



(12) **EUROPEAN PATENT APPLICATION**

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

(51) International Patent Classification (IPC):
D06F 31/00 ^(2006.01) **D06F 39/02** ^(2006.01)

(21) Application number: **21164255.8**

(52) Cooperative Patent Classification (CPC):
D06F 31/00; D06F 39/022; D06F 39/028

(22) Date of filing: **23.03.2021**

(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

- **WEINBRENNER, Georg**
83278 Traunstein (DE)
- **FASSBENDER, Thomas**
41466 Neuss (DE)
- **DÜRRSCHMIDT, Thomas**
40724 Hilden (DE)

(71) Applicant: **Ecolab USA, Inc.**
St. Paul, Minnesota 55102 (US)

(74) Representative: **Michalski Hüttermann & Partner**
Patentanwälte mbB
Kaistraße 16A
40221 Düsseldorf (DE)

(72) Inventors:
• **SCHMUCK, Walter**
2462 Wilfleinsdorf (AT)

(54) **DOSING SYSTEM FOR A TUNNEL WASHER, DOSING UNIT FOR SUCH DOSING SYSTEM AND TUNNEL WASHER**

(57) The invention relates to a dosing system (24) for a tunnel washer (10), the dosing system (24) comprising:

- at least one dosing unit (26, 28) for a dosed delivery of a plurality of products to be dosed into a respective compartment (18, 20) of the tunnel washer (10) and
- reservoirs (30, 32) for each of the products to be dosed, wherein the at least one dosing unit (26, 28) includes a dosing line (34) with a dispensing point (36), a pump (38), a flow meter (40) and a multi-way valve assembly (42), which are fluid-technically connected in the dosing line (34) and wherein the at least one dosing unit (26, 28) is fluid-technically connected to the reservoirs (30, 32) via its multi-way valve assembly (42) in such a way that the products to be dosed by the respective dosing unit (26, 28) can be selected via the multi-way valve assembly (42) of said dosing unit (26, 28).

The invention further relates to a corresponding dosing unit (26, 28), a corresponding use of such kind of dosing unit (26, 28) and a corresponding tunnel washer (10).

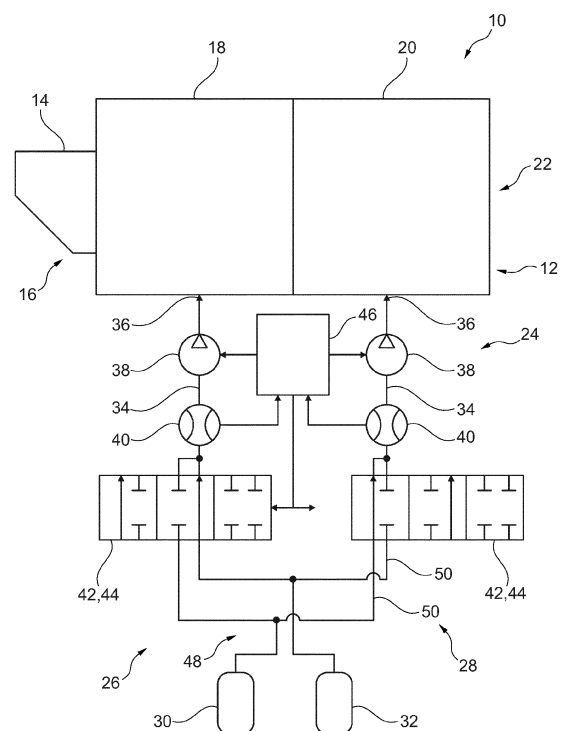


Fig. 1

Description

Field of the Invention

[0001] The invention relates to a dosing system for a tunnel washer, the dosing system comprising: at least one dosing unit for the dosed delivery of liquid products to be dosed into a respective compartment of the tunnel washer and reservoirs for each of the products to be dosed.

[0002] The invention further relates to a corresponding dosing unit, a corresponding use of such kind of dosing unit for a dosed delivery of a plurality of liquid products to be dosed from a plurality of reservoirs into a compartment of a tunnel washer and a corresponding tunnel washer with such a dosing system.

Background of the Invention

[0003] A tunnel washer, also called a continuous batch washer (CBW), is an industrial washing machine designed specifically to handle heavy loads of laundry.

[0004] Document US 2011/0296626 A1 shows such a tunnel washer with a plurality of compartments and a dosing system comprising a plurality of dosing units for the dosed delivery of liquid products to be dosed into the respective compartment of the tunnel washer and reservoirs for each of the products to be dosed. One reservoir per compartment is shown.

[0005] If it should be possible to dose liquid products from several reservoirs into one compartment, there are several dosing lines for this compartment and each of the dosing units is connected to the corresponding reservoirs via a separate dosing line. In other words, the current setup is that every product is dosed separately in the CBW. In case that several products go in the same compartment of the CBW there are several dosing lines in the same compartment.

[0006] The space of the dosing room which is in 80% of all laundries too small and therefore it is the object of the invention to indicate measures to provide a smaller dosing system with the same dosing possibilities as the current systems.

[0007] It is the object of the invention to provide means for a space-saving supply of product(s) to the corresponding compartments.

Summary of the Invention

[0008] This object is achieved by the invention as defined by the independent claims. The dependent claims detail advantageous embodiments of the invention.

[0009] According to various aspects of the invention, a dosing system for a tunnel washer is provided, which dosing system comprises: (a) at least one dosing unit for a dosed delivery of a plurality of liquid products to be dosed into a respective compartment of the tunnel washer and (b) reservoirs for each of the products to be dosed,

wherein the at least one dosing unit includes a dosing line with a dispensing point, a pump, a flow meter and a multi-way valve assembly, which are fluid-technically connected in the dosing line and wherein the at least one dosing unit is fluid-technically connected to the reservoirs via its multi-way valve assembly in such a way that the products to be dosed by the respective dosing unit can be selected via the multi-way valve assembly of said dosing unit. Such a dosing system can be realized in a very space-saving way. Especially if it should be possible to supply several of the compartments with the same products, the space saving becomes obvious.

[0010] A multi-way valve assembly can be realized with a single multi-way valve or a plurality of valves. According to a preferred embodiment of the invention, the multi-way valve assembly of the at least one dosing unit is realized by a single multi-way valve. If such a realization is possible, there is a further space saving.

[0011] In accordance with another preferred embodiment of the invention, the at least one dosing unit is further on fluid-technically connectable to a water supply via its multi-way valve assembly. By means of this measure the dosing line of each dosing unit can be flushed with water between different products. The water supply can be realized by a water pipe or by a water reservoir, which in principle does not differ from the other reservoirs of the system.

[0012] In accordance with yet another preferred embodiment of the invention, the at least one multi-way valve assembly has at least one more switching state than there are reservoirs, preferably two of them. One switching state for each reservoir/product to be delivered to the respective compartment and one extra switching state for no delivery at all and one extra switching state for flushing the dosing line with water.

[0013] In case the at least one multi-way valve assembly is realized by a single multi-way valve, the/each multi-way valve has at least one more switching state than there are reservoirs, preferably two of them.

[0014] Preferably the dosing system comprises a plurality of dosing units. A plurality of dosing units means that a plurality of compartments can be supplied with the same liquid products.

[0015] In accordance with another aspect of the dosing system according to the invention, the system further comprises a control unit for controlling and/or regulating the at least one dosing unit. In general, the control unit outputs control signals to the multi-way valve(s) and the pump(s) of the dosing unit(s) and receives measurement signals from the flow meter(s).

[0016] In accordance with yet another aspect of the dosing system according to the invention, the dosing system further comprises a piping system for fluid-technically connecting the at least one dosing unit to the reservoirs. Each of the reservoirs is fluidly connected to each of the multi-way valves (and the water supply) via the branched piping system.

[0017] According to various aspects of the invention,

a dosing unit for a dosed delivery of a plurality of liquid products to be dosed from a plurality of reservoirs into a compartment of a tunnel washer is provided, which dosing unit includes a dosing line with a dispensing point, a pump, a flow meter and a multi-way valve assembly, which are fluid-technically connected in the dosing line, wherein the multi-way valve assembly of the dosing unit arranged for a fluid-technically connection to the reservoirs in such a way that the products to be dosed by the respective dosing unit can be selected via the multi-way valve assembly of said dosing unit. The dosing unit especially is a dosing unit for the aforementioned dosing system. Each of the advantageous embodiments of the aforementioned dosing system relating to the dosing unit(s) is equally an advantageous embodiment of the dosing unit.

[0018] According to various aspects of the invention a use of the aforementioned dosing unit for a dosed delivery of a plurality of liquid products to be dosed from a plurality of reservoirs into a compartment of a tunnel washer is provided.

[0019] According to various aspects of the invention, a tunnel washer comprising a washing device with a plurality of compartments and an aforementioned dosing system is provided.

[0020] Preferably the washing device comprises a conveyor screw for transporting the laundry within the washing device along the compartments. The screw conveyor is usually made of perforated metal so that the laundry items can pass through the washing device in one direction, while water and additional liquid products required for washing, in particular washing chemicals, pass through in the opposite direction. Thus, the laundry moves through the compartments with progressively cleaner water and fresher chemicals during the washing process.

[0021] According to a preferred embodiment of the tunnel washer according to the invention, the tunnel washer further comprises a higher-level control unit for a coordinated control of the washing device and the dosing system.

Detailed Description of the Invention

[0022] Additional details, features, characteristics and advantages of the object of the invention are disclosed in the figure and the following description of the respective figure, which - in exemplary fashion - show one embodiment and an example of a dispensing system according to the invention. In the drawings:

Fig. 1 shows a tunnel washer with a washing device with a plurality of compartments and a dosing system.

[0023] Fig. 1 shows a tunnel washer 10, also called a continuous washing machine (CWM), in a schematic view. This tunnel washer 10 is an industrial washing ma-

chine specially designed for heavy loads of laundry. The tunnel washer 10 has a washing device 12 for washing laundry. This laundry, consisting of individual pieces of laundry, is fed into the washing device 12 via a funnel-like feed unit 14 at one end 16 of the tunnel washer 10, passes through a plurality of compartments 18, 20 (sometimes also called pockets) of the washing device 12 arranged in series, and can be removed cleanly from the tunnel washer 10 at the other end 22 of the tunnel washer 10. Only two compartments 18, 20 are shown in the schematic representation herein. The laundry is propelled within the washing device 12 by means of a screw conveyor (not shown in the figure). The screw conveyor is usually made of perforated metal so that the laundry items can pass through the washing device 12 in one direction (from the one end 16 to the other end 22), while water and additional liquid products required for washing, in particular washing chemicals, pass through in the opposite direction (towards the one end 16). Thus, the laundry moves through the compartments 18, 20 with progressively cleaner water and fresher chemicals during the washing process. The washing device 12 has a control unit (not shown here) for controlling said washing process.

[0024] The tunnel washer 10 further comprises a dosing system 24 for dosing the liquid products/chemicals into individual ones of the compartments 18, 20. By means of this dosing system, the product amounts in the individual compartments 18, 20 are monitored and adjusted, thereby adapting the washing formula to the laundry items passing through.

[0025] The dosing system 24 comprises (i) a plurality of dosing units 26, 28 for the dosed delivery of products to be dosed into a respective compartment 18, 20 of the washing device 12 and (ii) reservoirs 30, 32 for each of the products to be dosed. Each of the dosing units 26, 28 includes a dosing line 34 with a dispensing point 36, a pump 38, a flow meter 40 and a multi-way valve assembly 42, which components 36, 38, 40, 42 are fluid-technically connected in the dosing line 34. Within the dosing system 24 the dosing units 26, 28 are fluid-technically connected to the reservoirs 30, 32 via their multi-way valve assemblies 42 in such a way that each of the products can be dosed by each of the respective dosing units 26, 28, wherein a selection of the corresponding reservoir 30, 32 can be performed via the multi-way valve 42 of the respective dosing unit 26, 28. The multi-way valve assemblies 42 can comprise one or multiway valves 44. In the shown example, each of the multi-way valve assemblies 42 consists of one multiway valve 44. Each of the one multi-way valves 44 has one more switching state than there are reservoirs 30, 32 (three switching states and two reservoirs 30, 32). The dosing system 24 further comprises a control unit 46 for controlling and/or regulating the at least one dosing unit 26, 28. The control unit 46 outputs control signals to the multi-way valves 44 and the pumps 38 of the dosing units 26, 28 and receives measurement signals from the flow meters 40 (repre-

sented by arrows).

[0026] The dosing system further comprises a piping system 48 for realizing the fluid-technically connection of the dosing units 26, 28 to the reservoirs 30, 32. Each of the reservoirs 30, 32 is fluidly connected to each of the multi-way valves 44 via an own branched part 50 of the piping system 48. The piping system 48 also includes a part 50 (not shown here) for flushing the dosing lines 34 with water. This part is constructed like the other parts 50 of the piping system 48 (shown here) but is connected to a water supply. It should be noted that, unlike the example shown here, the dosing system 24 does not necessarily have to supply each of the compartments 18, 20 with product.

[0027] Within the dosing system 24 each dispensing point (dosing point) 36 is connected with one pump 38 and one flow meter 40 and a multi-way valve 44 in order to be able to switch between different products/reservoirs 30, 32. The dosing lines 34 have to be flushed with water between different products in order that this concept works.

[0028] The advantage of this dosing system 24 is that it requires less space and smaller number of pumps 38 and flow meters 40. Also, one could use a pre-dosage system in order not to lose too much time between dosages of different products through the same dispensing point (dosing point) 36.

[0029] It should be noted that, as used in this specification and the appended claims, the singular forms "a", "an" and "the" include plural referents unless the content clearly dictates otherwise. Thus, for example, reference to a composition containing "a compound" includes a mixture of two or more compounds. It should also be noted that the term "or" is generally employed in its sense including "and/or" unless the content clearly dictates otherwise.

Reference Numbers

[0030]

10	tunnel washer
12	washing device
14	feed unit
16	end
18	compartment
20	compartment
22	end
24	dosing system
26	dosing unit
28	dosing unit
30	reservoir
32	reservoir
34	dosing line
36	dispensing point
38	pump
40	flow meter
42	multi-way valve assembly

44	multi-way valve
46	control unit
48	piping system
50	branched part (of the piping system)

Claims

1. A dosing system (24) for a tunnel washer (10), the dosing system (24) comprising:

- at least one dosing unit (26, 28) for a dosed delivery of a plurality of liquid products to be dosed into a respective compartment (18, 20) of the tunnel washer (10) and
- reservoirs (30, 32) for each of the products to be dosed,

wherein the at least one dosing unit (26, 28) includes a dosing line (34) with a dispensing point (36), a pump (38), a flow meter (40) and a multi-way valve assembly (42), which are fluid-technically connected in the dosing line (34) and wherein the at least one dosing unit (26, 28) is fluid-technically connected to the reservoirs (30, 32) via its multi-way valve assembly (42) in such a way that the products to be dosed by the respective dosing unit (26, 28) can be selected via the multi-way valve assembly (42) of said dosing unit (26, 28).

2. The dosing system according to claim 1, wherein the multi-way valve assembly (42) of the at least one dosing unit (26, 28) is realized by a single multi-way valve (44).

3. The dosing system according to claim 1 or 2, wherein the at least one dosing unit (26, 28) is further on fluid-technically connectable to a water supply via its multi-way valve assembly (42).

4. The dosing system according one of claims 1 to 3, wherein the at least one multi-way valve assembly (42) has at least one more switching state than there are reservoirs (30, 32).

5. The dosing system according to one of claims 1 to 4, comprising a plurality of dosing units (26, 28).

6. The dosing system according to one of claims 1 to 5, further comprising a control unit (46) for controlling and/or regulating the at least one dosing unit (26, 28).

7. The dosing system according to one of claims 1 to 6, further comprising a piping system (48) for fluid-technically connecting the at least one dosing unit (26, 28) to the reservoirs (30, 32).

8. A dosing unit (26, 28) for a dosed delivery of a plurality of liquid products to be dosed from a plurality of reservoirs (30, 32) into a compartment (18, 20) of a tunnel washer (10), the dosing unit (26, 28) including a dosing line (34) with a dispensing point (36), a pump (38), a flow meter (40) and a multi-way valve assembly (42), which are fluid-technically connected in the dosing line (34), wherein the multi-way valve assembly (42) of the dosing unit (26, 28) arranged for a fluid-technically connection to the reservoirs (30, 32) in such a way that the products to be dosed by the respective dosing unit (26, 28) can be selected via the multi-way valve assembly (42) of said dosing unit (26, 28).
9. A use of a dosing unit (26, 28) according to claim 8 for a dosed delivery of a plurality of liquid products to be dosed from a plurality of reservoirs (30, 32) into a compartment (18, 20) of a tunnel washer (10).
10. A tunnel washer (10) comprising a washing device (12) with a plurality of compartments (18, 20) and a dosing system (24) according to one of claims 1 to 7.
11. The tunnel washer according to claim 10, wherein the washing device (12) comprises a conveyor screw for transporting the laundry within the washing device (12) along the compartments (18, 20).
12. The tunnel washer according to claim 10 or 11, further comprising a higher-level control unit for a coordinated control of the washing device (12) and the dosing system (24).

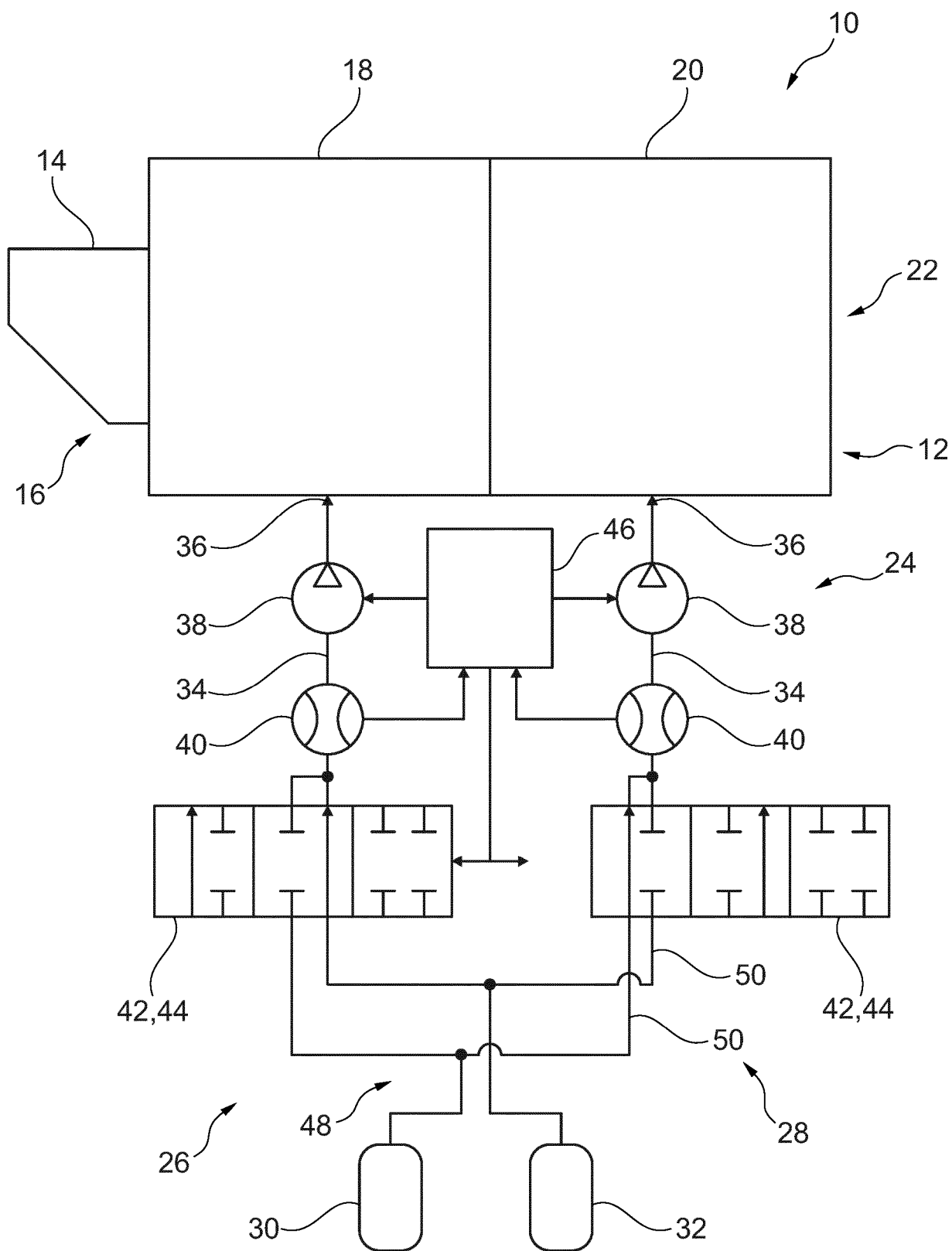


Fig. 1



EUROPEAN SEARCH REPORT

Application Number
EP 21 16 4255

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)
X	WO 2013/037407 A1 (ECOLAB INC [US]; DE BRABANTER DIRK [BE]) 21 March 2013 (2013-03-21) * page 14, line 31 - page 17, line 22; figure *	1-12	INV. D06F31/00 D06F39/02
X	----- CN 111 962 265 A (QINGDAO HAIER DRUM WASHING MACHINE CO LTD; HAIER SMART HOME CO LTD) 20 November 2020 (2020-11-20) * paragraph [0066] - paragraph [0116]; figures *	1-12	
X	----- WO 2014/180022 A1 (WUXI LITTLE SWAN CO LTD [CN]) 13 November 2014 (2014-11-13) * page 2, line 27 - page 7, line 7; figures *	1-12	
A	----- EP 2 044 877 A1 (WHIRLPOOL CO [US]) 8 April 2009 (2009-04-08) * paragraph [0010] - paragraph [0028]; figures 1-5 *	1-12	TECHNICAL FIELDS SEARCHED (IPC)
X	----- US 2020/325618 A1 (CHAE KYOSOUN [KR] ET AL) 15 October 2020 (2020-10-15) * paragraph [0041] - paragraph [0176]; figures 1-19 *	1-12	D06F A47L
A	----- JP H08 323088 A (MITSUBISHI HEAVY IND LTD) 10 December 1996 (1996-12-10) * abstract; figures *	9-12	
The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 31 August 2021	Examiner Sangiorgi, Massimo
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 21 16 4255

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.

31-08-2021

10

15

20

25

30

35

40

45

50

55

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
WO 2013037407 A1	21-03-2013	EP 2756127 A1 WO 2013037407 A1	23-07-2014 21-03-2013
-----	-----	-----	-----
CN 111962265 A	20-11-2020	NONE	
-----	-----	-----	-----
WO 2014180022 A1	13-11-2014	NONE	
-----	-----	-----	-----
EP 2044877 A1	08-04-2009	EP 2044877 A1 US 2009090401 A1	08-04-2009 09-04-2009
-----	-----	-----	-----
US 2020325618 A1	15-10-2020	CN 111809353 A EP 3722489 A1 KR 20200120208 A US 2020325618 A1 WO 2020209684 A1	23-10-2020 14-10-2020 21-10-2020 15-10-2020 15-10-2020
-----	-----	-----	-----
JP H08323088 A	10-12-1996	JP 3402854 B2 JP H08323088 A	06-05-2003 10-12-1996
-----	-----	-----	-----

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 20110296626 A1 [0004]