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kind of national protection available): AE, AG, AL, AM,  
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CA, CH, CL, CN, CO, CR, CU, CZ, DE, DJ, DK, DM, DO,  
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(54) Title: A DISHWASHER

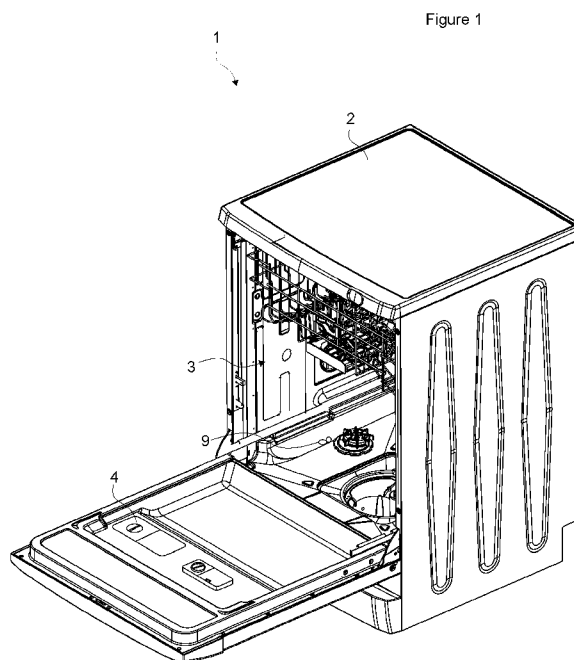


Figure 1

(57) Abstract: The present invention relates to a dishwasher (1) comprising a body (2); a washing cabin (3) wherein the washing process is performed; a detergent dispenser (4) wherein liquid/gel detergent can be filled; a control unit (5) in the memory of which the amount of detergent required to be transferred to the washing cabin (3) in the unit time period according to the selected program type as predetermined by the producer is recorded; a detergent receptacle (6) that is disposed in the detergent dispenser (4) and wherein the detergent is filled; a dosing receptacle (7) that is disposed next to the detergent receptacle (6), wherein the detergent to be used in the current washing cycle with the amount being determined by the control unit (5) is transferred from the detergent receptacle (6) and accumulated therein, and a dosing element (8) that is disposed between the detergent receptacle (6) and the dosing receptacle (7), that has an open position (A) wherein the detergent is enabled to flow from the detergent receptacle (6) to the dosing receptacle (7) and a



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**Description****A DISHWASHER**

- [0001] The present invention relates to a dishwasher comprising a liquid/gel detergent dosing unit that can dose the required amount of detergent into the washing cabin.
- [0002] In dishwashers, it is important that the use of detergent should be in the optimum level required for cleaning the dishes due to both the life span of the dishes and also for our health and pollution of the environment because of the chemicals contained therein. At the start of each washing cycle, the detergent is filled into the detergent dispenser disposed on the machine by the user. In washing cycles wherein intensively dirty dishes are washed, generally the use of greater amounts of detergent is preferred. Using the detergent in the right amount is among the factors that directly affect the washing performance. Therefore, lately the use of powder or gel/liquid detergents, the amount of which depends on user preference is becoming widespread. Systems are also known, that can automatically dose the liquid/gel detergents according to the chosen washing program. The detergent is filled by the user in the dosing systems so that the detergent is used in more than one cycle. The amount of detergent to be used in each cycle is determined by the dosing system. However, detergents of different brands or characteristics may have different fluidity values. Therefore, the same washing performance cannot be achieved with each detergent.
- [0003] In the state of the art European Patent No. EP2073684, a household appliance comprising a liquid detergent dosing unit is disclosed.
- [0004] The aim of the present invention is the realization of a dishwasher wherein the liquid/gel dosing is performed in an optimum manner.
- [0005] The dishwasher realized in order to attain the aim of the present invention, explicated in the first claim and the respective claims thereof, comprises a body; a washing cabin that is disposed on the body and wherein the washing process is performed; a detergent dispenser suitable for filling liquid/gel detergent therein; a control unit that controls the amount of detergent required to be transferred to the washing cabin; a detergent

receptacle that is disposed in the detergent dispenser, and a dosing receptacle that is disposed in the vicinity of the detergent receptacle. A dosing element that provides the flow of the detergent is disposed between the detergent receptacle and the dosing receptacle. Flow from the detergent receptacle to the dosing receptacle is provided when the dosing element is in the open position. When the detergent is being transferred from the dosing receptacle to the washing cabin, the dosing element is in the closed position.

- [0006] The dishwasher of the present invention comprises the control unit that enables the time periods of the open position and the closed position to be optimized according to the information received from the washing cabin. The time periods of the open position and the closed position are optimized depending on the concentration of the detergent.
- [0007] In an embodiment of the present invention, a conductivity and/or turbidity sensor is provided in the washing cabin.
- [0008] In an embodiment of the present invention, the dishwasher comprises the control unit that enables the concentration of the detergent to be determined by comparing the values measured from the washing cabin. The control unit measures the difference between a first conductivity value (C1) measured before the detergent is delivered into the washing cabin and a second conductivity value (C2) measured in the washing cabin after the pre-dosing is realized. By comparing the measured difference and the reference conductivity value prerecorded by the producer in the memory of the control unit, the concentration of the detergent is determined.
- [0009] In an embodiment of the present invention, the control unit enables the time periods of the open position and the closed position to be increased if the concentration of the detergent is high so that the amount of detergent transferred from the detergent receptacle to the dosing receptacle and from the dosing receptacle to the washing cabin is at the ideal level.
- [0010] In an embodiment of the present invention, the control unit enables the time periods of the open position and the closed position to be shortened if the concentration of the detergent is low so that the amount of detergent transferred from the detergent receptacle to the dosing receptacle and

from the dosing receptacle to the washing cabin is at the ideal level.

- [0011] In an embodiment of the present invention, the control unit enables the time periods of the dosing element to be optimized according to the conductivity values measured from in the washing cabin at certain intervals.
- [0012] The dishwasher realized in order to attain the aim of the present invention is illustrated in the attached figures, where
- [0013] Figure 1 – is the perspective view of the dishwasher.
- [0014] Figure 2 – is the schematic view of the detergent receptacle and the dosing receptacle when the dosing element is in the closed position.
- [0015] Figure 3 – is the schematic view of the detergent receptacle and the dosing receptacle when the dosing element is in the open position.
- [0016] Figure 4 – is the schematic view of the detergent dispenser and the control unit.
- [0017] The elements illustrated in the figures are numbered as follows:
1. Dishwasher
  2. Body
  3. Washing cabin
  4. Detergent dispenser
  5. Control unit
  6. Detergent receptacle
  7. Dosing receptacle
  8. Dosing element
  9. Sensor
- [0018] The dishwasher (1) comprises a body (2); a washing cabin (3) wherein the washing process is performed; a detergent dispenser (4) wherein liquid/gel detergent can be filled; a control unit (5) in the memory of which the amount of detergent required to be transferred to the washing cabin (3) in the unit time period according to the selected program type as predetermined by the producer is recorded; a detergent receptacle (6) that is disposed in the detergent dispenser (4) and wherein the detergent is filled; a dosing receptacle (7) that is disposed next to the detergent receptacle (6), wherein the detergent to be used in the current washing

cycle with the amount being determined by the control unit (5) is transferred from the detergent receptacle (6) and accumulated therein, and a dosing element (8) that is disposed between the detergent receptacle (6) and the dosing receptacle (7), that has an open position (A) wherein the detergent is enabled to flow from the detergent receptacle (6) to the dosing receptacle (7) and a closed position (K) wherein the detergent is transferred from the dosing receptacle (7) to the washing cabin (3). In the open position (A), the detergent is enabled to flow from the detergent receptacle (6) to the dosing receptacle (7). The detergent in the amount to be delivered to the washing cabin (3) is transferred to the dosing receptacle (7). When the dosing element (8) shifts to the closed position, the detergent is delivered from the dosing receptacle (7) to the washing cabin (3).

- [0019] The dishwasher (1) of the present invention comprises the control unit (5) that enables the time periods of the open position and the closed position to be optimized by determining the concentration of the detergent according to the information received from the washing cabin (3) when the washing process starts. When the washing process starts, the control unit (5) determines the concentration of the detergent. Thus, ideal cleaning is provided every time when different detergents are used. The control unit (5) enables the dosing element (8) to shift position by means of a crank-connecting rod mechanism. In a derivative of the embodiment, electronic methods can also be used.
- [0020] In an embodiment of the present invention, the dishwasher (1) comprises a conductivity sensor (9) and/or a turbidity sensor (9) that is disposed in the washing cabin (3) and that enables the concentration of the detergent to be determined.
- [0021] In an embodiment of the present invention, the dishwasher (1) comprises the control unit (5) that enables the concentration of the detergent to be determined by comparing the difference between a first conductivity value (C1) measured in the washing cabin (3) before the delivery of the detergent to the washing cabin (3) and a second conductivity value (C2) measured after the pre-dosing with a reference conductivity value (C3)

prerecorded by the producer in the memory of the control unit (5). Before the delivery of the detergent to the washing cabin (3), a conductivity value is measured by means of the dirt on the dishes. After the pre-dosing, the value of the conductivity provided by the detergent is measured. The pre-dosing may be repeated several times as per the preference of the user. The values are compared with the values prerecorded in the memory of the control unit (5). If the amount of detergent is less than the expected level as specified in the reference value, the control unit (5) decides that the detergent is too concentrated and the time periods of the dosing element (8) are optimized.

- [0022] In an embodiment of the present invention, the dishwasher (1) comprises the control unit (5) that increases the time periods of the open position (A) and the closed position (K) as the concentration of the detergent increases, and decreases the time periods of the open position (A) and the closed position (K) as the concentration of the detergent decreases.
- [0023] If the concentration of the detergent is high, a longer period is needed for filling the detergent at the desired level since the detergent flows more slowly. By determining the concentration of the detergent based on the values measured in the washing cabin (3), the time periods of the open position and the closed position of the dosing element (8) are optimized.
- [0024] Since the fluidity of the detergents with lower concentration is greater, the detergent in the desired amount is provided in a short time period. If the concentration of the detergent determined by the control unit (5) is lower than the concentration value predetermined by the producer, the time periods of the open position and the closed position are shortened by the control unit (5).
- [0025] In an embodiment of the present invention, the control unit (5) enables the time periods of the dosing element (8) to be optimized by means of the conductivity values continuously measured in the washing cabin (3) at certain intervals. The level of detergent in the washing cabin (3) is measured continuously at different time intervals and the dosing element (8) is optimized. Thus, the detergent is prevented from being used more or less than the actually required amount, and optimum detergent

consumption and optimum cleanliness is provided.

[0026] By means of the present invention, a dishwasher (1) comprising a liquid/gel detergent dosing element (8) is realized. By means of the dosing element (8), the detergent is enabled to be used in the required amount. The dosing element (8) can be optimized according to the concentration of the used detergent. Thus, every kind of detergent can be used in adequate amount and the desired cleanliness level is achieved.



## Claims

1. A dishwasher (1) **comprising** a body (2); a washing cabin (3) wherein the washing process is performed; a detergent dispenser (4) wherein liquid/gel detergent can be filled; a control unit (5) in the memory of which the amount of detergent required to be transferred to the washing cabin (3) in the unit time period according to the selected program type as predetermined by the producer is recorded; a detergent receptacle (6) that is disposed in the detergent dispenser (4) and wherein the detergent is filled; a dosing receptacle (7) that is disposed next to the detergent receptacle (6), wherein the detergent to be used in the current washing cycle with the amount being determined by the control unit (5) is transferred from the detergent receptacle (6) and accumulated therein, and a dosing element (8) that is disposed between the detergent receptacle (6) and the dosing receptacle (7), that has an open position (A) wherein the detergent is enabled to flow from the detergent receptacle (6) to the dosing receptacle (7) and a closed position (K) wherein the detergent is transferred from the dosing receptacle (7) to the washing cabin (3), **characterized by** the control unit (5) that enables the time periods of the open position and the closed position to be optimized by determining the concentration of the detergent according to the information received from the washing cabin (3) when the washing process starts.
2. A dishwasher (1) as in any one of the above claims, **characterized by** a conductivity sensor (9) and/or a turbidity sensor (9) that is disposed in the washing cabin (3) and that enables the concentration of the detergent to be determined.
3. A dishwasher (1) as in Claim 1, **characterized by** the control unit (5) that enables the concentration of the detergent to be determined by comparing the difference between a first conductivity value (C1) measured in the washing cabin (3) before the delivery of the detergent to the washing cabin (3) and a second conductivity value (C2) measured after the pre-dosing with a reference conductivity value (C3) prerecorded by the producer in the memory of the control unit (5).
4. A dishwasher (1) as in any one of the above claims, **characterized by** the control unit (5) that increases the time periods of the open position (A) and the

closed position (K) as the concentration of the detergent increases, and decreases the time periods of the open position (A) and the closed position (K) as the concentration of the detergent decreases.

5. A dishwasher (1) as in any one of the above claims, **characterized by** the control unit (5) that enables the time periods of the dosing element (8) to be optimized by means of the conductivity values measured in the washing cabin (3) at certain intervals.

Figure 1

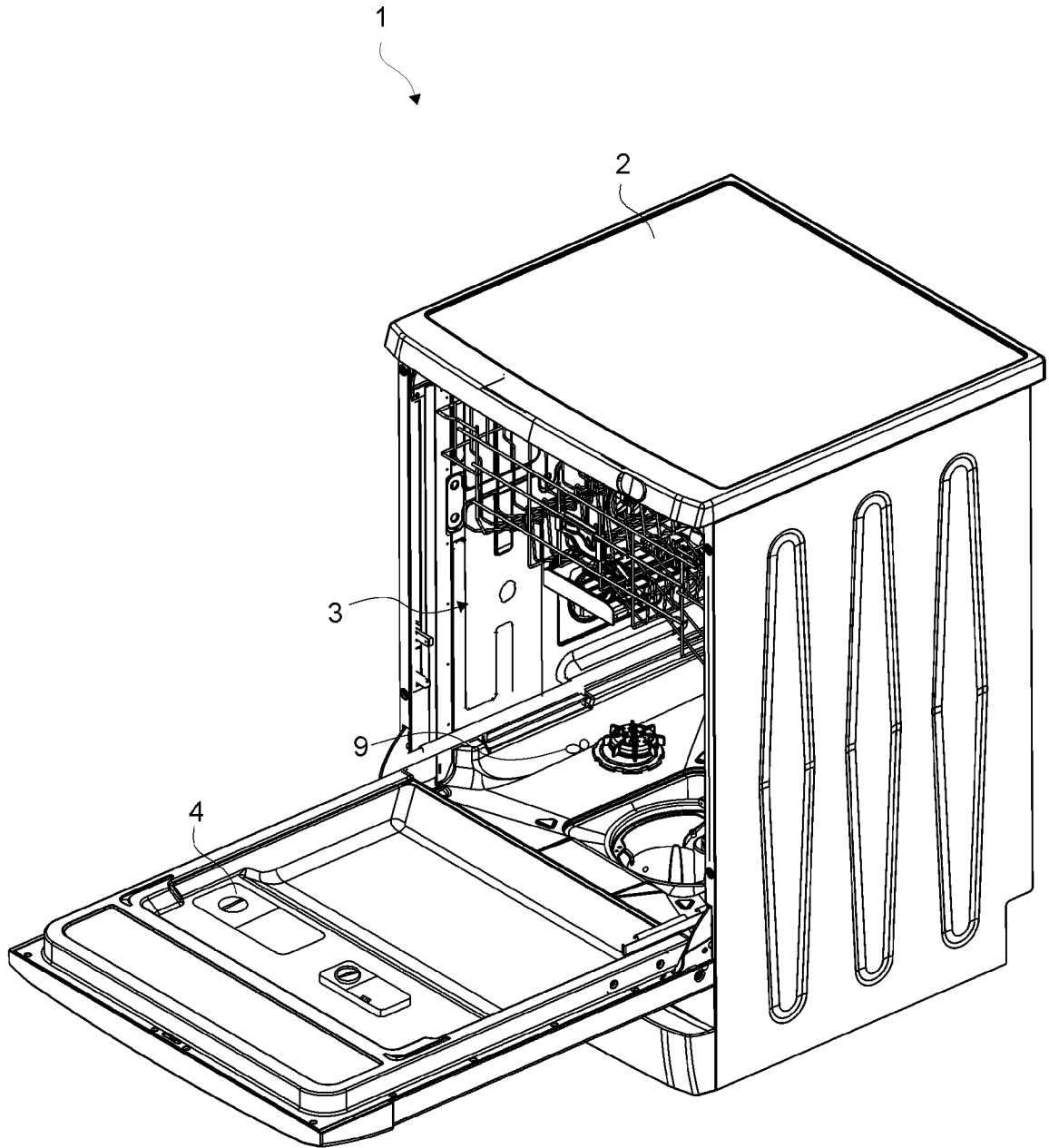


Figure 2

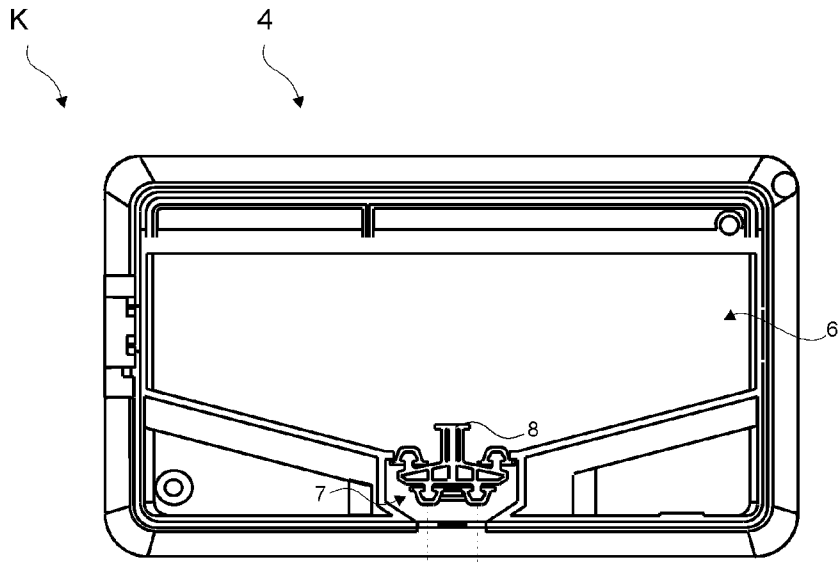


Figure 3

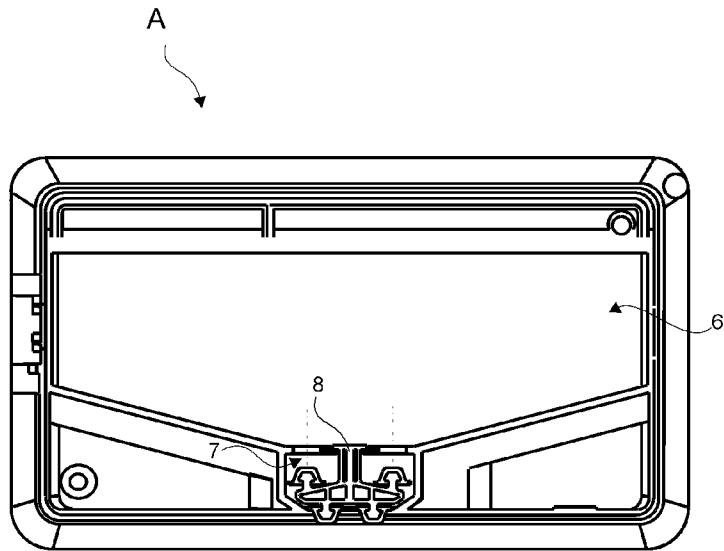
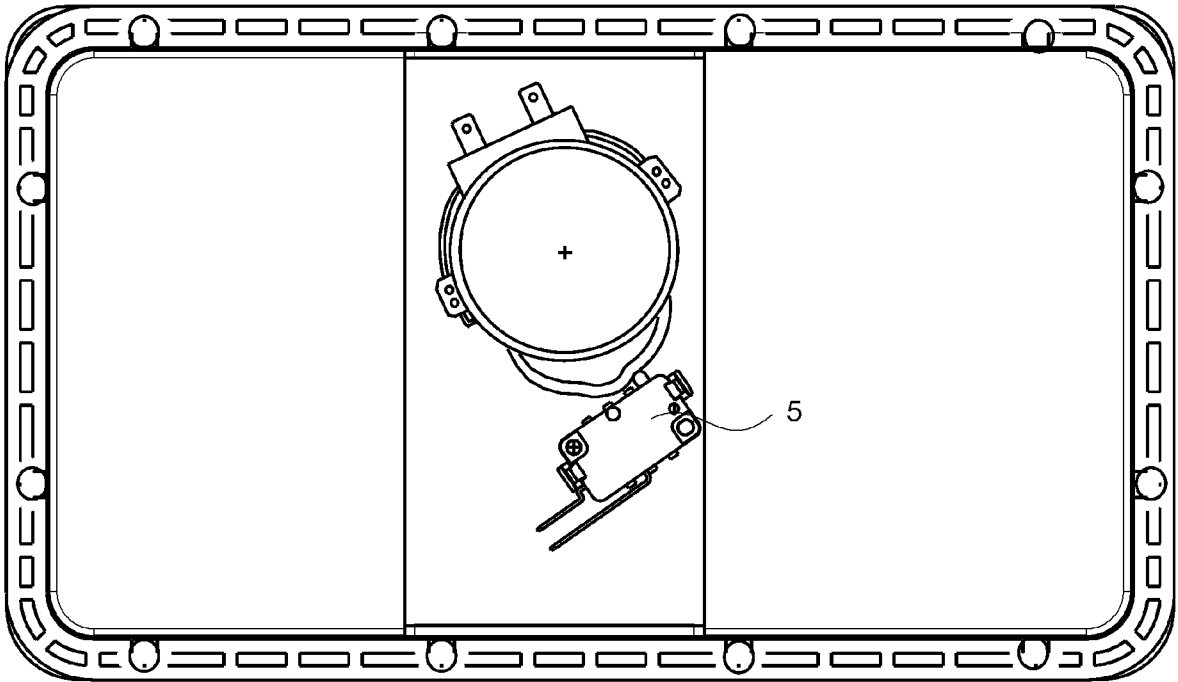


Figure 4



INTERNATIONAL SEARCH REPORT

International application No  
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A. CLASSIFICATION OF SUBJECT MATTER  
INV. A47L15/00 A47L15/44  
ADD.  
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)  
A47L  
Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)  
EPO-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	DE 10 2010 003770 A1 (BSH BOSCH SIEMENS HAUSGERAETE [DE]) 13 October 2011 (2011-10-13)	1,2,4
Y	paragraph [0005] - paragraphs [0006], [0012] paragraph [0032] - paragraphs [0051], [0064]; claims 2,4; figures 2,4,5	3,5
X	US 2004/122555 A1 (HOWES RONALD BRUCE [US] ET AL) 24 June 2004 (2004-06-24)	1,2,4,5
Y	paragraph [0035] - paragraph [0056]; claims 9,10,11; figures	3
Y	DE 203 11 432 U1 (AWECO APPLIANCE SYS GMBH & CO [DE]) 11 December 2003 (2003-12-11) paragraphs [0010], [0026] - paragraph [0040]; figures 3,4	3,5
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Further documents are listed in the continuation of Box C.  See patent family annex.

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"A" document defining the general state of the art which is not considered to be of particular relevance	"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
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"O" document referring to an oral disclosure, use, exhibition or other means	"&" document member of the same patent family
"P" document published prior to the international filing date but later than the priority date claimed	

Date of the actual completion of the international search <b>8 August 2017</b>	Date of mailing of the international search report <b>17/08/2017</b>
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Name and mailing address of the ISA/ European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Fax: (+31-70) 340-3016	Authorized officer <b>Beckman, Anja</b>
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## INTERNATIONAL SEARCH REPORT

International application No  
PCT/EP2017/065360

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	WO 2015/165732 A1 (HAGLEITNER HANS GEORG [AT]) 5 November 2015 (2015-11-05) page 7 - page 10; claim 4; figure 1 -----	3,5
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Information on patent family members

International application No

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