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(54) CAMERA ACCESSORY MOUNTINGS

(71) We, CANON KABUSHIKI KAISHA, a Japanese Company, of No. 3-30-2, Shimomaruko, Ohta-ku, Tokyo, Japan, 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 mounting arrangement for mounting an accessory on a camera body, and is particularly but not exclusively concerned with the mounting of an interchangeable lens on for instance a single lens reflex camera body.

In order to mount an accessory such as an interchangeable lens or an intermediate ring on a camera body, it is usual to use either a screw mount or a bayonet mount.

In the case of a screw mount system, it is necessary to rotate the lens barrel through several turns to tighten the lens to the camera body, so such a system is inconvenient for rapid handling. Also, it is necessary to make the parts with great accuracy in order that various elements on the lens barrel should stop at certain determined positions relative to the camera, which adds much to the cost. Furthermore, the screwing of the lens barrel into the camera mount wears the mount plane due to friction, so that after a period of use accurate lens positioning cannot be obtained. When operating mechanisms of the camera have to engage with association members on the lens, these may interengage and hinder the rotation, during the mounting operation.

By contrast, with a bayonet mount system, it is possible to mount a lens barrel on a camera body by means of a relatively small angle of rotation, so that it is convenient for rapid handling and for controlling the mounting position accurately.

However, if an interchangeable lens has such association members as have been mentioned above, the lens association mem-

bers engage the corresponding camera association members after the lens has been rotated through the necessary angle for the bayonet connection; and after that the lens association member will have to be moved further in order to operate for instance, the diaphragm. It is thus necessary to provide sufficient space in the camera for the full movement of the lens association member.

It is proving difficult to provide sufficient space in recent cameras which have complicated operating mechanisms. Furthermore, in the case of an interchangeable lens having more than one association member, there is likely to be interference between the lens association members and the corresponding camera association members. The construction of a satisfactory bayonet connection is therefore difficult.

There is a third mount system known for eliminating the above-mentioned shortcoming. In accordance with this third system, the lens bayonet member is rotatably mounted on the interchangeable lens barrel in such a manner that instead of the whole lens barrel being turned to mount the lens on a camera body, only the securing ring integral with the bayonet member is rotated. However, in the case of this system, the securing ring has to be provided around the circumference of the lens barrel so that the outer diameter becomes necessarily larger than that of the lens barrel. If the lens barrel is to be provided with many operation members such as an aperture value pre-set ring, a focus ring and so on, the axial width of the securing ring has to be small. Also, the securing ring has to be provided close to the mount member of the camera and this makes its rotational operation awkward. It is consequently difficult to obtain a secure mounting on the camera.

The purpose of the present invention is at least to reduce the above-mentioned shortcomings of the known mount systems, by providing a mounting arrangement for an

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accessory which allows the whole accessory body to be rotated, or a part thereof remote from the mounting region, and which allows the reliable interconnection of association members respectively in the accessory and the camera.

According to this invention, there is provided a mounting arrangement for mounting an accessory on a camera body as hereinafter defined, which arrangement comprises, on the camera body, a mounting member which defines a standard mounting surface and a securing member, and, on the body of the accessory, a mount member arranged for at least partial rotation with respect to the accessory body or a part thereof, the mount member defining a mount surface corresponding to the standard mounting surface of the camera mounting member and adapted for engagement therewith, the arrangement further including on the accessory body securing means adapted for engagement with the securing member provided on the camera body on rotation of the securing means, there being an abutment surface on the mount member for engagement with a corresponding surface of the camera body mounting member so as to hold the mount member against rotation relative to the mounting member as the securing means is rotated to engage with the camera body securing member.

In this Specification, the term 'camera body' is used to mean not only the camera body proper, but also some other component which ordinarily would be connected to a camera body and to which the accessory is to be attached, thereby indirectly mounting the accessory on the camera body.

Preferably, the securing means comprises a ring rigidly attached to the accessory body so as to surround the mount member, the ring being formed for engagement with and release from the securing member of the camera body by relative rotation therebetween. In this way, the whole accessory body—for instance, the lens barrel in the case of an objective lens—may be rotated to effect mounting and demounting of the accessory. Preferably also, the accessory securing member and the camera securing means together constitute a bayonet-type of connector, releasable and connectible by rotation of considerably less than one full turn.

In order that the present invention may better be understood, it will now be explained in greater detail and certain specific embodiments thereof given, reference being made to the accompanying drawings, in which:

Figures 1A and 1B show the principle mounting of an accessory on a camera, according to the present invention;

Figures 2 to 5 show a first embodiment of

this invention, as applied to an interchangeable lens for a camera body onto which the lens is to be mounted, Figure 2 showing a partly cut-away side view of the interchangeable lens, Figure 3 showing a rear view, Figure 4 showing a partial view of the lens, detailing the mounting, and Figure 5 showing the lens of Figure 2 but in the state in which the lens has been mounted on the camera;

Figure 6 shows in part a second embodiment of the present invention, as applied to the interchangeable lens;

Figure 7 shows in part a third embodiment;

Figures 8 to 13 show a fourth embodiment of the present invention as applied to an interchangeable lens having association members co-operating with the camera, Figure 8 showing a partially cut-away side view, Figure 9 showing a rear view, Figure 10 being an exploded perspective view of some of the internal components, Figure 11A showing a partly cut-away side view of the lens as mounted on a camera, Figure 11B showing on an enlarged scale a detail of the assembly of Figure 11A, Figure 12 being a rear view of the lens, and Figure 13 being a view similar to that of Figure 10 but with the lens in the state as mounted on a camera;

Figures 14 to 16 show a fifth embodiment of lens, Figure 14 being a partly cut-away, side view, Figure 15 being a rear view, and Figure 16 being an enlarged view of the lock used in this embodiment;

Figures 17 to 19 show a sixth embodiment of this invention, Figure 17 showing a partly cut-away side view of the interchangeable lens, Figure 18 being a rear view, and Figure 19 being an exploded perspective view of some of the internal components; and

Figures 20 to 22 show a seventh embodiment of this invention, Figure 20 showing a partly cut-away side view of the interchangeable lens, Figure 21 being a rear view, and Figure 22 being an exploded perspective view of some of the internal components.

Figures 1A and B show the principle of mounting one part on another, in accordance with the present invention. In these Figures, device A is that part which is to be mounted on device B in a particular disposition with reference to a standard mounting position; these devices could for instance be respectively a lens barrel and a camera, or an adapter lens and an intermediate ring, or a lens barrel and an intermediate ring. Shown in Figure 1A is a mount means *a* for controlling the mounting position of the device A to be mounted, being in the shape of a ring and rotatably arranged so that the mount means *a* cannot be detached from the device A. A securing means *b* such as an externally screw-threaded member or the like is fixed on the end plane of the body *d* of

the device A, or is rotatably mounted on the end plane but engaged with a driving member *e* for rotation thereby. A control member *c*, such as a pin or the like, is provided on the mount means *a*. The device B is provided with a position determining plane *a'*, a female screw-thread *b'* and a position control hole *c'*, so as to correspond to the respective members provided on the device A.

In the case of the above-mentioned construction, in order to mount the device A on the device B, the device A is offered up to the device B, engaging the control member *c* in the hole *c'*, whereafter the appropriate part of the device A (for example the body *d* or driving member *e*) is rotated to interengage the threads of the securing means *b* and the threads *b'*. During this, the mount means *a* is restrained from rotating by the control member *c*. The mounting is complete with mount means *a* bearing on the plane *a'*. It will be appreciated that the end plane of the mount means *a* is not subjected to relative rotation as the device A is mounted on device B, and this is not likely to be damaged or otherwise worn away, allowing the device A reliably to be mounted at a required axial position. The rotatable part of the device A, such as the body *d* or driving member *e* can be provided at a convenient position on the device A to be mounted, such as at a position other than immediately in the neighbourhood of the mounting plane, which is most advantageous for ease of operation.

As explained above, good efficiency in use can be obtained by operatively engaging the securing means *b* with at least one of the members constituting the device to be mounted (e.g. driving member *e*), in such a manner that they are rotatable relative to the body of the device and the rotation angle can be smaller than 360° for the case where the securing means is a bayonet connector. Thus the members of the device A which serve to secure it on device B can be quite separate from the other parts of device A which are present at the mounting plane; for example in the case of device A being an objective lens, such other parts may be the lens barrel proper for supporting the lens elements, or an aperture value setting ring, a zoom ring, a focussing ring, the lens hood ring and so on.

Figures 2 to 5 show an embodiment of an interchangeable lens for a camera and provided with a mounting means arranged in accordance with this invention.

In Figure 2, there is shown an annular lens barrel 1 having a focus adjusting helicoid (not shown in the drawing) on the internal wall at one end, there being a focus adjusting ring 2 unified with an intermediary helicoid ring (not shown in the drawing) which is engaged with the helicoid of the lens barrel 1, whereby rotation of ring 2 serves to move axially a movable cylinder 3 holding the lens

elements. A bayonet holding ring 4 is secured at the rear end of the lens barrel 1, and is provided with an engraving 4*a* to indicate a standard mounting position with respect to a camera body. A conventional aperture value setting ring 5 is rotatably engaged in a groove formed between the focus adjusting ring 2 and the holding ring 4 and is operatively engaged with a diaphragm device (not shown) built in the lens barrel 1. A bayonet member 6 is fixed within a stepped portion in the rear opening of the holding ring 4 and adapted to establish a securing effect in co-operation with bayonet claws provided on the camera, when the lens is mounted thereon, as will be explained later. The bayonet member 6 is prevented from moving axially out of the holding ring 4 by means of an inwardly-turned lip thereon, and at the same time is fixed to the holding ring 4 by means of a screw 7 so as to be secured against rotation relative to the ring 4. A mount member 8 is rotatably located in an annular groove formed between the holding ring 4 and the bayonet member 6. The outer rear portion of the mount member 8 is cylindrical, to present a standard engaging portion 8*a*. A position control pin 10 is provided on a radial plane of the mount member 8 serving as a standard plane, the pin being engageable in a position controlling slot formed in a bayonet part of the camera, in order to secure the mount member 8 against rotation.

The bayonet member 6 presents bayonet lugs 6*b*, 6*c* and 6*d* angularly spaced by 120°, as is shown in Figure 3. A disengaging pin 13 is carried in the mount member 8, urged to project axially therefrom, as shown in Figure 4, which illustrates the condition when the lens is removed from a camera. A lock pin 14 is located in a bore in the holding ring 4 and is urged by a spring 15; when the pins 13 and 14 are aligned, pin 14 moves partially into the mount member 8 to restrain relative rotation between the ring 4 and member 8. On fitting the lens to a camera, the pin 13 is moved axially against the bias of spring 15, so that the interface of pins 13 and 14 is in the same plane as the abutting faces of ring 4 and mount member 8, thereby disengaging the rotation lock. This arrangement thus serves to lock the lens barrel and mount member 8 at a certain relative position to each other whenever the lens is removed from a camera body.

The side wall of the bayonet member 6 in the region of each bayonet lug 6*b*, 6*c* and 6*d* is provided with a slot 6*a*, whereby each lug is resiliently movable along the optical axis of the lens barrel, in such a manner that as the lens is mounted on a camera the bayonet lugs 6*b*, 6*c* and 6*d* on the lens are resiliently engaged with the corresponding lugs on the camera.

When the engaging portion 8*a* of the

mount member 8 is put in a corresponding mounting opening in the camera body, by bringing the engraving 4a into alignment with a mount standard mark on the camera body (for instance, a conventional single lens reflex camera body such as a CANON FTb having bayonet lugs on the lens mount plane), the bayonet lugs of the camera enter into the slots between the lugs 6b, 6c and 6d of the bayonet member 6, while the position control pin 10 provided on the mount member 8 engages a slot 25a' (Figure 5) of the bayonet member 25 of the camera. Furthermore, the disengaging pin 13 is depressed by means of the end plane of the bayonet member in the camera, in such a manner that the pin 14 releases the rotation lock between the holding ring 4 and the mount member 8. The holding ring 4, together with the lens barrel 1 unified therewith, thus becomes rotatable relative to the mount member 8. Meanwhile, the position control pin 10, by engaging the slot 25a' formed in the middle of the bayonet lug 25a of the camera mount member, holds the mount member 8 against rotation relative to the camera body, while the lens barrel 1 is rotated to interengage the bayonet member 6 of the lens with the bayonet member 25 of the camera. A stop member (not shown) is provided to limit the rotation of the lens barrel 1 to about 60°, whereby, as is shown in Figure 5, the bayonet lugs 25a, 25b and 25c of the camera are respectively engaged with the bayonet lugs 6b, 6c and 6d of the lens. During this, the slots 6a allow resilient deformation of the lugs of the bayonet member 6 to give a secure mounting of the lens on the camera body.

In order to take the lens off the camera, the lens barrel 1 is rotated in a direction contrary to that for mounting. The mount member 8 does not rotate, being held by the position control pin 10 engaged in slot 25a, but along with the rotation of the lens barrel 1 the holding ring 4 rotates relative to the mount member 8 until the bayonet lugs 6b, 6c and 6d are disengaged from the bayonet lugs 25a, 25b and 25c of the camera—that is, when the lens barrel 1 has been rotated by 60°. Immediately after the disengagement of the bayonet members, pin 14 is urged by spring 15 into the aligned hole in the mount member 8, pushing pin 13 to project from the mount member and at the same time locking the mount member 8 against rotation relative to the lens barrel 1 (Figure 4).

The initial relative position of the bayonet member 6 unified with the holding ring 4 to the mount member 8 is controlled to be such that the bayonet-engaging operation is started without fail provided the engraving 4a on the holding ring 4 is presented to a standard mark on the camera. The lens barrel thus can easily be mounted on the camera with only the lens barrel having to be

rotated, after having set the engraving 4a and the camera standard mark together, without having to consider anything else. In the case of the above-mentioned embodiment, it is possible to replace the bayonet member 6 with a screw-threaded member, and the camera bayonet member 25 with a female screw-threaded member, and the screw pitch should preferably be such that the lens barrel can be secured within one full turn.

As is clear from the above-mentioned construction, the standard plane of the mount member 8 (from which plane the position control pin 10 projects) is not subjected to any friction by the bayonet lugs of the camera body, even during mounting. Consequently, the standard plane is accurately maintained because it is not subject to wear or damage while the lens barrel is being secured. The operation of mounting can be carried holding a part of the lens barrel which is easy to handle but distant from the mounting plane; thus a large area can be gripped giving a remarkably superior operation, which is convenient for realising a firm mounting though the operator need employ only low forces.

Figure 6 shows a second embodiment of the present invention, similar to the above-described first embodiment and like parts are given like reference characters. The second embodiment differs from the first embodiment only in that the securing operation is carried out by turning the aperture value setting ring, instead of the whole lens barrel. As is shown in Figure 6, the bayonet member is connected to a base member 61 rotatably carried inside the holding ring 4, while the mount member 8 is rotatably mounted internally of the base member 61. An arm 62 projects parallel to the axis from the base member so as to be engageable by the projections 5A and 5B on the aperture value setting ring 5. The projection 5A is engaged with the arm 62 when the aperture value setting ring 5 is rotated beyond the smallest aperture value on the aperture scale on the ring 5, while the projection 5B is engaged with the arm 62 when the ring 5 is rotated beyond the largest aperture value on the aperture scale on the ring 5. Thus, mounting and dismounting are carried out by rotating the aperture value setting ring 5 beyond the normal range. When mounting the lens on the camera body, the disengaging pin 13 is first operated and then by the operator rotating the ring 5 the mounting is completed, in the same way as in the first embodiment.

Also shown in Figure 6 is a preset cam ring 100 (for the diaphragm device of the lens, which cam is connected to the ring 5 by means of absorption springs S₁ and S₂, as well as a leg upstanding from the preset cam ring 100 and a projection 5C of the ring 5. The

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5 springs serve to hold the leg and projection 5C in engagement over the aperture value setting range, in such a manner that it is possible to transmit a value set on the aperture value setting ring to the cam ring 100.

10 Figure 7 shows a third embodiment of the invention, in which the bayonet member 6 of the embodiment shown in Figures 2 to 5 is connected to an operating ring 200 provided at the front end of the lens, in such a manner that the mounting and dismounting is carried out by rotating the ring 200 with respect to the lens barrel, thus rotating the bayonet member 6. In other words, in the case of this embodiment, the mount member 8 is held by a part of the structure of the lens and is not rotated during the mounting or dismounting of the lens.

20 Furthermore, in a similar way to that described above referring to Figure 6 in which the aperture value setting ring 5 is used to drive the bayonet member 6, the ring 200 can be one of the constructional elements of the lens, such as the focus-setting ring, a zoom ring or a holding ring for these components. In the case where the operating member has another purpose, it is necessary to provide a movement absorption mechanism (such as the above-mentioned springs S₁ and S₂) in order to avoid interference with the other purpose. Also, the position control pin 10 in each of the above-described embodiments need not always be a pin or provided on the mount standard plane itself. It is sufficient that the rotation of the mount member is restricted by association with a part of the camera during the securing operation, to prevent wear or the like taking place. For instance, a projection could be provided on the camera and engageable with the mount member so that the rotation of the mount member is restricted by means of the projection.

45 Figures 8 to 13 show a fourth embodiment of the present invention, as applied to an interchangeable lens for a single lens reflex camera.

50 In Figure 8, the lens barrel and the mount means have the same construction as that shown in Figure 2, and like parts are given like reference characters; these parts will not be described in detail again. The lens of Figure 8 is however an 'automatic' lens, having an association member 11a for transmitting a preset aperture value signal. The member 11a is formed integrally with an intermediary ring 11 (Figure 10) rotatably arranged in the lens barrel and can receive a signal from a corresponding association member in the camera in the case of a photographic automatic aperture adjusting mode, and can transmit a signal to the association member in the camera in the case of a manual aperture adjusting mode. The

lens also has an automatic diaphragm driving member 12a which projects at a right angle through a slot provided in the rear wall of an annulus 9 let into the mount member 8. The member 12a is formed integrally with an automatic aperture driving ring 12 (Figure 10) rotatably arranged in the lens barrel 1.

70 The bayonet member 6 presents bayonet lugs 6b, 6c and 6d angularly spaced by 120°, as is shown in Figure 9. The disengaging pin 13, locking pin 14 and spring 15 are arranged as shown in Figure 10, which illustrates the condition when the lens is removed from a camera body. This arrangement is essentially the same as that of Figure 4 and will not be described in detail again. Suffice it to say the pins 13 and 14 serve to lock the holding ring 4 to the mount member 8 such that the latter assumes a certain relative position to the lens barrel when the lens is removed from a camera body.

85 Figure 10 also shows an aperture value preset cam ring 17 rotatably carried in the lens barrel 1, the internal circumference of the ring 17 defining a cam surface 17a and the ring also having association arms 17b and 17b' formed therewith. An absorption spring 18 is provided between an arm 11b formed on the intermediary ring 11 and the association arm 17b' of the ring 17, the spring 18 being under tension in the state shown in Figure 10 because the two arms are spaced apart. On the internal circumference of the pre-setting ring 5 (referred to in the previous embodiments as an aperture value setting ring, the function of which is essentially the same) there is provided a projection 5a within the rotation range of the association arm 17b' while a spring 19 connected to the association arm 17b' normally urges the ring 17 counter-clockwise so that it is possible to set the cam ring 17 at a desired angular position by manually operating the ring 5.

90 In addition to the driving member 12a (mentioned above) the driving ring 12 also carries an association arm 12b, for engagement with a tab 20a of a C-shaped lever 20, there being a cam follower pin 20b on the lever 20 engageable with the cam 17a of the ring 17. The lever 20 is freely movable about the axis of the lens barrel 1 in such a manner that when the driving member 12a is driven by means of an automatic diaphragm closing lever within the camera body, the lever 20 is turned until it is restricted by the cam 17a. A ring 21 for driving the diaphragm blades 22 is operatively connected to the lever 20 by means of a leg 21a projecting from the ring 21, a spring 21A urging the ring in a direction which causes the diaphragm to close. The automatic diaphragm driving ring 12, cam ring 17, C-shaped lever 20, diaphragm device 21, 22 and so on, can all be replaced by a conventional preset diaphragm device for a single lens reflex camera, and as these 130

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components form no part of the present invention, they will not be described in any greater detail.

5 The association arm 17b of the cam ring 17 may connect with a charge member 23 which is fixed on the lower surface of the holding ring 4 by means of a screw 24, such that the charge member is positioned in the path of movement of the arm 17b. A spring 26 is provided to urge the ring 12 clockwise, so as to hold the diaphragm blades in the totally open state, against the action of spring 21A acting on ring 21.

15 The interchangeable lens constructed as above is mounted on the camera by rotating the lens barrel body, following the same sequence of operations as that of the aforementioned embodiment of Figures 2 to 5, so as to engage the corresponding bayonet lugs of the lens and camera with each other. At this time, the association members 11a and 12a projecting from the rear wall of the annulus 9 of the mount member 8 are arranged at positions at which they are engageable with the association members C₁ and C₂ (Figure 11A) of the camera, not only before the lens body is offered to the camera body and rotated, but also after the rotation and securing operation. This is because the mount member 8 maintains the original preset position relative to the camera body, even during the lens barrel rotation for securing the lens.

35 As the lens is mounted on the camera body, the charge member 23 moves away from the association arm 17b, by the rotation operation of the lens barrel 1, to assume the relative positions shown in Figure 13. Then, the ring 11 and the cam ring 17 are set into an operatively engaged state by means of the spring 18 pulling the association arms 11b and 17b' into engagement with each other. In consequence, the cam ring 17 is set at a particular angular position, by projection 5a of the pre-setting ring 5 driving the arm 17b'. At the same time, the association member 11a of the ring 11 is moved, under the action of spring 18. As a result, an aperture value preset on ring 5 is fed to an exposure determining device within the camera body through the association member C₁ of the camera body, whereby a shutter time appropriate for a proper exposure can be determined—for example in accordance with the object brightness information obtained by TTL (through-the-lens) full aperture light metering and film sensitivity information.

55 When the shutter is released, the association member C₂ is driven by means of a known automatic diaphragm driving mechanism within the camera body, so that the ring 12 is rotated, the C-shaped lever 20 following the movement of ring 12 by the force of spring 21A until the pin 20b of the C-shaped lever 20 contacts the cam surface 17a of the

cam ring 17. The lever 20 is arrested at this position, so that the diaphragm is stopped down to the preset value. After exposure the diaphragm is fully opened again, on release of the member 12a. For shutter priority exposures, the presetting ring 5 can be provided with a mark signifying EE exposure mode adjacent the smallest aperture value, whereby the association member C₂ of the camera can move the association member 11a only by the amount corresponding to the required aperture value obtained from the preset shutter speed, the film sensitivity and the object brightness information.

80 In order to take the lens off the camera body, the lens barrel 1 is rotated in the opposite sense to that for mounting. The mount member 8 is not free to rotate, being fixed to the bayonet lugs of the camera body by means of the position control pin 10. On rotation of the lens barrel 1, the holding ring 4 rotates relative to the mount member 8 in such a manner that the bayonet lugs 6b, 6c and 6d of the lens are disengaged from the bayonet lugs 25a, 25b and 25c respectively of the bayonet member 25 of the camera, by a rotation through 60°. During this, the mount member 8 remains still so that the association members 11a and C₁, and 12a and C₂ respectively are kept in an operatively-engaged state, whereas the charge member 23 engages the arm 17b to rotate the cam ring 17, loading the spring 18. Immediately after the disengagement of the bayonet members, the lock pin 14 on the ring 4 is driven by spring 15 into the hole of the disengaging pin 13 so that the rotation of the mount member 8 with respect to the lens barrel 1 is prohibited, completing removal of the lens from the camera body. In this state the signal transmitting association member 11a is compulsorily moved by means of the strength of the spring 18 until the member 11a engages the end of the associated slot in the annulus 9, as shown in Figure 10.

110 The association member 12a is normally positioned at one end of its associated slot by means of the force of the spring 26. Also, as mentioned above, the holding ring 4 and the mount member 8, are locked in advance at the required angular position for mounting the lens on a camera.

120 It will be appreciated that in the state of the lens as removed from the camera, the association members 11a and 12a and the mount member 8 assume the positions at which the lens is ready for mounting on a camera body, with the lens association members 11a and 12a ready for engaging the camera association members C₁ and C₂. Moreover, the bayonet member 6 and the mount member 8 have the required initial relative positions at which a bayonet engaging operation can be started without fail on offering the lens to a camera body, provided

the engraving 4a on the holding ring 4 is presented to the standard mark on the camera body. The lens can thus easily be mounted on a camera body by rotating only the lens itself, and only the standard marks need be set together without the need to consider anything about the operative engagement of the association members. Further, in the case of the above-described embodiment, the bayonet members can be replaced by screw members, the bayonet members can be replaced by screw members, the bayonet lugs 25a, 25b and 25c of the camera being replaced by a female screw the pitch of which should preferably be such that the lens can be secured by a rotation of less than one whole turn.

Figures 14 to 16 show a fifth embodiment of the present invention as applied to an interchangeable lens for a single lens reflex camera, in which a lock device is provided for locking the lens to the camera at the time of mounting the lens thereon, in addition to features mentioned above. In Figures 14 to 16, parts similar to those of the preceding embodiments are given like reference characters and will not be described in detail again.

Figures 14 and 15 show the lens only in its state as mounted on a camera, and the lens includes a disengaging operation member 101 held in such a manner that an end thereof projects from the lower part of the holding ring 4 but that the member 101 may be moved back into the ring. A spring member 102 has one end held by the lens barrel 1 (as is shown in Figure 16), and the other end bent to engage a stepped portion of the operation member 101, thereby urging the member 101 outwardly. The operation member 101 is guided by a groove 4A provided in the holding ring 4, so as to be movable radially of the ring, a lug 101A on the inner end portion of the member 101 being receivable in a recess 8A formed on an inner wall surface of the mount member 8. The recess 8A is designed in such a manner that the lug 101A of the operation member 101 is held in the recess 8A by means of the force of the spring when the bayonet member 6 has been engaged with the corresponding bayonet member of the camera after mounting the lens thereon, and thus after the rotation of the lens barrel 1 bring the groove 4A into alignment with the recess 8A. The member 101 is thus moved automatically to enter the recess and then restrains further movement of the barrel relative to the camera body. In this way, the further rotation of the lens barrel is completely locked and disengagement of the barrel due to misoperation can completely be avoided.

In order to remove the lens from the camera, the operation member 101 is pushed radially inwardly so as to disengage the lug

101A from the recess 8A, whereby the lens barrel 1 becomes free to rotate relative to the mount member 8. When the lens barrel 1 is rotated in the opposite direction to that for mounting, the lens is demounted from the camera, in the manner explained above.

In the case of this embodiment, the position control pin 10 is provided on the mount member 8 so as to restrict rotation of the mount member on becoming engaged with a groove in a bayonet member of the camera. However, it is not always necessary totally to restrict the rotation of the mount member; for example it is also possible to provide the position control pin on the rear wall of the annulus 9 let into the mount member in such a manner that at the time of mounting the lens body on the camera, the mount member is rotated until the position control pin comes in contact with a stop member provided on the camera, when the association members on the lens come into operative engagement with those on the camera. Furthermore, it is also possible to replace the position control pin by an association member of the lens or an association member of the camera, depending upon the circumstances. It goes without saying that it is necessary that at the time of dismounting of the lens rotation of the mount member should be restricted, up to the position at which the bayonet members are disengaged, whereby the bayonet lugs provided on the lens and on the camera can be disengaged.

It will be appreciated that in the case of the embodiments of Figures 8 to 16, the association members of the lens are to be operatively engaged with the association members of the camera once the lens has been mounted on the camera, but this does not mean that the or each association member should be in close contact with the or each corresponding association member of the camera. Instead, the intention is that the respective association members may co-operate as necessary, mechanically or electrically, so as to obtain the required function—for example opening or closing electrical contacts or setting a resistance value on a variable resistance provided within the lens or the camera body.

Figures 17 to 19 show a sixth embodiment of the present invention; like parts with those of the previous embodiments are given like reference characters and will not be described again.

In the case of a lens having an association member for transmitting a pre-set aperture value to a corresponding association member in a camera, the member of the lens is moved in response to movement of the pre-set aperture value ring. Should the ring be set to a position part-way between the ends of its travel, the association member will be moved from its end position, and when the lens is

5 fitted to a camera, the association member of the lens may engage with the camera association member on the wrong side thereof. Should such reversed engagement take place between the association members, the pre-set aperture value will inaccurately be transmitted to the camera.

10 To avoid the above-mentioned inconvenience, it is sufficient to ensure that the rotation of the securing means of the lens to release the lens from the camera serves to bring the lens association member back to an initial end position and to hold the member there until the lens is mounted on a camera again. Such an arrangement is shown for instance in the embodiment of Figures 8 to 13, but because the rotation angle of the securing means (bayonet member 6) is not equal to the rotation angle of the association member 11a, it is necessary to allow such differential rotation to take place, in the case where the rotation angle of the securing means is larger than that of the association member 11a. For instance, it is simple to interconnect the securing means (or a part fixed thereto) and the association member with a spring as an absorption mechanism—for instance spring 18. The spring can however exert an excessive load on the rotation of the preset ring and so on, so that ease of operation is reduced.

25 In the embodiment of Figures 17 to 19, the above-mentioned difference between the rotation angles is absorbed without using a spring, in such a manner that a pre-set aperture value is always correctly transmitted between the aperture value pre-set mechanism of the lens and the exposure amount determining device. An interchangeable lens having superior ease of operation can thus be offered.

30 The aperture value pre-set association ring 11 (in the previously-referred to described embodiments as an "intermediary ring") is rotatably held in the mount member 8, the ring 11 having an arm 11b extending forwardly (of the lens) to engage within the fork of an arm 17c formed on the aperture value pre-set cam ring 17, so that the arm 11b may move relative to the ring 17 only in directions parallel to the lens axis. The ring 11 has a signal value transmitting member 11a (association member) extending rearwardly of the lens to project through the arcuate slot in the annulus 9 fixed to the mount member 8, so as to be engageable with the association member C₁ (Figure 18) of the camera, arm 11b being pulled by a spring 75 provided between the arm 11b and the mount member 8 and being engaged with an intermediary ring 71 to be explained later.

35 The pre-set cam ring 17 is rotatably held on the lens barrel body, a cam surface 17a being formed on the circumference thereof. A diaphragm blade driving ring 21 holds

diaphragm blades 22 in a conventional manner and is urged by means of a spring 74 in a direction which closes the diaphragm. A bell crank lever 20' has a cam follower 76 which is engaged with the cam surface 17a, and a control pin 77 which is received in a notch 21' in the diaphragm blade driving ring 21, whereby the lever 20' rotates along with the rotation of the cam ring 17 and controls rotation of the diaphragm blade driving ring 21. The aperture driving ring 12 is rotatably supported on the mount member 8, an arm 12c extending forwardly to engage a leg 21a of the diaphragm blade driving ring 21, and a spring 26 provided between the ring 12 and the mount member 8 pulling the ring to one end of its range of operation, so as normally to hold the diaphragm blade driving ring 21 at the position at which the diaphragm is fully open. Association member 12a extends backwards to project through an arcuate slot in the annulus 9 so as to be engageable with the automatic aperture member C₂ of the camera.

40 The aperture value pre-set ring 5 rotatably surrounds the lens barrel, the circumference of the ring 5 being provided with aperture value marks and an AUTO mark (A), a conventional click-stop mechanism serving to hold the ring 5 at any selected mark. The ring 5 has a projection 5a extending inwardly through the slot (not shown) in the circumferential wall of the lens body.

45 The intermediary ring 71 provided between the aperture value pre-set ring 5 and the aperture value association ring 11 is rotatable within the lens barrel 1 and has an arm 71b engageable with the projection 5a of the pre-set ring and a projection 71a engageable with the association arm 11b of the association ring 11. A connecting pin 72 is slidably mounted in a hole 71c provided in the ring 71, the pin 72 having a head 72a urged by means of a spring 73 so as to be in contact with the rim 8c of the mount member 8. The smaller diameter portion 72b of the pin 72 is engageable in a slot 5b provided in the projection 5a of the pre-set ring 5.

50 Figure 19 shows the lens in the state as removed from a camera body, in which the head 72a of the connecting pin 72 is urged by means of the spring 73 into a V-shaped groove 8e provided in the rim of the mount member 8, whereby the intermediary ring 71 is held by the mount member against rotation; the connection between the connecting pin 72 and the pre-set ring 5 is thus broken as the pin lifts out of slot 5b. The arm 11b of the association ring 11 is however held at one end of its range of rotation by means of the projection 71a of the intermediary ring 71.

55 Now let us suppose that the pre-set ring 5 be at the position at which the diaphragm is fully opened, as is shown in the drawing, at the time of mounting the lens on the camera. 130

The engraving 4a provided on the circumference of the holding ring 4 is set against the standard mark on the camera, and the cylindrical portion 8f of the mount member is inserted into the opening in the bayonet ring of the camera, so that the standard plane is brought into contact with the front surface of the bayonet ring, the mount ring being positioned by means of the position control pin 10 so as not to be rotatable relatively to the camera. The aforementioned disengaging pin 13 is moved so as to release the locking, whereafter the lens barrel body is rotatable relative to the mount member. Initially, the signal transmission member 11a is not positioned in the neighbourhood of the association member C₁ of the camera, as is shown in Figure 18. Along with the rotation of the lens barrel in the direction of the arrow in Figure 18, the bayonet member 6 connected to the lens barrel is also rotated in such a manner that the bayonet lugs thereof are, as mentioned above, engaged with the bayonet lugs of the camera to secure the lens on the camera. The mount member 8 is held against rotation and the intermediary ring 71 is also held by the member 8, so that at the beginning of such rotation the signal transmission member 11a does not move. Along with the rotation of the lens barrel body, the pre-set ring 5 rotates until at last the projection 5a is engaged with the arm 71b of the intermediary ring, whereafter the ring 71 starts to rotate in the same direction. The head 72a of the connecting pin 72 carried by the ring 71 is thus moved along the inclined side of the V-shaped groove 8e until the head runs on the flat surface of the rim 8c, the smaller diameter portion 72b of the pin moving into the slot 5b in the projection 5a. In this manner, the intermediary ring 71 and the pre-set ring 5 become interengaged for movement as one body. When the lens barrel is rotated a little further, the signal transmission member 11a, being pulled by the spring 75, follows the movement of the intermediary ring 71 until the member 11a is engaged with the association member C₁, at the initial position. At this position, the bayonet member 6 is in contact with a stop member (not shown) so as to complete the mounting. At this time, the pre-set cam ring 17 to be engaged with the association arm 11b is also rotated a little, in such a manner that the aperture is pre-set at the fully open value (in this case f/1.4). Subsequent rotation of the pre-set ring 5 in the direction of the arrow rotates the intermediary ring 71, whereby the association ring 11 and the cam ring 17 follow rotation of ring 5, due to the force of the spring 75, in such a manner that the aperture is manually pre-set to a value corresponding to the indication on the aperture scale on the ring 5.

When the lens has been mounted as

mentioned above and the pre-set ring 5 is rotated to set the AUTO mark 'A' against an indicator 1a, provided the camera has an automatic aperture value determining mechanism, the association member in the camera is engaged with the signal transmission member 11a and on operation of the automatic aperture value determining mechanism the association member drives the signal member 11a in the direction for opening the diaphragm, against the action of spring 75. The member 11a is moved to a position at which the pre-set cam ring 17 takes up a position corresponding to the required aperture value for an exposure, but the intermediary ring 71 and the pre-set ring 5 remain at the set 'A' position by means of the conventional click stop mechanism.

In the case in which the pre-set ring 5 is set at an aperture value other than maximum aperture (for example, to f/8), the projection 5a becomes engaged with the arm 71b of the intermediary ring 71 earlier than in the case where the pre-set ring 5 is set at the largest aperture value (for example, f/1.4). The pre-set ring 5 is thus connected to the intermediary ring 71 by means of the connecting pin 72 before the termination of the mounting rotation of the lens barrel and the association ring 11 and the cam ring 17 start to rotate, whereby at the termination of the mounting the aperture will have been pre-set to a value corresponding to the set position of ring 5. At the time of mounting, the diaphragm blade driving ring 12 is, as mentioned above, maintained by spring 26 acting between the ring 12 and the mount member 8 at the initial end of its slot in the annulus 9. The ring 12 can however be rotated by the association member C₂ after the lens has been mounted on the camera on a release operation of the shutter, assisted by the spring 74 to the extent permitted by the cam ring 17 corresponding to the pre-set shutter value. The ring 12 is brought back to the initial position by means of the strength of the spring 26 on the automatic return of the member C₂, so that the member 12a never lies part-way over its range of operation at the time of mounting.

Below the dismounting of the lens from the camera body will be explained. When the pre-set ring 5 is set to the fully open position, rotation of the lens barrel in the other direction to that of the arrow in Figure 19 also rotates the pre-set ring 5 in such a manner that the intermediary ring 71 connected to the pre-set ring 5 by means of the pin 72 also starts to rotate moving the association ring 11 by virtue of projection 71a engaging arm 11b. After a little rotation, the head 72a of the connecting pin 72 moves into the V-shaped groove 8e so as to hold the intermediary ring 71, releasing the connection to the pre-set ring 5. At this time, the signal transmission member 11a has been

brought back into the position shown in Figure 18, and the pre-set ring 5 has been disengaged from the intermediary ring 71; thereafter the member 11a remains at the shown position irrespective of further rotation of the lens barrel freeing the lens from the camera body.

When the lens is to be dismounted from the camera body and the pre-set ring is set to the 'A' position, rotation of the lens barrel will also rotate the intermediary ring 71 and the association ring 11 in the same way as mentioned above until the lens barrel has been rotated through an angle equal to the angle on the pre-set ring 5 between the largest aperture setting ($f/1.4$) and the AUTO mark 'A', whereat the signal transmission member 11a reaches a position corresponding to the initial point of the aforementioned association member C_1 . On a little further rotation, the member 11a reaches the position shown in Figure 18, the connecting pin 72 moves into the V-shaped groove 8e of the mount member and at the same time the intermediary ring 71 is disengaged from the pre-set ring 5. Then, the lens barrel can be rotated till the bayonet connection is released, without affecting the signal transmission member 11a nor meeting any other resistance than the friction between the bayonet lugs. The rotation angle of the signal member 11a, after having stopped, does not influence the internal mechanism in the camera nor that of the interchangeable lens, so that the mounting angle (i.e. rotation of the lens) can be chosen to be sufficiently large—that is, as large as is required by the form of the bayonet lugs and so on, irrespective of the operation of the pre-set mechanism.

Figures 20 to 22 show a seventh embodiment of lens of this present invention, in which an association member of the lens is brought back to an initial position on turning the lens to remove it from the camera body, in the case of an interchangeable lens so designed that the angle through which the lens is turned to mount or dismount the lens is smaller than the operating angle of the association arm. Otherwise, this embodiment is similar to that described with reference to Figures 8 to 13 and like parts are given like reference characters: these parts will not be described in detail again.

In the drawings, there is shown a cam plate 51 fixed on the mount member 8, an acceleration lever 52 being mounted on the lens barrel 1 in a position generally opposed to the cam plate 51 and having a pin 53 in contact with the cam surface, the transmission member 11a being engaged with the side surface of the lever 52.

Figure 22 shows the interchangeable lens in its state as dismounted from the camera body. The aperture value pre-set ring 5 is

shown set at the position at which the diaphragm is fully open. The intermediary ring 11 has a transmission member 11a for transmitting the pre-set signal, the ring 11 being rotatably held within an internal cylinder 8d of the mount member 8 and pulled by means of the spring 18 provided between the ring 11 and the cam ring 17 in such a manner that the member 11a is engaged with the end of the slot in the annulus 9 through which the member 11a projects, corresponding to the diaphragm being fully open. The cam ring 17 has a pre-set cam surface 17a, and is rotatably mounted in the lens barrel, the engaging arm 17c of the cam ring 17 being pulled by the spring 19 so that said arm is engaged with the projection 5a of the pre-set ring 5, whereby the cam ring 17 follows movement of the pre-set ring 5. The arm 17c is shaped so as also to be engageable with the arm 11b of the intermediary ring, but in the state shown in the drawing the arm 17c is spaced from the arm 11b. The C-shaped lever 20 has a pin 20b engageable with the internal cam surface 17a of the cam ring 17, the lever 20 being held in the lens barrel 1 by means of a pivot pin 20d, and having at its end opposed to the pin 20b a recess 20c in which the leg 21a of the diaphragm blade driving ring 21 is received. The lever 20 also has a tab 20a engageable with the arm 12b of the automatic aperture value setting ring 12. This ring 12 is rotatably mounted within the internal cylinder 8d of the mount member 8, and has an association member 12a projecting from the rear end of the lens through a slot in the annulus 9 so as to be engageable with an automatic diaphragm lever (not shown) in the camera body. The ring 12 is pulled by means of a strong spring 26 provided between the member 12a and the mount member 8 so as to be normally in contact with a holding member (not shown in the drawing). The diaphragm blade driving ring 21 is also rotatably held in the lens barrel 1 and carries a plurality of diaphragm blades 22 in the usual way, and although the ring 21 is urged by means of the spring 21A in the direction which closes the diaphragm, it is normally kept in the fully open position by means of the force of the spring 26, acting on the automatic aperture value setting ring 12 and the C-shaped lever 20.

Figure 21 shows the interchangeable lens as seen from the camera, but with the lens removed from the camera. When the engraving 4a provided on the circumference of the holding ring 4 is set in alignment with the standard mark on the camera and the cylindrical portion 8f of the mount member is inserted into the opening of the bayonet ring of the camera, the bayonet lugs of the camera bayonet ring engage between the lugs 6b, 6c and 6d of the lens bayonet member 6, while the position control pin 10 provided on the

mount member 8 enters the slot therefor provided in the bayonet ring of the camera.

The lock disengaging pin 13 (described in detail above) projecting from the mount member 8 is pushed by the front plane of the camera bayonet lugs, moving the lock pin 14 until that pin is disengaged from the mount member 8, so as to release the lock between the mount member and the lens barrel. At this time, the aperture value signal association member C_1 and the automatic aperture setting association member C_2 , both in the camera, are positioned at certain determined positions, as are shown in broken lines in Figure 21, being ready for engagement with the association members 11a and 12a of the lens.

When the lens barrel 1 is rotated from this state in the direction of the arrow shown in Figure 21, the mount member 8 is held against rotation by the pin 10, and therefore the association members 11a and 12a do not rotate either, but the bayonet member 6 being fixed to the lens barrel does rotate with the barrel in such a manner that the lugs 6b, 6c and 6d engage with the back planes of the lugs of the bayonet member of the camera. In this way, the lens is tightened to the camera with the standard plane 8b of the mount member defining the lens position. In the present embodiment, slots 6a are provided in the cylindrical portion of the bayonet member 6 so as to allow resilient deformation of the member 6 as tightening is effected.

The mounting is complete when the lens barrel has been rotated through a certain angle and has been stopped by means of the holding member (not shown). During the mounting operation, the pre-set ring 5 rotates with the lens barrel, and as the projection 5a is engaged by the arm 17c of the cam ring 17, that ring 17 also rotates, being pulled by the spring 19 until the arm 17c engages the arm 11b of the intermediary ring 11 at a certain pre-determined position from the initial mounting position. When the pre-set ring 5 is rotated along the direction of the arrow in Figure 22 from the fully open position, so as to be set at a desired aperture value, the cam ring 17 is also rotated by means of the force of the spring 19, whereby the aperture value is pre-set by means of the cam surface 17a, while the intermediary ring 11 is rotated by the interengagement of the arms 17c and 11b in such a manner that the pre-set aperture value is transmitted from the signal transmitting association member 11a to the association member C_1 of the camera. When the required aperture value is determined by a device in the camera, the pre-set ring 5 is rotated round to the AUTO scale position beyond the smallest aperture setting, whereby the cam ring 17 and the signal transmitting member 11a rotate beyond the end of their range of movement for the pre-

setting of the smallest aperture, by means of the spring 19. The association member C_1 in the camera drives the member 11a in the opposite direction by means of the association member, the intermediary ring 11 being rotated against the force of the spring 19, whereby the required aperture value is pre-set by means of the cam surface 17a independently of the pre-set ring 5.

When the member C_1 has been positioned by the aperture determining device and the shutter is released, the aperture value setting association member C_2 of the camera moves in the direction of the arrow in Figure 21, whereby the association member 12a of the lens is pushed so as to rotate the aperture value setting ring 12 in the direction of the arrow in Figure 22. The C-shaped lever 20 follows the movement of the arm 12b, turning about the pivot 20d under the action of the diaphragm blade driving spring 21A, until the pin 20b of the lever 20 engages the cam surface 17a at the pre-set position. The blade driving ring rotates along with the turning movement of the C-shaped lever, closing the blades 22 down to the pre-set value.

When the camera association member C_2 assumes the initial position, after the termination of a shutter operation, the aperture ring 12 is rotated by the force of the spring 26, so as to open the diaphragm fully again.

When the lens is to be removed from the camera, the lens barrel is rotated in the other direction to that for mounting, the pre-set ring 5, the cam ring 17, the C-shaped lever 20 and the diaphragm driving ring 21 all rotating in unison. During this time, the intermediary ring 11 rotates under the action of the spring 18, following the cam ring 17 until the signal transmission association member 11a reaches the fully-open end of its range of operation, in which position the member 11a is in contact with the holding member, for example, the end of the arcuate slot provided in the annulus 9. After that, only the cam ring 17 rotates and the arm 17c leaves the arm 11b of the intermediary ring.

If the pre-set ring 5 were set at the diaphragm fully open scale position, the member 11a would be at the end of its range of movement for a fully open diaphragm and not in a position to rotate, being in contact with the holding member from the very beginning. Conversely, if the pre-set ring were set at the smallest aperture or the AUTO scale position, the member 11a would be at the end of its range of movement opposed to that just mentioned above, and because the angular range of operation of the member 11a is larger than the angle through which the lens is turned for removing the lens as explained above, the member 11a will not be returned to the fully open end of the arcuate slot in the annulus 9 at the point

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where the bayonet engagement of the lens with the camera is released.

In accordance with the present embodiment, the lack of angular movement as mentioned above is compensated by means of the accelerating lever 52 and the cam plate 51 in such a manner that at the time of removing the lens the signal transmission association member 11a is made to return to the proper initial position, namely at the end of the range of movement thereof corresponding to a fully open diaphragm. Cam plate 51 is fixed on the mount member 8, which does not rotate during mounting and removing the lens, while the accelerating lever 52 is pivotted by shaft 52a to the lens barrel 1. Thus, as the lens is removed, the pin 53 provided on the lever 52 engages with the higher portion of the cam surface 51a (that is, the portion nearer the optical axis) so as to push the signal transmission association member 11a to the end of its range of operation corresponding to a fully open diaphragm.

When the lens is mounted on the camera in this state, the lens barrel 1 is rotated in the direction of the arrow in Figure 22, and thus the accelerating lever 52 also moves, leaving the signal transmission member 11a so as to release that member from the pushing effect of the lever 52. However, the member 11a stops at a point corresponding to a fully open diaphragm under the action of spring 18, until the other arm 11b is engaged by the arm 17c of the cam ring 17. In the state in which the lens has been mounted on the camera, the pin 53 of the accelerating lever 52 engages with the lower portion of the cam surface 51a (that is, the portion most distant from the optical axis), so that the signal transmission member 11a is not prevented from rotating right to the smallest aperture end of its range of operation.

To remove the lens from the camera when in the state in which the signal transmission member 11a is at the end of its range of operation corresponding to the smallest aperture (that is, the pre-set ring 5 has been set at the numerically largest value or at the AUTO scale position) the lens barrel 1 is rotated along the other direction to that for mounting, whereby the pre-set ring 5 also rotates so as to rotate the intermediary ring 11 in the same direction through the cam ring 17, the spring 18 and the engagement with the projection 5a. At this time, the pin 53 moves in contact with the fixed cam surface 51a, the accelerating lever 52 rotating around the shaft 52a in the direction of the arrow, whereby the signal transmission association member 11a is pushed by the edge of the lever 52 so that the angular movement of the lens barrel body is amplified and transmitted to the signal transmission member 11a. The consequence is that when the lens barrel has

been rotated through a certain angle towards the dismounting position, the member 11a reaches the end of its range of operation corresponding to a fully open diaphragm.

When the lens has been dismounted from the camera, the lens barrel and the mount member 8 are held against relative rotation by means of the lock pin 14, so that the signal transmission association member 11a does not move, being held between the accelerating lever 52 controlled by the cam plate 51 and the end of the arcuate slot in the annulus 9. Even if the pre-set ring 5 is rotated when the lens is in this state, the signal transmission member 11a does not move and this completely avoids the possibility of an incorrect engagement between the association members 11a and C, respectively of the lens and the camera.

As will be appreciated from the above described embodiment of this invention, the body of an attachment to a camera (such as a lens barrel body) is relatively rotatable and securable to a mounting member on the camera by means of rotating of a bayonet member co-operable with a similar member on the camera. In the described embodiments, the lens bayonet member is either fixed to the lens barrel, or is rotatable by some other ring mounted on the lens barrel. The lens includes a mount member which does not rotate, so that even if a plurality of association members project therefrom to co-operate with similar members in the camera, the accessory can be mounted without the need to provide space within the camera or a mechanism to accommodate the movement of the association members of the accessory. The invention can of course be applied to a wide range of accessories besides the described objective lenses.

Reference is directed to our co-pending Application No. 5022/78 (Serial No. 1600892), in which are described and claimed various interchangeable lenses for mounting on a camera body, using a mounting arrangement as described and claimed herein.

WHAT WE CLAIM IS:—

1. A mounting arrangement for mounting an accessory on a camera body as hereinbefore defined, which arrangement comprises, on the camera body, a mounting member which defines a standard mounting surface and a securing member, and, on the body of the accessory, a mount member arranged for at least partial rotation with respect to the accessory body or a part thereof, the mount member defining a mount surface corresponding to the standard mounting surface of the camera mounting member and adapted for engagement therewith, the arrangement further including on the accessory body securing means



where the bayonet engagement of the lens with the camera is released.

In accordance with the present embodiment, the lack of angular movement as mentioned above is compensated by means of the accelerating lever 52 and the cam plate 51 in such a manner that at the time of removing the lens the signal transmission association member 11a is made to return to the proper initial position, namely at the end of the range of movement thereof corresponding to a fully open diaphragm. Cam plate 51 is fixed on the mount member 8, which does not rotate during mounting and removing the lens, while the accelerating lever 52 is pivoted by shaft 52a to the lens barrel 1. Thus, as the lens is removed, the pin 53 provided on the lever 52 engages with the higher portion of the cam surface 51a (that is, the portion nearer the optical axis) so as to push the signal transmission association member 11a to the end of its range of operation corresponding to a fully open diaphragm.

When the lens is mounted on the camera in this state, the lens barrel 1 is rotated in the direction of the arrow in Figure 22, and thus the accelerating lever 52 also moves, leaving the signal transmission member 11a so as to release that member from the pushing effect of the lever 52. However, the member 11a stops at a point corresponding to a fully open diaphragm under the action of spring 18, until the other arm 11b is engaged by the arm 17c of the cam ring 17. In the state in which the lens has been mounted on the camera, the pin 53 of the accelerating lever 52 engages with the lower portion of the cam surface 51a (that is, the portion most distant from the optical axis), so that the signal transmission member 11a is not prevented from rotating right to the smallest aperture end of its range of operation.

To remove the lens from the camera when in the state in which the signal transmission member 11a is at the end of its range of operation corresponding to the smallest aperture (that is, the pre-set ring 5 has been set at the numerically largest value or at the AUTO scale position) the lens barrel 1 is rotated along the other direction to that for mounting, whereby the pre-set ring 5 also rotates so as to rotate the intermediary ring 11 in the same direction through the cam ring 17, the spring 18 and the engagement with the projection 5a. At this time, the pin 53 moves in contact with the fixed cam surface 51a, the accelerating lever 52 rotating around the shaft 52a in the direction of the arrow, whereby the signal transmission association member 11a is pushed by the edge of the lever 52 so that the angular movement of the lens barrel body is amplified and transmitted to the signal transmission member 11a. The consequence is that when the lens barrel has

been rotated through a certain angle towards the dismounting position, the member 11a reaches the end of its range of operation corresponding to a fully open diaphragm.

When the lens has been dismounted from the camera, the lens barrel and the mount member 8 are held against relative rotation by means of the lock pin 14, so that the signal transmission association member 11a does not move, being held between the accelerating lever 52 controlled by the cam plate 51 and the end of the arcuate slot in the annulus 9. Even if the pre-set ring 5 is rotated when the lens is in this state, the signal transmission member 11a does not move and this completely avoids the possibility of an incorrect engagement between the association members 11a and C, respectively of the lens and the camera.

As will be appreciated from the above described embodiment of this invention, the body of an attachment to a camera (such as a lens barrel body) is relatively rotatable and securable to a mounting member on the camera by means of rotating of a bayonet member co-operable with a similar member on the camera. In the described embodiments, the lens bayonet member is either fixed to the lens barrel, or is rotatable by some other ring mounted on the lens barrel. The lens includes a mount member which does not rotate, so that even if a plurality of association members project therefrom to co-operate with similar members in the camera, the accessory can be mounted without the need to provide space within the camera or a mechanism to accommodate the movement of the association members of the accessory. The invention can of course be applied to a wide range of accessories besides the described objective lenses.

Reference is directed to our co-pending Application No. 5022/78 (Serial No. 1600892), in which are described and claimed various interchangeable lenses for mounting on a camera body, using a mounting arrangement as described and claimed herein.

WHAT WE CLAIM IS:—

1. A mounting arrangement for mounting an accessory on a camera body as hereinbefore defined, which arrangement comprises, on the camera body, a mounting member which defines a standard mounting surface and a securing member, and, on the body of the accessory, a mount member arranged for at least partial rotation with respect to the accessory body or a part thereof, the mount member defining a mount surface corresponding to the standard mounting surface of the camera mounting member and adapted for engagement therewith, the arrangement further including on the accessory body securing means



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adapted for engagement with the securing member provided on the camera body on rotation of the securing means, there being an abutment surface on the mount member for engagement with a corresponding surface of the camera body mounting member so as to hold the mount member against rotation relative to the mounting member as the securing means is rotated to engage with the camera body securing member.

2. A mounting arrangement as claimed in claim 1, wherein the accessory securing means comprises a ring rigidly attached to the accessory body so as to surround the mount member, the ring being formed for engagement with and release from the securing member of the camera body by relative rotation therebetween.

3. A mounting arrangement as claimed in claim 2, wherein said ring is in the form of one element of a bayonet connector and the camera body securing member is in the form of the other element of the bayonet connector, whereby the two elements may be interengaged by relative rotation therebetween.

4. A mounting arrangement as claimed in claim 1, wherein the accessory securing means comprises a ring rotatably mounted on the accessory body so as to surround the mount member, the ring being connected to an operating sleeve also rotatably mounted on the accessory body remote from said ring, said the mount member being rotatable with respect to said sleeve.

5. A mounting arrangement as claimed in any of claims 1 to 4, wherein releasable means are provided to prevent relative rotation between the accessory body and the mount member, which means are releasable automatically by offering the accessory to the mounting member and securing member of the camera body.

6. A mounting arrangement as claimed in any of claims 1 to 5, wherein the accessory is an interchangeable objective lens, the accessory body being the lens barrel thereof.

7. A mounting arrangement as claimed in any of claims 1 to 6, wherein at least one movable association member extends through an aperture in the mount member for co-operation with a corresponding association member in the camera body, there being means to move the accessory association member to one end of its range of movement when the accessory is disengaged from the camera.

8. A mounting arrangement as claimed in claim 7, wherein the range of movement of the accessory association member is greater than the angular movement of the securing means to mount or dismount the accessory on the camera, there being a device interconnecting the accessory association member and that part of the accessory which is

rotated to effect mounting or dismounting, the device serving to increase the mounting or dismounting rotation and impart movement to the accessory association member, the increased rotation ensuring the accessory association member is returned to an end position on dismounting the accessory.

9. A mounting arrangement as claimed in claim 6 and in claim 7 or claim 8, wherein the accessory association member is connected to a pre-set ring to transfer the setting thereof to the corresponding camera association member when the accessory is mounted on an camera.

10. An arrangement as claimed in claim 9, wherein there is provided an intermediary member between the accessory association member and the pre-set ring, the intermediary member being engageable with and disengageable from the pre-set ring respectively on mounting and dismounting the accessory from the camera, disengagement occurring on the accessory association member being moved to the end of its range of movement whereby the pre-set ring may continue to move to allow complete dismounting.

11. A mounting arrangement as claimed in any of claims 1 to 10, wherein there is provided releasable lock means automatically to inhibit relative rotation between the accessory securing means and mount member once the accessory has been mounted on a camera.

12. A mounting arrangement for mounting an accessory on a camera, substantially as hereinbefore described, with reference to and as illustrated in Figures 1A and 1B, 2—5, 6, 7, 8—13, 14—16, 17—19, and 20—22.

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