



EUROPEAN PATENT APPLICATION

(43) Date of publication:
24.05.2023 Bulletin 2023/21

(51) International Patent Classification (IPC):
F24F 1/0018 ^(2019.01) **F04D 25/06** ^(2006.01)

(21) Application number: **22208780.1**

(52) Cooperative Patent Classification (CPC):
F04D 25/0693; F04D 19/002; F04D 29/522;
F24F 1/0018

(22) Date of filing: **22.11.2022**

(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 ME MK MT NL
NO PL PT RO RS SE SI SK SM TR
Designated Extension States:
BA
Designated Validation States:
KH MA MD TN

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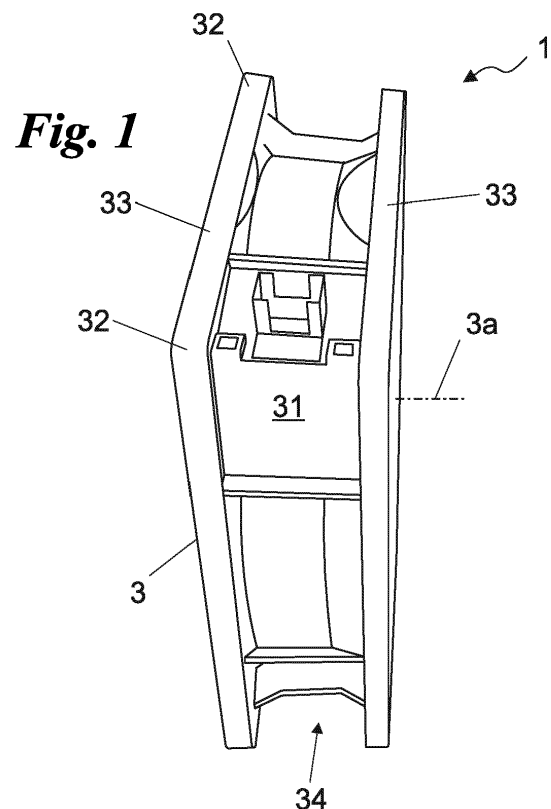
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(30) Priority: **23.11.2021 IT 202100029555**

(54) **VENTILATION DEVICE FOR HOUSEHOLD APPLIANCES**

(57) It is provided a ventilation device (1) for household appliances comprising an axial fan (2) including a frame (3) defining an closed internal wall (30) and a closed external wall (31) wrapped around a central axis (3a), an impeller (4) constrained in a compliant way to the frame (3) within the internal wall (30) and rotatable around the central axis (3a), a drive unit (5) integrally constrained to the frame (3), positioned at the central axis (3a), operatively connected to the impeller (4) and configured to rotate the impeller (4) in proportion to electrical signals, at least one electrical cable (6) connected to the unit (5), and an IDC type connector (7) positioned on the external wall (31), connected to at least the cable (6), facing outwards from the frame (3) and configured to be connected to an external power supply and control system of a household appliance.



Description

[0001] The present invention relates to a ventilation device for household appliances of the type specified in the preamble to the first claim.

[0002] In particular, the present invention relates to a ventilation device for household appliances in the context of the white goods industry such as, for example, washing machines, refrigerators, air conditioners and other similar apparatuses.

[0003] Similar devices are described in the patent applications US 2021/018009 A1, US 2020/232151 A1 and EP 0 688 088 A1. There are also patent applications describing ventilation devices for other areas, for example, patent applications: US 2014/308121 A1, US 2016/025104 A1, US 2008/100160 A1, US 2007/280840 A1 and US 5 189 327 A.

[0004] As is well known, household appliances in the white goods sector, or white goods industry, are electrical devices that are widely used within home environments and essentially assist human beings in carrying out day-to-day household operation and maintenance activities or in controlling the environmental characteristics of rooms in the home, such as humidity and temperature.

[0005] Among the most common household appliances are the air conditioners, the refrigerators, the washing machines and other devices that generally consist of a motor to drive one or more control units.

[0006] Among the most common drive units, the heat pump is well known. The heat pump is basically a device configured to produce thermal energy. Generally, the heat pump is coupled with at least one fan to ventilate it.

[0007] Thus, the household appliances usually comprise at least one fan, preferably an axial fan, for ventilating the same or certain parts thereof such as the motor or the heat pump or other devices.

[0008] The fan essentially comprises a impeller, or cochlea, rotatably constrained within a frame, usually having a square cross-section, and operatively connected to a drive unit positioned in the fulcrum area of the impeller configured to rotate the impeller when electrically powered in relation to external signals.

[0009] The connection of the drive unit to the power and control system is usually made via two or more cables. These cables run out of the frame, from the drive unit, and terminate with a pin that can be connected to the power and control system. Examples of these types of fans, now widely used, are the common computer fans. The known technique described includes some important drawbacks.

[0010] In particular, cables coming out of the frame often dangle inside the household appliance, interfering with other devices or taking up space needed to house other components. Furthermore, these cables must be connected to the power and control system and, therefore, it can be complicated and inconvenient to connect the pin to the system, as is usually the case with computers.

[0011] In addition, having dedicated connection cables for each fan does not allow for pre-configuration of the wiring inside the appliance during assembly, forcing one to have to run cables to each fan during the assembly stages, which is clearly time-consuming. In this situation, the technical task underlying the present invention is to devise a ventilation device for household appliances capable of substantially obviating at least part of the aforementioned drawbacks.

[0012] In the context of said technical task, it is an important scope of the invention to obtain a ventilation device for household appliances which enables to reduce or avoid the clutter and interference resulting from the cables coming out of the device.

[0013] Another important scope of the invention is to achieve a ventilation device for household appliances which allows to increase the convenience of installation of the device within the household appliance.

[0014] In conclusion, a further task of the invention is to obtain a ventilation device for household appliances which allows for a pre-configurable household appliance, in terms of wiring, prior to the installation of the various components, in particular of the ventilation device or devices, avoiding the need to carry the cables of each device to the power and control system.

[0015] The specified technical task and purposes are achieved by a ventilation device for household appliances as claimed in the appended claim 1.

[0016] Preferred technical solutions are highlighted in the dependent claims.

[0017] The features and advantages of the invention are hereinafter clarified by the detailed description of preferred embodiments of the invention, with reference to the accompanying drawings, in which:

the Fig. 1 shows a side perspective view of a ventilation device for household appliances according to the invention;

the Fig. 2 illustrates in detail a connector of a ventilation device for household appliances according to the invention; and

the Fig. 3 is a front view of a ventilation device for household appliances according to the invention.

[0018] In the present document, the measurements, values, shapes and geometric references (such as perpendicularity and parallelism), when associated with words like "about" or other similar terms such as "approximately" or "substantially", are to be considered as except for measurement errors or inaccuracies due to production and/or manufacturing errors, and, above all, except for a slight divergence from the value, measurements, shape, or geometric reference with which it is associated. For instance, these terms, if associated with a value, preferably indicate a divergence of not more than 10% of the value.

[0019] Moreover, when used, terms such as "first", "second", "higher", "lower", "main" and "secondary" do

not necessarily identify an order, a priority of relationship or a relative position, but can simply be used to clearly distinguish between their different components.

[0020] Unless otherwise specified, as results in the following discussions, terms such as "treatment", "computing", "determination", "calculation", or similar, refer to the action and/or processes of a computer or similar electronic calculation device that manipulates and/or transforms data represented as physical, such as electronic quantities of registers of a computer system and/or memories in, other data similarly represented as physical quantities within computer systems, registers or other storage, transmission or information displaying devices.

[0021] The measurements and data reported in this text are to be considered, unless otherwise indicated, as performed in the International Standard Atmosphere ICAO (ISO 2533:1975).

[0022] With reference to the Figures, the ventilation device for household appliances according to the invention is globally referred to as number 1.

[0023] The device 1 is substantially configured to allow ventilation of components of a household appliance. The latter, may be any apparatus of the white sector, for example a refrigerator, an air conditioner, a dryer or others. Preferably, the device 1 is suitable for use in a washing machine.

[0024] In particular, the washing machine may comprise, as is known, a heat pump. Thus, a washing machine according to the invention may comprise a heat pump and the device 1. The latter is, therefore, configured to ventilate the heat pump.

[0025] The device 1, in detail, comprises at least one fan 2.

[0026] The fan 2 is preferably axial. Therefore, the fan 2 is essentially a fan preferably similar to the fans found on common computers, in particular within the enclosures of desktop computers.

[0027] Therefore, in brief, the fan 2 comprises at least a frame 3 and an impeller 4.

[0028] The frame 3 is preferably a frame. Thus, the frame 3 preferably extends over a closed path.

[0029] Furthermore, the frame 3 defines a central axis 3a. The central axis 3a is essentially the axis around which the frame 3 extends. The frame 3 additionally defines an at least one internal wall 30 and an external wall 31.

[0030] The internal wall 30 and the external wall 31 are wrapped around the central axis 3a. The internal wall 30 faces towards, and faces onto, the central axis 3a. The external wall 31 faces outwards.

[0031] Thus, the frame 3 may be annular and the surfaces 30, 31 may be circular strings. Alternatively, the frame 3 may define a square shape, for example rectangular or, more preferably, square.

[0032] In general, if square or angular in shape, the frame 3 defines a plurality of edges 32. The edges 32 are essentially areas of the frame 3 in which the surfaces 30, 31, or the sides of the frame 3, abruptly change di-

rection.

[0033] Furthermore, the surfaces 30, 31 of the frame 3 may be mostly flat, at least in places. Or, the outer surface 31 may be concave.

[0034] In the latter case, the outer surface 31 may define borders 33 and a groove 34.

[0035] The groove 34 is substantially a cavity extending, preferably but not necessarily continuously, around the central axis 3a.

[0036] The edges 33 are substantially the lateral outer surface portions 31. Thus, the groove 34 is positioned between the edges 33.

[0037] The impeller 4 is, therefore, constrained in a compliant way to the frame 3. The impeller 4 may be directly constrained in a compliant way to the frame 3 or constrained to the frame 3 by means of a further component, described below.

[0038] The impeller 4, in general, is positioned within the internal wall 30. Therefore, the internal wall 30 surrounds the impeller 4, preferably without contacting each other. Thus, the impeller 4 is rotatable, with respect to the frame 3, about the central axis 3a. The impeller 4 is substantially a multi-blade element, i.e. having a plurality of blades rotating rigidly around the central axis 3a.

[0039] The impeller 2 preferably comprises a drive unit 5.

[0040] The unit 5 is preferably positioned at the central axis 3a. In particular, the unit 5 may be the connecting component between the frame 3 and the impeller 4. Thus, the impeller 4 may be constrained in a compliant way to the frame 3 via the unit 5. The latter is thus preferably constrained rigidly to the frame 3 preferably in the previously described position.

[0041] Furthermore, the unit 5 is operatively connected to the impeller 4. Thus, the unit 5 is configured to rotate the impeller 4 around the central axis 3a in proportion to electrical signals.

[0042] In this regard, in a preferred embodiment, the unit 5 includes an electric motor. Thus, the electric motor preferably includes a rotating shaft centred with respect to the central axis 3a. The rotating shaft, if present, is naturally rigidly connected to the impeller 4. Preferably, therefore, the unit 5 is electromechanical.

[0043] Preferably, therefore, the impeller 2 also comprises at least one cable 6.

[0044] The cable 6 is an electrical cable. Furthermore, the cable 6 is connected, it is understood electrically or operationally, to the unit 5. If unit 5 includes the electric motor, cable 6 is operatively connected to the electric motor to power it.

[0045] Thus, the cable 6 defines at least one terminal in the vicinity of the central axis 3a and may extend outwards.

[0046] Preferably, the frame 3 comprises a guide 35.

[0047] Preferably, the guide 35 is configured to accommodate at least part of the cable 6. Furthermore, preferably, the guide 35 is accessible from the outside. In addition, the guide 35 extends at least partially radially, rel-

ative to the central axis 3a, so as to be able to contain and convey the incoming cable 6 from the unit 5.

[0048] Advantageously, the device 1 comprises a further element.

[0049] In particular, the device 1 comprises a connector 7.

[0050] Advantageously, the connector 7 is of the IDC type. In detail, the connector 7 may be of the RAST type, more particularly still of the RAST 2.5 type. In addition, connector 7 can be of the insulation perforation type. In addition, connector 7 may be of the female type.

[0051] Furthermore, the connector 7 is connected to at least the cable 6. Therefore, preferably, if the frame 3 comprises the guide 35, the latter accommodates the cable 6 between the unit 5 and the connector 7.

[0052] Even more advantageously, the connector 7 faces outwards, for example perpendicularly to the outer surface 30. Thus, the connector 7 is configured to be connected to an external power supply and control system of a household appliance, for example a washing machine.

[0053] Even more advantageously, the connector 7 is positioned on the external wall 31. For example, connector 7 could be positioned near the edges 32.

[0054] In addition, the connector 7 could also be positioned at the groove 34 such that it does not protrude entirely beyond the edges 33, i.e. beyond the virtual plane connecting the edges 33.

[0055] Preferably, less than half of the connector 7 protrudes beyond the edges 33.

[0056] The operation of the appliance ventilation device 1 described above in structural terms is substantially similar to any fan of the known technology.

[0057] However, the household appliance ventilation device 1 according to the invention achieves important advantages.

[0058] Indeed, the household appliance ventilation device 1 avoids clutter and interference from cables exiting the device, since the cable 6 does not exit the device 1 and remains housed therein.

[0059] Furthermore, the appliance ventilation device 1 increases the convenience of installation of the device 1 within the appliance, since it is possible to install the device 1 and subsequently connect the device 1 itself with ease.

[0060] In conclusion, the appliance ventilation device 1 allows a household appliance, in particular a washing machine, to be pre-configured in terms of wiring.

[0061] Furthermore, the device 1 withstands the imposed vibrations optimally, which are especially noticeable in washing machines and similar.

[0062] In fact, it is possible to provide specific installation configurations of the components and to provide male sockets terminating at the positions of the components, such as device 1. Thus, each device 1 can be installed and connected to the pre-configured wiring of the household appliance, with ease.

[0063] The invention is susceptible to variations within

the scope of the inventive concept as defined by the claims. For example, the device is also well suited for other industries such as automotive, i.e., for cars such as passenger cars and the like.

Claims

1. Ventilation device (1) for household appliances comprising an axial fan (2) including:

- a bezel frame (3) defining a closed internal wall (30) and a closed external wall (31) wrapped around a central axis (3a),
- an impeller (4) constrained in a compliant way to said frame (3) within said internal wall (30) and rotatable around said central axis (3a),
- a drive unit (5) rigidly constrained to said frame (3), positioned at said central axis (3a), operatively connected to said impeller (4) and configured to rotate said impeller (4) proportionally to electrical signals,
- at least one electrical cable (6) connected to said unit (5),

and characterized by further comprising

- a connector (7) of the IDC type positioned on said external wall (31), connected to at least said cable (6), facing outwards of said frame (3) and configured to be connected to an external power supply and control system of a household appliances.

2. Device (1) according to claim 1, wherein said connector (7) is of RAST type.

3. Device (1) according to any one of the preceding claims, wherein said connector (7) is of type insulation displacement.

4. Device (1) according to any one of the preceding claims, wherein said connector (7) is a female connector.

5. Device (1) according to claim 1, wherein said frame (3) has a square shape defining a plurality of edges (32) and said connector (7) is positioned in close proximity to one of said edges (32).

6. Device (1) according to any one of the preceding claims, wherein said external surface (31) is concave defining borders (33) and a groove (34) extending around said central axis (3a) between said borders (33) and said connector (7) is positioned in correspondence of said groove (34) in such a way as not to protrude entirely beyond said edges (33).

7. Device (1) according to the preceding claim, wherein less than half of said connector (7) protrudes beyond said borders (33).
8. Device (1) according to any one of the preceding claims, wherein said frame (3) comprises a guide (35) accessible from the outside, extending at least partly radially with respect to said central axis (3a) and configured to accommodate at least part of said cable (6) between said unit (5) and said connector (7).
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9. Device (1) according to any one of the preceding claims, wherein said unit (5) comprises an electric motor connected to said cable (6) and including a rotary shaft cantered with respect to said central axis (3a) and integrally connected to said impeller (4).
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10. Washing machine comprising a heat pump and a device (1) according to any one of the preceding claims configured to ventilate said heat pump.
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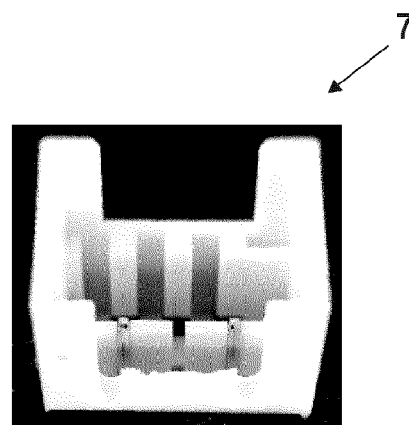
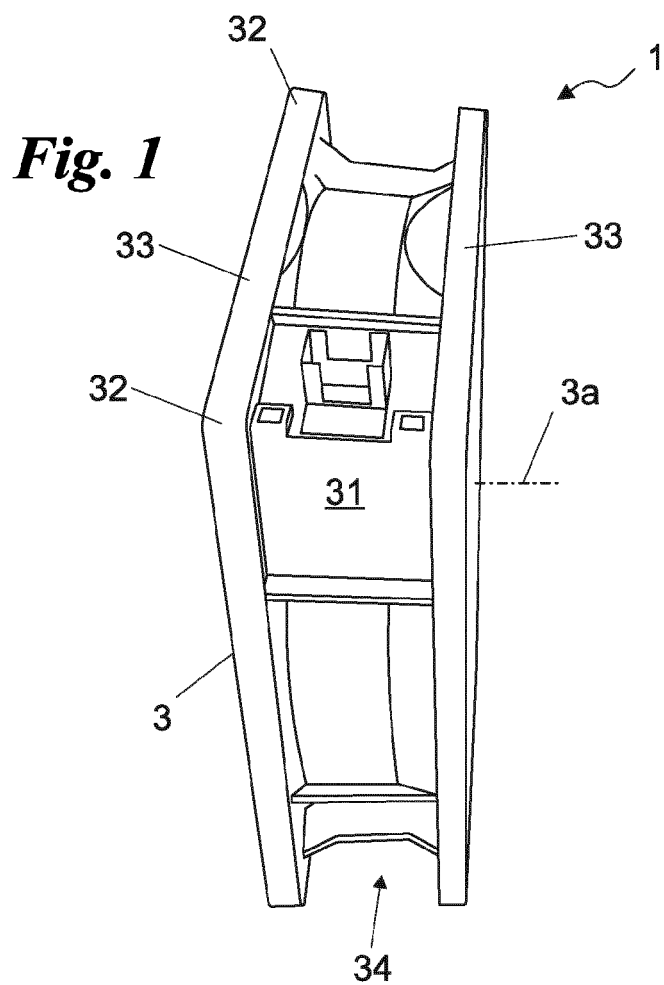
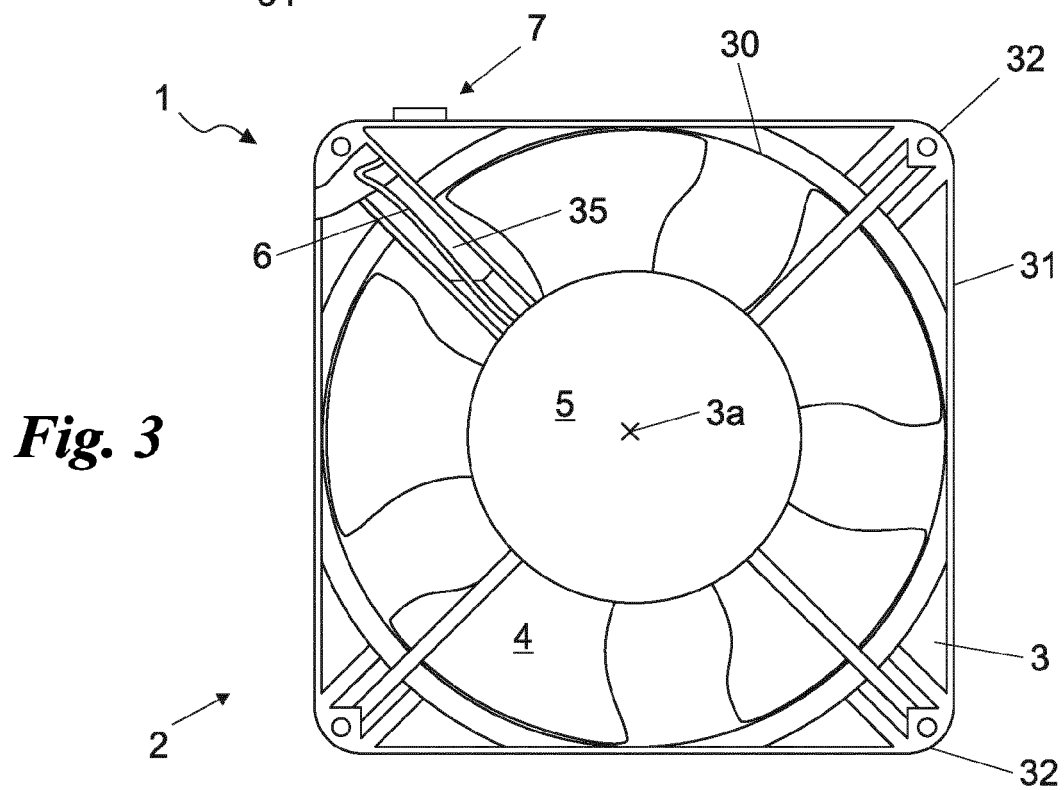


Fig. 2





EUROPEAN SEARCH REPORT

Application Number

EP 22 20 8780

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EPO FORM 1503 03.82 (P04C01)

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 2021/018009 A1 (HSIEH MING-KAI [TW] ET AL) 21 January 2021 (2021-01-21)	1, 3, 5, 7, 9, 10	INV. F24F1/0018
Y	* figures 1A, 1C, 1H * * paragraphs [0046], [0049] * -----	2, 4, 6, 8	F04D25/06
Y	US 2020/232151 A1 (SAVINI PAOLO [IT] ET AL) 23 July 2020 (2020-07-23) * figure 5 * * paragraph [0051] * -----	2	
Y	US 2014/308121 A1 (TANG XIAN-XIU [CN]) 16 October 2014 (2014-10-16) * figures 1, 2, 5 * -----	4	
Y	US 2016/025104 A1 (SHEN CHING-HANG [TW]) 28 January 2016 (2016-01-28) * figures 2a, 2c * -----	6	
A	US 2008/100160 A1 (SHIBUYA NAOTAKA [JP] ET AL) 1 May 2008 (2008-05-01) * figures 1, 3, 4 * -----	6	TECHNICAL FIELDS SEARCHED (IPC)
Y	US 2007/280840 A1 (SUGIYAMA TOMOTSUGU [JP] ET AL) 6 December 2007 (2007-12-06) * figures 1-3, 8, 9 * -----	8	F24F F04D
A	US 5 189 327 A (OOTSUKA SHIGERU [JP] ET AL) 23 February 1993 (1993-02-23) * figures 1-3 * -----	8	
A	EP 0 688 088 A1 (EMERSON ELECTRIC CO [US]) 20 December 1995 (1995-12-20) * abstract; figures 3, 4, 11, 12 * -----	1-10	
The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 17 January 2023	Examiner Güvener, Cem
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	

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

EP 22 20 8780

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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.

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Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 2021018009 A1	21-01-2021	NONE	
US 2020232151 A1	23-07-2020	AU 2018346819 A1	09-04-2020
		CA 3075982 A1	11-04-2019
		CN 111630222 A	04-09-2020
		EP 3692202 A1	12-08-2020
		JP 2020535912 A	10-12-2020
		KR 20200096211 A	11-08-2020
		US 2020232151 A1	23-07-2020
		WO 2019069185 A1	11-04-2019
US 2014308121 A1	16-10-2014	CN 104100560 A	15-10-2014
		US 2014308121 A1	16-10-2014
US 2016025104 A1	28-01-2016	NONE	
US 2008100160 A1	01-05-2008	JP 2008115696 A	22-05-2008
		US 2008100160 A1	01-05-2008
US 2007280840 A1	06-12-2007	CN 101082346 A	05-12-2007
		JP 2007321625 A	13-12-2007
		US 2007280840 A1	06-12-2007
US 5189327 A	23-02-1993	JP 2858368 B2	17-02-1999
		JP H04109843 A	10-04-1992
		US 5189327 A	23-02-1993
EP 0688088 A1	20-12-1995	BR 9501984 A	12-12-1995
		CA 2148509 A1	12-11-1995
		EP 0688088 A1	20-12-1995
		JP H07327349 A	12-12-1995
		KR 950035007 A	30-12-1995
		TW 289177 B	21-10-1996
		US 5610458 A	11-03-1997

REFERENCES CITED IN THE DESCRIPTION

This list of references cited by the applicant is for the reader's convenience only. It does not form part of the European patent document. Even though great care has been taken in compiling the references, errors or omissions cannot be excluded and the EPO disclaims all liability in this regard.

Patent documents cited in the description

- US 2021018009 A1 [0003]
- US 2020232151 A1 [0003]
- EP 0688088 A1 [0003]
- US 2014308121 A1 [0003]
- US 2016025104 A1 [0003]
- US 2008100160 A1 [0003]
- US 2007280840 A1 [0003]
- US 5189327 A [0003]