

(19)



(11)

**EP 4 064 661 A3**

(12)

**EUROPEAN PATENT APPLICATION**

(88) Date of publication A3:  
**28.12.2022 Bulletin 2022/52**

(43) Date of publication A2:  
**28.09.2022 Bulletin 2022/39**

(21) Application number: **22158456.8**

(22) Date of filing: **24.02.2022**

(51) International Patent Classification (IPC):  
**H04M 1/02** <sup>(2006.01)</sup>      **H04N 5/232** <sup>(2006.01)</sup>  
**A61B 5/107** <sup>(2006.01)</sup>      **G01B 11/25** <sup>(2006.01)</sup>  
**G06F 21/32** <sup>(2013.01)</sup>      **G06V 10/145** <sup>(2022.01)</sup>  
**G06V 40/16** <sup>(2022.01)</sup>      **G03B 15/05** <sup>(2021.01)</sup>  
**G03B 17/54** <sup>(2021.01)</sup>      **G03B 30/00** <sup>(2021.01)</sup>  
**H01L 27/32** <sup>(2006.01)</sup>

(52) Cooperative Patent Classification (CPC):  
**H04M 1/026; G01B 11/25; G03B 15/05;**  
**G03B 17/54; G03B 30/00; G06F 21/32;**  
**G06V 10/145; G06V 40/166; G06V 40/172;**  
**H04M 1/0264; H04N 5/2258; H04N 5/2354;**  
**A61B 5/1176; H04M 2250/12; H04N 5/23219**

(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**  
 Designated Validation States:  
**KH MA MD TN**

(30) Priority: **02.03.2021 US 202163155693 P**  
**02.04.2021 US 202163170327 P**  
**08.06.2021 US 202163208477 P**  
**10.09.2021 US 202117471693**

(71) Applicant: **Apple Inc.**  
**Cupertino CA 95014 (US)**

(72) Inventors:  
 • **TOMASETTA, Christopher S.**  
**Cupertino, 95014 (US)**  
 • **NEEVEL, Jason B.**  
**Cupertino, 95014 (US)**  
 • **SALMON, Sara E.**  
**Cupertino, 95014 (US)**

- **KOCH, Richard H.**  
Cupertino, 95014 (US)
- **LEE, Jonathan M.**  
Cupertino, 95014 (US)
- **MERZ, Nicholas**  
Cupertino, 95014 (US)
- **JARVIS, Daniel**  
Cupertino, 95014 (US)
- **OSTDIEK, Jared P.**  
San Francisco, 94117 (US)
- **WITTENBERG, Michael B.**  
Cupertino, 95014 (US)
- **PHOUTHAVONG, Rasamy**  
Cupertino, 95014 (US)
- **PAKULA, David A.**  
Cupertino, 95014 (US)
- **SPRAGGS, Ian A.**  
Cupertino, 95014 (US)
- **RAMMAH, Marwan**  
Cupertino, 95014 (US)

(74) Representative: **Rooney, John-Paul**  
**Withers & Rogers LLP**  
**2 London Bridge**  
**London SE1 9RA (GB)**

(54) **HANDHELD ELECTRONIC DEVICE**

(57) A portable electronic device (900) may include a housing (904), a display at least partially within the housing, a front cover (1000) coupled to the housing and positioned over the display, and a biometric sensor module (918) configured to illuminate an object and capture an image of the object through the front cover (1000). The biometric sensor module (918) may include a first lens (1002) positioned below the front cover, a first light source (1004) positioned below the first lens and configured to project, through the first lens (1002), a dot pattern on the object, a second light source (1006) positioned below the first lens (1002) and configured to illuminate,

through the first lens, the object with a flood of light, a second lens positioned below the front cover (1000), and a light sensor positioned below the second lens and configured to capture an image of the object.

**EP 4 064 661 A3**

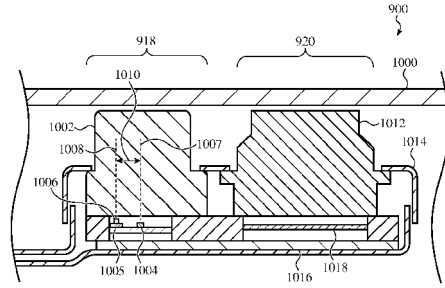


FIG. 10A



**PARTIAL EUROPEAN SEARCH REPORT**

Application Number

under Rule 62a and/or 63 of the European Patent Convention.  
This report shall be considered, for the purposes of subsequent proceedings, as the European search report

**EP 22 15 8456**

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)
Y	<p><b>CN 108 200 238 A (GUANGDONG OPPO MOBILE TELECOMMUNICATIONS CORP LTD)</b>                      22 June 2018 (2018-06-22)                      * The following passages refer to the enclosed automatic translation of this Chinese document in one of the official languages of the EPO. *</p> <p>* paragraph [0047] - paragraph [0049] *</p> <p>* paragraph [0059] *</p> <p>* paragraph [0063] *</p> <p>* paragraph [0067] *</p> <p>* paragraph [0069] *</p> <p>* figures 1-5, 11, 12 *</p> <p>-----</p>	1-7	<p><b>INV.</b>                      H04M1/02                      H04N5/232                      A61B5/107                      G01B11/25                      G06F21/32                      G06V10/145                      G06V40/16                      G03B15/05                      G03B17/54                      G03B30/00</p> <p><b>ADD.</b>                      H01L27/32</p>
Y	<p><b>US 2019/264890 A1 (CHANG YU-YU [TW] ET AL)</b>                      29 August 2019 (2019-08-29)                      * paragraph [0004] - paragraph [0005] *</p> <p>* paragraph [0008] - paragraph [0009] *</p> <p>* paragraph [0042] *</p> <p>* paragraph [0071] *</p> <p>* paragraph [0075] *</p> <p>* figures 8, 15 *</p> <p>-----</p>	1-7	<p><b>TECHNICAL FIELDS SEARCHED (IPC)</b></p> <p>H04M                      H01L                      G09G                      G02F                      H04N                      A61B                      G01B                      G06V                      G07C                      G03B                      G01S                      G06F</p>
<p><b>INCOMPLETE SEARCH</b></p> <p>The Search Division considers that the present application, or one or more of its claims, does/do not comply with the EPC so that only a partial search (R.62a, 63) has been carried out.</p> <p>Claims searched completely :</p> <p>Claims searched incompletely :</p> <p>Claims not searched :</p> <p>Reason for the limitation of the search:  <b>see sheet C</b></p>			
Place of search		Date of completion of the search	Examiner
<b>Munich</b>		<b>16 November 2022</b>	<b>Banerjea, Robin</b>
CATEGORY OF CITED DOCUMENTS		<p>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</p> <p>.....                      &amp; : member of the same patent family, corresponding document</p>	
<p>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</p>			

2  
EPO FORM 1503 03.82 (P04E07)



PARTIAL EUROPEAN SEARCH REPORT

Application Number

EP 22 15 8456

5

10

15

20

25

30

35

40

45

50

55

EPO FORM 1503 03.82 (P04C10) 2

DOCUMENTS CONSIDERED TO BE RELEVANT			CLASSIFICATION OF THE APPLICATION (IPC)
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	
A	<p>US 2018/343438 A1 (CHO AYOUNG [KR] ET AL)                      29 November 2018 (2018-11-29)                      * paragraph [0002] *                      * paragraph [0009] - paragraph [0013] *                      * paragraph [0020] *                      * paragraph [0025] - paragraph [0027] *                      * paragraph [0105] - paragraph [0106] *                      * paragraph [0112] - paragraph [0113] *                      * paragraph [0123] *                      * paragraph [0145] *                      * paragraph [0155] - paragraph [0163] *                      * paragraph [0169] *                      * paragraph [0229] *                      * paragraph [0235] *                      * paragraph [0241] *                      * page 243 *                      * paragraph [0287] - paragraph [0302] *                      * paragraph [0306] - paragraph [0307] *                      * paragraph [0319] *                      * figures 1B, 4, 9 *</p> <p style="text-align: center;">-----</p>	1-7	<p>TECHNICAL FIELDS SEARCHED (IPC)</p>



**INCOMPLETE SEARCH  
SHEET C**

Application Number  
**EP 22 15 8456**

5

**Claim(s) completely searchable:**

1-7

10

**Claim(s) not searched:**

8-15

**Reason for the limitation of the search:**

15

In response to the invitation pursuant to Rule 62a(1) EPC dated 14.07.2022, the applicant indicated in his letter dated 09.09.2022 that the search is to be carried out on the basis of independent claim 1 and its dependent claims.

20

25

30

35

40

45

50

55

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

EP 22 15 8456

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.

16-11-2022

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
<b>CN 108200238 A</b>	<b>22-06-2018</b>	<b>NONE</b>	
-----			
<b>US 2019264890 A1</b>	<b>29-08-2019</b>	<b>CN 110196527 A</b>	<b>03-09-2019</b>
		<b>CN 110196528 A</b>	<b>03-09-2019</b>
		<b>TW 201937239 A</b>	<b>16-09-2019</b>
		<b>US 2019264890 A1</b>	<b>29-08-2019</b>
-----			
<b>US 2018343438 A1</b>	<b>29-11-2018</b>	<b>CN 108933850 A</b>	<b>04-12-2018</b>
		<b>EP 3407601 A1</b>	<b>28-11-2018</b>
		<b>US 2018343438 A1</b>	<b>29-11-2018</b>
		<b>US 2020107012 A1</b>	<b>02-04-2020</b>
-----			

EPO FORM P0459

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