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D E C I S I O N
of 24 June 2003

Case Number: T 0166/02 - 3.4.2

Application Number: 93310343.4

Publication Number: 0604180

IPC: G01M 11/02

Language of the proceedings: EN

Title of invention:
Ophthalmic lens inspection system and method

Patentee:
JOHNSON & JOHNSON VISION PRODUCTS

Opponent:
Novartis AG, Patent- und Markenabteilung

Headword:
-

Relevant legal provisions:
EPC Art. 56

Keyword:
"Inventive step - yes"

Decisions cited:
-

Catchword:
-

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Beschwerdekammern | Boards of Appeal | Chambres de recours

Case Number: T 0166/02 - 3.4.2

D E C I S I O N
of the Technical Board of Appeal 3.4.2
of 24 June 2003

Appellant: (Proprietor of the patent)
JOHNSON & JOHNSON VISION PRODUCTS, INC.
4500 Salisbury Road
Suite 300
Jacksonville
Florida 32216 (US)

Representative:
Mercer, Christopher Paul
Carpmaels & Ransford
43, Bloomsbury Square
London WC1A 2RA (GB)

Respondent: (Opponent)
Novartis AG, Patent- und Markenabteilung
Lichtstrasse 35
CH-4002 Basel (CH)

Representative:
VOSSIUS & PARTNER
Siebertstrasse 4
D-81675 München (DE)

Decision under appeal:
Decision of the Opposition Division of the European Patent Office posted 18 December 2001 revoking European patent No. 0604180 pursuant to Article 102(1) EPC.

Composition of the Board:

Chairman: E. Turrini
Members: A. G. M. Maaswinkel
M. J. Vogel

Summary of Facts and Submissions

I. The appellant (proprietor of the patent) lodged an appeal, received on 12 February 2002, against the decision of the opposition division, dispatched on 18 December 2001, revoking the European patent No. 0 604 180 (application No. 93 3103 43.4). The fee for the appeal was paid on 12 February 2002. The statement setting out the grounds of appeal was received on 26 April 2002.

II. Opposition had been filed against the patent as a whole on the basis of Article 100(a) EPC in combination with Articles 52(1), 54 and 56 EPC. At the oral proceedings before the opposition division the objection with respect to novelty was not maintained. To support its objections the opponent referred to the following documents:

(D1) EP-A-0 491 663

(D9) DE-A-3 722 214

(D10) DE-A-3 048 927

(D11) "Automated Visual Inspection" pages 459 and 460, Edited by B.G. Batchelor, D.A. Hill and D.C. Hodgson, IFS (Publications) Ltd, UK North-Holland 1985.

III. On 24 June 2003 oral proceedings were conducted according to an auxiliary request of the respondent.

At the oral proceedings the appellant requested that the decision under appeal be set aside and that the patent be maintained unamended (main request) or, in the alternative, on the basis of the first or second auxiliary requests submitted with the letter dated 23 May 2003.

The respondent requested that the appeal be dismissed.

IV. The wording of claim 1 according to the main request reads as follows:

"An apparatus for the inspection of ophthalmic lenses comprising:

a lens pallet (16) having wells (62) for receiving at a lens container receiving area a plurality of lens containers for holding a plurality of ophthalmic lenses,

an inspection station (22) including a lamp (70) for illuminating the lenses and the lens containers, and

image analysis means to determine whether individual ones of the lenses are acceptable or unacceptable; characterised in that:

the inspection station (22) also includes a camera (68) for capturing images of the lenses produced during illumination of the containers,

the image analysis means is connected to the camera to receive the images of the lenses from the camera (68) and to produce signals identifying said individual ones of the lenses as acceptable or unacceptable, and in that the apparatus also comprises:

a lens disposition mechanism (36) connected to the image analysis means to receive the signals therefrom and, in response to said signals, to remove all the lens

containers from the pallet and to physically separate acceptable lenses from unacceptable lenses,

a lens transport system comprising a conveyor (24) for transporting the pallet (16) from the lens container receiving area to the inspection station (22) and then to the lens disposition mechanism (36), and

means (32,44) for returning the pallet from the lens disposition mechanism to the container receiving area."

The wording of claim 12 according to the main request reads as follows:

"A method of inspecting ophthalmic lenses, for use with a movable pallet (16) having a plurality of wells (62), said method comprising:

placing lens containers into the wells (62) of the lens pallet (16) at a container receiving area,

placing ophthalmic lenses into the lens containers,

transporting the pallet (16) from the container receiving area to an inspection station (22) comprising a lamp (70),

illuminating the lenses and the lens containers with the lamp (70), and

transporting the pallet from the inspection station to a lens disposition mechanism,

characterised by the steps of:

capturing with a camera (68) images of the lenses produced during illumination of the lens containers,

determining whether the lenses contain non-conformities from the images received from the camera (68),

producing, in response to said determination, signals identifying lenses as acceptable or unacceptable,

dispositioning the lenses at the lens dispositioning mechanism in response to said signals by removing all the lens containers from the pallet (16) and physically separating acceptable lenses from unacceptable lenses, and

returning the pallet (16) from the lens dispositioning mechanism to the container receiving area."

Claims 2 to 11 and 13 to 19 according to the main request are dependent claims.

V. The appellant's arguments may be summarised as follows.

The closest prior art for the subject-matter of independent claims 1 and 12 is disclosed in document D1. According to D1, see page 2, lines 12 to 17, the prior art to this document suffered from the problem that it did not disclose in the context of automatised production of optical lenses how the quality could be reproducibly be controlled, for instance, by detecting scratches on the optical surfaces. The solution disclosed in D1, see page 2, lines 45 to 47, involves capturing high-contrast images of the optical parts. These images are obtained by using a dark-field illumination technique and by subsequently analysing these by counting the bright pixels in the image frame. This solution, capturing high-contrast images by using a dark-field illumination, is also pursued in all disclosed embodiments (Figures 1 and 12), and is furthermore defined in the independent claims 1, 8 and 14 of D1. Therefore the skilled person reading the disclosure of D1 understands that the teaching of this

document is exclusively concerned with this inspection method.

In the decision under appeal the opposition division had been of the opinion that the technical problem solved in the patent over the prior art in D1 was concerned with the automatised transport of the lenses. The division had made reference to the manufacturing process in Figure 7 of D1 and in particular to the final inspection of the lens in a container in step 47. According to page 7, lines 15 to 21, this final inspection includes a check of the quality of the lens placed in its package which check is carried out using the image analysis disclosed earlier in the document in the context of Figure 1. However, since in this embodiment a high angle of incidence dark field illumination is a prerequisite the contact lens can only be tested if its carrier (in the embodiment of Figure 1 the holding and transporting means 8) is optically flawless. It is undoubtable that neither the glass container nor the blister pack shown in Figures 9 and 10 meets this requirement, therefore a quality test of a lens in a container using the apparatus shown in Figure 1 would not provide any meaningful data. The skilled person reading document D1 concludes that the disclosure concerning the final check is technically impossible whence this part of the disclosure must be rejected. Because of this shortcoming in document D1 the skilled person would first have to address and solve this problem before he would consider any further improvement in the lens inspection process, for instance, automatising the lens transport. In this case it is noted that the inspection method in D1 is incompatible with the type of automation defined in the independent claims of the patent in suit because

according to the claims the lenses are inspected while a plurality of them being contained in a plurality of lens containers placed on a lens pallet. In the inspection method disclosed in D1 the lenses have to be centred to the field of view as shown in Figure 3 and to be properly rotated to the mask as shown in Figure 4 and in the flow chart in Figure 11. This is possible for an individual lens placed on a xy-table as shown in Figure 1, but it would not be feasible for a plurality of lenses fixed in containers on a pallet, which pallets are moved on conveyors as defined in the claims of the patent. Therefore starting from the disclosure in D1 the skilled person would not consider the automatised handling and transport as defined in the independent claims with which the objective problem, to increase the process efficiency in general, is solved, since in contrast to the present invention in the apparatus and method of D1 such a measure would not increase but rather decrease its efficiency. From the constraints imposed by the inspection apparatus in D1 it also follows that the lens inspection apparatus and process known from D1 is inherently incompatible with the conveyor-based transport apparatuses disclosed in documents D9 and D10, wherein a combination of these teachings is in any case questionable because lens testing concerns highly precise inspection of fragile objects requiring special handling techniques and D9 and D10 concern ordinary conveyors used in the production of blister packs. Finally with respect to the foil or blister pack shown in Figures 9 and 10 of D1 it is pointed out that this package is not a pallet as defined in the independent claims; and furthermore that the claims define that all the lens containers are removed from the pallet and that acceptable lenses are

physically separated from unacceptable lenses; this is uneconomical for the package shown in Figures 9 and 10 of D1, because if an unacceptable lens is diagnosed in this package the entire package has to be rejected. Rather the teaching in D1 is that all lenses are tested individually and the acceptable lenses are packaged. As set out before, a final inspection test of the packaged lenses with the apparatus of D1 would be impossible. Therefore the subject-matter of claim 1 and claim 12 involves an inventive step.

VI. The respondent's arguments may be summarised as follows:

Document D1 discloses an apparatus and a method for the inspection of ophthalmic lenses in which an inspection station including a lamp and a camera, image analysis means and a lens disposition mechanism are employed, see the embodiment shown in Figure 1. The subject-matter of claims 1 and 12 differs from the prior art in D1 in the provision of a circulating pallet on a conveyor for transporting the lenses. Therefore the objective problem addressed in the patent in suit may be seen in the automatisation of the lens transport. The claimed solution, a transport system with circulating pallets and a conveyor, is known from document D9 or equally D10. Furthermore document D1 teaches already on page 8, last paragraph of the description, that by applying the inspection method of this document in the manufacture of optical parts as shown in Figures 7 and 8 an automatisation degree of 100% can be reached. Figure 9 and its caption on page 4, lines 9 to 10 of D1 discloses a particular suitable package for plural lenses with which the final inspection can be carried out, for instance the check of presence of the lenses in a

blister pack, as referred to in step 47 of the flow chart in Figure 7. An alternative package comprising glass containers for individual lenses is disclosed on page 7, lines 13 to 14, and it is clear that a glass container carrying a lens which upon inspection is found to be unacceptable will be sorted out in the same way as disclosed on page 5, lines 37 to 39. Since the technical problem, to aim at a further automatisation of the production process, is already known from D1 and a solution, to provide circulating pallets on a conveyor belt, is readily implemented in this apparatus, the solution defined by the independent claims is obvious.

With respect to the argument of the appellant that the disclosure on page 7, lines 15 to 21 of D1 cannot be carried out because the apparatus disclosed in this document does not employ direct illumination but dark-field illumination it is noted that the independent claims of the patent in suit are silent about the type of illumination, therefore this feature is not a difference on the basis of which an inventive step could be argued. Furthermore the appellant asserts that it is the "final check" in the referred passage in D1 which cannot be carried out. However, on page 5, lines 40 to 44 these inspection steps are clearly explained. Also, the independent claims of the patent do not define that the inspection must be a "final inspection", therefore it cannot be seen that the inspection steps on page 5 of D1 would be excluded by the claims. With respect to the objection that the provision of an xy-table in the inspection apparatus of Figure 1 of D1 would render unfeasible a combination with a conveyor and lenses on pallets it is noted that according to page 4, lines 53 to 57, such an xy-table is merely an option; also the

feature referred to by the appellant that the lenses are centred is, according to the same passage, only an example. In any case "means for centring" and a "step of centring" the lenses are equally defined in claims 3 and 14 of the patent, hence it is not understandable why the skilled person would have problems in including a pallet and conveyor system in the apparatus known from D1 in order to improve the automatisation of the process, in particular because a transport means is already disclosed on page 5, line 40 and 41 of D1.

Therefore the subject-matter of claims 1 and 12 is obvious.

VII. The board gave its decision at the end of the oral proceedings.

Reasons for the Decision

1. The appeal is admissible.

2. *Main request*

Since during the opposition proceedings the original objection pertaining to lack of novelty had not been pursued the only issue to be considered in the appeal is the question of inventive step.

Inventive step

2.1 There is agreement amongst the parties that document D1 represents the closest prior art. This document discloses in the embodiment shown in Figure 1 an

apparatus and in Figure 11 of D1 the corresponding method for the inspection of ophthalmic lenses (6). The apparatus comprises an inspection station (2) including a lamp (18) for illuminating the lens and image analysis means (9) to determine whether the lens is acceptable or unacceptable. The inspection station also includes a camera (3) for capturing images of the lens and the image analysis means (9) is connected to the camera (3) to receive the images of the lenses from the camera and to produce signals identifying the lens as acceptable or unacceptable. The apparatus finally includes a lens disposition mechanism (11) connected to the image analysis means to receive the signals therefrom and, in response to these signals, to physically separate acceptable lenses from unacceptable lenses.

2.2 Document D1 discloses on page 6, line 37 to page 7, line 12, in the context of Figure 7, and similarly on page 7, starting on line 22 in the context of Figure 8, manufacturing processes of ophthalmic contact lenses, during which after every manufacturing step (31, 33, 34, 37, 39, 41 in Figure 7) an optical inspection step follows (32, 35, 36, 38, 40, 42, 44). These inspection steps can be carried out with the apparatus shown in Figure 1 of D1 and according to the image analysis steps in Figure 11 (see page 6, line 38; line 46; lines 48 and 49; line 53; lines 56 and 57; and page 7, lines 7 and 8; and in particular line 11). It is noted that according to page 5, lines 42 to 44, if the part under inspection does not meet the quality requirements it is removed from the capture and transport means (8), whence it is concluded that this sorting process is part of all inspection steps 32 to 44 in Figure 7.

2.3 On page 7, lines 13 and 14, document D1 discloses that (after optional hydration) the lens is inserted in glass containers or in blister packs ("foilpacks") as shown in Figures 9 and 10. In a following inspection step 47 it can be checked whether the lens indeed was placed in the container 69. The reference sign "69" finds its correspondance in the blister pack 68 shown in Figures 9 and 10. On page 7, line 16 it is explained that this check is in the context of a so-called "presence control" ("Anwesenheitskontrolle"). In the next lines, document D1 adds that the further checks in step 47 (fluid level; fluid purity; lens quality and refractive power) may be carried out according to the process of Figure 11 and the apparatus of Figure 1.

2.4 As to these further checks in step 47 the board concurs with the appellant that it is not a straightforward matter to obtain technically meaningful data for the optical quality of the lens if it is measured while in a transparent container of optically poor quality. It might be possible to detect the mere presence of a lens in a blister pack might using a dark-field illumination pattern, but in this case such a check would probably only be possible on controlling the presence of a single lens in its respective container in the blister pack at a time. The same would apply for a single lens in a glass container.

2.5 Therefore the optical inspection apparatus and the corresponding method disclosed in document D1 relate to the testing of *individual* lenses during the manufacturing process (steps 32 to 44 in Figure 7; steps 49 to 63 in Figure 8); and the detecting of the presence of an *individual* lens in a glass container or in one of

the respective containers 69 of the blister pack 68. It is concluded that the entire manufacturing process (both the one according to Figure 7, and the one according to Figure 8) until and including the affirmative check that the lens is in its container is concerned with the handling of an *individual* lens. As a final step the containers are closed with cover foils (page 7, lines 20 and 21; and line 58).

2.6 The apparatus defined in claim 1 of the main request comprises a lens pallet having wells for receiving a *plurality* of lens containers for holding a *plurality* of ophthalmic lenses. Furthermore, according to claim 1, the inspection station includes a lamp for illuminating *the* lenses and the lens containers; and the image analysis is carried out to determine and to produce signals identifying the individual ones of the lenses as acceptable or unacceptable, whereafter *all* lens containers are removed from the pallet while physically separating acceptable lenses from unacceptable lenses. The apparatus finally includes a lens transport system comprising a conveyor for transporting the pallet from the lens container receiving area to the inspection station and then to the lens disposition mechanism, and returning it to the container receiving area. These features are not known from document D1.

2.7 According to the appellant, the technical problem underlying these differences is not merely a transport problem but is simultaneously related to improving process efficiency. The respondent has argued that document D1 already contains several references to process automatisation (page 6, line 40; page 8, line 2) which would obviously suggest the inclusion of

automatised transport via e.g. pallets or conveyors, as known from D9 or D10.

2.8 The board agrees with the respondent that document D1 contains several references to automatisation. However, these references appear to be related to the desirability of avoiding visual quality control (see page 2, lines 5 to 10) and the solution offered in D1 is a fully automatised inspection process directly interacting with the manufacturing process (Figures 7 and 8). No disclosure or suggestion with respect to the automatisation of transport of the lens(es) is found in this document. Although such measures could be regarded as desirable *per se* and, for instance, documents D9 and D10 each disclose solutions in which, by using circulating pallets on conveyors, the output of the system is increased, the board is unable to see how, by a combination of the teachings of either of these documents with that of document D1, a lens inspection apparatus with the features of claim 1 of the main request or a method of inspecting lenses with the features of claim 12 *would* result without inventive skill.

2.9 Rather it appears that it is a consequence of selecting the inspection method based on dark-field illumination as in D1 that the object must be precisely centred (step 22 in Figure 11) and that the measurement should not suffer from stray radiation coming from other surfaces: for instance, the plate 148 in the embodiment of Figure 12 of D1 is at both sides provided with anti-reflection coatings (page 6, line 12). This condition would appear irreconcilable with the features in claim 1 and 12 of the main request that the lens is inspected while in a

container, because neither the glass containers nor the blister packs disclosed in D1 are expected to have high quality optical surfaces.

2.10 Furthermore, as set out in point 2.5 *supra*, in both embodiments according to Figure 7 and Figure 8 an *individual* lens is manufactured and during this process frequent inspection steps are included to control that the lens fulfils the specifications. In this context reference is made to the passage on page 8, lines 4 to 6, which discloses that because of the continuous monitoring or in-process control a final control of the finished lens may not be necessary. Therefore the skilled person would conclude that after manufacturing an individual lens according to the sequence of steps 31 to 45 in the embodiment of Figure 7 and similarly steps 48 to 66 in the embodiment of Figure 8 the finished lens may be packaged in a container, whereafter the only remaining test would be the check of its presence (step 47).

2.11 Should the skilled person wish to automatise the lens transport the only point in the process disclosed in D1 where such an automatised transport could be introduced without disrupting the manufacturing and inspection process would appear after the introduction of the lenses in the glass containers or blister packs. The addition of such a step to the known process would, however, not result in the subject-matter of claim 1 or of claim 12 of the main request, since both claims define that a *plurality* of lenses are transported in a lens pallet while in respective containers; that in the inspection station the lenses *in the containers* are illuminated and inspected on their acceptance; and that

all the lens containers are removed and the lenses in their containers are physically separated according to the result of the acceptance test.

2.12 As reasoned in point 2.4 it would be highly doubtful whether the skilled person would consider testing the optical quality of a contact lens while in a poor quality transmitting container by the dark-field illumination diagnostic system disclosed in D1. Furthermore, since neither documents D9 or D10 nor document D1 provide any teaching how the inspection or the handling process of document D1 could be modified in the claimed way the board is unable to see how the subject-matter of independent claims 1 and 12 of the main request *would* result from a combination of the teachings of these documents. It is concluded that the subject-matter of these claims involves an inventive step within the meaning of Article 56 EPC. Claims 2 to 11 and claims 13 to 19 are equally inventive by virtue of their dependence of claims 1 and 12.

3. Since the subject-matter of the claims of the appellant's main request is not obtainable from the prior art in an obvious way, the main request meets the requirements of Article 52(1) EPC and there is no need to consider the further auxiliary requests.

Order

For these reasons it is decision that:

1. The decision under appeal is set aside.

2. The patent is maintained as granted.

The Registrar: The Chairman:

P. Martorana E. Turrini