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**Datasheet for the decision
of 14 February 2014**

Case Number: T 0604/10 - 3.4.02
Application Number: 99120409.0
Publication Number: 994372
IPC: G02B15/173
Language of the proceedings: EN
Title of invention:
Zoom lens
Applicant:
CANON KABUSHIKI KAISHA
Relevant legal provisions:
EPC 1973 Art. 84
Keyword:
Clarity (yes - amended claims)



**Beschwerdekammern
Boards of Appeal
Chambres de recours**

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Case Number: T 0604/10 - 3.4.02

D E C I S I O N
of Technical Board of Appeal 3.4.02
of 14 February 2014

Appellant: CANON KABUSHIKI KAISHA
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Decision under appeal: Decision of the Examining Division of the
European Patent Office posted on 13 November
2009 refusing European patent application No.
99120409.0 pursuant to Article 97(2) EPC.

Composition of the Board:

Chairman: A. G. Klein
Members: F. J. Narganes-Quijano
L. Bühler

Summary of Facts and Submissions

- I. The appellant (applicant) lodged an appeal against the decision of the examining division refusing European patent application No. 99120409.0 (publication No. 0994372).
- II. The facts of the first-instance proceedings pertinent for the present appeal can be summarised as follows:
- The examining division issued a communication under Rule 51(4) EPC 1973 dated 31 August 2007. The "Druckexemplar" annexed to the communication and containing the application documents intended for grant included amendments to claim 1 proposed by the examining division and intended to clarify the claimed subject-matter.
 - The appellant did not approve the amended text of claim 1 intended for grant. During the subsequent examination proceedings the appellant submitted a main and first and second auxiliary requests.
 - The examining division issued a communication under Rule 71(3) EPC dated 29 May 2009 based on the first auxiliary request. In an annex to the communication the examining division gave reasons why claim 1 of the main request did not satisfy the requirements of Article 84 EPC 1973.
 - In reply to the communication under Rule 71(3) EPC, the appellant withdrew the first auxiliary request and requested an appealable decision in respect of the main request.
 - The examining division then issued the decision underlying the present appeal. In its decision the examining division held that the feature of claim 1 of the main request then on file relating to imaging

magnifications passing "through a -1-time point" during zooming was not clear (Article 84 EPC 1973).

III. With the statement setting out the grounds of appeal dated 2 March 2010 the appellant filed an amended set of claims 1 to 4 according to a main request and two further amended sets of claims as auxiliary requests. The appellant requested that the decision under appeal be set aside and a patent be granted on the basis of one of the claim requests together with the description (pages 1 to 39) and the drawings (drawing sheets 1/34 to 34/34) of the "Druckexemplar" annexed to the communication issued under Rule 51(4) EPC 1973 and dated 31 August 2007.

IV. In reply to a telephone consultation with the rapporteur of the Board, the appellant filed by letter dated 24 January 2014 an amended claim 1 replacing claim 1 of the main request and an amended page 10 of the description.

V. Claim 1 of the present main request reads as follows:

"A zoom lens comprising a first lens unit (L1) having a positive refracting power and being fixed during zooming, a second lens unit (L2) having a negative refracting power and being movable during zooming, a third lens unit having a positive refracting power (L3) and used to correct for image plane variation with zooming, a stop and a fourth lens (L4) unit having a positive refracting power, said lens units being sequentially arranged from the object side,

wherein imaging magnifications of said second and third lens units simultaneously pass through an x^{-1} point during zooming, wherein x stands for "times", characterized in that

an intermediate focal length f_m of the zoom lens is given by

$$f_m = f_w \cdot z^{1/2}$$

where f_w is the focal length of the zoom lens at a wide-angle end, and z is a total zoom ratio of the zoom lens, wherein an aspherical surface shaped to decrease the positive refracting power or increase the negative refracting power is provided at a lens surface of said third lens unit (L3) which satisfies

$$1 < |h_3'/h_3|$$

where h_3 is a height at which an on-axial marginal ray passes, and h_3' is a height at which an off-axial marginal ray passes that is formed into an image at a maximum image height, at this intermediate focal length f_m ."

The main request also includes dependent claims 2 to 4 all referring back to claim 1.

Reasons for the Decision

1. The appeal is admissible.
2. The claimed invention is directed to a zoom lens comprising a first to a fourth lens unit, the second lens unit being movable during zooming and the third lens unit being used to correct for image plane variation with zooming.

2.1 Claim 1 of the main request underlying the decision under appeal required, among other features, that the imaging magnifications of the second and the third lens units "simultaneously pass through a -1-time point during zooming". In its decision the examining division held that the expression "-1-time point" was inappropriate and lacked a well recognised technical meaning in the field, and concluded that the expression rendered the corresponding claimed feature obscure and the claimed subject-matter unclear (Article 84 EPC 1973).

The appellant for its part has essentially submitted that the objected expression would be understood by the skilled person as designating nothing else than the passage of the imaging magnifications of the two lens units through a point at which they have the value -1, and has referred in this respect to a series of citations in the technical field as evidence in support of the interpretation of the term "-1-time point".

2.2 The Board first notes that a zoom lens as claimed forms an image of an object and that this image is the result of the object being successively imaged by each of the lens units constituting the zoom lens, so that each of the lens units forms a corresponding intermediate image of the intermediate image formed by the previous lens unit in the zoom lens, the corresponding intermediate image being imaged by the lens unit at a predetermined imaging magnification. According to the claimed subject-matter, zooming involves movement of the second lens and the resulting image plane variation of the zoom lens is corrected by the third lens unit. The skilled person would therefore understand that the value of the imaging magnifications of each of the

second and the third lens units would vary during zooming, i.e. would pass through different points within a range of values determined by the operational zoom range of the zoom lens.

The skilled person would therefore understand in the technical context of the invention that the feature according to which the imaging magnifications of the second and the third lens units simultaneously pass through a "-1-time point" during zooming means that the ranges of variation of the value of the imaging magnification of the second and the third lens units contain a point corresponding to the value "-1-time", and that the zoom lens of the invention has been designed so that at a predetermined zooming magnification, i.e. at a predetermined zooming state of the zoom lens, the varying imaging magnification of each of the second and the third lens units has the mentioned value "-1-time".

As regards the term "-1-time", this term is expressed in a terminology that, as held by the examining division, does not appear to be conventional in the technical field - or at least can be perceived not to be so. However, contrary to the approach followed by the examining division, the question is not whether the meaning of the term can be understood when interpreted literally and considered in isolation, but whether the skilled person would understand the technical meaning of the term in its technical context. As noted above, the imaging magnification of an optical system can vary within a range of values, and the values of the imaging magnification are conventionally designated by a sign ("- " or "+", indicating whether the image is inverted or not) and the number of times (for instance "x 2" or "2x", where "x" stand for "times") that the image is

magnified when compared with the object being imaged (i.e. the quotient between the image and the object sizes). The skilled person would therefore understand that the value of the imaging magnification "-1-time" required by the claimed subject-matter designates in its technical context nothing else than an inverted imaging magnification of one unit, i.e. a magnification of "x -1" or "-1 x" or "-1 time(s)".

This conclusion is, in addition, supported by the terminology used in an analogous disclosure in the application as filed, namely the passage on page 11, second paragraph of the description. In this passage it is stated that the magnifying system constituted by the second and the third lens units "performs magnifying operation by using a range including an imaging magnification of x -1 (one-to-one)". The term "x -1" used in this passage reflects the terminology conventionally used in this art in the designation of the values of the imaging magnification, and the additional expression "(one-to-one)" in this passage further confirms this conclusion.

- 2.3 In view of the above considerations, the Board concludes that the skilled person would interpret the term "-1-time" in its technical context as designating an imaging magnification of "x -1", where "x" stands for "times". This conclusion is in agreement with the submissions of the appellant and, in view of the above considerations, there is no need to consider the technical evidence submitted by the appellant in support of its case.

In addition, claim 1 has been amended according to the present main request so that the expression "pass through a -1-time point during zooming" objected by the

examining division now reads "pass through an x^{-1} point during zooming, wherein x stands for "times"". The feature has therefore been reformulated in line with the terminology conventionally used in the art and, in addition, the amended feature emphasizes that " x " stands for the mathematical expression "times". The corresponding feature on page 10 of the description has been brought into conformity with the amended formulation of the claimed feature (Rule 27(1) (c) EPC 1973).

As is apparent from the discussion above, these amendments are supported by the content of the original application (Article 123(2) EPC) and, in addition, they overcome the grounds given by the examining division for the refusal of the application.

2.4 In its decision the examining division also expressed by way of *obiter dictum* its opinion that it remained unclear (Article 84 EPC 1973) how the imaging magnification of individual lenses of a zoom lens is defined, and whether there is an inconsistency between the claimed feature relating to the imaging magnification of the second and the third lens units and the passage of the description on page 11, second paragraph referred to in the last paragraph of point 2.2 above.

As regards the first of these objections, the Board notes that, as already noted in the first paragraph of point 2.2 above, each of the lens units of a zoom lens forms its own intermediate image of the intermediate image formed by the previous lens unit, the corresponding intermediate image being imaged by the lens unit at a predetermined imaging magnification. Therefore, for a predetermined zooming state of a zoom

lens imaging a predetermined object at a predetermined zooming magnification, each of the lens units of the lens forms an intermediate image at a predetermined imaging magnification, the image formed by the last of the lens units constituting the final image formed by the zoom lens as a whole. The Board does therefore not see any unclarity in defining a zoom lens in terms of, among other features, the imaging magnification of lens units constituting the zoom lens, especially as this feature can - as is the case with the present invention - contribute to the optical characteristics of the zoom lens.

As regards the second of the mentioned objections, the passage of the description under consideration states that the magnifying system constituted by the second and the third lens units performs "magnifying operation by using a range including an imaging magnification of $x - 1$ (one-to-one)". This expression, however, does not necessarily mean - as appears to have been assumed by the examining division - that the imaging magnification of the whole magnifying system is $x - 1$, but can also be understood in its context as referring - in agreement with the appellant's submissions - to the imaging magnification range of each of the second and the third lenses taken individually. In addition, it is this latter interpretation which prevails on an objective reading of the claims, this interpretation being in addition consistent with the remaining corresponding statements in the description and with the eight specific embodiments disclosed in detail in the description. Therefore, no manifest technical inconsistency arises between the claimed subject-matter and the passage on page 11, second paragraph of the description, at least not to the extent of being

prejudicial to clarity of the claimed invention within the meaning of Article 84 EPC 1973.

- 2.5 Having regard to the above, the Board concludes that the reasons given in the decision under appeal for the refusal of the application cannot be maintained in respect of the set of claims amended according to the present main request.
3. Apart from the reformulation in claim 1 of the claimed feature objected in the decision (cf. point 2.3 above, penultimate paragraph), claim 1 differs from the claim 1 underlying the decision under appeal in that the expression "at this magnification" in the feature "an intermediate focal length f_m of the zoom lens at this magnification is given by $f_m = f_w \cdot z^{1/2}$ " has been omitted, the mentioned "said magnification" referring in the context of the claimed subject-matter to the zoom magnification at which the imaging magnifications of the second and the third lens units simultaneously pass through an $x = -1$ point during zooming. This omission reflects the fact that the definition of the intermediate focal length f_m as $f_w \cdot z^{1/2}$ (and therefore as the geometrical mean of the two extreme focal lengths of the zoom lens) depends on the two extreme values of the operational range of focal lengths of the zoom lens and is independent of the zoom focal length - and therefore independent of the zooming magnification - at which individual lens units of the zoom lens operate at a predetermined imaging magnification. In addition, this omission is supported within the meaning of Article 123(2) EPC by the subject-matter of claim 1 as originally filed when read together with the description, and in particular when read in connection with all the particular embodiments of the zoom lens in which - as shown by the evidence submitted by the

appellant with the statement of grounds of appeal - the focal length of the zoom lens at which the second and the third lens units simultaneously operate at an imaging magnification of $x = -1$ is different from the value of the intermediate focal length f_m of the lens.

4. Apart from the amendments to claim 1 referred to in points 2.3 and 3 above, the version of the application amended according to the present main request corresponds essentially to the version of the application proposed for grant by the examining division with the communication under Rule 71(3) EPC dated 29 May 2009 referred to in point II above - and also to that proposed with the communication under Rule 71(3) EPC dated 29 May 2009. Furthermore, apart from the issues under Article 84 EPC 1973 addressed in point 2 above, the decision is silent as to any other possible non-compliance of the application with the requirements of the EPC. In these circumstances, the Board concludes, after due consideration of all the facts, that the application documents of the present main request and the invention to which they relate meet the requirements of the EPC within the meaning of Article 97(1) EPC.

Accordingly, the Board concludes that the decision under appeal is to be set aside and a patent granted on the basis of the present main request of the appellant.

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:
 - claims: claim 1 filed with the letter dated 24 January 2014 and claims 2 to 4 of the main request filed with the letter dated 2 March 2010;
 - description: pages 1 to 9 and 11 to 39 of the "Druckexemplar" annexed to the communication under Rule 51(4) EPC 1973 dated 31 August 2007, and page 10 filed with the letter dated 24 January 2014; and
 - drawings: sheets 1/34 to 34/34 of the "Druckexemplar" annexed to the communication under Rule 51(4) EPC 1973 dated 31 August 2007.

The Registrar:

The Chairman:



M. Kiehl

A. G. Klein

Decision electronically authenticated