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D E C I S I O N
of 22 April 2005

Case Number: T 0879/02 - 3.4.2

Application Number: 95103672.2

Publication Number: 0674205

IPC: G02B 27/64

Language of the proceedings: EN

Title of invention:

Optical system capable of correcting image position

Applicant:

Nikon Corporation

Opponent:

-

Headword:

-

Relevant legal provisions:

EPC Art. 56

Keyword:

"Inventive step (yes) "

Decisions cited:

-

Catchword:

-



Case Number: T 0879/02 - 3.4.2

D E C I S I O N
of the Technical Board of Appeal 3.4.2
of 22 April 2005

Appellant: Nikon corporation
2 - 3, Marunouchi 3-chome
Chiyoda-ku
Tokyo (JP)

Representative: Grünecker Kinkeldey
Stockmair & Schwanhäusser
Anwaltssozietät
Maximilianstraße 58
D-80538 München (DE)

Decision under appeal: Decision of the Examining Division of the
European Patent Office posted on 1 March 2002
refusing European application No. 95103672.2
pursuant to Article 97(1) EPC.

Composition of the Board:

Chairman: A. G. Klein
Members: F. J. Narganes-Quijano
M. J. Vogel

Summary of Facts and Submissions

- I. The appellants (applicants) have lodged an appeal against the decision of the examining division refusing European patent application No. 95 103 672.2 (publication No. 0 674 205).

At oral proceedings the examining division announced its intention to grant a patent on the basis of the application documents according to a second auxiliary request then on file. A communication under Rule 51(4) EPC was subsequently issued to this effect. The appellants indicated disapproval of the text proposed for grant and requested an appealable decision on the basis of the main request then on file. The examining division informed the appellants of the reasons why it did not consent to grant a patent on the basis of the main request and the appellants declined to make further comments. Thereupon the examining division refused the application on the grounds that the subject-matter of claim 1 of the main request did not involve an inventive step (Articles 52(1) and 56 EPC) with regard to the prior art represented by the disclosure of document:

D1: US-A-5 039 211.

The examining division held in particular that the closest prior art was represented by the lens optical system disclosed in example 2 of document D1, that the problem solved by the claimed subject-matter was to choose the appropriate lens group capable of correcting image position and that the claimed solution was rendered obvious by the additional teaching of document

D1 relating to the use of a rear lens group as image position correction lens group.

II. In response to a telephone consultation with the rapporteur the results of which were dispatched with a communication dated 27 January 2005 together with attached sheets showing by way of example amendments to the application documents, the appellants requested by letter dated 6 April 2005 that the decision under appeal be set aside and that a patent be granted on the basis of claim 1 and description pages 1a, 2a, 2b and 26 as attached to the Board's communication dated 27 January 2005, dependent claims 2 to 7 filed with the letter dated 28 August 1998, description pages 1, 1b, 2, 17 and 24 filed with the letter dated 12 August 1997 [received on that date but actually dated 11 August 1997] and description pages 3 to 16, 18 to 23, 25 and 27 and drawing sheets 1/9 to 9/9 as originally filed.

III. Claim 1 according to the request of the appellants reads as follows:

"An optical system capable of correcting an image position, wherein a focus group and an image position correction group of optical members are separated from each other, comprising in the following order from the object side:

- (a) a front group (GF) being fixed in position in a direction substantially perpendicular to the optical axis of the optical system, and comprising, in the following order from the object side, a positive lens group having a positive refractive power, and

a negative lens group having a negative refractive power, said negative lens group being movable along the optical axis to perform the focusing operation,

said front group satisfying

$$1.45 < n_1 < 1.64$$

$$62 < v_1 < 78$$

where n_1 is the refractive index of the optical member (L1) located at a position closest to the object side of optical members constituting said front group (GF), and v_1 is the Abbe's number of said optical member (L1); and

- (b) a rear group (GR) having a positive refractive power, said rear group (GR) being movable in the direction substantially perpendicular to the optical axis to perform the image position correction."

Dependent claims 2 to 7 all refer back to claim 1.

IV. The arguments of the appellants in support of their request are essentially the following:

The lens system disclosed in example 2 of document D1 is constituted by four lens groups having respectively positive, negative, positive and positive refractive powers, the first lens group serving as focusing group and the second lens group serving as image blur compensation group. The problem solved by the claimed subject-matter over the lens system of example 2 of document D1 is not that formulated by the examining division, but the provision of an optical system capable of correcting an image position with improved imaging performance and in particular with improved

aberration correction. There is however no indication in the prior art that would have prompted the skilled person to modify example 2 of document D1 so as to arrive at the invention. In particular, while in the claimed invention the image position correction lens group is positive, in all the embodiments of document D1 the corresponding group is negative and in addition the lens system of example 2 of document D1 is a front focus system whereas the claimed optical system is an inner focus system. The claimed features allow for an improved correction of the optical aberrations of the optical system.

Reasons for the Decision

1. The appeal is admissible.
2. *Amendments*

Except for minor amendments of a purely clarifying nature, present claims 1 to 7 correspond to claims 1 to 7 of the main request on which the decision under appeal was based. During the first-instance proceedings the examining division did not object to the amendments made in claims 1 to 7 of the main request then on file and, after due consideration of the amendments made, the Board sees no reason to object to the amendments to the claims according to the present request of the appellants.

Apart from some minor amendments, the description has been amended to make it consistent with the amended set

of claims and to acknowledge the pertinent prior art (Article 84 and Rule 27(1), (b) and (c) EPC).

The Board is therefore satisfied that the application documents amended according to the appellants' request comply with the formal requirements of the EPC, and in particular with those set forth in Article 123(2) EPC.

3. *Patentability under Article 52(1) EPC*

3.1 In the decision under appeal the examining division held that claim 1 of the main request then on file defined new subject-matter with regard to the prior art cited in the European search report and in particular with regard to document D1. The Board sees to reason to deviate from the examining division's conclusion and concludes that the subject-matter of present claim 1 and that of dependent claims 2 to 7 is novel over the available prior art (Articles 52(1) and 54 EPC).

3.2 The examining division's finding of lack of inventive step was based on the optical system of example 2 of document D1 (Figures 17 to 26 together with the corresponding description) as closest state of the art. This optical system is designed to compensate image blur, i.e. to correct image position variations caused by accidental inclination of the optical system (abstract and column 3, lines 11 to 20), and is constituted by four lens groups I to IV. As submitted by the appellants during appeal proceedings, lens groups I, II and IV have positive, negative and positive refractive powers, respectively.

In addition, lens groups II and III are arranged to be moved along the optical axis of the optical system so as to vary the focal length and therefore the optical power of the optical system (column 9, lines 22 to 24 and lines 52 to 56 together with Figures 17 and 19) and lens group II is also arranged to be moved in a direction orthogonal to the optical axis so as to compensate for image blur (column 9, lines 24 to 27, paragraph bridging columns 9 and 10, and column 10, lines 34 to 37 together with Figures 21 and 22). During the zooming operation determined by movement of lens groups II and III, the positive lens group I also moves, thus performing the focusing operation during zooming (column 2, lines 37 to 40 together with Figures 17 and 19 and the variations of the distances between the lens groups in Tables 3 and 4) so that image focusing and image position correction are carried out respectively by group I and by group II, i.e. by two groups that are separated within the meaning of the present invention. In addition, the first of the lenses of the optical system has a refractive index of 1.48749 and an Abbe's number of 70.2 (Table 3) and therefore satisfies the claimed algebraic conditions.

- 3.2.1 It follows that the claimed subject-matter differs from the lens system of example 2 of document D1 in that the group movable in a direction perpendicular to the optical axis for image position correction is the rear lens group instead of an intermediate lens group, and in that the lens group performing the focusing operation is an intermediate negative lens group instead of the front positive lens group.

3.2.2 According to the examining division, the problem solved by the distinguishing features identified in point 3.2.1 above is to choose the appropriate lens group capable of performing image position correction. The Board cannot accept this formulation of the problem solved by the claimed subject-matter over the optical system of example 2 of document D1 because the problem is addressed in document D1 and already solved in example 2 by selecting lens group II as the appropriate image position correction lens group and therefore the problem so formulated does not reflect the contribution of the claimed invention over the closest state of the art considered by the examining division.

The appellants for their part have submitted that the problem solved by the claimed subject-matter over the disclosure of document D1 is the improvement of the aberration correction capability of the optical system. The disclosure of the application appears to support the correction of aberrations of the optical system, at least to some extent. However, a comparison of the degree of correction of aberrations achieved in the examples of the invention and shown in Figures 2, 3, 5, 6, 8 and 9 of the application with the degree of correction achieved in example 2 of document D1 and shown in Figures 18, 20, 25 and 26 of the document does not allow the conclusion that the claimed optical system would allow for the correction of aberrations beyond that achieved in example 2 of document D1 as contended by the appellants.

In view of the above, and in the absence of evidence to the contrary, the problem solved by the claimed invention over the closest state of the art considered

by the examining division can only be seen in the provision of an alternative optical arrangement having at least the same aberration correction capability as the optical system of example 2 of document D1.

- 3.2.3 Document D1 discloses alternative arrangements to that of example 2 in which not a subgroup of the variable power lens group, but a lens group located in a position nearer to the image than the variable power lens group (abstract), and in particular the lens group closest to the image (example 1 together with Figures 8 to 16 and the corresponding description) moves in a direction perpendicular to the optical axis for image position correction. In addition, these alternative arrangements also achieve the correction of aberrations to an extent comparable to that achieved in example 2 of document D1 (compare Figures 9, 11, 15 and 16 with Figures 18, 20, 25 and 26, respectively).

In the Board's view, however, the teaching of document D1 would have lead the skilled person confronted with the problem formulated above to reproduce the specific alternative arrangements as actually disclosed in detail in the document - and in particular the arrangement of the optical system of example 1 which nonetheless differs in several respects from the claimed subject-matter - rather than to contemplate designing further arrangements by combination of elements arbitrarily selected from the particular embodiments disclosed in document D1.

In particular, although the embodiments disclosed in examples 1 and 2 of document D1 share some common features, they also present substantial differences in

both the optical arrangement and the optical characteristics of the lenses and the features of the two systems are not merely interchangeable by one another. Thus, although the skilled person could have considered incorporating into the optical system of example 2 elements of the teaching of document D1 relating to the alternative arrangements such as the use of the rear lens group as image position correction group, there is *a priori* no reason why he would have followed such an approach. On the contrary, such an approach would have called for modifications of the arrangement of the optical system in order to maintain the aberration compensation characteristics achieved in example 2. In particular, since the optical characteristics of the optical system of example 2 such as the refractive index and the Abbe's number of the front lens have been selected to preserve the correction of aberrations upon movement of the lens group II in the direction perpendicular to the optical axis (Figures 21, 22, 25 and 26 together with the paragraph bridging columns 9 and 10, and column 10, lines 49 to 53), the skilled person would have been aware that if the rear lens group were to be moved in a direction perpendicular to the optical axis, the degree of correction of aberrations would generally not be preserved upon movement of the rear group so that such an approach would require re-designing the optical system to give account of the aberrations of the system upon movement of the rear lens and possibly even require modifying the refractive index and the Abbe's number of the front lens to an extent such that the algebraic conditions of present claim 1 and relevant in the aberrations characteristics of the claimed optical system (page 3, line 14 to page 5, line 6 of the

application as originally filed) would not be satisfied any longer, as it is the case in the optical system of example 1 of D1 in which correction of aberrations results in a front lens having a refractive index of 1.83400 and an Abbe's number of 37.1 (Table 1) which do not satisfy any of the claimed algebraic conditions.

The Board also notes that other documents cited in the search report and not considered during the first-instance examination proceedings also disclose lens systems in which the rear lens group is movable orthogonally to the optical axis for correction of the image position upon movements - such as vibrations and shake - of the whole lens system. However, there is no indication in the available prior art that the problem formulated above would be solved by arranging the rear lens group of the optical system of example 2 of document D1 to be movable orthogonally to the optical axis without modification of the remaining features of the optical system, and in particular without modification of the features of the optical system that are common to the claimed optical system.

In addition, although movement of the lens group II of example 2 of document D1 along the optical axis may affect the focus state of the lens system, this movement is primarily made to change the optical power of the lens system, i.e. for zooming, and there is no teaching in the prior art that would suggest moving the lens group II of the lens system of example 2 of document D1 to properly perform the focusing operation of the lens system as claimed.

For these reasons, the Board is not in a position to follow the reasoning of the examining division in the decision under appeal.

- 3.2.4 In view of the foregoing, the subject-matter of claim 1 does not result in an obvious way from example 2 of document D1 as the closest state of the art. In addition, after consideration of the disclosure of the remaining documents cited in the search report, the Board is satisfied that the subject-matter of claim 1 does not result in an obvious way from the available prior art within the meaning of Article 56 EPC.

The Board therefore concludes that the subject-matter of claim 1 as well as that of dependent claims 2 to 7 involves an inventive step (Article 56 EPC).

4. In view of the above conclusions and considerations, and having convinced itself that the patent application as amended according to the appellants' request and the invention to which it relates meet the requirements of the EPC, the Board considers it appropriate to exercise favourably the power within the competence of the examining division to order grant of a patent (Articles 97(2) and 111(1) EPC).

Order

For these reasons it is decided that:

1. The decision under appeal is set aside.

2. The case is remitted to the department of first instance with the order to grant a patent on the basis of the following application documents:
 - claim 1 as annexed to the communication of the Board dated 27 January 2005 and dependent claims 2 to 7 filed with the letter dated 28 August 1998,

 - description pages 1, 1b, 2, 17 and 24 filed with the letter dated 11 August 1997, description pages 1a, 2a, 2b and 26 as annexed to the communication of the Board dated 27 January 2005 and description pages 3 to 16, 18 to 23, 25 and 27 as originally filed, and

 - drawing sheets 1/9 to 9/9 as originally filed.

The Registrar:

The Chairman:

M. Dainese

A. G. Klein