



(11) **EP 2 738 627 A3**

(12) **EUROPEAN PATENT APPLICATION**

(88) Date of publication A3:  
**18.02.2015 Bulletin 2015/08**

(51) Int Cl.:  
**G04F 5/14 (2006.01) H03L 7/26 (2006.01)**

(43) Date of publication A2:  
**04.06.2014 Bulletin 2014/23**

(21) Application number: **13191631.4**

(22) Date of filing: **05.11.2013**

(84) Designated Contracting States:  
**AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO RS SE SI SK SM TR**  
Designated Extension States:  
**BA ME**

(72) Inventors:  
• **Overstolz, Thomas**  
**2072 Saint-Blaise (CH)**  
• **Haesler, Jacques**  
**1789 Lugnorre (CH)**

(30) Priority: **05.11.2012 US 201261722468 P**

(74) Representative: **GLN SA**  
**Avenue Edouard-Dubois 20**  
**2000 Neuchâtel (CH)**

(71) Applicant: **CSEM Centre Suisse d'Electronique et de Microtechnique SA - Recherche et Développement**  
**2002 Neuchâtel (CH)**

(54) **Micro-machined vapor cell**

(57) The invention concerns a micro-machined vapor cell (1) comprising a central silicon element (10) forming a cavity (20) containing vapor cell reactants such as alkali metal or alkali metal azide, at least a buffer gas, and/or at least an anti relaxation coating; a first (30) and a second (40) glass caps sealing the cavity (20); and a solenoid

(50) arranged to provide a homogeneous magnetic field to said vapor cell (1). The solenoid (50) is coiled directly on the central silicon element (10) of the vapor cell (1). This invention is an improvement for the highly miniaturized atomic clocks developments.

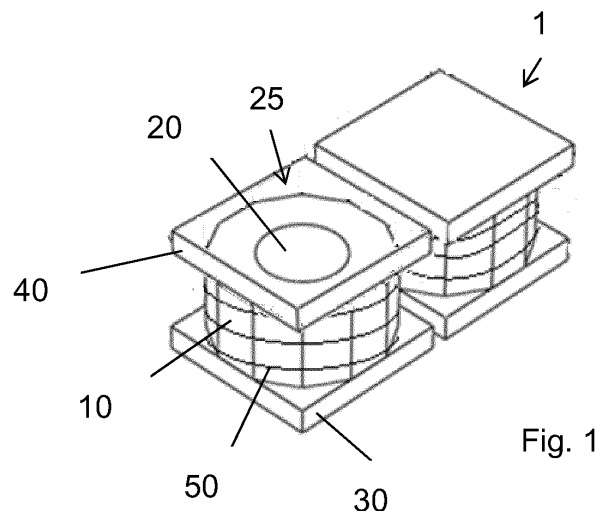


Fig. 1

**EP 2 738 627 A3**



EUROPEAN SEARCH REPORT

Application Number  
EP 13 19 1631

5

10

15

20

25

30

35

40

45

50

55

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 2006/022761 A1 (ABELES JOSEPH H [US] ET AL) 2 February 2006 (2006-02-02) * paragraphs [0030] - [0036]; figures 2,3,4,13 *	1,6-8	INV. G04F5/14 H03L7/26
A	----- US 6 265 945 B1 (DELANEY MICHAEL J [US] ET AL) 24 July 2001 (2001-07-24) * abstract; figure 3 *	1-8	
A	----- US 2005/007118 A1 (KITCHING JOHN [US] ET AL) 13 January 2005 (2005-01-13) * page 113 - page 114; figure 1 *	1-8	
			TECHNICAL FIELDS SEARCHED (IPC)
			G04F H03L
<del>The present search report has been drawn up for all claims</del>			
Place of search <b>The Hague</b>		Date of completion of the search <b>15 September 2014</b>	Examiner <b>Mérimèche, Habib</b>
CATEGORY OF CITED DOCUMENTS 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		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	

EPO FORM 1503 03 82 (F04C01)



Application Number

EP 13 19 1631

5

10

15

20

25

30

35

40

45

50

55

**CLAIMS INCURRING FEES**

The present European patent application comprised at the time of filing claims for which payment was due.

- Only part of the claims have been paid within the prescribed time limit. The present European search report has been drawn up for those claims for which no payment was due and for those claims for which claims fees have been paid, namely claim(s):
  
- No claims fees have been paid within the prescribed time limit. The present European search report has been drawn up for those claims for which no payment was due.

**LACK OF UNITY OF INVENTION**

The Search Division considers that the present European patent application does not comply with the requirements of unity of invention and relates to several inventions or groups of inventions, namely:

see sheet B

- All further search fees have been paid within the fixed time limit. The present European search report has been drawn up for all claims.
- As all searchable claims could be searched without effort justifying an additional fee, the Search Division did not invite payment of any additional fee.
- Only part of the further search fees have been paid within the fixed time limit. The present European search report has been drawn up for those parts of the European patent application which relate to the inventions in respect of which search fees have been paid, namely claims:
  
- None of the further search fees have been paid within the fixed time limit. The present European search report has been drawn up for those parts of the European patent application which relate to the invention first mentioned in the claims, namely claims:  
 1-8
  
- The present supplementary European search report has been drawn up for those parts of the European patent application which relate to the invention first mentioned in the claims (Rule 164 (1) EPC).



LACK OF UNITY OF INVENTION  
SHEET B

Application Number  
EP 13 19 1631

5

The Search Division considers that the present European patent application does not comply with the requirements of unity of invention and relates to several inventions or groups of inventions, namely:

10

1. claims: 1-8

Properties of the solenoid around the cell

---

15

2. claims: 9-11

Shape of the holes of the wafer

---

20

25

30

35

40

45

50

55

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

EP 13 19 1631

5

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European 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.

15-09-2014

10

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 2006022761 A1	02-02-2006	US 2006022761 A1	02-02-2006
		WO 2006036268 A2	06-04-2006
-----			
US 6265945 B1	24-07-2001	NONE	
-----			
US 2005007118 A1	13-01-2005	NONE	
-----			

15

20

25

30

35

40

45

50

EPO FORM P0459

55

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82