



(51) International Patent Classification:

A62C 3/02 (2006.01) G08B 17/11 (2006.01)
G08B 17/00 (2006.01) G08B 25/00 (2006.01)
G08B 17/10 (2006.01) G08B 31/00 (2006.01)

(21) International Application Number:

PCT/US2021/065312

(22) International Filing Date:

28 December 2021 (28.12.2021)

(25) Filing Language:

English

(26) Publication Language:

English

(72) Inventor; and

(71) Applicant: COSENTINO, Filadelfo, Joseph [US/US];
3309 Parkhaven Drive, Plano, TX 75075-1708 (US).

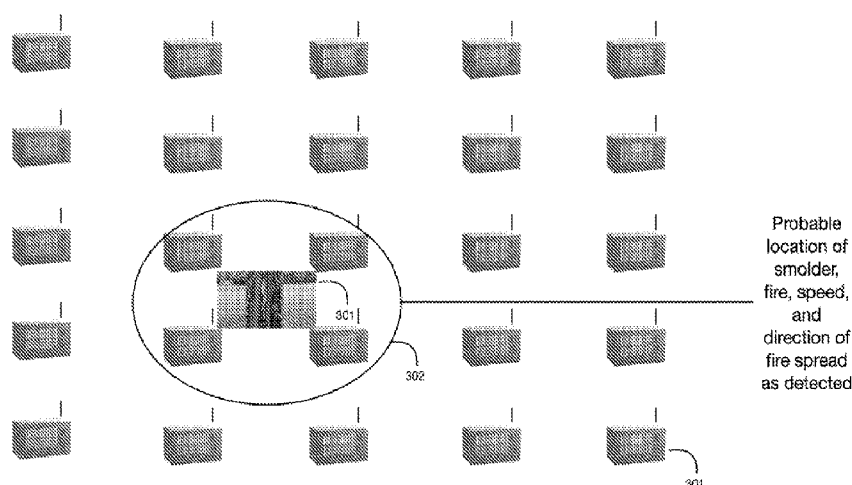
(81) Designated States (unless otherwise indicated, for every

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, IR, IS, IT, 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, 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,

(54) Title: FOREST FIRE AND WILDFIRE DETECTION SYSTEM

Figure 3
Graphic Representation
Wildfire Triangulation and Early Remediation



(57) Abstract: This "Forest Fire and Wildfire Detection System," herein referred to "Wildfire," will use a combination or existing "on the shelf" technologies for specific use of detecting fires, forest fires, and wildfire by sampling the air for both smoke with both ionization and/or photoelectric smoke detector technologies and a temperature sensor in an outdoor enclosure distributed across a grid of forest, woodlands, prairie, and fire prone areas to detect presence of combusting ions and/or smoke that may signify a potential fire source or fire in progress. The system will use telemetry or cellemetry, to a satellite or cellular/ wireless network to notify Command, Control and Dispatch of a fire potential long before the forest is ablaze leading to a wildfire. Smoldering embers and small fires can be more easily be extinguished by dispatching a small crew or water drop by aircraft log before the forest is burning. Wildfire will locate, and detect the direction and speed of the burn.

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).

Declarations under Rule 4.17:

— *as to the identity of the inventor (Rule 4.17(i))*

Published:

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

Forest Fire and Wildfire Detection System

FIELD

The “Forest Fire and Wildfire Detection System” uses a combination of diverse technologies with “on the shelf hardware, technology, and equipment” for specific use to detect remote, forest, wilderness of fire, smoldering embers, and smoke long before there is a forest, prairie, or wild fire.

BACKGROUND

The world is experiencing more and larger wildfires that consume thousands of acres of forest, prairie and private land eat year across the globe with most notoriety in California, Australia, and the tropical forest and woodlands across the globe causing destruction of the natural habitat, wildlife, homes, and human lives. In addition to the destruction of nature and lives, homes and personal property is destroyed costing billions of dollars in loss of property, livestock, fire fighting personnel and equipment, disaster aid, and insurance claims. However the Wildfire system will notify the Command Control that there are smoldering embers, smoke, or flame long before there the area is ablaze, and can be easily contained and extinguished, thus averting a forrest, prairie, or wild fire.

Upon Detection of combusting ions, smoke and/or sudden increase of temperature, an alert will be given to the Command Center that the there is probable fire detected with triangulation location detected of a probable smolder or fire for immediate response and indicating action is needed to contain and/or extinguish the source long before the area is a blazing fire.

SUMMARY

The use of this combination of existing proven technology for this specific application is unique, novel, an improvement, not obvious, or statutory in the application for this use as previously discussed in this document by using the technology in combination to detect smoldering embers, smoke, small fires, and/or sudden temperature increase. The combination of the technologies are useful in early warning of potential fires in wooded areas, prairie, fire prone areas and remote buildings, grain storage, national parks, woodlands and privately owned forests and grasslands.

The embodiment can be individual existing proven hardware and technologies currently available. It can be cluttered together into a self contained weather proof "box" using a satellite and/or cell phone telemetry or cellemetry in a self contained unit comprised of a ionization detector detecting flame ions, photoelectric sensory detecting smoke, and temperature sensor, battery, small solar pane and battery chartering unit to charge the rechargeable battery, and a standard satellite telemetry or cellular cellemetry transmitting device for monitoring. The central command will collected monitor all of the reporting stations. If there is an an indication of an impending smolder or fire, and alert will be sent to the central command to triangulate the issue for immediate rapid response to the most probable triangulation location for immediate remediation.

This device is a new and novel use of flame, smoke, and heat sensing hardware currently used for in-building and home fire detection to an outdoor application primarily, but not limited to rural, barns, remote building s and storage, grain storage, forest, woodlands, and

remote wilderness in the prevention of forest fires and wildfires caused by lightning, careless people, or arson.

The use of ionizing flame detectors, photoelectric smoke detectors, temperature sensors, telemetry, solar cells, cellemetry, and rechargeable battery technology is already proven technology and is not addressed in this patent.

This system is scalable to for implementation per the parameters established for controllable burn ranging for one station per every acre to mile(s). For example, there are 33 million acres of forest including 19 million acres of managed forest by the USDA Forest Service and the USDI Bureau of Land Management and National Park Service in the state of California, herein called "land management," can set the parameters of what is allowable burn before intervention is required. Ideally, there should be 1 detector every acre of a fireproof area with immediate response to extinguish a fire.

Each station can be mounted on a steel pole, tree, or big place to detect flaming ions, smoke, and increased temperature, but be able to receive sunlight to the solar panel of each station. In addition to ionization, smoke detection, and heat sensing components, a remote camera can be added for additional visual verification, as well as remote surveillance of forest, human use, wildlife management and tracking, and visual conditions of the forest, or wilderness.

BRIEF DESCRIPTION OF THE DRAWINGS

The invention will be better understood and objects other than those set forth will become apparent when consideration is given to the following detailed description thereof. Such the description makes reference to the annexed drawing within:

Figure 1 is a Graphic Representation of the Functional Hardware Design Architecture of the Wildfire Station and components of the integrated technologies and device embodied and carrying out the method of the invention.

Figure 2 is a Graphic Representation of each Wildfire connect to the Command, Control, and Dispatch Center via satellite telemetry, or wireless networks, either public or private.

Figure 3 is a Graphic Representation of each Wildfire station method of detection and locating smoke, smolder, or flame; and triangulation of the smolder, smoke, flame, the direction of the burn and the speed of the burn.

DETAILED DESCRIPTION

In the following detailed description, the device embodies the combination of three major existing and proven technologies for a specific and unique use and application that is unique, novel, not obvious, not statutory, improvement in the application for this use to detect fire with combustion ions, smoke by photoelectric, and heat detecting devices via either telemetry, cellemetry, and wireless monitor detection for outdoor, rural, forested areas, and wilderness applications.

The Central Command can be any CPU or computing device, mobile phone, tablet, etc. to monitor each deployed station embodying in the Wildfire system, to detect flame, smoke, heat, or video to issue an alarm for a probable fire for remediation, and triangulate exact location based on the area of concern with triangulation with probable location from the stations with an alarm status, showing direction and speed of the burn.

Fire alarm detection technology is typically used only for in building and in home use, and either ionization detection of flame, or photoelectric detecting smoke. The Wildfire station

combines both technologies to detect a smolder or burn, in addition to a heat sensor to indicate a sudden increase in heat, and an optional mini camera to get a visual of the area of concern. The top of the container will use a solar cell to recharge the rechargeable batteries powering the unit.

The use of the diverse technologies are for wide area deployment to detect flame, smoke, and heat of a smolder or flame for outdoors, rural wide area, forest, and wilderness is unique, not obvious, not statutory, and not used for wide area fire detection and location. The deployment spacing can be determined by the authority having jurisdiction for land management for early detection of an impending flame or burn. Firefighters can locate the fire for early remediation, and can determine the direction and speed of the flame for early remediation

The use of the wireless technology, both telemetry or cellemetry, for actual or potential forest fire and wildfire detection of remote areas and wilderness is also unique, novel, not obvious, and not statutory.

Since the existing technologies are proven and ubiquitous, they will not be described in detail in this document, but only their functionality will be referred for the Wildfire station application.

Figure 1 is a graphic representation of the Wildfire station. Each Wildfire station will consist of a louvered metal outdoor louvered enclosure 101 to allow ambient air inside to detect flame, smoke, and heat. A metal or synthetic screen 102 will be a insect, animal, and debris barrier.

The top of the Wildfire station will have a solar panel 103 to gather sunlight to keep the redundant batteries 108 recharged through the battery charger 107. The power will be brought to a PDU (Power Distribution Unit) to power the Ionization Detection Circuit Board 105, Photoelectric Detection Circuit Board, heat sensor 110, optional mini camera 111 CPU and Alarm Panel 112, and transmitter 113.

The PDU 109 will connect to the CPU and Alarm Panel 112 to monitor the battery condition to the Central Command and Dispatch. The heat sensor 110, Ionization Detection Circuit Board 105, Photoelectric Circuit Board 106, and Mini-camera 111 will also be connected to the CPU and Alarm Panel 112.

The CPU and Alarm Panel 113 will connect to the Telemetry/Cellemetry Transmitter 113 to transmit the alarm signals via the antenna 104 to either, or or both satellite and/or wireless network to the Command and Control Dispatch center to be monitored.

Figure 2 is graphic representation of the Wildfire Communications Network. Each station 201 will monitor the ambient air for smoke, flame, heat and/or visual view of the designated vicinity. If there is any indication of a smolder or fire 200, the Wildfire station 201 will transmit the detection signal to the Command, Control and Dispatch computing device for immediate remediation. The signal can be transmitted to either satellite 202 to EarthStation 204 to the Network 206 and ultimately to the Command, Control, and Dispatch center 207. Alternately, or both, the signal can also be transmitted to one or more cellular towers 205 to the network 206, and ultimately to the Command , Control and Dispatch center 207.

Figure 3 is a graphic representation of a Wildfire station array. The placement of the Wildfire stations are at the discretion of the authority having jurisdiction of the forest, land,

and wilderness management. Ideally, the Wildfire stations should be placed at every acre, and on any building or structure in the area to be monitored, and closer in areas that are more fire prone.

This dawn i a sample of the placement on a grid system that is being monitored of by the Wildfire station 301. A smolder 301 has been detected and an early warning to the Command, Control and Dispatch center. The ring of smoke 302 can be triangulated to determine location of the burn, direction of the burn, and speed of the burn. The Command and Control and Dispatch center can send immediate crew to remediate and extinguish the burn or send a single airplane water dump to extinguish the flame early before the forest catches fire and/or becomes a wildfire out of control.

The invention claimed are:

1. The Wildfire system is a unique blend of technologies for early warning and detection of forest fires, grass fires, and wildfires for broad area in rural, woodlands, and wilderness, and is proprietary.
2. Wildfire system combines ionizing detection to detect flame, photoelectric smoke detection, heat sensor to detect sudden increase in heat, and/or a mini-camera for visual verification embodies the Wildfire System four ways to detect a smolder, burn, flame and sudden heat increase, and is proprietary.
3. The Wildfire System is primarily for outdoor use over a broad area of rural, woodland, grasslands, and wilderness is proprietary.
4. The Wildfire System is an early warning system of smolder, smoke, fire, burn, or fame is proprietary.
5. Triangulation for fire location is proprietary.
6. Fire location, direction, and speed by a distributed network of monitoring stations for broad area is proprietary.
7. The combination of multiple technologies to detect smolder, burn, forest fire and wildfire for broad area outdoor use embodied in this document are proprietary.
8. The use of satellite and the cellular/wireless network to determine location, direction, and speed of a fire is proprietary.
9. The alarm system embodied in this document is proprietary for this application and/or all other applications is proprietary.
10. The use of the "on the shelf hardware," as well as any/all other custom or "on the shelf" hardware and software for this application or any other use is proprietary.
11. Optional electronic nose to detect odors and molecular signatures indicating pre-combustion and combustion is proprietary.

Figure 1
Graphic Representation
Wildfire Station Components and Technologies Employed.

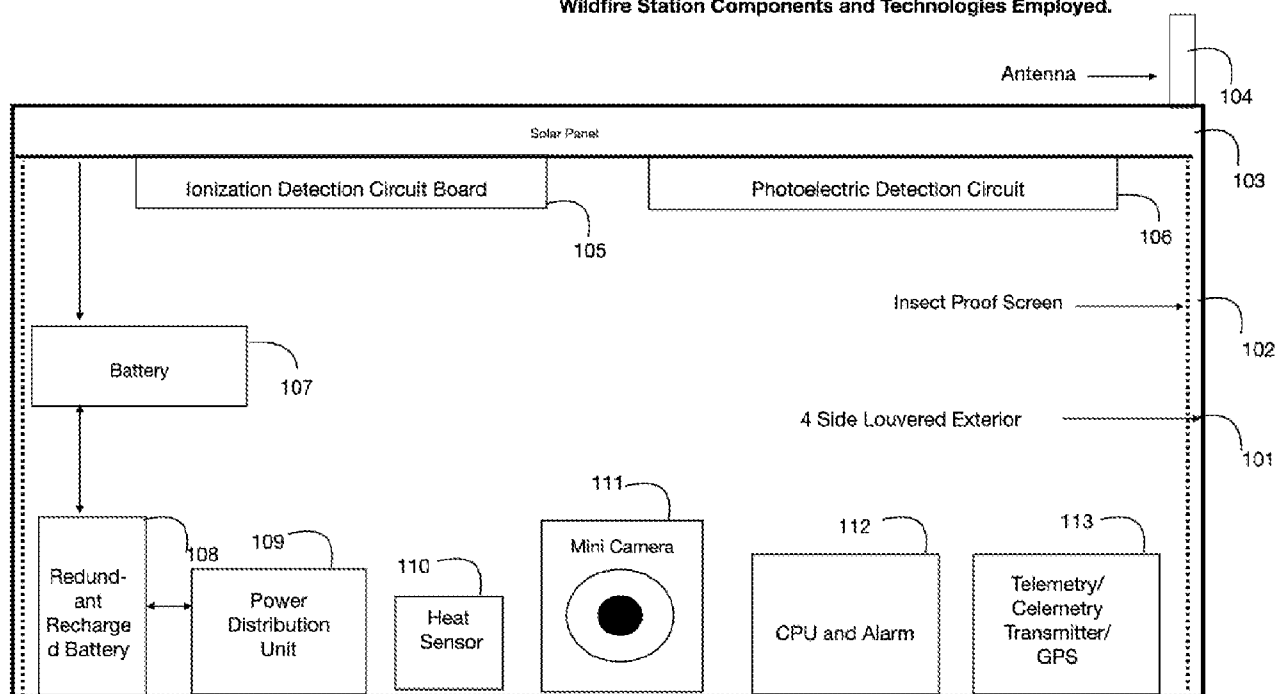


Figure 2
Graphic Representation
Wildfire Communication

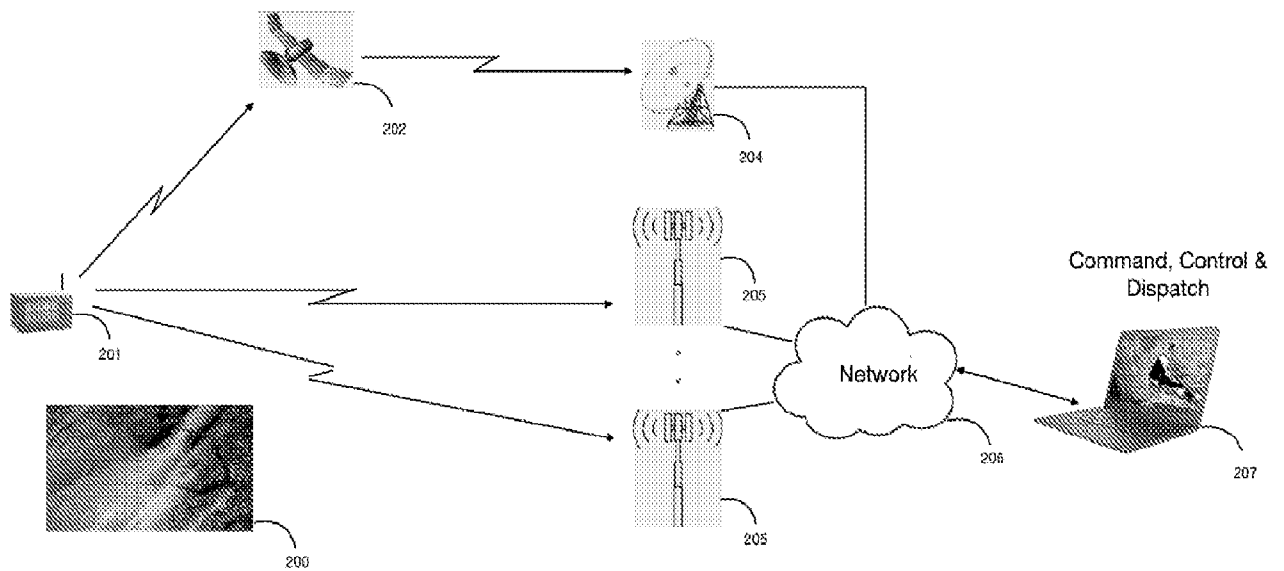
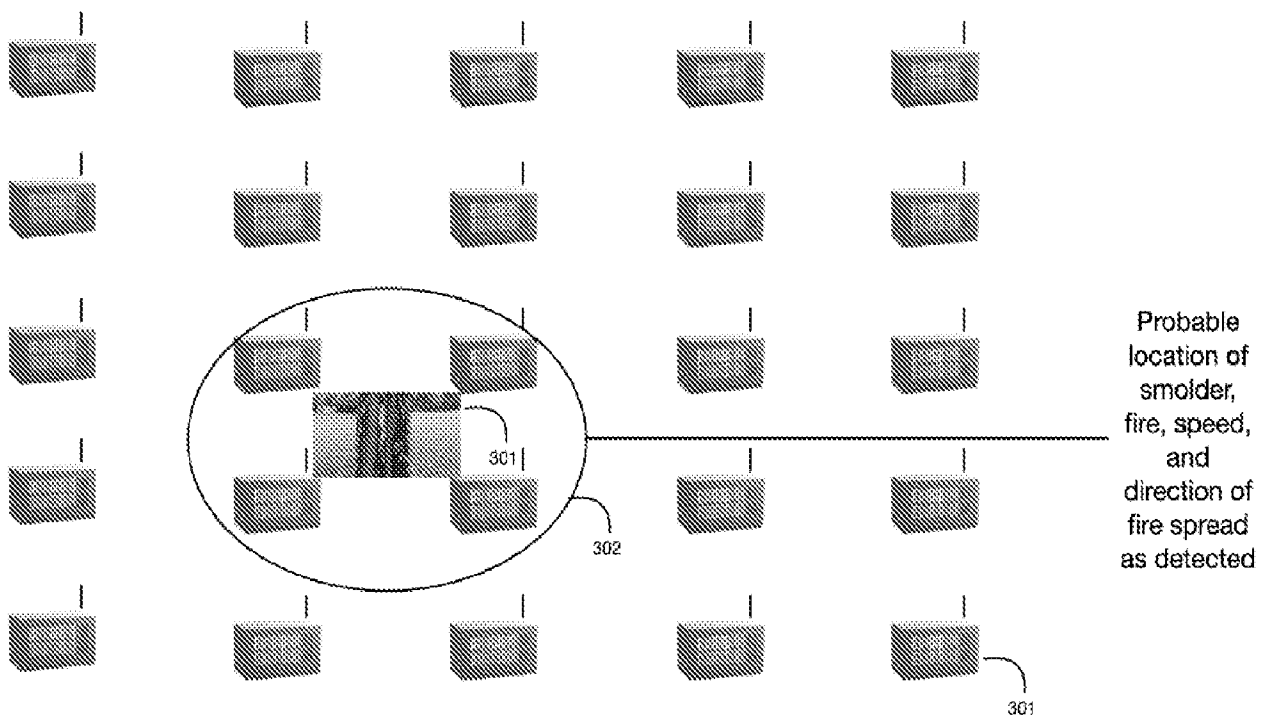


Figure 3
Graphic Representation
Wildfire Triangulation and Early Remediation



INTERNATIONAL SEARCH REPORT

International application No.

PCT/US2021/065312

A. CLASSIFICATION OF SUBJECT MATTER

IPC(8) - A62C 3/02; G08B 17/00; G08B 17/10; G08B 17/11; G08B 25/00; G08B 31/00 (2022.01)

CPC - A62C 3/0271; A62C 3/02; G08B 17/005; G08B 17/10; G08B 17/103; G08B 17/107; G08B 17/11; G08B 17/117; G08B 25/009; G08B 31/00 (2022.02)

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	US 2016/0127878 A1 (INTERNATIONAL BUSINESS MACHINES CORPORATION) 05 May 2016 (05.05.2016) entire document	1-11
X	US 2018/0374330 A1 (BALAJI et al) 27 December 2018 (27.12.2018) entire document	1-4, 7, 9-11
X	US 2012/0229283 A1 (MCKENNA) 13 September 2012 (13.09.2012) entire document	1, 3, 4, 6-10
X	WO 2021/174291 A1 (STEPHEN et al) 10 September 2021 (10.09.2021) entire document	5
E	US 2022/0008773 A1 (M-FIRE HOLDINGS LLC) 13 January 2022 (13.01.2022) entire document	3, 4, 6-11
A	US 2004/0183021 A1 (LUCK et al) 23 September 2004 (23.09.2004) entire document	1-11
A	WO 2020/116927 A1 (POI F) 23 July 2020 (23.07.2020) entire document	1-11
A	US 2006/0176169 A1 (DOOLIN et al) 10 August 2006 (10.08.2006) entire document	1-11

☐ 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

19 February 2022

Date of mailing of the international search report

APR 11 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

Harry Kim

Telephone No. PCT Helpdesk: 571-272-4300