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| EXAMINER | |
|---|---|
| ANGEBRANNDT, MARTIN J | |
| **ART UNIT** | **PAPER NUMBER** |
| 1795 | |
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**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

| Office Action Summary | Application No. | Applicant(s) | |
|---|---|---|---|
| | 10/834,431 | GLEBOV ET AL. | |
| | Examiner | Art Unit | |
| | Martin J. Angebranndt | 1795 | |

*-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --*

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

1)☒ Responsive to communication(s) filed on *5/18/09*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

4)☒ Claim(s) *1-30* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-7 and 11-30* is/are rejected.

7)☒ Claim(s) *8-10* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

**Application Papers**

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

**1.** The request for continued examination has been received and made of record. The declaration of Dr. Leon GLEBOV has been considered. Attachment A to the declaration is 28 pages of (powerpoint) slides. **Page 18 is somewhat equivalent to figures 6, 10 and so add nothing to the record beyond the reference to "Raytheon's Scanner". It is not clear what the structure of the scanner that the applicant is referring to is. The declaration is silent with respect to the photograph attached to the declaration which has a page number of "14" . It is not clear from the declaration (which is silent regarding the photograph), what document this was page 14 of and when it was available to the public which is the question at hand. The issue of enablement hangs if one of ordinary skill in the art would have been able to assemble a scanning device bounded by the claims based upon the (public) knowledge of one of ordinary skill in the art at the time of filing. If this photo/mechanical drawing had been part of publication available to the public, then the answer would be yes. This question has not been addressed. Also is this a photograph/drawing of "Raytheon's Scanner" discussed on page 18 of the slides/presentation ? The issue is not merely spinning the gratings (see Cook), but spinning one gating, while moving the other in tandem with the spinning so that it's axis of spinning is co-incident with the optical axis of the diffracted beam.**

2. The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

3. Claims 14-30 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. The claim(s) contains subject matter which

was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention.

If the first grating is spinning, (BG1 in figure 6) then the location/axis of the diffracted light changes and only for a certain portion of the time is the diffracted light incident at all upon the second gratings (BG2a or BG2b), let alone coaxial with the spinning axis of these, unless these are moving together in space with BG1 and while being rotated about their axes. The specification does not describe means for this or describe the gratings (BG2a or BG2b) moving in space. The enablement seems to be only for at some time in the scanning, the axis of the incident light being coaxial/coincident with the axis of the spinning grating.

The specification does not describe means for rotating the first and second gratings together so that the light diffracted by the first is always incident upon the second grating. Page 18 cited in the response does not describe these means. The figures and specification do not describe the larger movement of the second grating(s) in space so that the light diffracted over them is consistently incident upon them at the point about which they are rotated.

The Wands Factors are analyzed below:

1) The nature of the invention is laser scanning using diffractive elements (ie gratings).

2) The state of the prior art evidences scanning/steering using two diffractive elements which rotate and the light passes through them (Cole et al.). The Efimov

reference teaches plural gratings which are wobbled or pivoted to move/scan/steer the beams through space to different points.

3) The level of one of ordinary skill in the art is an individual with at least a BS degree, but mostly having either a further degree or equivalent work experience.

4) The effects of diffraction are well known and predictable, but coupling scanning with the physical movement of other elements is more complex.

5) There are no teachings of mounts/holding means or drivers (motors, etc) for either for the spinning/rotation of the gratings or the physical movement of the gratings through space.

6) A working example is mentioned on page 21, but not described in any detail (beyond its existence).

7) The breadth of the claims embrace two as well as three of more grating elements as evidenced by figures 6 and 9.

8) The skilled artisan could not make a beam scanning apparatus claimed (claims 14-23) or required in method claims 1-13 having more than two diffractive elements without undue experimentation. The scanning language requires movement on thier own to move the beams, so merely being able to move by hand the second and third gratings so that the diffracted beam in incident upon thier axis of rotation is not sufficient. A more robust and self-contained means must be disclosed. There would be significant and undue experimentation required to practice the full scope of coverage sought, where three of more gratings were coupled in their movement so that the light diffracted by the previous grating in incident upon the point of the axis of rotation of the subsequent grating.

Therefore claims 1 and 14 and those depending upon them are rejected for lacking enablement for the entirety of its scope.

**Further, where is the enablement for the three successive gratings provided in the specification as filed. (page and line please).**

**Each claims is assigned a date and contrary to the apparent position of the applicant, merely because the independent claim is accorded a date, does not mean that all the claims dependent upon it are accorded that same date.**

4. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

5. Claims 1-30 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 1 is unclear as to if the plurality of holograms is in the same piece of PTR glass or not.

6. Claims 3,6-10 are objected to under 37 CFR 1.75(c), as being of improper dependent form for failing to further limit the subject matter of a previous claim. Applicant is required to cancel the claim(s), or amend the claim(s) to place the claim(s) in proper dependent form, or rewrite the claim(s) in independent form.

In claim 1, the grating exposure (patterning exposure) is done using ionizing/UV radiation. In the claims of 7326500, (and instant claim 3) a uniform exposure using the UV/ionizing radiation and then the visible exposure is a patterning exposure.

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

8. Claims 1-2,4,5 and 11-13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Glebov et al. "Polychromatic glasses – a new material for recording volume phase holograms", Sov. Phys. Dokl Vol. 35(10) pp. 878-880 (10/1990) or Glebov et al. "Photoinduced processes in photothermorefractive glasses", Proc. 18th Int. Congr. Glass pp. 1151-1156 (1998), in view of Maniloff et al. "Maximized photorefractive holographic storage", J. Appl. Phys. Vol. 70(9) pp 4702-4707 (11/1991).

Glebov et al. "New Ways to use photosensitive glasses for recording volume phase holograms" Opt. Spectrosc. Vol 73 (2) pp. 237-241 (08/1992) teaches the exposure of the PTR glass to UV light (nitrogen laser, 337 nm) to record a grating followed by thermal development at 460-540 degrees C. The angular selectivity is illustrated in figures 5 and 6.

Glebov et al. "Photoinduced processes in photothermorefractive glasses", Proc. 18th Int. Congr. Glass pp. 1151-1156 (1998) describes a glass is described composed of sodium, zinc, aluminum, and silicon oxides doped with cerium, silver, fluorine and bromine which is prepared in the manner described in the experimental section. Figure 4 evidences diffraction efficiency of approximately 95% for a PTR glass which has been exposed at approximately 0.5 J/cm$^2$ (500 mJ/cm$^2$) using exposure to UV light from a HeCd laser (325nm). Figure 5 evidences increased refractive index modulation as a function of the duration of heating for an exposure of 64 mJ/cm$^2$ with heating at 520 degrees for up to 200 minutes. The examiner notes that figure 5 evidences a 275% increase in refractive index modulation at 200 minutes, compared with 50 minutes. The

examiner notes that the first data point of figure 4 seems to correspond to the second data point of figure 5 and that one expects that the diffraction efficiency of the 64 $mJ/cm^2$ exposure with a heating of 200 minutes at 520 degrees C would have a high diffraction efficiency similar to that achieved by the higher exposures with heating for a shorter duration. The use of exposures in the range of $50mJ/cm^2$ to $5J/cm^2$ is disclosed on the second page. The use of DTA analysis of all the samples and the annealing of the variously processed samples is disclosed on the second page. Note that the disadvantages of references 1 and 2 apply only to the processing of the materials.(first page)

Maniloff et al. "Maximized photorefractive holographic storage", J. Appl. Phys. Vol. 70(9) pp 4702-4707 (11/1991) teaches the storage of multiple holograms in photorefractive materials. (see figure 5, which shows 10 and 30 holograms angularly multiplexed.

It would have been obvious to one skilled in the art to modify the processes of Glebov et al. "Polychromatic glasses – a new material for recording volume phase holograms", Sov. Phys. Dokl Vol. 35(10) pp. 878-880 (10/1990) or Glebov et al. "Photoinduced processes in photothermorefractive glasses", Proc. 18th Int. Congr. Glass pp. 1151-1156 (1998) by recording plural holograms to increase the information content of the holographic recording medium as taught by Maniloff et al. "Maximized photorefractive holographic storage", J. Appl. Phys. Vol. 70(9) pp 4702-4707 (11/1991).

The embodiments bounded by the claims where UV/ionizing radiation is used for the interferometric exposure are rendered obvious by this rejection.

9. Claims 1-6 and 11-13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bukharev et al., "Recording of holograms on radiation color centers in glass",

Pis'ma v Zhurnal Tekhnicheskoi Fiziki Vol. 1(21) pp. 975-7 (1975), in view of Maniloff et al. "Maximized photorefractive holographic storage", J. Appl. Phys. Vol. 70(9) pp 4702-4707 (11/1991).

Bukharev et al., "Recording of holograms on radiation color centers in glass", Pis'ma v Zhurnal Tekhnicheskoi Fiziki Vol. 1(21) pp. 975-7 (1975) in the abstract describes the exposure of a color center forming glass to gamma or UV radiation to form color centers, followed by the decolorization using 632.8 nm (HeNe) interferometric exposure to form a hologram followed by heating.

It would have been obvious to one skilled in the art to modify the processes of Bukharev et al., "Recording of holograms on radiation color centers in glass", Pis'ma v Zhurnal Tekhnicheskoi Fiziki Vol. 1(21) pp. 975-7 (1975) by recording plural holograms to increase the information content of the holographic recording medium as taught by Maniloff et al. "Maximized photorefractive holographic storage", J. Appl. Phys. Vol. 70(9) pp 4702-4707 (11/1991).

The embodiments bounded by the claims where UV/ionizing radiation is unpattrned and visible light is used for the interferometric exposure are rendered obvious by this rejection.

10. Claims 1-7,11 and 12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Araujo et al. '404, in view of Bukharev et al., "Recording of holograms on radiation color centers in glass", Pis'ma v Zhurnal Tekhnicheskoi Fiziki Vol. 1(21) pp. 975-7 (1975) and Glebov et al. "Photoinduced processes in photothermorefractive glasses", Proc. 18$^{th}$ Int. Congr. Glass pp. 1151-1156 (1998).

Araujo et al. '404 teaches the heating of the glasses to 450-650 degrees C is disclosed in table I and the use of mercury arc lamps as the light darkening source and various lasers including krypton ion lasers operating at 480, 531 and 570 nm as the bleaching light source is taught in table II. The darkening of the glass is disclosed as causing color center formation (9/56-10/16). The treatment of the bistable photochromic glass to make the images stable is disclosed. (16/61-17/11).

It would have been obvious to one skilled in the art to modify the process of Araujo et al. '404 by using two overlapping beams from the disclosed Krypton ion lasers to form a bleached holographic pattern in the color centers based upon the teachings of of Bukharev et al., "Recording of holograms on radiation color centers in glass", Pis'ma v Zhurnal Tekhnicheskoi Fiziki Vol. 1(21) pp. 975-7 (1975)(Abstract only), to use the high purity materials developed by Glebov et al. "Photoinduced processes in photothermorefractive glasses", Proc. 18th Int. Congr. Glass pp. 1151-1156 (1998) and to stabilize the resulting holographic images through the thermal treatment as taught by Glebov et al. "Photoinduced processes in photothermorefractive glasses", Proc. 18th Int. Congr. Glass pp. 1151-1156 (1998), who also teaches that holograms in PTR materials such as those of Araujo et al. '404 are desirable.

11. Claims 24-25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Efimov et al. '104 and Cook et al. '028.

Efimov et al. '104 teaches the recording of a bragg grating using the interferences of beams from a 325 nm HeCd laser, which is thermally developed at between 500 and 650 degrees C [0059-0060,0089]. The recording of gratings in PTR glass discs and the use of these to deflect a beam is disclosed. The pivoting, (but not rotation/spinning) of the

disks is disclosed [0108-0015]. Figure 8a shows deflection by diffraction of the transmitted light to other gratings and figure 8b shows deflection by diffractive reflection of the light to another grating. The diffraction efficiency is more than 93%.

Cook et al. '028 describes with respect to figures 5a-c, the two gratings may be rotated together such that the diffracted light 508 remains normally incident upon gratings 504 (5/66-6/49, particularly 6/4-15).

It would have been obvious to one skilled in the art to skilled in the art to modify the embodiments of figure 8a of Efimov et al. '104 by using a rotational motion of the gratings as shown figures 5a-c of Cook et al. '028 with a reasonable expectation of forming a useful scanner and scanning linear patterns based upon the description of scanning in both these embodiments and/or it would have been obvious to modify the embodiment of figure 5a-c of Cook et al. '028 by using PTR gratings of Efimov et al. '104 to gain their high diffraction efficiency with a reasonable expectation of success based upon the description of scanning in both these embodiments.

The Cook et al. '028 reference addresses the issue of directing the light with the first grating toward the second grating such that it is perpendicular to the second grating.

The applicant argues that scanning of the collimated optical beams is not taught. Efimov et al. '104 specifically uses the term with respect to scanning the beam across a space as shown below:

> [0119] FIG. 9a shows beam steering by utilizing the matrix of Bragg gratings 635 recorded in PTR glass flat disc ring 630. All grating 635 should be recorded in such way to have the same Bragg angle for incident beam and various exit angles to provide selectable scanning of the space 640 with trajectories 650, 660, 670. It can be done in configuration of compact disk 630 as it is shown in FIG. 9a, or in any other configuration, e.g. orthogonal matrix.

A simple estimation of capacity of such system can be done. For the laser beam 610 of 1 mm diameter, 100 gratings/cm.sup.2 can be recorded in glass plate 630. Compact disk 630 has surface of about 100 cm.sup.2. Consequently, 10.sup.4 gratings 635 can be recorded in one disk 630 of about 120 mm diameter and therefore 10.sup.4 positions in the space can be pointed. It is important that two-step process of hologram recording in PTR glass (exposure and development) allows writing of several elements in the same volume of glass with no interaction between different holograms. This means that angular scanning of matrix can result in dramatic capacity increase.

Cook et al. '028 uses the term steering instead, but the effect is the same, specifically moving the collimated laser beam so that it is directed at other positions, so the combination cannot but teach scanning of the collimated laser beam over a range of arbitary angles. The rejection stands.

12. Claims 18-26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Efimov et al. '104 and Cook et al. '028, in view of Broome et al. '831 and Metlitsky et al. '904.

Broome et al. '831 in figure 3 teaches where the discs are tilted for reflective to the next element (6/3-9)

Metlitsky et al. '904 teach the use of two mirrors to produce scanning of laser beams as illustrated in figure 1. The formation of various scanning patterns, such as those shown figures 2-11 by changing the angles or relative rate of rotation of the mirrors

It would have been obvious to one skilled in the art to skilled in the art to modify the embodiments of figure 8b of Efimov et al. '104 by using a rotational motion of the gratings in a manner similar to that shown in figure 1 of Metlitsky et al. '904, but where the fringes of the gratings are at an angle as opposed to the grating itself with a

reasonable expectation of forming a useful scanner and scanning linear patterns based upon the description of scanning in both these embodiments and the teachings of the use of reflection gratings in reflective scanners by Broome et al. '831 with a reasonable expectation of success based upon the description of scanning in both these embodiments.

13. Claims 18-26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Efimov et al. '104 and Cook et al. '028, in view of Broome et al. '831 and Metlitsky et al. '904, combined with, further in view of Bryngdahl et al., 'Laser beam scanning using computer generated holograms', Appl. Opt. Vol. 15(1) pp. 183-194.

Bryngdahl et al., 'Laser beam scanning using computer generated holograms', Appl. Opt. Vol. 15(1) pp. 183-194 (01/1976) teaches the use of computer generated holograms in scanning and on pages 184 describes the equivalence of refractive, reflective and diffraction optical elements in scanning systems.

To address the embodiments not rendered obvious above, but bounded by the claims, the examiner cites Bryngdahl et al., 'Laser beam scanning using computer generated holograms', Appl. Opt. Vol. 15(1) pp. 183-194 and holds that it would have been obvious to modify the embodiments rendered obvious by the combination of Efimov et al. '104 and Cook et al. '028, in view of Broome et al. '831 and Metlitsky et al. '904 by using grating patterns which do not result in linear scanning of the beam but result in helical, trepanning or rotational Lissajous patterns, such as those illustrated in figure 10 of the instant application and/or figures 2-11 of Metlitsky et al. '904 with a reasonable expectation of success based upon the disclosure of the equivalence of diffraction and reflective optical elements in scanning by Bryngdahl et al., 'Laser beam

scanning using computer generated holograms', Appl. Opt. Vol. 15(1) pp. 183-194 (01/1976).

14. The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. A nonstatutory obviousness-type double patenting rejection is appropriate where the conflicting claims are not identical, but at least one examined application claim is not patentably distinct from the reference claim(s) because the examined application claim is either anticipated by, or would have been obvious over, the reference claim(s). See, e.g., *In re Berg*, 140 F.3d 1428, 46 USPQ2d 1226 (Fed. Cir. 1998); *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) or 1.321(d) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent either is shown to be commonly owned with this application, or claims an invention made as a result of activities undertaken within the scope of a joint research agreement.

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

15. Claims 1-2,4,5,11 and 12 are rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1-11 of U.S. Patent No. 6586141. Although the conflicting claims are not identical, they are not patentably

distinct from each other because they seek coverage for the same process of recording holograms using PTR materials.

16. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Martin J. Angebranndt whose telephone number is 571-272-1378. The examiner can normally be reached on Monday-Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mark Huff can be reached on 571-272-1385. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Martin J Angebranndt/
Primary Examiner, Art Unit 1795

Martin J Angebranndt
Primary Examiner
Art Unit 1795

8/3/09