens, and the focussing means is connected to the transmission means, is mounted on the pivotable housing portion, preferably in the range of a release button of the camera, and is manually accessible.

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The gearing engagement of the gear wheels 4 and 5 can be accurately adjusted by further bending of the flange 10f. The mountings for the transmission shaft 3 are, moreover, so designed and arranged that the entire unit of the transmission means (transmission shaft 3, gear wheel 4 and focussing element 2) can be mounted in a simple manner upon insertion into the camera.

If the setting means are mishandled the taking lens 6, 6a may reach an end of its focussing movement whilst an operator continues to try and rotate the focussing element 2 (e.g. knurled roller). In order to ensure that the arrangement is not subjected to an overload in such a case, the transmission shaft 3 is made of spring steel and can compensate for such load due to its torsional and elastic properties.

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2. A camera according to Claim 1 wherein the pivotable housing portion comprises internally opening recesses which serve for mounting the transmission means, the latter being in the form of a transmission shaft.

3. A camera according to Claim 2 wherein the pivotable housing portion is attached by its inner surface to a mounting plate comprising projections which cooperate with the recesses of the pivotable housing portion to hold the transmission shaft therein.

4. A camera according to Claim 1, 2 or 3 wherein the pivotable housing portion comprises an externally opening recess, preferably adjacent the camera release button in which the focussing means, in the form of a cylindrical focussing element is partly located.

5. A camera according to Claim 4 wherein the focussing element is connected for rotation with the transmission shaft.

6. A camera according to Claim 4 or 5 wherein the transmission shaft comprises a flattened portion on which the focussing element is secured.

7. A camera according to Claim 4 or 5 wherein the transmission shaft comprises an offset portion on which the focussing element is located.

8. A camera according to Claim 7 wherein the focussing element is in two parts and consists of an outer sleeve-shaped portion, and an inner holding portion in engagement with the offset portion of the transmission shaft and which engages and co-operates with the sleeve-shaped portion.

9. A camera according to Claim 8 wherein the holding portion has an approximately U-shaped cross-section, with the open side of which a projection internally of the sleeve-shaped portion and extending in the longitudinal direction thereof engages.

10. A camera according to Claim 9 wherein

the holding portion comprises a recess in the area opposite the projection of the sleeve-shaped portion, the recess serving to receive the offset portion of the transmission shaft.

11. A camera according to Claim 9 or 10 wherein the holding portion comprises a pip which co-operates with a corresponding indentation of the sleeve-shaped portion and causes locking engagement thereof.

12. A camera according to Claim 3 or any Claim appendant thereto wherein the mounting plate comprises a slot in a bent-over portion thereof and flanges serving for mounting and holding, respectively, and for accurately adjusting, the transmission shaft.

13. A camera according to Claim 3 or any Claim appendant thereto wherein a gear wheel is connected for rotation with the transmission shaft at that end thereof adjacent the lens.

14. A camera according to Claim 13 wherein an axle whereon the gear wheel is secured is arranged on the bent-over portion of the mounting plate.

15. A camera according to Claim 14 wherein the axle comprises a slot which receives right-angled end element of the transmission shaft.

16. A camera according to Claim 13, 14 or 15 wherein a gear wheel is rotatably mounted on the bent-over portion of the mounting plate, the gear wheel being in engagement with the gear wheel of the transmission shaft and with a focussing mount of the lens.

17. A photographic camera substantially as hereinbefore described with reference to and as illustrated in Figs. 1 to 6 or Figs. 1 to 6 as modified by Figs. 7 and 8 or Figs. 1 to 6 as modified by Figs. 9 and 10 or Figs. 1 to 6 as modified by Figs. 7, 8, 9 and 10.

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