

SEARCH REPORT

Application Number

LH 25
LT 2020563

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	US 2014/092931 A1 (STRAUSS UWE [DE] ET AL) 3 April 2014 (2014-04-03) * paragraphs [0062] - [0071], [0084]; figures 2,6 *	1-3, 5-10,12, 16,19	INV. H01S3/02 G02B7/00
Y	Base Lab Tools: "October 2015 Newsletter - Liquid cooled breadboard", 25 October 2015 (2015-10-25), pages 1-4, XP55836026, Retrieved from the Internet: URL:https://www.baselabtools.com/October-2 015-Newsletter_b_22.html [retrieved on 2021-08-30] * pages 1-2 *	1-19	
Y	US 2006/086293 A1 (RYABOY VYACHESLAV M [US] ET AL) 27 April 2006 (2006-04-27) * paragraphs [0030] - [0035]; figure 1 *	1-19	
The present search report has been drawn up for all claims			TECHNICAL FIELDS SEARCHED (IPC)
			H01S G02B
Munich		Date of completion of the search 31 August 2021	Examiner Laenen, Robert
CATEGORY OF CITED DOCUMENTS		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document	
X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document			

**ANNEX TO THE SEARCH REPORT
ON LITHUANIAN PATENT APPLICATION NO.**

LH 25
LT 2020563

This annex lists the patent family members relating to the patent documents cited in the above-mentioned search report.
The members are as contained in the European Patent Office EDP file on
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

31-08-2021

Patent document cited in search report			Publication date	Patent family member(s)			Publication date
US 2014092931	A1	03-04-2014	US	2014092931	A1	03-04-2014	
			US	2015288138	A1	08-10-2015	

US 2006086293	A1	27-04-2006	US	2006086293	A1	27-04-2006	
			US	2013001396	A1	03-01-2013	

WRITTEN OPINION

File No. LH25	Filing date (<i>day/month/year</i>) 14.12.2020	Priority date (<i>day/month/year</i>)	Application No. LT2020563
International Patent Classification (IPC) INV. H01S3/02 G02B7/00			
Applicant UAB "Integrali skaidulin optika"			

This opinion contains indications relating to the following items:

- ☒ Box No. I Basis of the opinion
- ☐ Box No. II Priority
- ☐ Box No. III Non-establishment of the opinion with regard to novelty, inventive step and industrial applicability
- ☐ Box No. IV Lack of unity of invention
- ☒ Box No. V Reasoned statement with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- ☐ Box No. VI Certain documents cited
- ☐ Box No. VII Certain defects in the application
- ☐ Box No. VIII Certain observations on the application

	Examiner Laenen, Robert
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WRITTEN OPINION**Box No. I Basis of this opinion**

1. This opinion has been established on the basis of the latest set of claims filed before the start of the search.
2. With regard to any **nucleotide and/or amino acid sequence** disclosed in the application, this opinion has been established on the basis of:
 - a. type of material:
 - ☐ a sequence listing
 - ☐ table(s) related to the sequence listing
 - b. format of material:
 - ☐ on paper
 - ☐ in electronic form
 - c. time of filing/furnishing:
 - ☐ contained in the application as filed.
 - ☐ filed together with the application in electronic form.
 - ☐ furnished subsequently for the purposes of search.
3. ☐ In addition, in the case that more than one version or copy of a sequence listing and/or table relating thereto has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.
4. Additional comments:

Box No. V Reasoned statement with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes: Claims	4, 6, 7, 11, 13-15, 17-19
	No: Claims	1-3, 5, 8-10, 12, 16
Inventive step (IS)	Yes: Claims	
	No: Claims	1-19
Industrial applicability (IA)	Yes: Claims	1-19
	No: Claims	

2. Citations and explanations

see separate sheet

Re Item V

Reasoned statement with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1 Reference is made to the following documents:

- D1 US 2014/092931 A1 (STRAUSS UWE [DE] ET AL) 3 April 2014 (2014-04-03)
- D2 Base Lab Tools: "October 2015 Newsletter - Liquid cooled breadboard", , 25 October 2015 (2015-10-25), pages 1-4, XP55836026, Retrieved from the Internet:
URL:https://www.baselabtools.com/October-2015-Newsletter_b_22.html [retrieved on 2021-08-30]
- D3 US 2006/086293 A1 (RYABOY VYACHESLAV M [US] ET AL) 27 April 2006 (2006-04-27)

2 The subject-matter of claims 1,8 is not new.

2.1 D1 discloses a method for homogenizing the temperature of a laser base plate, wherein holders of laser optical components are attached to the laser base plate (Figs. 2,6; par. 62-71,84), comprising:

- choosing of material from which the laser base plate 12 and optical component holders 14 will be made (Figs. 2,6; par. 66,69,71,84; *D1 discloses a stainless steel plate and a stainless steel cover holding an optical window 15 as component*),
- providing the laser base plate with a temperature homogenizing means (Figs. 2,6; par. 66,71,84; *D1 discloses a copper rod as homogenizing means*),
- attaching of the optical component holders to the laser base plate and their final alignment (par. 69), wherein

the material selected for the production of the laser base plate and the optical component holders is stainless steel (Figs. 2,6; par. 66,69,71,84; *D1 discloses a stainless steel plate and a stainless steel cover as holder*),

the temperature homogenizing means is at least one elongated heat transfer means inserted in the laser base plate (Figs. 2,6; par. 66,71,84; *D1 discloses a stainless steel plate 12 with a copper rod core inside*),

the heat transfer means is selected to have a significantly, preferably at least ten times, a higher thermal conductivity than stainless steel and a coefficient of thermal expansion close to that of stainless steel (Figs. 2,6; par. 66,71,84; *D1 discloses a stainless steel plate 12 with a copper core inside and it is known that the CTE of copper is close to that of steel but the thermal conductivity is at least ten times higher*),

the optical component holders are attached to said laser base plate and adjusted using laser spot welding (par. 69; *D1 discloses a TO housing with a LD inside and consequently because of the dimensions involved welding can only be performed by laser spot welding although not explicitly disclosed in D1*).

Therefore, the subject-matter of claim 1 is not new.

- 2.2 Claim 8 defines a device putting a method as defined in claim 1 into practice without adding in any clearly limiting manner features beyond the ones as already defined in claim 1. Therefore, according to a corresponding argumentation as detailed above also the subject-matter of claim 8 is not new in view of D1.

- 3 The subject-matter of claims 1,8 does not involve an inventive step.

Document D2 is considered to represent closest prior art.

- 3.1 D2 discloses a method for homogenizing the temperature of a laser base plate, wherein holders of laser optical components are attached to the laser base plate (p. 1-2), comprising:

- choosing of material from which the laser base plate and optical component holders will be made (p. 1-2; *D2 discloses a solid aluminium base plate and every component holder must be made from a material*),
- providing the laser base plate with a temperature homogenizing means (p. 1-2; *D2 discloses a solid aluminium base plate and copper tubes which are inserted into the plate on one side*),
- attaching of the optical component holders to the laser base plate and their final alignment (p. 1-2; *D2 disclose an optical breadboard with mounting holes to mount an optical component via a holder*), wherein

the temperature homogenizing means is at least one elongated heat transfer means inserted in the laser base plate (p. 1-2; *D2 discloses two parallel copper tubes which are inserted into the plate on one side*),

the heat transfer means is selected to have a significantly, preferably at least ten times, a higher thermal conductivity than stainless steel and a coefficient of thermal expansion close to that of stainless steel (p. 1-2; *D2 discloses copper tubes as heat transfer means and it is known that the CTE of copper is close to that of steel but the thermal conductivity is at least ten times higher*).

- 3.2 The subject-matter of claim 1 differs from D2 in that
- the laser base plate and the optical component holders are made from stainless steel,
 - the optical component holders are adjusted and attached to said laser base plate using laser spot welding.
- 3.3 The problem to be solved by the distinguishing features may therefore be regarded as to provide a laser base plate suitable for fixed mounting of optical components.
- 3.4 D2 discloses as one possibility to mount optical components on the upper surface of the table with the copper tubing on the bottom side (p. 2, figure at the bottom of the page).

In case the skilled person solves the technical problem posed he has to look for a teaching on how to enable fixed mounting of optical components on a breadboard as laser base plate as disclosed in D2.

He will consider D3 as being relevant as D3 stems from the same technical field of a breadboard as laser plate to mount optical components.

D3 discloses that in order to weld an optical component holder on the laser base plate the plate must be manufactured from stainless steel like the component holder and that in such a case an aluminium base plate must be replaced by stainless steel as an alternative material (Fig. 1; par. 30-35).

- 3.5 Starting from D2 as closest prior art and solving the technical problem posed no inventiveness is involved in replacing the aluminium plate material of D2 by stainless steel and to laser weld the holder to the base plate as taught by D3.
- Consequently, the subject-matter of claim 1 does not involve an inventive step.
- 3.6 Claim 8 defines a device putting a method as defined in claim 1 into practice without adding in any clearly limiting manner features beyond the ones as already defined in claim 1. Therefore, according to a corresponding argumentation as detailed above also the subject-matter of claim 8 does not involve an inventive step in view of the combination of documents D2 and D3.

- 4 Dependent claims 2,3,5,9,10,12,16 do not contain any additional features which, in combination with the features of any claim to which they refer, meet the requirements with respect to novelty, the reasons being as follows:
- D1 discloses the subject-matter of claims 2,3,5,9,10,12,16 as D1 discloses the following features:
- claims 2,3,5,9,10,12: D1 discloses a copper rod shaped heat transfer means oriented into two directions (Figs. 2,6; par. 66);
 - claim 16: D1 discloses the LD in the TO housing to be driven with a current and heat being removed (par. 61,62), i.e. the whole device must have been mounted on a heat sink in order to provide an electrical current to the LD and to remove the heat generating during operation and therefore, D1 discloses a heat sink dissipating the heat from the laser base plate.
- Therefore, the subject-matter of claims 2,3,5,9,10,12,16 is not novel.
- 5 Dependent claims 4, 6, 7, 11, 13-15, 17-19 do not contain any additional features which, in combination with the features of any claim to which they refer, meet the requirements with respect to inventive step, the reasons being as follows:
- A method and a device as defined in claims 1,8 is known from D1 (see point 2 above) and rendered not inventive from the combination of D2 and D3 (see point 3 above).
- claims 6,7,19: Using an optical component holder comprising two monolithic blocks and aligning the optical component along orthogonal directions before fixing to the plate and using AISI 304 stainless steel merely represents the application of standard workshop knowledge well known in the field of lasers which can therefore, per se, not involve any inventiveness as it is merely obvious.
 - claims 4,11,13,14,17: D2 discloses to use two parallel copper tubes at equal intervals acting as heat pipes and arranged in one direction with the possibility in one alternative to insert the tubing in the optical component (p. 1; *especially the top figure*) and therefore, it is obvious by itself to keep these features when arriving at the subject-matter of claims 1,8 without involving inventiveness and starting from D2 as closest prior art.

- claim 15: D2 discloses to connect the copper tubing heat transfer means to a water chiller as additional heat transfer means (p. 2, last par.) and therefore, it is obvious by itself to keep this feature when arriving at the subject-matter of claim 8 without involving inventiveness and starting from D2 as closest prior art.
- claim 18: Adding further water cooling means into the laser base plate to improve cooling of the plate represents merely an obvious choice the skilled person is well aware of from basic workshop knowledge which therefore can, per se, not involve any inventiveness as it is merely obvious.

Therefore, the subject-matter of claims 4, 6, 7, 11, 13-15, 17-19 does not involve an inventive step.