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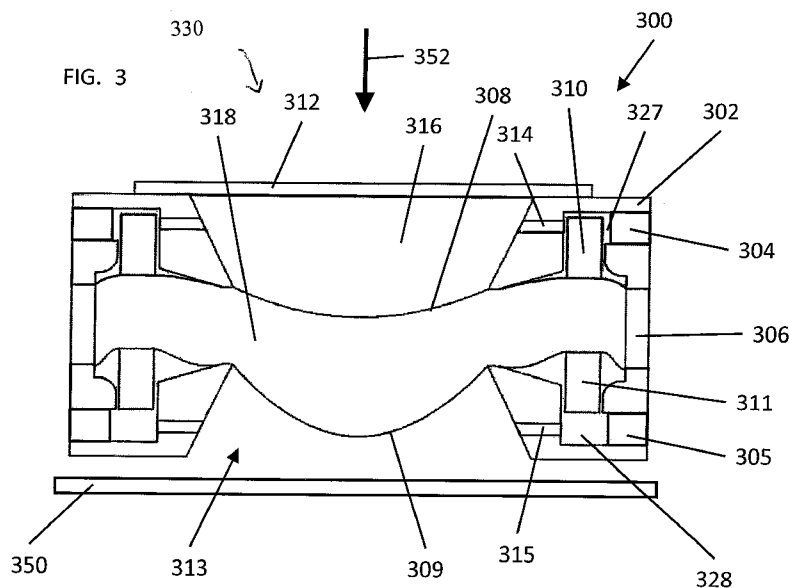
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AO, AT, AU, AZ, BA, BB, BG, BH, BR, BW, BY, BZ,
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[Continued on next page]

(54) Title: LENS ASSEMBLY APPARATUS AND METHOD



(57) Abstract: An optical apparatus includes a first membrane, a second membrane and at least one electromagnetically displaceable component. The first membrane includes an optically active area. The first membrane and the second membrane are coupled by a filler material disposed in a reservoir. At least one electromagnetically displaceable component is coupled to the filler material via the second membrane, such that a displacement of the at least one electromagnetically displaceable component is operative to cause a deformation of the optically active area of the first membrane by movement of the filler material.

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ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MK, MT, NL, NO, PL, PT, RO, SE, SI, SK, SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

— *before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments (Rule 48.2(h))*

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According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

G02B 3/14; G02B 7/28; H01L 33/00; H01L 21/329; G02B 15/14

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Korean utility models and applications for utility models

Japanese utility models and applications for utility models

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

eKOMPASS(KIPO internal) & Keywords: lens, membrane, deformable

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X A	JP 11-133210 A (DENSO CO., LTD.) 21 May 1999 See pages 3-6, and figures 5-7, 11-14	1-26, 66-71, 74-86 , 99-100 27-65, 72-73, 87-98 , 101-109
A	US 2006-0028734 A1 (STEIN KUIPER et al.) 09 February 2006 See pages 4-5, and figures 4-6	1-109
A	US 2008-0142820 A1 (JOHN A. EDMOND et al.) 19 June 2008 See pages 2-4, and figures 1-4	1-109

 Further documents are listed in the continuation of Box C. See patent family annex.

* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier application or patent but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search

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Name and mailing address of the ISA/KR

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Box No. II Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)

This international search report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:

2. Claims Nos.:
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:

3. Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box No. III Observations where unity of invention is lacking (Continuation of item 3 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

Group 1, claims 1-47 directed to a second membrane. Group 2, claims 48-55 directed to one actuator element. Group 3, claims 56-60 directed to a motor. Group 4, claims 61-62 directed to a deformable lens. Group 5, claims 63-65 directed to a semi-permeable membrane. Group 6, claims 66-71 directed to a deformable lens. Group 7, claims 72-73 directed to one piezo motor. Group 8, claims 74-82 directed to a second mechanism. Group 9, claims 83-86 directed to a displacement mechanism. Group 10, claims 87-98 directed to a reflector. Group 11, claim 99 directed to a second deformable lens. Group 12, claim 100 directed to a membrane. Group 13, claims 101-106 directed to a first detachment point. Group 14, claims 107-109 directed to an actuation device. Since there is no technical relationship among those groups of inventions involving one or more of the same or corresponding special technical features, this application does not fulfill the requirement of unity of invention.

1. As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.
2. As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.
3. As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:

4. No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

Remark on Protest

- The additional search fees were accompanied by the applicant's protest and, where applicable, the payment of a protest fee.
- The additional search fees were accompanied by the applicant's protest but the applicable protest fee was not paid within the time limit specified in the invitation.
- No protest accompanied the payment of additional search fees.

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.

PCT/US2010/026749

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
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