(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) **EP 4 124 600 A1**

(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
01.02.2023 Bulletin 2023/05

(21) Application number: **22000162.2**

(22) Date of filing: **17.06.2022**

(51) International Patent Classification (IPC):
B67D 1/00 *(2006.01)*

(52) Cooperative Patent Classification (CPC):
F28D 1/0213; B67D 1/0063; B67D 1/0859; B67D 1/0864; F25D 31/003; F28D 1/0472

(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: **26.07.2021 IT 202100019892**

(71) Applicant: **Watnext Industries S.r.l.**
17100 Savona (IT)

(72) Inventor: **Crosa, Roberto**
I-10030 RONDISSONE (TO) (IT)

(74) Representative: **Garavelli, Paolo**
A.BRE.MAR. S.R.L.
Consulenza in Proprietà Industriale
Via Servais 27
10146 Torino (IT)

(54) **LIQUID COOLING SYSTEM FOR HOUSEHOLD AND OFFICE USE**

(57) A liquid cooling system (1) for domestic and office use is described, comprising a tank (2) designed to contain: at least one first coil (3); at least one second coil (5) concentric with the first coil (3) and designed to operatively cooperate the said first coil (3); a third coil obtained by doubling the first coil (3) and concentric with the first and second coil (3, 5); at least one outlet pipe (8) operatively connected with the tank (2); at least one temperature probe (7) designed to operatively cooperate with the cooling system (1); and at least one water level probe designed to operatively cooperate with the cooling system (1).

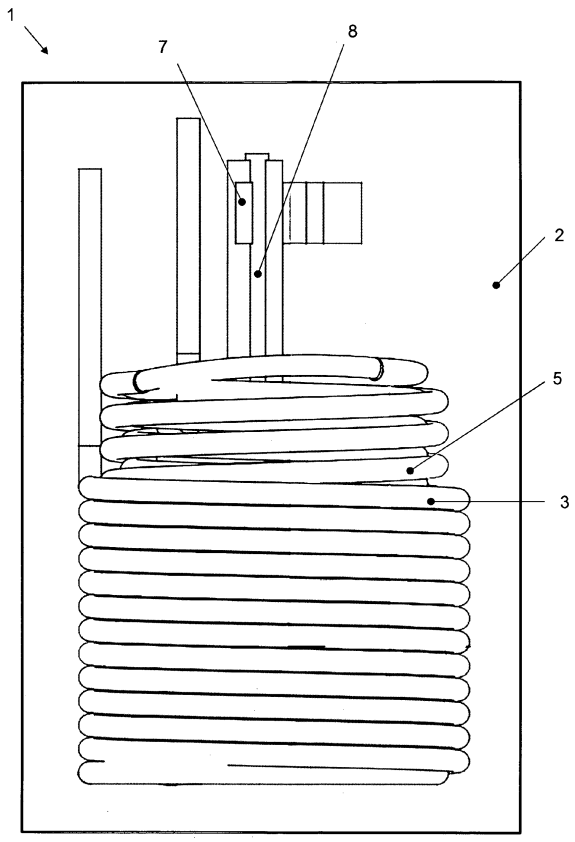

Fig. 1

EP 4 124 600 A1

Description

[0001] The present invention refers to a cooling system for domestic and office use, in the context of dispensing of liquids.

[0002] Many cooling systems are known in the art:

- dry systems, namely hermetic system with evaporator and stainless steel pipes for water cooling embedded in an aluminum block as an excellent cold transmitter;
- ice bank systems, i.e. with evaporator on the internal walls of a tank that are used to generate ice on the walls and transmit cold to nearby stainless steel pipes to cool water. This system has the problem that the tank containing water and ice is not hermetic and therefore, to avoid the formation of a single block of ice, a circulation pump is required as in aquariums: this results in an annoying noise in a domestic environment. Furthermore, in the event of being moved for cleaning operations, there is a real risk that the water will transfer from the tank, compromising electrical parts and wetting the surrounding support surface.
- hermetic systems, which use a stainless steel container with a head for lid that resembles the head of a carbonatorsaturator of CO_2 on the market. Water inside will be added with CO_2 to make it sparkling and there will be another coil of stainless steel tube inside which there will be nonsparkling water that will be cooled by induction by cold sparkling water. Outside the stainless steel container, a copper tube will be rolled and wound inside which the refrigerant gas will flow to cool the water inside.

[0003] The limits of these latter systems are that they deliver a maximum of one liter of cold water continuously and that the temperature of the cold water can hardly drop below + 10 / + 12 °C for one liter.

[0004] Furthermore, the repetition of an additional liter of cold water dispensed will take about 15 minutes, resulting in being non-performing.

[0005] Object of the present invention is solving the aforementioned problems of the prior art by providing a hermetic carbonator with triple coil, capable of gassing and cooling water quickly and efficiently.

[0006] Another object of the present invention is allowing the complete sanitization of the water tank, filling it completely with sanitizing agent.

[0007] The main advantage of the above invention is the possibility of obtaining cold and sparkling water faster than current systems and with less energy expenditure.

[0008] Furthermore, by temporarily deactivating the safety valve, the sanitizing agent can be circulated throughout the system, obtaining a complete sanitizing action.

[0009] Another advantage is the ease of installation that results from the integration of the components inside the tank. By presenting only a smooth steel wall, positioning within a casing or furniture is simplified.

[0010] Finally, the hermetic closure of the tank prevents water contamination by external agents or its overturning in the environment surrounding the device.

[0011] The above and other objects and advantages of the invention, as will emerge from the following description, are achieved with a liquid cooling system for domestic and office use such as claimed in claim 1. Preferred embodiments and non-trivial variants of the present invention form the subject of the dependent claims.

[0012] It is understood that all attached claims form an integral part of the present description.

[0013] It will be immediately obvious that innumerable variations and modifications (for example relating to shape, dimensions, arrangements and parts with equivalent functionality) can be made to what is described, without departing from the scope of the invention as appears from the attached claims.

[0014] The present invention will be better described by some preferred embodiments thereof, provided by way of non-limiting example, with reference to the attached drawings, in which:

- FIG. 1 shows a front view of an embodiment of the cooling system inside the tank according to the present invention;
- FIG. 2 shows a perspective view of a section of an embodiment of the cooling system according to the present invention;
- FIG. 3 shows a front view of a section of an embodiment of the cooling system according to the present invention.

[0015] With reference to the Figures, it can be noted that the liquid cooling system 1 for domestic and office use of the invention comprises a tank 2 designed to contain:

- at least one first coil 3;
- at least one second coil 5 designed to operatively cooperate with the first coil 3;
- at least one outlet pipe 8 operatively connected with the tank 2;
- at least one temperature probe 7 designed to operatively cooperate with the cooling system 1;
- at least one water level probe (not shown) designed to operatively cooperate with the cooling system 1.

[0016] Advantageously, in a variation of the liquid cooling system 1 for domestic and office use, there are three concentric pre-cooling coils, the first coil 3 becoming double to ensure a greater flow of water, with an 8-mm diameter stainless steel pipe wound on three diameters and in contact, to deliver 2 liters of cold still water continuously at an average between + 8 °C and + 12 °C.

[0017] Reducing the diameter of the evaporator coil

also allows having the right compromise between cooling capacity, cooling speed and low risk of excessive ice formation.

[0018] To succeed, it is necessary to use a new R290 refrigeration gas with hermetic compressor and starting condenser.

[0019] Furthermore, in the cooling system 1 according to the present invention, the first coil 3 is designed to make cold water flow and the second coil 5 is designed to contain refrigerant gas designed to cool water passing through the first coil 3 and/or water contained in the tank 2.

[0020] In particular, the tank 2 of the liquid cooling system 1 for domestic and office use is hermetically closed.

Claims

1. Liquid cooling system (1) for domestic and office use comprising a tank (2) designed to contain:

   - at least one first coil (3);
   - at least one second coil (5) concentric with said first coil (3) and designed to operatively cooperate with said first coil (3);
   - a third coil obtained by doubling said first coil (3) and concentric with said first and second coil (3, 5);
   - at least one outlet pipe (8) operatively connected with said tank (2);
   - at least one temperature probe (7) designed to operatively cooperate with said cooling system (1); and
   - at least one water level probe designed to operatively cooperate with said cooling system (1);

   wherein said first coil (3) and said third coil are designed to flow cold water and said second coil (5) is designed to contain refrigerant gas designed to cool water passing through said first coil (3) or third coil and/or water contained in said tank (2).

2. Liquid cooling system (1) for domestic and office use according to claim 1, **characterized in that** said tank (2) is hermetically closed.

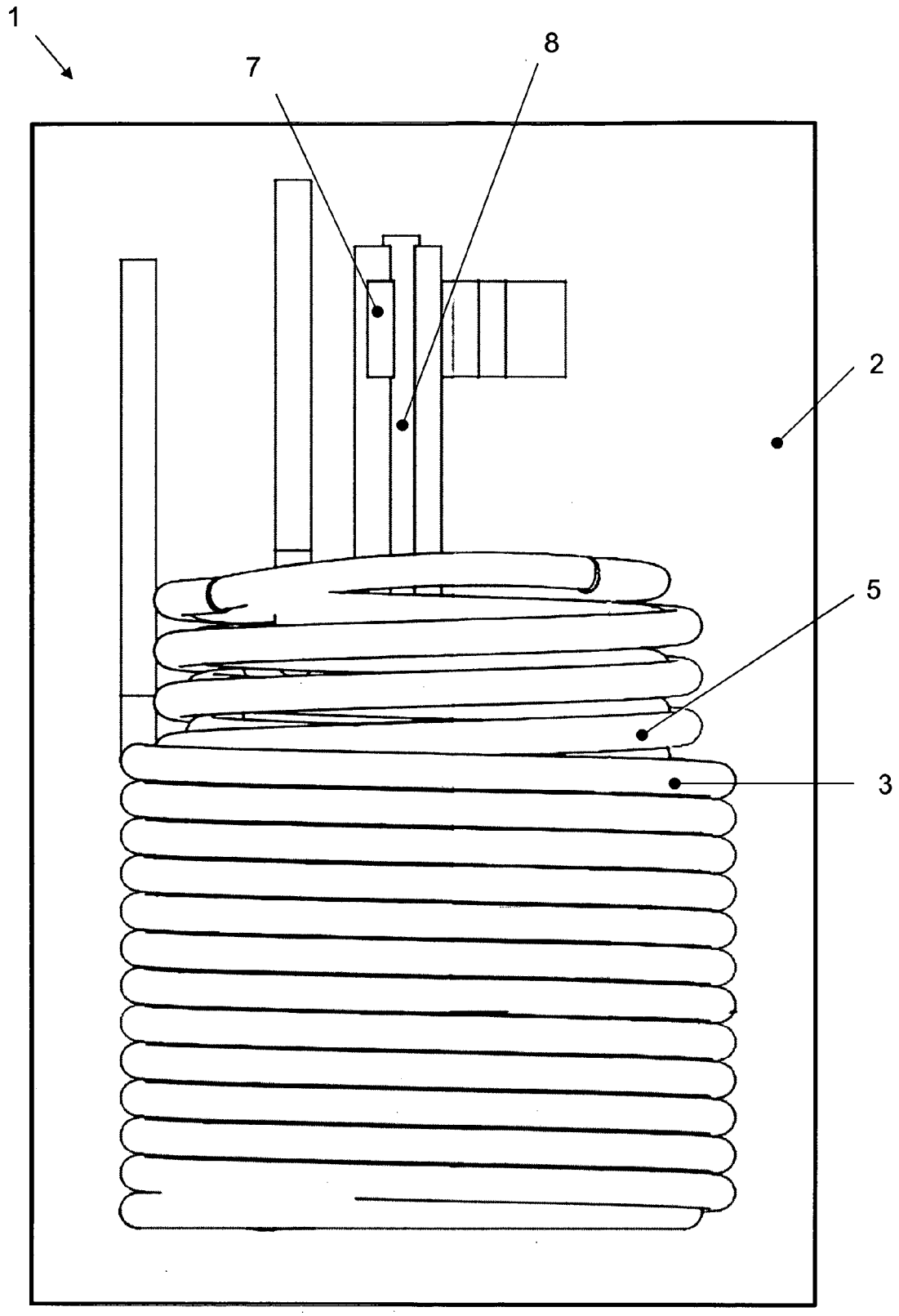

Fig. 1

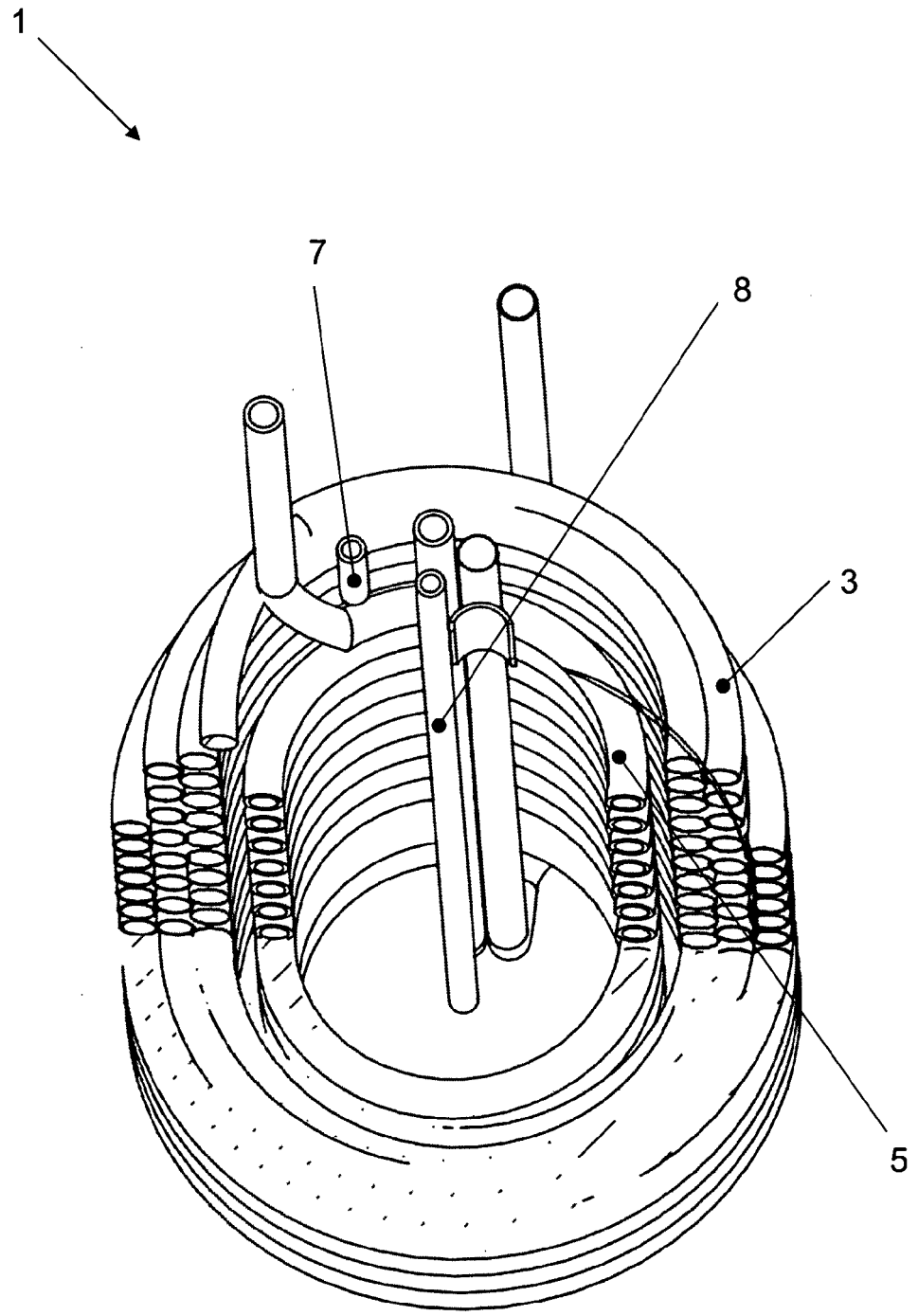

Fig. 2

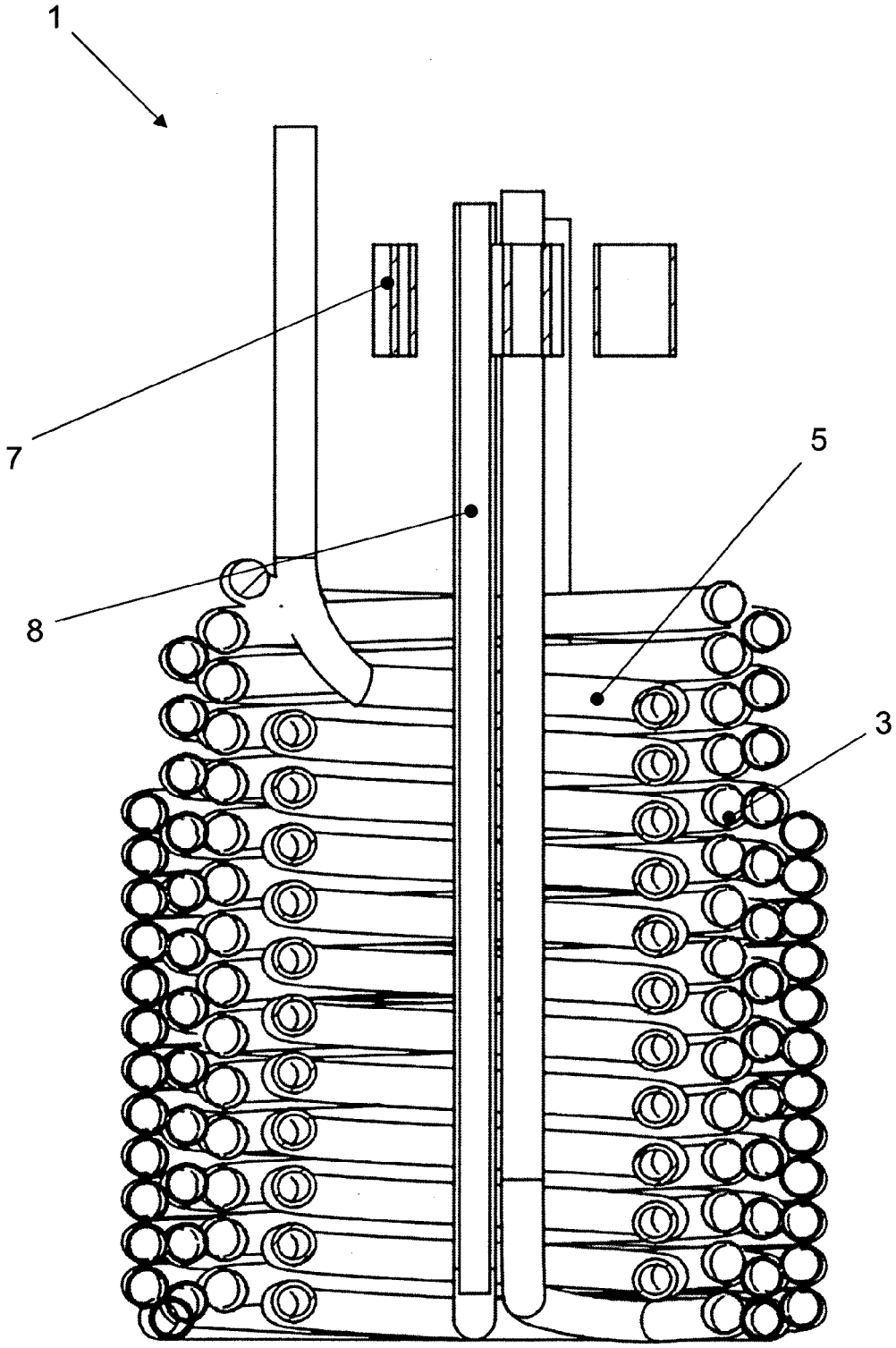

Fig. 3

Europäisches Patentamt
European Patent Office
Office européen des brevets

EUROPEAN SEARCH REPORT

Application Number
EP 22 00 0162

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	EP 1 892 214 A1 (ASSET S R L [IT]) 27 February 2008 (2008-02-27) * figures 1,2 * * paragraph [0008] *	1,2	INV. B67D1/00
X	JP 2014 058323 A (FUJI ELECTRIC CO LTD) 3 April 2014 (2014-04-03) * figures 1-3 *	1,2	
X	IT RN20 090 041 A1 (CELLI SPA) 12 March 2011 (2011-03-12) * figures 1,2 *	1,2	
A	US 5 140 822 A (GUPTA ASHIS S [US]) 25 August 1992 (1992-08-25) * figures 1-3 *	1,2	
A	EP 3 540 346 A1 (LG ELECTRONICS INC [KR]) 18 September 2019 (2019-09-18) * figure 12 *	1,2	
			TECHNICAL FIELDS SEARCHED (IPC)
			B67D F25D

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	11 November 2022	Dezso, Gabor

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 (P04C01)

ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 22 00 0162

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.

11-11-2022

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
EP 1892214 A1	27-02-2008	NONE	
JP 2014058323 A	03-04-2014	JP 6011184 B2	19-10-2016
		JP 2014058323 A	03-04-2014
IT RN20090041 A1	12-03-2011	NONE	
US 5140822 A	25-08-1992	NONE	
EP 3540346 A1	18-09-2019	CN 109923359 A	21-06-2019
		EP 3540346 A1	18-09-2019
		KR 20180052348 A	18-05-2018
		US 2019276299 A1	12-09-2019
		WO 2018088849 A1	17-05-2018

EPO FORM P0459

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