(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau

(43) International Publication Date
19 October 2023 (19.10.2023)

WIPO | PCT

(10) International Publication Number
WO 2023/200464 A1

(51) International Patent Classification:
G01N 33/52 (2006.01) *G01N 33/58* (2006.01)
G01N 33/569 (2006.01) *G01N 37/00* (2006.01)

(21) International Application Number:
PCT/US2022/035876

(22) International Filing Date:
30 June 2022 (30.06.2022)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
63/329,937 12 April 2022 (12.04.2022) US

(72) Inventor; and

(71) Applicant: **HEEGER, Brandon** [US/US]; 6055 Yellow Birch Court, Avon, IN 46123 (US).

(74) Agent: **BRANNON, C., John**; 47 South Meridian Street, Suite 400, Indianapolis, IN 46237 (US).

(81) Designated States *(unless otherwise indicated, for every kind of national protection available)*: AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BN, BR, BW, BY, BZ, CA, CH, CL, CN, CO, CR, CU, CZ, DE, DJ, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IQ, IR, IS, IT, JM, JO, JP, KE, KG, KH, KN, KP, KR, KW, KZ, LA, LC, LK, LR, LS, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PA, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, SA, SC, SD, SE, SG, SK, SL, ST, SV, SY, TH, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, WS, ZA, ZM, ZW.

(84) Designated States *(unless otherwise indicated, for every kind of regional protection available)*: ARIPO (BW, GH, GM, KE, LR, LS, MW, MZ, NA, RW, SC, SD, SL, ST, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, RU, TJ, TM), European (AL, 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, RS, SE, SI, SK, SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, KM, ML, MR, NE, SN, TD, TG).

Published:
— *with international search report (Art. 21(3))*

(54) Title: MEDICAL TEST MATERIAL AND METHOD FOR GENERATING MACHINE-READABLE BARCODE INCLUDING MEDICAL TEST DATA

(57) Abstract: A method for generating a machine-readable barcode representing medical test data comprises steps of: providing a first visual representation of the machine-readable barcode, wherein decoding the first visual representation results in a first set of medical test data; activating a medical test material corresponding to the machine-readable barcode; changing the first visual representation of the machine-readable barcode into a second visual representation of the machine-readable barcode as a result of the activating step, wherein decoding the second visual representation results in a second set of medical data different than the first set of medical data; and changing the second visual representation of the machine-readable barcode into a third visual representation of the machine-readable barcode as a result of the activating step, wherein decoding the third visual representation results in a third set of medical data different than the second set of medical data.

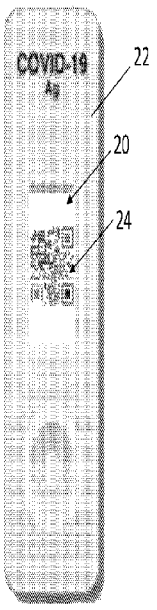


FIG. 2

WO 2023/200464 A1

MEDICAL TEST MATERIAL AND METHOD FOR GENERATING MACHINE-READABLE BARCODE INCLUDING MEDICAL TEST DATA

Cross-Reference to Related Applications:

[0001] This patent application claims priority to co-pending U.S. Provisional Patent Application Serial No. 63/329,937, filed on April 12, 2022.

Technical Field:

[0002] The present disclosure relates generally to a medical test material and method for generating a machine-readable barcode including medical test data.

Background:

[0003] Machine-readable barcodes are visual representations of data (e.g., encrypted data) that may be read, decoded or decrypted, by a barcode reader. In standard barcodes, information is encoded in the width of and distance between vertical lines. In QR codes, or barcodes, a two-dimensional type of barcode, information is encoded in the arrangement of squares. Either way, data transforms into a machine-readable arrangement of visual elements. And, upon scanning by an optical scanning device, the data translates back to its original form.

Summary:

[0004] The present disclosure relates to a medical test material and method causing the visual appearance of a machine-readable barcode to be changed after initial creation or generation.

[0005] Certain aspects of the invention are directed generally toward machine-readable barcodes. Machine-readable barcodes typically come in one-dimensional or two-dimensional formats, and, more-recently, three-dimensional formats, and can be further classified as statice or dynamic. Dynamic barcodes allow for remote alteration of a destination URL, whereas static barcodes do not. Machine-readable barcodes have a myriad of applications and are becoming increasingly common for commercial and personal use. However, currently, regardless of the barcode type, once a barcode is physically produced, it does not change.

[0006] Certain aspects of the invention are directed generally toward medical tests. Medical tests, according to the present disclosure, include screenings and diagnostic tests, with screenings being intended for asymptomatic people, whereas diagnostic tests are intended for those showing symptoms in need of a diagnosis. These can include or correspond to, but are not limited to, any one or more of home tests, at-home tests, over-the-counter tests, point-of-care tests and self-tests. These types of medical tests typically generate results in a few minutes, or an otherwise relatively short period of time.

[0007] However, the teachings of the present disclosure have broad applicability and should not be limited to the embodiments provided herein.

Brief Description of the Drawings:

[0008] FIG. 1 shows a prior art test card for a medical test;

[0009] FIG. 2 shows a test card for a medical test displaying a machine-readable barcode in a first configuration, according to the present disclosure;

[0010] FIG. 3 shows an exemplary readout of information corresponding to the first configuration of the machine-readable barcode, as shown in FIG. 2, according to the present disclosure;

[0011] FIG. 4 shows the test card of FIG. 2, in a second configuration, according to the present disclosure;

[0012] FIG. 5 shows an exemplary readout of information corresponding to the second configuration of the machine-readable barcode, as shown in FIG. 4, according to the present disclosure

[0013] FIG. 6 shows the test card of FIGS. 2 and 4, with the machine-readable barcode in a third configuration, according to the present disclosure; and

[0014] FIG. 7 shows an exemplary readout of information corresponding to the third configuration of the machine-readable barcode, as shown in FIG. 6, according to the present disclosure.

Detailed Description:

[0015] Before the present methods, implementations, and systems are disclosed and described, it is to be understood that this invention is not limited to specific implementations, and as such may, of course, vary. It is also to be understood that the

terminology used herein is for the purpose of describing particular implementations only and is not intended to be limiting.

[0016] As used in the specification and the claims, the singular forms "a," "an" and "the" include plural references unless the context clearly dictates otherwise. Ranges may be expressed in ways including from "about" one particular value, and/or to "about" another particular value. When such a range is expressed, another implementation may include from the one particular value and/or to the other particular value. Similarly, when values are expressed as approximations, for example by use of the antecedent "about," it will be understood that the particular value forms another implementation. It will be further understood that the endpoints of each of the ranges are significant both in relation to the other endpoint, and independently of the other endpoint.

[0017] "Optional" or "optionally" means that the subsequently described event or circumstance may or may not occur, and that the description includes instances where said event or circumstance occurs and instances where it does not. Similarly, “typical” or “typically” means that the subsequently described event or circumstance often occur or often not occur, and that the description includes instances where said event or circumstance occurs and instances where it does not.

[0018] FIG. 1 shows a prior art test card 10 for a medical test. The medical test may be one of those described above. One such medical test may, for example, generate a positive or negative test result based on detection of a predetermined chemical reaction when a sample contacts a specific portion of a medical test strip of the test card 10. According to the prior art test card 10, the test results are conveyed to the user by the presence or absence of a line at a predetermined position 12 of the test card 10. One line,

at 12, may indicate a negative test result, while two lines, 12, may indicate a positive test result. According to some embodiments, one test line, such as a first test line, may be a control line, indicating that the test is functioning properly, while another test line, such as a second test line, may be a test result line.

[0019] FIG. 2 shows a medical test material 20, which may be supported on a test card 22, or other support, for a medical test having a machine-readable barcode 24 in a first configuration, according to the present disclosure. According to the exemplary embodiment, the machine-readable barcode 24 is a QR code, or two-dimensional barcode, having a first visual representation. By scanning it, you access the information encoded in it. More specifically, a QR code is a machine-readable optical label that can contain information about the item to which it is attached, data for a locator, identifier, or tracker that points to a website or application. Generally speaking, QR codes, or QR barcodes, can be in the form of numeric and alphanumeric characters, and bytes converted into a unique two-dimensional arrangement of squares. When an optical scanner passes over those squares, it translates their arrangement back into that data's original form. This happens in seconds.

[0020] FIG. 3 shows an exemplary readout of information corresponding to the first configuration, or first visual representation, of the machine-readable barcode 24, as shown in FIG. 2, according to the present disclosure. For example, the first visual representation may be decoded into the data's original form at a first block 26:

Test number: 4567a89b

Time stamp: 04/01/2022 at 0815

Geographic coordinates: 40°22'12"N 80°13'58"W

Control: not detected

Test: n/a

[0021] As shown, the medical data may include a test number, time stamp, geographic coordinates, results at a control location, and results at a test location. According to a method of the present disclosure, as stated above, the first visual representation of the machine-readable barcode 24 may be provided prior to activation of a medical test, wherein decoding the first visual representation results in the first block, or set, 26 of medical test data, as shown above and in FIG. 3.

[0022] The present method also includes a step of activating the medical test material 20 corresponding to the machine-readable barcode 24, wherein activating includes contacting the medical test material 20 with a medical specimen or sample. As a result of the activating step, the first visual representation of the machine-readable barcode 24 is changed into a second visual representation of the machine-readable barcode 24.

[0023] FIG. 4 shows the test card 22 of FIG. 2, with the machine-readable barcode 24 in a second configuration, having a second visual representation, according to the present disclosure. Changing the first visual representation to the second visual representation may include adding a first feature, 30. Decoding the second visual representation results in a second block 32, or set, of medical data different than the first block 26, or set, of medical data. FIG. 5 shows an exemplary readout of information corresponding to the second configuration of the machine-readable barcode, as shown in FIG. 4, according to the present disclosure, at the second block 26, or set:

Test number: 4567a89b

Time stamp: 04/01/2022 at 0825

Geographic coordinates: 40°22'12"N 80°13'58"W

Control: Detected - valid test

Test: Negative

[0024] FIG. 6 shows the test card 22 of FIGS. 2 and 4, with the machine-readable barcode 24 in a third configuration, according to the present disclosure. Changing the second visual representation of the machine-readable barcode 24 into the third visual representation of the machine-readable barcode 24 may include adding a second feature 36 to the machine-readable barcode 24. FIG. 7 shows an exemplary readout of information corresponding to the third configuration of the machine-readable barcode, as shown in FIG. 6, according to the present disclosure, at a third block 38, or set:

Test number: 4567a89b

Time stamp: 04/01/2022 at 0835

Geographic coordinates: 40°22'12"N 80°13'58"W

Control: Detected - valid test

Test: Positive

[0025] The amount of data machine-readable barcodes can hold, how quickly they are read, and that virtually all smart devices can instantly and easily scan them and only some of the benefits of using barcodes to change, evolve or augment after initial visual representation in response to a medical test to convey medical test data, such as test results.

[0026] In further advancements, the medical test material may test for more than one pathogen, and the machine-readable barcode may be generated or changed to reflect

medical data, which may include test result data. Such tests may be administered for humans or animals.

Claims:

I/we claim:

1. A method for generating a machine-readable barcode representing medical test data, comprising steps of:

providing a first visual representation of the machine-readable barcode prior to activation of a medical test, wherein decoding the first visual representation results in a first set of medical test data;

activating a medical test material corresponding to the machine-readable barcode, wherein activating includes contacting the medical test material with a medical specimen or sample;

changing the first visual representation of the machine-readable barcode into a second visual representation of the machine-readable barcode as a result of the activating step, wherein decoding the second visual representation results in a second set of medical data different than the first set of medical data; and

changing the second visual representation of the machine-readable barcode into a third visual representation of the machine-readable barcode as a result of the activating step, wherein decoding the third visual representation results in a third set of medical data different than the second set of medical data.

2. The method of clam 1, wherein changing the first visual representation of the machine-readable barcode into the second visual representation of the machine-readable barcode includes adding at least one feature to the machine-readable barcode.

3. The method of claim 1, wherein changing the second visual representation of the machine-readable barcode into the third visual representation of the machine-readable barcode includes adding at least one feature to the machine-readable barcode.

4. The method of claim 1, wherein the medical test is a diagnostic test or a screening test.

5. The method of claim 4, wherein the medical test is a test for coronavirus disease.

6. The method of claim 1, wherein the second visual representation corresponds to a control position of the medical test.

7. The method of claim 1, wherein the third visual representation corresponds to a test position of the medical test.

8. The method of claim 1, wherein each of the first visual representation, second visual representation, and third visual representation are one-dimensional, two-dimensional, or three-dimensional.

9. The method of claim 1, wherein each of the first visual representation, second visual representation, and third visual representation are static or dynamic.

10. The method of claim 1, wherein the medical test material is a chromogenic material.

11. The method of claim 10, wherein, according to the first visual representation, a control position of the chromogenic material and a test position of the chromogenic material are not activated.

12. The method of claim 1, wherein the medical test data includes an indication of a positive test result or a negative test result.

13. The method of claim 10, wherein, according to the second visual representation, a control position of the control chromogenic material is activated and a test position of the chromogenic material is not activated.

14. A medical test material for generating a machine-readable barcode representing medical test data, including:

the medical test material configured to:

display a first visual representation of the machine-readable barcode prior to activation of a medical test, wherein decoding the first visual representation results in a first set of medical test data;

as a result of activating a medical test material corresponding to the machine-readable barcode, change the first visual representation of the machine-readable

barcode into a second visual representation of the machine-readable barcode, wherein decoding the second visual representation results in a second set of medical data different than the first set of medical data; and

as a result of activating the medical test material, change the second visual representation of the machine-readable barcode into a third visual representation of the machine-readable barcode, wherein decoding the third visual representation results in a third set of medical data different than the second set of medical data.

15. The medical test material of clam 14, wherein changing the first visual representation of the machine-readable barcode into the second visual representation of the machine-readable barcode includes adding a feature to the machine-readable barcode.

16. The medical test material of claim 14, wherein changing the second visual representation of the machine-readable barcode into the third visual representation of the machine-readable barcode includes adding a feature to the machine-readable barcode.

17. The medical test material of claim 14, wherein the medical test is a diagnostic test or a screening test.

18. The medical test material of claim 17, wherein the medical test is a test for coronavirus disease.

19. The medical test material of claim 14, wherein the second visual representation

corresponds to a control position of the medical test.

20.The medical test material of claim 14, wherein the third visual representation corresponds to a test position of the medical test.

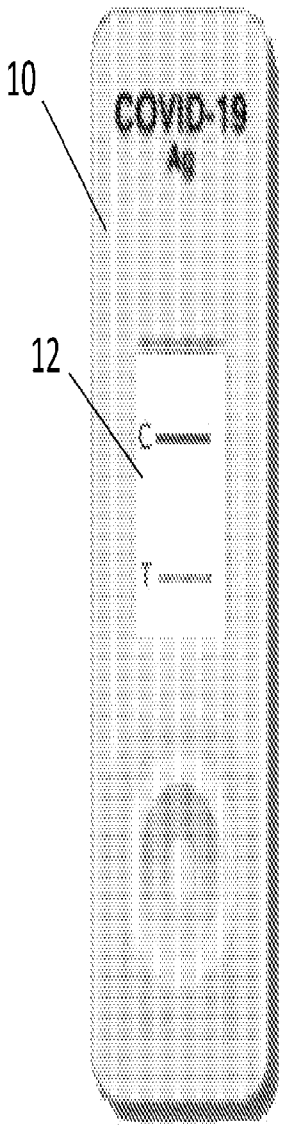


FIG. 1
(PRIOR ART)

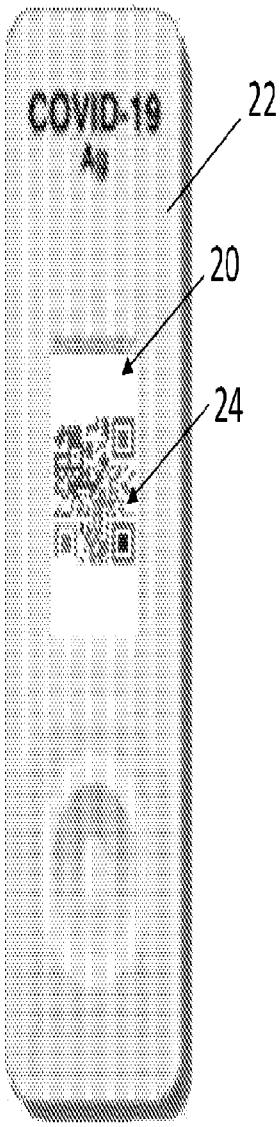


FIG. 2

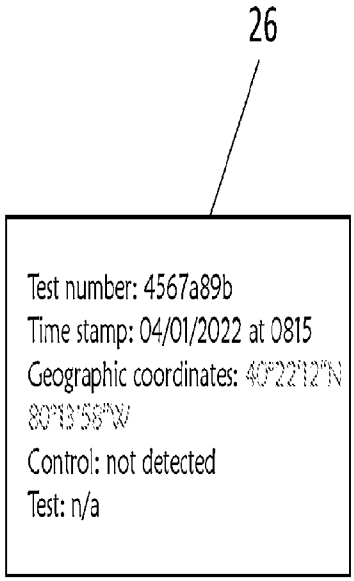


FIG. 3

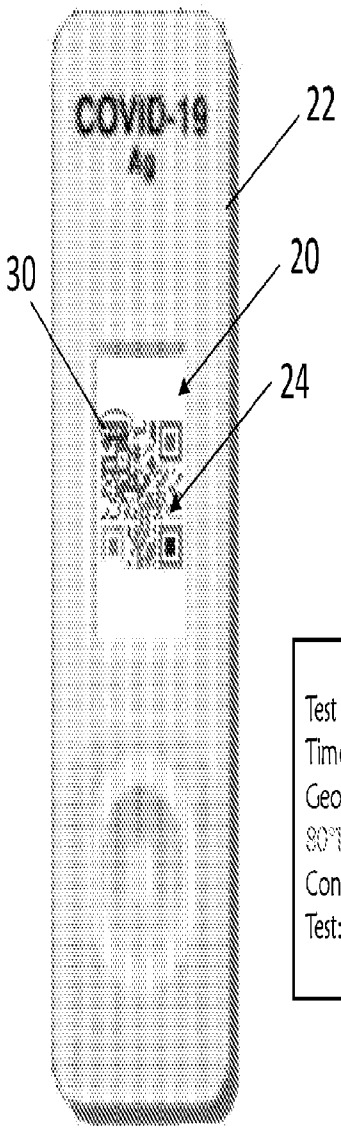


FIG. 4

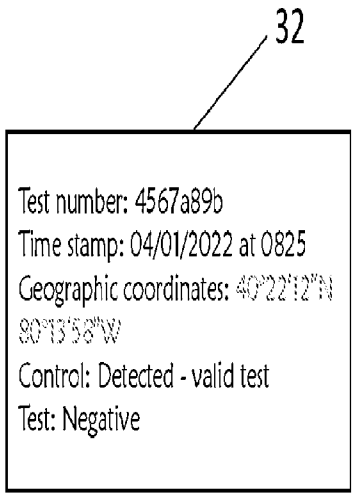


FIG. 5

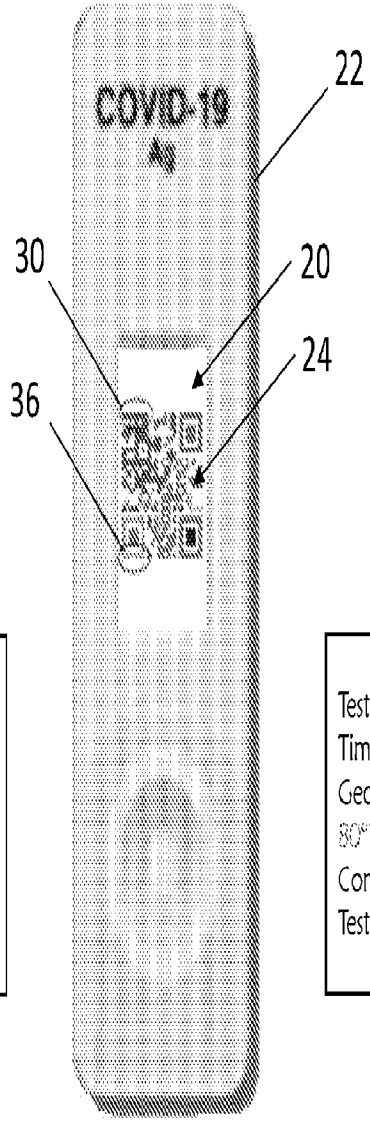


FIG. 6

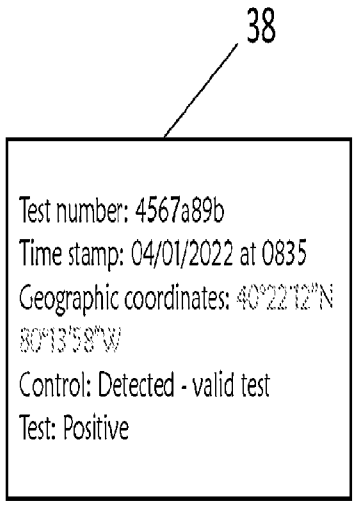


FIG. 7

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US2022/035876

A. CLASSIFICATION OF SUBJECT MATTER

IPC(8) - INV. - G01N 33/52; G01N 33/569; G01N 33/58 (2022.01)
ADD. - G01N 37/00 (2022.01)

CPC - INV. - G01N 33/52; G01N 33/56983; G01N 33/58 (2022.08)
ADD. - G01N 2800/00 (2022.08)

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)
See Search History document

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

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

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X --- Y	US 11,112,408 B2 (CENTRE NATIONAL DE LA RECHERCHE SCIENTIFIQUE et al) 07 September 2021 (07.09.2021) entire document	1-4, 6-20 --- 5
Y	US 10,823,746 B1 (BUSA et al) 03 November 2020 (03.11.2020) entire document	5
A	US 2016/0299136 A1 (NANOBIZ NANOBIYOTEKNOLOJIK SISTEMLER EGITIM BILISIM DANISMANLIK AR-GE SAN.TIC. LTD. STI.) 13 October 2016 (13.10.2016) entire document	1-20
A	US 11,060,924 B2 (VARCODE LTD.) 13 July 2021 (13.07.2021) entire document	1-20
A	US 2002/0072079 A1 (WOODAMAN) 13 June 2002 (13.06.2002) entire document	1-20

☐ 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
"D" document cited by the applicant in the international application
"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 another 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	Date of mailing of the international search report
02 September 2022	OCT 05 2022
Name and mailing address of the ISA/US Mail Stop PCT, Attn: ISA/US, Commissioner for Patents P.O. Box 1450, Alexandria, VA 22313-1450 Facsimile No. 571-273-8300	Authorized officer Taina Matos Telephone No. PCT Helpdesk: 571-272-4300