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**Datasheet for the decision
of 20 May 2021**

Case Number: T 0138/18 - 3.4.02

Application Number: 08012853.1

Publication Number: 2017663

IPC: G02B21/02, G02B21/33, G02B9/60,
G02B15/163

Language of the proceedings: EN

Title of invention:

Immersion microscope objective and laser scanning microscope system using the same

Patent Proprietor:

Olympus Corporation

Opponent:

Carl Zeiss Microscopy GmbH

Headword:

Relevant legal provisions:

EPC Art. 54(1)
RPBA 2020 Art. 13(1), 13(2)

Keyword:

Novelty - main request and first auxiliary request (no) -
ambiguous feature

Admissibility of second to fourth auxiliary requests (no) -
exceptional circumstances (no) - procedural economy (no) -
suitability of amendment to resolve issues (no)

Decisions cited:

T 1049/99, T 0872/09

Catchword:



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Case Number: T 0138/18 - 3.4.02

D E C I S I O N
of Technical Board of Appeal 3.4.02
of 20 May 2021

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Decision under appeal: **Interlocutory decision of the Opposition
Division of the European Patent Office posted on
9 November 2017 concerning maintenance of the
European Patent No. 2017663 in amended form.**

Composition of the Board:

Chairman R. Bekkering
Members: A. Hornung
B. Müller

Summary of Facts and Submissions

I. The opponent appealed against the interlocutory decision of the opposition division maintaining European patent No. 2017663 in amended form.

Opposition had been filed against the patent as a whole and based on the grounds for opposition of Article 100(a) EPC, together with Articles 54(1) and 56 EPC and Article 100(b) EPC, together with Article 83 EPC.

The opposition division had found that the patent as amended according to a second auxiliary request then on file and the invention to which it related met the requirements of the EPC.

II. Oral proceedings before the board were held on 20 May 2021.

III. The opponent (appellant) requested that the decision of the opposition division be set aside and that the European patent be revoked.

IV. The patentee (respondent) requested that the appeal be dismissed (main request) or that the decision under appeal be set aside and the European patent be maintained in amended form with the claims according to

- auxiliary request 1 filed with a letter dated 19 July 2018, or
- auxiliary request 2 filed during the oral proceedings of 20 May 2021 or
- auxiliary requests 3 or 4, both filed with a letter dated 16 March 2021 as auxiliary requests 2 and 3, respectively.

V. The following documents will be referred to in the present decision:

E1: US 2003/0043473 A1,

A5: "Chapter 2, Basics of imaging optics (1) Paraxial theory", excerpt from Japanese Optics textbook "Guide to imaging optics", published by Keigaku shuppan, 1 June 1988, ISBN-13: 978-4766506013,

A5': Japanese original text of A5

VI. Claim 1 according to the main request reads as follows:

"An immersion microscope objective comprising, in order from the object side:

a first lens group (G1) having positive refractive power;

a second lens group (G2) having positive refractive power;

a third lens group (G3);

a fourth lens group (G4) having negative refractive power;

and

a fifth lens group (G5) having positive refractive power;

characterized in that

at least one of the first through fifth lens groups is movable along the optical axis, and

the following conditions are satisfied

$$D_o/f > 10$$

$$NA \cdot f > 6$$

$$0.85 < |\beta_s| < 1.1$$

where

D_o is the distance between the specimen surface and the mounting position of the immersion microscope objective,

NA is the object-side numerical aperture of the immersion microscope objective,

f is the focal length of the immersion microscope objective, and

β_s is the magnification of said movable lens group."

First auxiliary request

Independent claim 1 according to the first auxiliary request differs from claim 1 of the main request in that the feature "at least one of the first through fifth lens groups is movable along the optical axis" is replaced by the feature "the third lens group (G3) is movable along the optical axis".

Second auxiliary request

Independent claim 1 according to the second auxiliary request differs from claim 1 of the first auxiliary request in that

- the feature "the third lens group (G3) is movable along the optical axis" is amended to read "the third lens group (G3) is movable along the optical axis relative to the second and fourth lens groups so as to correct aberrations" and in that
- the following feature is added at the end of the claim:

"wherein a lens group is defined as an assembly of one or more lens components that are fixed or movable as a single unit,

a lens component is defined as

a single lens element spaced so far from any adjacent lens element that the spacing cannot be neglected in computing the optical image forming properties of the lens elements, or

two or more lens elements that have their adjacent lens surfaces either in full overall contact or overall so close together that the spacing between adjacent lens surfaces of the different lens elements are so small that the spacings can be neglected in

computing the optical image forming properties of the two or more lens elements, and a lens element is defined as a single transparent mass of refractive material having two opposed refracting surfaces, which surfaces are positioned at least generally transversely of an optical axis".

Third auxiliary request

Independent claim 1 according to the third auxiliary request is identical to claim 1 of the first auxiliary request.

Fourth auxiliary request

Independent claim 1 according to the fourth auxiliary request differs from claim 1 of the first auxiliary request in that the feature "the third lens group (G3) is movable along the optical axis" is amended to read "the third lens group (G3) is movable along the optical axis relative to the second and fourth lens groups so as to correct aberrations".

Reasons for the Decision

1. Main request - Novelty

The subject-matter of claim 1 is anticipated by the disclosure of E1 (Article 54 (1) and (2) EPC).

1.1 It is undisputed between the parties that the embodiment of E1, figure 1, discloses all the features of claim 1 except for the two following features:

- (i) $NA \cdot f > 6$
- (ii) $0.85 < |\beta_s| < 1.1$

1.2 Features (i) and (ii) lack novelty

1.2.1 Feature (i): $NA \cdot f > 6$

The board is of the opinion that the numerical values $NA = 1.2$ and $F = 5$, disclosed in table 2 of E1, represent precise mathematical instructions about how to carry out the optical design of a microscope objective lens. These numerical values are taken into account by the optical design software as purely mathematical numbers without any experimental degree of precision for calculating theoretical radii of curvature and thicknesses of the lenses. The outcome of the calculation is a theoretical microscope objective lens fulfilling the condition " $NA \cdot f = 6$ " which differs from a theoretical microscope objective lens fulfilling the condition " $NA \cdot f > 6$ " of claim 1.

E1, paragraph [0089], further discloses that "according to the present invention, it is possible to *realize* a liquid immersion type microscope objective lens of the apochromat class, which (...) has the magnification of about 40 and the numerical aperture (NA) of about 1.2". E1 discloses a microscope objective lens which has been *manufactured*. Due to manufacturing tolerances, the actual numerical aperture (NA) of the microscope objective lens has a numerical value of *about* 1.2. In other words, a concrete microscope objective lens having been manufactured according to the theoretical values of table 2 of E1 has a numerical aperture (NA) of about 1.2, i.e. some microscope objective lenses have a numerical aperture (NA) larger than 1.2 and others have a numerical aperture (NA) smaller than 1.2. Similarly, the focal length F of an actually manufactured

microscope objective lens will not be exactly equal to the theoretical numerical value "5" indicated in table 2 but be *about* 5.

As a consequence, certain microscope objective lenses manufactured according to table 2 of E1 will indeed fulfil the condition " $NA \cdot f > 6$ ", thereby anticipating the above feature (i).

1.2.2 Feature (ii): $0.85 < |\beta_s| < 1.1$

The board agrees with the opponent in that the magnification β_s of an optical lens group depends *inter alia* on the position of the object to be imaged by the lens group (see statement of grounds of appeal, page 6, last paragraph). This property of the magnification β_s of an optical lens is confirmed by the "typical formula" disclosed on page 7 of the patentee's letter of reply to the opponent's statement of grounds of appeal defining a magnification $\beta(s)$ as a function of the position (s) of the object. Since the magnification β_s of an optical lens depends on the actual position of the object to be imaged with respect to the optical lens, it is unsuitable for defining a structural technical feature of the optical lens as such. Therefore, without defining in the claim the position of the object to be imaged, feature (ii) is intrinsically unsuitable to establish novelty of the claimed subject-matter with respect to any microscope objective of the prior art. Legal certainty requires that a claimed subject-matter cannot be regarded as novel over the prior art on the basis of an ambiguous feature (see T 1049/99, reasons 4.4; T 872/09, catchword).

Claim 1 neither defines the exact position of the sample with respect to any of the lens groups (G1-G5) of the immersion microscope objective, nor the exact value of the

optical power of the lens groups (G1-G5) imaging the sample, the optical power of at least some of the lens groups (G1-G5) determining the effective position of the object to be imaged by the movable lens group. Therefore, the actual position of the object to be imaged by the movable lens group is left undefined in claim 1 and may be chosen arbitrarily. A position of an object to be imaged by the movable lens group (G4, G5) of E1 may be selected such that the magnification β_s of the movable lens group (G4, G5) of E1 falls within the claimed range, thereby anticipating the above feature (ii).

1.3 As a consequence, the subject-matter of claim 1 lacks novelty with respect to the microscope objective lens of E1.

1.4 Patentee's submissions

1.4.1 Concerning feature (i), the patentee argued that the values "F = 5" and "NA = 1.2" mentioned in table 2 of E1 are to be understood in an extremely precise manner, so that the disclosure of "NA · f = 6" of E1 is a precise indication and does fall within the claimed range of feature (i). In the patentee's view, the values of table 2 of E1 "are rather precise instructions on how to build a liquid immersion type microscope objective". See patentee's letter of reply to the opponent's statements of grounds appeal, pages 3 to 5. Concerning the quotation "about 1.2" in paragraph [0089] of E1, the patentee submitted that this "statement of E1 cannot 'soften' the disclosure of the precise values" which are indicated in table 2 of E1 (see patentee's letter of reply to the opponent's statement of grounds of appeal, page 4, second paragraph). Neither in its second letter, dated 16 March 2021, in reply to the board's communication annexed to the summons to oral proceedings, nor during

oral proceedings before the board, did the patentee provide further counter-arguments in support of novelty of feature (i).

The board notes that E1, [0089], clearly discloses the realization of a microscope objective lens whose numerical aperture is *about* 1.2, implying that the feature (i) is fulfilled.

- 1.4.2 Concerning feature (ii), the patentee contended "that the magnification β_s of the movable lens group is a structural property which is clearly defined" (patentee's letter of reply to the opponent's statements of grounds appeal, page 8, first paragraph). In support of its contention, it presented a "typical formula for the magnification β of a thin lens" (letter of reply, page 7). Moreover, the patentee stated that "the movable lens group G4+G5 of E1 had a magnification value that was exceedingly different from 1" (letter of reply, page 8, third paragraph).

The board does not consider the patentee's argument to be convincing since it does not address the issue concerning the undefined position in claim 1 of the object to be imaged by the movable lens group, rendering feature (ii) so obscure that it is intrinsically unsuitable for distinguishing the claimed microscope objective from any conventional microscope objective. On the contrary, the formula for the magnification β_s submitted by the patentee confirms the dependence of the magnification β_s with respect to the position of the object to be imaged. The allegedly "exceedingly different" magnification value of the movable lens group (G4, G5) of E1 corresponds to a specific position of the object to be imaged by the movable lens group (G4, G5). Since claim 1 does not define the exact position of the object to be imaged by the movable lens group, the magnification value of the movable

lens group (G4, G5) of E1 is not restricted to the "exceedingly different" value calculated by the patentee.

- 1.4.3 In response to the communication annexed to the summons to oral proceedings, the patentee, with a letter dated 16 March 2021, filed document A5 together with arguments explaining how the magnification of a lens system may be calculated on the basis of the theory disclosed in A5. During oral proceedings, the patentee further filed A5' to provide evidence that A5 belonged to the state of the art under Article 54(2) EPC.

The board acknowledges that it is well-known in the art how to calculate the magnification of a lens group of a microscope objective. The disclosure of A5 does not go beyond this common general knowledge. Late-filed documents A5 and A5', as well as the patentee's submissions based on A5, are not relevant to the present issue concerning the undefined position in claim 1 of the object to be imaged by the movable lens group. Therefore, documents A5 and A5', as well as the corresponding submissions, are not suitable for resolving the issue and are therefore not admitted into the proceedings on the basis of Article 13 (1,2) RPBA 2020.

2. First auxiliary request - Novelty

The subject-matter of claim 1 is anticipated by the disclosure of E1 (Article 54 (1) and (2) EPC).

- 2.1 Claim 1 of the first auxiliary request differs from claim 1 of the main request only in that the movable lens group is the third lens group of the immersion microscope objective.

2.2 As submitted by the opponent, letter dated 25 November 2019, page 12, the microscope objective of E1 comprises a plurality of lenses which may be arbitrarily divided into five groups as long as the resulting five groups of lenses comprise all the features of the lens groups as defined in claim 1. Following the opponent's arrangement, lens group G1 of E1 forms the first lens group of claim 1, the combination of lens groups G2 and G3 of E1 forms the second lens group of claim 1, lens group G4 of E1 forms the third movable lens group of claim 1, single lens L51 of E1 forms the fourth lens group of claim 1 and single lens L52 of E1 forms the fifth lens group of claim 1. According to claim 1, the five lens groups are merely characterized by the sign of their optical power. Moreover, the third lens group of claim 1 is characterized by the fact that it is movable and that it has a magnification β_s such that $0.85 < |\beta_s| < 1.1$.

The patentee does not dispute that the opponent's arrangement of lens groups as defined above comprises all the features of the lens groups of claim 1, except for the claimed range of the magnification β_s . However, as explained in point 1.2.2 above, the magnification β_s of the movable lens group is unsuitable for defining a structural technical feature of the lens as such.

Therefore, the microscope objective of E1 comprises five lens groups fulfilling all the conditions defined in claim 1.

2.3 The patentee argued that the above arrangement of lenses of E1 in five groups was artificial and technically not reasonable. In particular, the skilled person would not consider the two single lenses L51 and L52 of the cemented doublet G5 of E1 to correspond to the two distinct lens groups G4 and G5 defined in claim 1. Two single lenses

cemented together would not be considered to be two lens groups. This understanding was coherent with the definition of lens elements, lens components and lens groups according to the description of the patent, paragraphs [0022] and [0023].

The board is not convinced by these arguments. According to claim 1, besides from the third lens group being qualified as being movable, each lens group of claim 1 is exclusively defined by the sign of its optical power. Claim 1 does not define any further structural features of a lens group. In particular, claim 1 does not exclude that lens groups are cemented together. Distinct lens groups may be defined merely with respect to distinct optical roles as, for instance, providing negative or positive optical power. Distinct lens groups with respect to the sign of their optical power may well be cemented together in a lens doublet as is the case in the lens doublet G5 of E1, formed by the single lenses L51 and L52 cemented together. Concerning the definition of lens elements, lens components and lens groups in the patent description, paragraphs [0022] and [0023], the board notes that a definition merely in the patent description does in general not limit the scope of protection of a claim. Moreover, the definition of a lens group given in the patent description does not exclude that lens groups may be cemented together.

3. Second auxiliary request - Admissibility

The board decides not to admit the second auxiliary request into the proceedings under Articles 13(1) and (2) RPBA 2020 for the following reasons:

3.1 The second auxiliary request was filed during the oral proceedings. Claim 1 was amended with respect to claim 1

of the first auxiliary request by adding features (a) and (b), wherein feature (a) relates to the movable third lens group being movable relative to the second and fourth lens groups so as to correct aberrations and wherein feature (b) defines the meaning of a lens group. It is to be noted that feature (a) had already been filed previously on 16 March 2021 as part of claim 1 of the then third auxiliary request.

- 3.2 According to the patentee, feature (a) overcame the novelty objection raised against the subject-matter of claim 1 of the first auxiliary request because E1 did not disclose any movable lens group surrounded by two fixed lens groups. Feature (b) was intended to clarify that the two cemented single lenses L51 and L52 of E1 did not form a lens group in the meaning of the claim.

The second auxiliary request should be admitted because feature (a) was "occasioned by the appellant's arguments at item 6.2 of its letter dated 25 November 2019. It is respectfully requested that Auxiliary Request 3 be allowed into the proceedings since it only concerns a minor further specification with regard to the already pending Auxiliary Request 1" (see patentee's letter dated 16 March 2021, page 8).

Feature (b) was added to claim 1 in reaction to the surprising view of the board and the opponent, expressed during the oral proceedings, that the cemented doublet G5 of E1 was formed by two lens groups L51 and L52.

- 3.3 The board is not convinced by the patentee's arguments.
- 3.3.1 The board does not share the patentee's view concerning a surprising development of the proceedings. In the opponent's letter dated 25 November 2019 (see items 6.2 to

6.4 of that letter) already, the opponent raised various objections against claim 1 of the first auxiliary request and submitted the new arrangement of lens groups of E1, anticipating the arrangement of the lens groups of claim 1 of the first auxiliary request. Filing an amended claim 1 comprising feature (a) only on 16 March 2021 in response to the board's summons to oral proceedings is considered by the board to be late-filed. The opponent's objections, filed with its letter of 25 November 2019, do not represent exceptional circumstances justifying the filing during oral proceedings of an amended claim 1 comprising features (a) and (b). Therefore, the second auxiliary request is not admitted under Article 13(2) RPBA 2020.

3.3.2 Moreover, the board concurs with the opponent's submission according to which amended feature (a) of claim 1, if admitted, would require an additional search, which was not feasible at such a late stage of the proceedings. In case the opponent submitted a new line of arguments of lack of novelty and/or inventive step, possibly based on new prior art documents found during the additional search, the case might have to be remitted to the department of first instance for further prosecution, which would be detrimental to procedural economy, contrary to Article 13(1) RPBA 2020.

3.3.3 Feature (b) is not suitable for resolving the issues at stake (Article 13(1) RPBA 2020). In particular, feature (b) does not overcome the objection of lack of novelty of the subject-matter of claim 1 of the first auxiliary request, since it does not clearly exclude that lens groups may be cemented together.

3.3.4 Still further, as submitted by the opponent, there appears to be no clear basis of feature (a) in the patent application as originally filed (Article 123(2) EPC).

Moreover, features (a) and (b) seem to lack clarity (Article 84 EPC). Indeed, contrary to the patentee's view that the skilled person would be able to clearly understand the wording of claim 1, the expressions used in feature (a), i.e. "so as to correct aberrations" and in feature (b), i.e. "spaced so far from any adjacent lens element that the spacing cannot be neglected", have only a relative meaning. Since these amendments give rise to new objections, the second auxiliary request is not to be admitted under Article 13(1) RPBA 2020.

4. Third auxiliary request - Admissibility

The board decides not to admit the third auxiliary request into the proceedings under Articles 13(1) and (2) RPBA 2020.

4.1 The third auxiliary request was filed as second auxiliary request with the patentee's letter dated 16 March 2021 in response to the summons to oral proceedings. It represents, therefore, an amendment to the patentee's case whose admittance is to be assessed according to Article 13 RPBA 2020.

4.2 Claim 1 of the third auxiliary request is identical to claim 1 of the first auxiliary request. Therefore, for the reasons that claim 1 of the third auxiliary request is not suitable for overcoming the objection of lack of novelty of the subject-matter of claim 1 of the first auxiliary request, the third auxiliary request is not admitted into the proceedings under Article 13(1,2) RPBA 2020. The patentee did not present any further arguments in favour of admissibility of the third auxiliary request.

5. Fourth auxiliary request - Admissibility

The board decides not to admit the fourth auxiliary request into the proceedings under Articles 13(1) and (2) RPBA 2020.

5.1 The fourth auxiliary request was filed as third auxiliary request with the patentee's letter dated 16 March 2021 in response to the summons to oral proceedings. It represents, therefore, an amendment to the patentee's case whose admission is to be assessed according to Article 13 RPBA 2020.

5.2 Claim 1 of the fourth auxiliary request differs from claim 1 of the first auxiliary request in that it comprises the same feature (a) as claim 1 of the second auxiliary request, relating to the movable third lens group being movable relative to the second and fourth lens groups so as to correct aberrations.

As explained in point 3.3.1 above, there are no exceptional circumstances justifying the filing of the fourth auxiliary request with an amended claim 1 comprising feature (a) (Article 13(2) RPBA 2020).

Moreover, as explained in points 3.3.2 and 3.3.4 above, claim 1 of the fourth auxiliary request, if admitted, would require an additional search and raises new issues. Therefore, the fourth auxiliary request is not to be admitted under Article 13(1,2) RPBA 2020.

5.3 The patentee's counter-arguments, essentially the same arguments as for claim 1 of the second auxiliary request, were not found convincing by the board for the reasons given in point 3.3 above.

6. For the above reasons the board comes to the conclusion that none of the patentee's requests is allowable (main

and first auxiliary requests) or admitted into the proceedings (second, third and fourth auxiliary requests).

Order

For these reasons it is decided that:

1. The decision under appeal is set aside.
2. The patent is revoked.

The Registrar:

The Chairman:



L. Gabor

R. Bekkering

Decision electronically authenticated