

THIS OPINION WAS NOT WRITTEN FOR PUBLICATION

The opinion in support of the decision being entered today (1) was not written for publication in a law journal and (2) is not binding precedent of the Board.

Paper No. 24

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte TAKUJI HAMASAKI

Appeal No. 95-1401
Application 07/885,364¹

ON BRIEF

Before BARRETT, LEE, and TORCZON, Administrative Patent Judges.
BARRETT, Administrative Patent Judge.

DECISION ON APPEAL

This is a decision on appeal under 35 U.S.C. § 134 from the final rejection of claims 1-21, all of the claims pending in the

¹ Application for patent filed May 19, 1992, entitled "Cam Mechanism For Lens Barrel," which claims the foreign priority benefit under 35 U.S.C. § 119 of Japanese Application 3-214848, filed May 20, 1991.

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application. The amendment after final rejection received February 22, 1994, has been entered (Examiner's Answer, page 2).

We affirm-in-part.

The disclosed invention is directed to a cam mechanism for a lens barrel which prevents and minimizes slanting or skewing of a movable annular member. In one claimed embodiment, appellant provides an annular cam member having two identically shaped cam grooves which are circumferentially aligned and are offset in the optical axis direction and corresponding cam pins are installed on the movable angular member and fitted into the cam grooves. In a second claimed embodiment, one cam pin is fitted into a guide groove at the same time it is fitted into a cam groove and a guide piece unified with the cam pin is fitted into the guide groove for sliding movement therein.

Claims 12 and 21 are reproduced below.

12. A cam mechanism for a lens barrel, said cam mechanism comprising:

a stationary annular member having a guide groove formed thereon;

an annular cam member arranged on said stationary annular member in such a manner as to permit said annular cam member to be rotatable around an optical axis of said stationary annular member and having a first cam groove formed in a predetermined cam profile thereon;

a movable annular member attached to said annular cam member in such a manner as to permit said movable annular member to be movable in an optical axis direction;

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a first cam pin installed on said movable annular member and fitted into said guide groove of said stationary annular member at same time as said first cam pin is fitted into said first cam groove on said annular cam member, and

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a guide piece installed in a structure unified with said first cam pin and fitted into said guide groove in such a manner that said guide piece can slide freely therein.

21. A cam mechanism for a lens barrel, said cam mechanism comprising:

an annular cam member having at least two arcuate cam grooves formed thereon with a same profile, said two arcuate cam grooves positioned circumferentially aligned with each other and offset with respect to each other in an optical axis direction;

a movable annular member movably attached to said annular cam member; and

at least two cam pins installed on said movable annular member and fitted into said at least two cam grooves of said annular cam member respectively.

The examiner relies upon admitted prior art in the specification as represented by figures 1 and 2 and on the following prior art:

Furusawa et al. (Furusawa)	3,628,439	December 21, 1971
Ito et al. (Ito)	3,787,108	January 22, 1974
Hummel et al. (Hummel)	3,819,254	June 25, 1974
Nakagawa	4,294,526	October 13, 1981
Ohnuki	4,515,438	May 7, 1985
Bornhorst	4,709,311	November 24, 1987
Kohmoto	5,043,752	August 27, 1991

Claims 1-21 stand rejected under 35 U.S.C. § 103 as being unpatentable over Ohnuki taken with Bornhorst or Hummel or the admitted prior art alone or together with Kohmoto. With respect to claim 1, the examiner finds that Kohmoto is substantially the

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same as the admitted prior art of appellant's figures 1 and 2 and (Examiner's Answer, page 5): "Kohmoto recognizes the problem dealt with by applicant and notes that the solution is to provide an increased number of cam grooves and pins. Note column 1, lines 6-10, 30-38, and 47-51." The examiner finds (Examiner's Answer, page 6): "Ohnuki clearly teaches the provision of additional guide slots and pins offset from the first guide slot and pin in an axial direction in order to prevent undesired lens play. Note column 2, lines 37-54 and column 3, lines 3-20 and 60-66." The examiner concludes that "one skilled in the art would have found a clear suggestion in Ohnuki to provide duplicate cam slots and pins spaced axially from each other in order to prevent undesired tilting of the lens" (Examiner's Answer, page 6). The examiner cites Hummel and Bornhorst as "evidence to suggest that those skilled in the art would have been motivated from known practices to provide axially spaced guides to prevent lens play" (Examiner's Answer, page 6). The rejection of claim 21 is based on the same reasons (Examiner's Answer, page 8). With respect to independent claim 12, the examiner finds the limitations to be essentially shown in Ohnuki (Examiner's Answer, pages 7-8).

Claims 1-21 stand rejected under 35 U.S.C. § 103 as being unpatentable over the admitted prior art taken with Ohnuki,

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Bornhorst or Hummel alone or together with Kohmoto, further in view of Nakagawa, Furusawa, and Ito. The rejection appears to be basically the same as discussed above except that the examiner cites Furusawa, Ito, and Nakagawa as "evidence that it is a common and well known mechanical expedient in this art to provide plural guide grooves and pins so as to constrain movement of a member to a desired direction" (Examiner's Answer, page 9).

We refer to the Examiner's Answer (Paper No. 16) for a statement of the examiner's position and to the Appeal Brief (Paper No. 13) and the Reply Brief (Paper No. 19) for a statement of appellant's position.

OPINION

Claims 1-11 and 21

Claims 1 and 21 each recite two arcuate cam grooves positioned circumferentially aligned with each other and offset with respect to each other in an optical axis direction.

The examiner points to Kohmoto as recognizing the problem dealt with by appellant and showing a solution of using an increased number of pins and grooves. While the examiner agrees with appellant's statement that Kohmoto is not substantially different from the admitted prior art as represented by figures 1 and 2, we do not. Appellant argues that Kohmoto shows the same defect as the admitted prior art (Brief, pages 7-8): "As can

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most clearly be seen with reference to Figures 1 and 2 of KOHMOTO, since both of the cam followers 21b (two of which are shown in Figure 2) are aligned within a single plane passing through the center of the pins 21b and transverse to the optical axis of the lens, the cam ring 20 can skew about this plane." Kohmoto states (col. 2, line 68, to col. 3, line 2): "The three front lens cam grooves 20a are preferably spaced from one another at a substantially equiangular distance." Thus, although shown opposite each other in figure 2, the cam followers 21b are not opposite each other, but are at different phases just as pin 24a and pin 21b are shown in the same view even though they are not in the same plane (col. 3, lines 45-48): "Note that the pin 24a is shown in the same sectional view as the pin 21b for the purpose of clarification, but in fact they are located at different phases [sic, (]that is, they actually do not appear in the same sectional view)." Thus, we do not agree with appellant's argument that Kohmoto shows oppositely aligned cam pins which are substantially the same as the admitted prior art. However, while Kohmoto discloses a plurality of circumferentially spaced cam grooves to overcome the problem of inclination or deviation of the optical axis (col. 1, lines 30-55), it does not disclose or suggest appellant's claimed solution of circumferentially aligned cam grooves which are offset in the

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optical axis direction.

The examiner relies on the teaching in figure 4 of Ohnuki, which shows two guide slots 2', 2" circumferentially aligned and offset in the optical axis direction. Appellant argues that Ohnuki does not show identical arcuate cam grooves with cam rollers received therein and there is no reason for modifying Ohnuki to provide such a feature. The examiner concludes that "one skilled in the art would have found a clear suggestion in Ohnuki to provide duplicate cam slots and pins spaced axially from each other in order to prevent undesired tilting of the lens" (Examiner's Answer, page 6). The examiner states that "the clear teaching of Ohnuki is that the provision of axially spaced slots prevents skewing" (Examiner's Answer, page 9) and "[a]pplicant's attempt to make a distinction between guide slots and cam slots misses the point and also ignores the question of obviousness" (Examiner's Answer, page 10). In our opinion, Ohnuki discloses another solution to the problem of preventing play or slanting of the movable annular member due to rotating motion centering around the cam pin and the examiner has failed to establish a prima facie case of obviousness for providing cam grooves which are circumferentially aligned and offset in the optical axis direction.

In the embodiment of figures 1-3 of Ohnuki, skew in a

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direction at right angles to the optical axis is prevented using elongated sliding members 4 of suitable length which are in close engagement with the sides of guide slots 2 extending in a direction of the optical axis, the guide slots being provided in at least two locations spaced at an angle other than 180°. In the embodiment of figures 4-6, two pins 5 are aligned in a row instead of using an elongated sliding member and two shorter guide slots 2', 2" are aligned in the direction of the optical axis instead of using a single slot. Ohnuki teaches that skew is prevented by the engagement of sliding members or pins with angularly spaced guide slots extending in a direction of the optical axis, not by using arcuate cam grooves which are circumferentially aligned and offset in the optical axis direction. The two guide slots 2', 2" are separated by a partition P for reinforcement (col. 3, lines 10-16) and, manifestly, the two slots could be formed as a single long slot as in figures 7, 10, and 11 if desired. While we can see the superficial resemblance between the two slots 2', 2" in Ohnuki and two cam grooves claimed, the slots extend in the direction of the optical axis and the cam grooves do not and there is no suggestion in Ohnuki to modify the slots to be cam grooves. Ohnuki discloses a different solution to the problem of preventing skew. It appears that the examiner's reason to modify

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Ohnuki comes from appellant's disclosure rather than from the references or from what was known by the artisan.

Hummel and Bornhorst show structure to maintain a movable tubular member centered in a stationary tubular member. Neither reference shows a cam mechanism or cam grooves which are circumferentially aligned and offset in the optical axis direction to prevent skew. Therefore, Hummel and Bornhorst are not relevant to the rejection.

We agree with the examiner that Furusawa, Ito, and Nakagawa show "that it is a common and well known mechanical expedient in this art to provide plural guide grooves and pins so as to constrain movement of a member to a desired direction" (Examiner's Answer, page 9). However, none of these references has anything to do with a cam mechanism having cam grooves which are circumferentially aligned and offset in the optical axis direction to prevent skew. Therefore, Furusawa, Ito, and Nakagawa are not relevant to the rejection.

For the reasons stated above, the rejections of claims 1-11 and 21 is reversed.

Claims 12-19

We will sustain the rejection of claims 12 and 16. The guide frame 1 having a guide slot 2 in Ohnuki corresponds to the

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"stationary annular member having a guide groove formed thereon" in claim 12. The drive means 7 in Ohnuki, "which corresponds to a cam cylinder or an operating ring" (col. 2, lines 54-55), corresponds to the "annular cam member" in claim 12. The drive means 7 in Ohnuki has a cam groove (col. 2, lines 54-62) which corresponds to the "first cam groove" in claim 12. The moving frame 3 in Ohnuki corresponds to the "movable annular member" in claim 12 and is "attached to said annular cam member" through the sliding member 4 and driven pin 6 in figures 1-3 or through the sliding pin 5 in figures 4-6. In figures 4-6 of Ohnuki, the axial pin 5a corresponds to the "first cam pin" in claim 12 and the collar 5a of resin material in Ohnuki corresponds to the "guide piece" unified with the first cam pin in claim 12.

Claim 12 does not recite that the guide piece is elongated in the direction of the guide groove, nor does it recite that the guide piece functions to prevent skewing. Since claim 16 recites that guide piece is formed in a non-circular shape, claim 12 permits the guide piece to be in a circular shape like collar 5a.

Alternatively, in the embodiment of figures 1-3 of Ohnuki, it would have been obvious to extend the driven pin 6 through the sliding member 4 to attach to the moving frame 3 in view of the showing of pin 5 in figure 4 extending through the guide groove and the cam groove at the same time. Under this alternative

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reasoning, the sliding member 4 in Ohnuki corresponds to the "guide piece installed in a structure unified with said first cam pin" in claim 12 and member 4 has a "non-circular cross sectional shape" as recited in claim 16.

Appellant argues (Brief, page 24):

OHNUKI does not disclose a guide piece structurally unified with the first cam pin as recited herein. Nor does OHNUKI disclose movable annular member attached to the annular cam member. As can clearly be seen in the drawings of OHNUKI, in each instance, the stationary member is intermediate the movable member and the cam member.

The collar 5a in figure 4 corresponding to the "guide piece" is structurally unified with the pin 5a. Also, the sliding member 4 attached to the driven pin 6 corresponds to the "guide piece installed in a structure unified with said first cam pin." As previously noted, it would have been obvious to extend the pin 6 through the member 4 in figure 1 to attach to the moving frame 3 in view of the showing of pin 5 in figure 4 extending through the guide groove and the cam groove at the same time.

The moving frame 3 in Ohnuki corresponds to the "movable annular member" and is "attached to said annular cam member in such a manner as to permit said movable annular member to be movable in an optical axis direction" because it is attached to drive means 7, corresponding to the "annular cam member," through sliding member 4 and driven pin 6 in figure 1 or through pin 5 in

figure 4. The term "attached to" means connected and does not specifically require that the movable annular member be mounted touching the annular cam member. However, it would have been obvious to mount the annular cam member between the stationary annular member and the movable annular member in view of Kohmoto, which discloses an annular cam ring 20 disposed between a stationary barrel 14 having straight guide grooves 14a (figure 2) and a front lens group frame (lens barrel) 21. The arrangement in Kohmoto is reversed from appellant's figure 3 where the stationary annular member is on the inside; however, claim 12 does not recite the order of the stationary annular member, the annular cam member, and the movable annular member and so does not distinguish over Ohnuki or Kohmoto. Note that in Kohmoto two pins 21b extend from frame 21 through the cam groove 20a in cam ring 20 and into the straight guide grooves 14a, similar to appellant's arrangement except that Kohmoto does not disclose a guide piece fitted into the guide groove.

For the reasons stated above, we sustain the rejection of claims 12 and 16.

Claim 13 recites a "second cam groove being positioned circumferentially aligned with said first cam groove and offset from said first cam groove in the optical axis direction," which is the same limitation we found to be missing from the

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combination of references in the rejection of claims 1 and 21.
Accordingly, we reverse the rejection of claim 13 and claims 14,
15, and 17-20, which depend directly or indirectly therefrom.

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CONCLUSION

The rejections of claims 1-11, 13-15, and 17-21 are reversed.

The rejections of claims 12 and 16 are sustained.

No time period for taking any subsequent action in connection with this appeal may be extended under 37 CFR § 1.136(a).

AFFIRMED-IN-PART

LEE E. BARRETT)	
Administrative Patent Judge)	
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)	BOARD OF PATENT
JAMESON LEE)	APPEALS
Administrative Patent Judge)	AND
)	INTERFERENCES
)	
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