

(19)



(11)

EP 3 081 136 A1

(12)

EUROPEAN PATENT APPLICATION

(43) Date of publication:
19.10.2016 Bulletin 2016/42

(51) Int Cl.:
A47L 15/42^(2006.01) D06F 39/14^(2006.01)

(21) Application number: **16000232.5**

(22) Date of filing: **01.02.2016**

(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:
MA MD

(71) Applicant: **Zmazek, Blaz**
2250 Ptuj (SI)

(72) Inventor: **Zmazek, Blaz**
2250 Ptuj (SI)

(74) Representative: **Golmajer Zima, Marjanca Patentna Pisarna d.o.o.**
Copova 14
P.O. Box 1725
1000 Ljubljana (SI)

(30) Priority: **16.04.2015 SI 201500096**

(54) **HOUSEHOLD APPLIANCE, PREFERABLY A BUILT-IN DISHWASHER, WITH A DOOR AND A SLIDING PANEL ARRANGED ON THE DOOR**

(57) A household appliance, preferably a built-in dishwasher, comprising a door (1), a sliding panel (2) and a hinge (8) of the sliding panel, wherein the hinge of the sliding panel is formed as a flat articulated mechanism fastened to a door hinge (4) for opening the dishwasher

door, such that it fills the existing empty space between the basic hinge and external housing of the machine, and is comprised of members that are pivotally connected with each other with pins in a way that the pins are arranged in corners of a parallelogram.

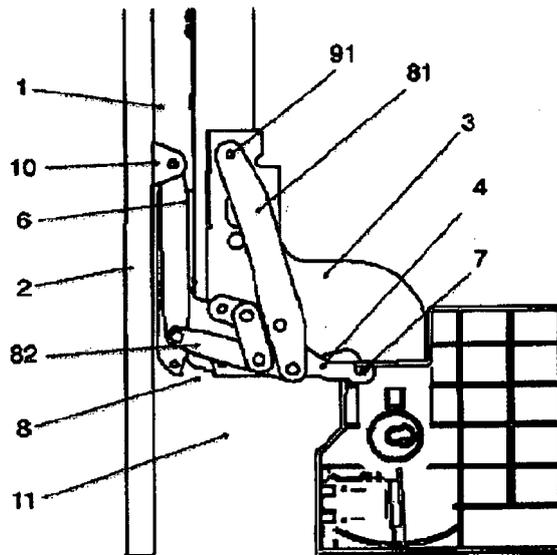


Fig. 1

EP 3 081 136 A1

Description

Object of Invention

[0001] The object of the invention is a household appliance, preferably a built-in dishwasher, with a door that is pivotally arranged on an axis extending parallel to a bottom edge of a dishwasher housing and to a bottom edge of the door, said door being provided at its external side with a decorative panel that normally reaches under the bottom edge of the door, wherein the decorative panel slides upwards and downwards along the door, while the door is opening/closing, in a direction orthogonal to the axis of the door; the dishwasher door is coupled with a door hinge that is fixedly connected with the dishwasher door with one of its ends and reaches with its other free end into the interior of the dishwasher housing substantially perpendicularly to the axis and is intended to receive an elastic element for decelerated opening/closing of the door.

Technical Problem

[0002] The technical problem solved by the present invention is how to conceive such hinge of a sliding panel of a dishwasher door that will allow a simple mounting on an existing housing of a built-in dishwasher having two lateral door hinges of a known type, wherein the hinge of the sliding panel is simple to fabricate and mount, safe for the user and does not require any changes made in the construction of the dishwasher housing and/or lateral door hinges. Moreover, the hinge of the sliding panel should easily be installed into built-in dishwashers of various heights, of various shapes of the base and of various heights of the decorative panel without any need for considerable constructional changes.

Prior Art

[0003] A dishwasher has a front loading opening and a door that closes this opening and is pivotally connected with the bottom part of the housing of the dishwasher such that the door pivots usually around the axis that extends parallel to the bottom edge of the housing or the floor. Each door hinge is fastened with one of its ends to the dishwasher door and connected with its other free end with an elastic element acting as a counterweight of the door and decelerating the opening of the door. In the event of a built-in dishwasher where the dishwasher is completely integrated into the kitchen and its front side blends with the other existing kitchen elements, a decorative panel is applied to the dishwasher door. The decorative panel is connected with the door in a way to slide along the door upwards/downwards while the dishwasher door is opened/closed in a direction orthogonal to the axis. Simultaneous sliding of the panel while the door is opening is rendered possible by a hinge that is arranged in the area of the door hinge.

[0004] A hinge of a sliding panel that automatically slides along the door while the dishwasher door is opening/closing is disclosed in European patent application EP 1894509 A1 (Ambrosi, Bianco). The hinge of the sliding panel is arranged at the bottom part of the dishwasher housing on a rotating section, by means of which the dishwasher door is opened. The hinge of the sliding panel comprises an arcuate tie-rod that is fastened with one end at the bottom part of the rotating section and with another end connected via common pin with an articulated rod and a straight arm that connect the housing of the dishwasher and the sliding panel. The rod is pivotally fastened with its opposite end via pin to the dishwasher housing, the arm is mounted with its other end to the frame on the sliding panel. Opening of the door causes rotation of the arcuate tie-rod which pushes the rod upwards and outwards with its other end, such that it rotates in a counter clockwise direction. The rod pulls the arm upwards until the latter abuts on the sliding panel. The active force that causes the sliding of the door is very small due to the arcuate shape of the tie-rod or the articulated shape of the rod, whereas the loads exerted on the pin that connects the arcuate tie-rod, the rod and the arm are very heavy. The pin is a critical point that can lead to destruction of the mechanism and can consequently cause damage to the machine or even hurt the user. While the door is further opened, the rod keeps rotating in clockwise direction until it reaches its end position. The arm that abutted on the panel now slightly rotates in counter clockwise direction to get distant from the panel and causes a short interruption of the sliding of the panel. To reactivate the sliding of the panel a sufficient force is needed that causes the sliding of the sliding panel. As a result, the panel does not slide smoothly and the mechanism may get stuck. Owing to the construction of the hinge such as the shapes of individual members and their fastening on the housing of the dishwasher the entire hinge of the sliding panel is arranged outside of the housing of the dishwasher in an area between the sliding panel and the base of the dishwasher which is foreseen to receive the bottom edge of the panel. A user, especially a child might thus get hurt if inadvertently reaching into said space with a hand. A further significant disadvantage is that the disclosed hinge can only be built into dishwashers designed for the disclosed type of the sliding panel hinge since the disclosed hinge calls for a special embodiment of the basic hinge of the door with a vertical design and a vertically arranged elastic element for decelerated door opening. The disclosed hinge cannot be built into a dishwasher with a door that is opened by way of a conventional lateral hinge whose free end intended to receive an elastic element for decelerated door opening is oriented at the lateral side of the dishwasher towards the rear part of the housing and is most frequently built into built-in dishwashers.

[0005] So there is a need for a hinge for a sliding panel of a built-in dishwasher that will do away with the mentioned disadvantages from prior art.

Solution to the Technical Problem

[0006] The technical problem is solved by the characteristics defined in the characterising part of the independent claim. Details of the invention are disclosed in dependent claims.

[0007] A hinge of a sliding panel of the invention can be built into an existing construction of a dishwasher without subjecting the dishwasher to any constructional changes on the housing or other parts. The hinge of a sliding panel is formed as a plane articulated mechanism and fastened to a door hinge for dampened opening a dishwasher door. Its plane construction makes it possible to build it into an existing empty space between a door hinge and existing external housing of the machine. The loading space of the dishwasher remains intact. A further advantage of the hinge of the invention is that it can be mounted into dishwashers regardless of the height of the sliding panel. Without performing any substantial changes in the construction of the machine the hinge of the invention can also be mounted into dishwashers with sliding panels reaching up to the floor. The hinge of the sliding panel is constructed in a way that none of its elements ever reaches into the area of the base of the machine which is intended to receive the bottom part of the sliding panel while the door is opening, and potential damage especially of hands in the event of uncontrolled reaching into said space is prevented.

[0008] The hinge of the sliding panel is made from any material having sufficient stability and mechanical properties such as metal, plastic. Individual hinge elements are of a simple and conventional shape, which calls in favour of mass production with huge economic efficiency. It also excels in its simple mounting.

[0009] The invention will be described in more detail by way of an embodiment and the drawings representing in

- Fig. 1 hinge of a sliding panel of the invention arranged on a door of a dishwasher with the door of the dishwasher closed;
- Fig. 2 hinge of the sliding panel from Figure 1 with the door of the dishwasher partially opened;
- Fig. 3 hinge of the sliding panel from Figure 1 with the door of the dishwasher completely opened.

[0010] A built-in household appliance, preferably a built-in dishwasher, comprises a front loading opening and a door 1 closing said opening. In the event of a built-in dishwasher where the dishwasher is completely integrated into the kitchen and its front side blends with the other existing kitchen elements, a decorative panel 2 is applied to the dishwasher door. The dishwasher door 1 is hinged at the bottom part of a housing 3 of the dishwasher such that the door pivots around an axis that extends parallel to a bottom edge of the housing 3 or the floor. In the present embodiment, each door hinge 4 is supported in the hinged axis and fastened with one of its

ends 6 to the dishwasher door 1 while its other free end 7 is oriented at the lateral wall of the dishwasher towards the rear part of the housing 3 and intended to receive an elastic element (not shown) for decelerated opening of the door.

[0011] The sliding panel 2 is coupled with the door 1 via guiding channels and pins or in any other known way (not subject of the invention, not shown), such that the panel slides along the door upwards/downwards in a direction orthogonal to the axis up to a height that allows complete opening of the dishwasher door 1, i. e. to a completely horizontal position with respect to the floor.

[0012] Sliding of the sliding panel 2 while the door 1 is opened/closed is carried out by a hinge 8 of the sliding panel arranged in the area of the door hinge 4 or close to it. The hinge 8 of the sliding panel is comprised of:

- a hang member 81 that is hung on the housing 3 of the dishwasher by a pin 91 at a vertical distance from the door hinge 4,
- a pushing collapsible member 82 that is at one end articulated by way of a pin 92 with a free lower end of the hang member 81 and pivotally connected at the other end by way of a pin 93 with a connecting element 10 fastened on the sliding panel 2,
- a drive member 83 that pivotally connects by way of a pin 94 the upper part of the door hinge 4 and by way of a pin 95 the other end of the hang member 81, wherein the pins 92 and 95 are distant from each other,
- a connecting member 84 that connects by way of pins 96, 97 the drive member 83 and the pushing collapsible member 82, such that the pins 92, 95, 96, 97 are arranged in corners of a parallelogram, preferably an equilateral parallelogram.

[0013] The connecting element 10 is arranged on the sliding panel 2 on a side of the sliding panel adjacent to the door 1 at such distance from the bottom edge of the sliding panel that the pin 93 of the connecting element 10, independently on the position of the sliding panel 2, is always above the pin 92 of the hang member 81 with respect to the floor or is at least level with it, wherein the hang member 81 is arranged on the dishwasher housing 3 such that it does not reach with its lower end into a space 11 below the dishwasher housing 3, i. e. into the space intended to receive the bottom part of the sliding panel 2 while the door 1 is opened.

[0014] The door 1 gets opened due to rotation of the door hinge 4 and of the drive member 83 connected therewith. As the drive member 83 is connected with the hang member 81 via rotation pin 95, the hang member 81 rotates in direction towards the door and causes rotation of the pushing collapsible member 82 that acts through the fastening element 10 on the sliding panel 2 and the latter slides along the door substantially orthogonally with respect to the axis. Smooth and simultaneous rotation of all elements of the hinge 8 is provided for by

a connecting member 84. As a result, the sliding panel 2 slides steadily without stopping.

[0015] The closing of the door 1 causes activating and functioning of the hinge of the sliding panel in reverse direction as described above.

[0016] It goes without saying that a person skilled in the art can make different embodiments without circumventing the essence of the invention.

Claims

1. A household appliance, preferably a built-in dishwasher, comprising a door (1),

- that is pivotally arranged on an axis extending parallel to a bottom edge of a dishwasher housing and to a bottom edge of the door,
- that is coupled with a door hinge (4) that is fixedly connected with the dishwasher door with one of its ends and reaches with its other free end into the interior of the dishwasher housing substantially perpendicularly to the rotation axis, which free end is intended to receive an elastic element for decelerated opening/closing of the door,

a sliding panel (2),

- that is arranged parallel to the external surface of the door (1) and slidingly connected therewith in a known form-locking manner,
- that is provided at its surface facing the door with a connecting element (10) for pivotal fastening of a hinge (8) of the sliding panel,

and a hinge (8) of the sliding panel,

- that is pivotally hung on the housing (3) of the dishwasher and pivotally fastened to the connecting element (10)

characterised in that

the hinge (8) of the sliding panel (2) is comprised of members (81, 82, 83, 84) that are pivotally connected with each other by way of pins (92, 95, 96, 97), such that the pins (92, 95, 96, 97) are arranged in corners of a parallelogram.

2. Household appliance, preferably a built-in dishwasher, according to claim 1 **characterised in that** the parallelogram is preferably an equilateral parallelogram.

3. Household appliance, preferably a built-in dishwasher, according to claims 1 and 2 **characterised in that** the hinge (8) of the sliding panel (2) is comprised

of

- a hang member (81) that is hung on the housing (3) of the dishwasher by a pin (91) at a vertical distance from the door hinge (4),

- a pushing collapsible member (82) that is at one end articulated by way of a pin (92) with a free end of the hang member (81) and pivotally connected at the other end by way of a pin (93) with a connecting element (10) fastened on the sliding panel (2),

- a drive member (83) that pivotally connects by way of a pin (94) the upper part of the door hinge (4) and by way of a pin (95) the other end of the hang member (81), wherein the pins (92) and (95) are distant from each other,

- a connecting member (84) that connects by way of pins (96, 97) the drive member (83) and the pushing collapsible member (82).

4. Household appliance, preferably a built-in dishwasher, according to preceding claims **characterised in that** the hinge is formed as a plane articulated mechanism.

5. Household appliance, preferably a built-in dishwasher, according to claim 4 **characterised in that** the hinge (8) is fastened to the door hinge (4) of the dishwasher door (1) and fills an existing empty space (11) between the door hinge (4) and external housing of the machine.

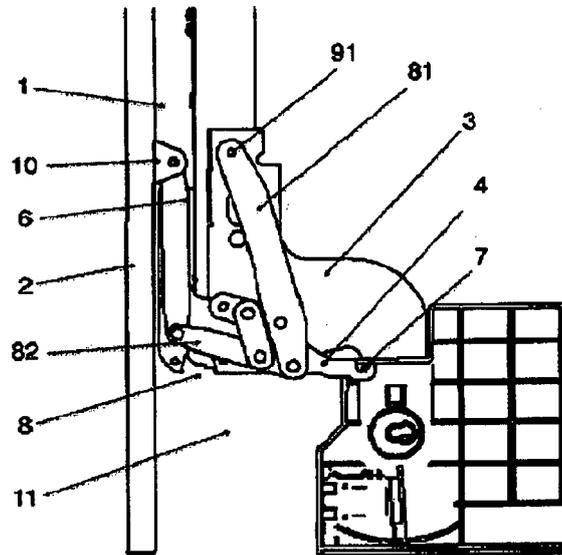


Fig. 1

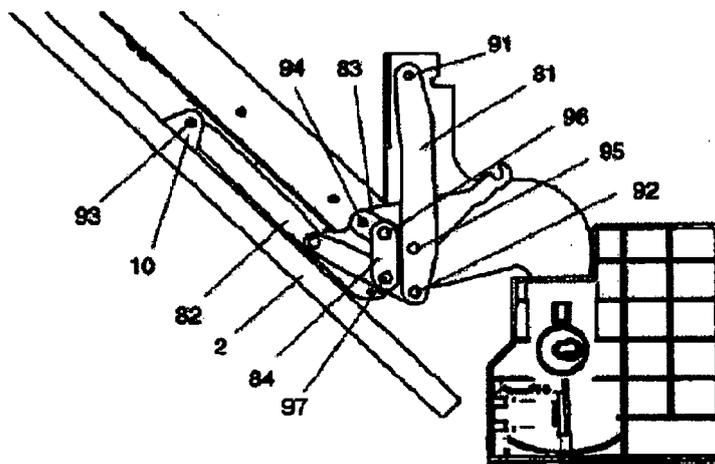


Fig. 2

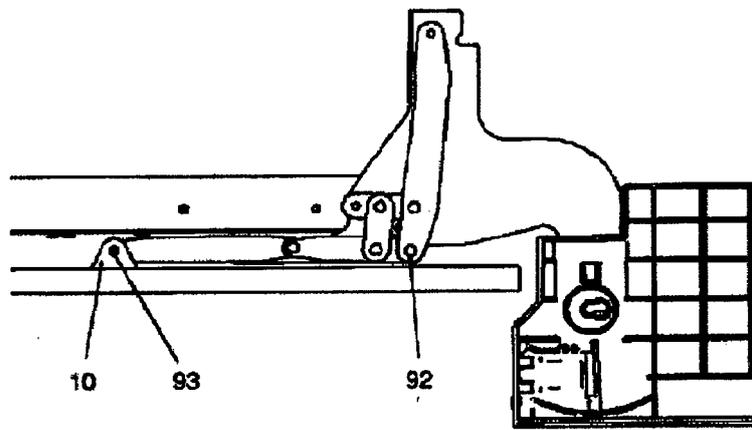


Fig. 3



EUROPEAN SEARCH REPORT

Application Number
EP 16 00 0232

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	EP 1 875 850 A1 (BONFERRARO SPA [IT]) 9 January 2008 (2008-01-09) * paragraph [0013] - paragraph [0021]; figures *	1,2,4,5	INV. A47L15/42 D06F39/14
X	EP 1 364 609 A1 (BONFERRARO SPA [IT]) 26 November 2003 (2003-11-26) * paragraph [0009] * * paragraph [0014] - paragraph [0021]; claims 1,4; figures 1-5 *	1,2,4	
X	GB 2 079 589 A (ZANUSSI A SPA INDUSTRIE) 27 January 1982 (1982-01-27) * page 1, line 38 - line 46 * * page 1, line 67 - line 101; claim 1; figures *	1,2,4	
			TECHNICAL FIELDS SEARCHED (IPC)
			A47L D06F
The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 22 July 2016	Examiner Beckman, Anja
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 03/02 (P04/C01)

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

EP 16 00 0232

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.

22-07-2016

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
EP 1875850	A1	09-01-2008	NONE
EP 1364609	A1	26-11-2003	AT 258761 T 15-02-2004 DE 60200204 D1 11-03-2004 DE 60200204 T2 18-11-2004 EP 1364609 A1 26-11-2003 ES 2215979 T3 16-10-2004
GB 2079589	A	27-01-1982	DE 8110398 U1 24-10-1981 FR 2485913 A3 08-01-1982 GB 2079589 A 27-01-1982

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

- EP 1894509 A1 [0004]