

(19)



(11)

EP 4 212 086 A1

(12)

EUROPEAN PATENT APPLICATION

(43) Date of publication:
19.07.2023 Bulletin 2023/29

(51) International Patent Classification (IPC):
A47L 15/42^(2006.01)

(21) Application number: **22151147.0**

(52) Cooperative Patent Classification (CPC):
**A47L 15/4259; A47L 15/4263; A47L 2401/26;
A47L 2501/28**

(22) Date of filing: **12.01.2022**

(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 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

(72) Inventors:
• **GOBBI, Ezio**
Roncoferraro MN (IT)
• **PIAZZA, Damiano**
Nogara VR (IT)

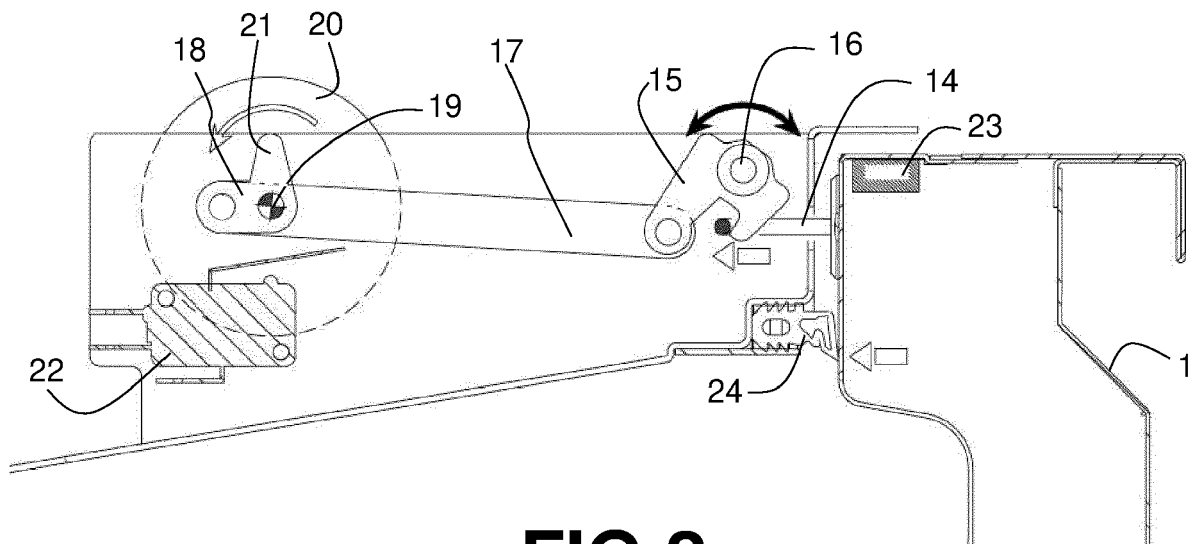
(74) Representative: **Concone, Emanuele et al**
Società Italiana Brevetti S.p.A.
Via Carducci 8
20123 Milano (IT)

(71) Applicant: **Bonferraro S.p.A.**
37060 Bonferraro (VR) (IT)

(54) APPLIANCE WITH HINGED DOOR

(57) An appliance is provided with a hinged door (1), which closes a compartment provided with a perimetral seal (24) on which the door (1) goes into abutment, and a motorised latch comprising a motor (20) which operates a hook (15) swinging around a pin (16) between a locking

position, in which it engages an eyelet (14) of the door (1) pulling the door (1) inwards until it compresses the seal (24), and a position in which it does not engage the eyelet (14), the oscillation between the locking position and the disengagement position implying a push of the hook (15) on the eyelet (14) such as to cause the door (1) to be detached from the seal (24).

**FIG.2****EP 4 212 086 A1**

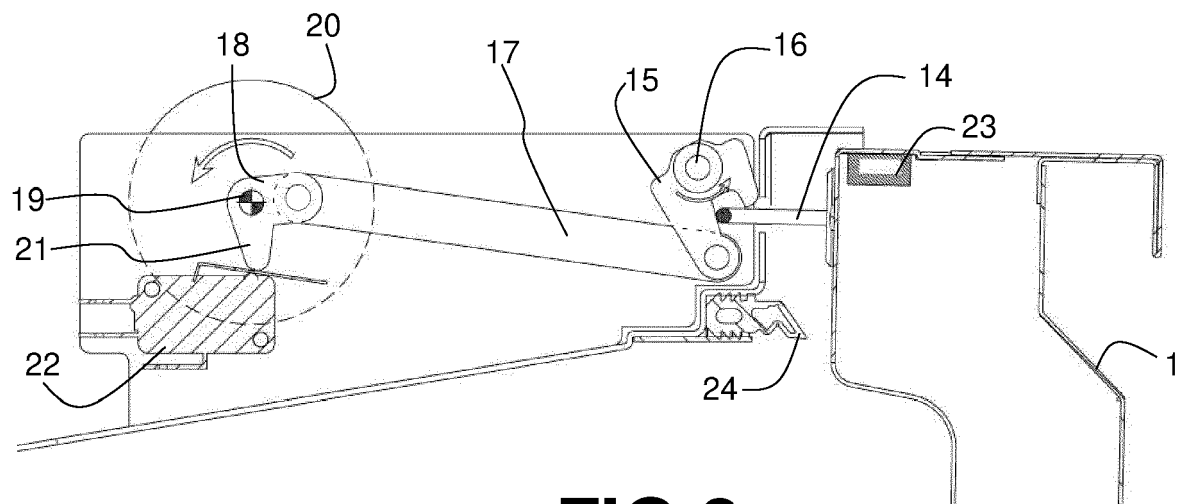


FIG.3

Description

[0001] The present invention relates to an appliance, for domestic or professional use, provided with a hinged door which is automatically locked and unlocked by means of a motorised latch. In the following, specific reference will be made to a dishwasher, but it is clear that the invention can be applied to other types of appliances comprising the same type of door (e.g. thermo-disinfectors, washing machines, refrigerators, ovens, etc.).

[0002] It is known that there are appliances in which the compartment that is closed by the hinged door has a perimeter seal that the door must compress when closing, for example to prevent the escape of water and steam in a dishwasher, or hot air and/or steam in an oven. This compression action can be performed manually by the user or automatically by a motorised device for the door opening and closing, which requires also a safety control to prevent the door from damaging an obstacle (an object or an operator) that could be found in its path.

[0003] To this end, the presence of the obstacle is typically detected through the increase in the motor torque required to move the door, which has a two-way connection with the motorised device that controls its movement. In practice, the safety control is entrusted only to a sensor that detects the increased absorption due to an obstacle, so as to interrupt/reverse the operation of the motor beyond a certain overload threshold.

[0004] A traditional latch that merely locks and unlocks, with a simple manually operated mechanism or a motorised device, the door in the closed position with the seal in a compressed condition, is inadequate when the seal creates problems when opening and/or closing the door.

[0005] A first drawback can arise when the seal becomes stiffer as it ages, requiring a greater push to compress it. In such a case, the manual closure requires a greater effort by the user, while in the case of a motorised door, if the safety control intervention threshold is not raised to take account of this increased push, a "false positive" may occur, i.e. the detection of a non-existent obstacle, with the result that the device is unable to close the door.

[0006] A second similar drawback that can occur at the beginning of the opening phase is that the aged seal tends to stick to the door, thus requiring a greater initial effort by the user or the motorised device. This leads to a risk of "false positive" if the threshold is too low, as an obstacle is detected in the opening process that is not there, with the result that the device is unable to open the door.

[0007] On the other hand, adjusting the threshold to suit the aged seal is not easy either, as it is necessary to proceed by trial and error and the threshold may be adjusted so high that it risks damaging an obstacle.

[0008] Finally, there are other types of safety control using different means, such as an infrared barrier or a contact-sensitive moving edge, which are however much more expensive and complex to operate.

[0009] The object of the present invention is therefore to provide an appliance having a motorised latch which overcomes these drawbacks. This object is achieved by means of an appliance in which the door latch actively assists in compressing the seal in the closing phase and detaching it from the door in the opening phase.

[0010] The main advantage of the appliance according to the present invention is therefore that of having a latch that directly provides the interventions on the seal both in the opening and closing phase. In this way, the ageing of the seal does not require a greater effort by the user nor affects the correct functioning of the safety control of the possible door movement device, without risk of "false positives" or damage to an obstacle due to an excessively high intervention threshold.

[0011] A further significant advantage of this appliance stems from the fact that the latch is extremely simple and therefore reliable and inexpensive, and its operation is very easy to control by the control unit.

[0012] These and other advantages and features of the appliance according to the present invention will be evident to those skilled in the art from the following detailed description of an embodiment thereof, with reference to the accompanying drawings in which:

Fig.1 is a schematic view of the main elements of the latch of an appliance according to the invention, during the door engagement phase;

Fig.2 is a similar view to the previous one, in the condition of locking the door and compressing the seal; and

Fig.3 is a similar view to the previous one, in the condition of unlocking the door and detaching it from the seal.

Referring to Fig.1, it can be seen that the latch acts on a horizontal eyelet 14, fixed to the hinged door 1 which rotates around a bottom horizontal axis; eyelet 14 is engaged by the free end of an inverted hook 15 swinging around a horizontal pin 16, under the action of a connecting rod 17 pivoted at the other end of hook 15. The connecting rod 17 is pivoted at its opposite end to a crank of a crankshaft 18, which rotates counterclockwise about a horizontal axis 19 being driven by a unidirectional motor 20.

[0013] The engagement position of Fig.1 is preferably confirmed by means of a sensor that detects the presence of door 1 when it arrives in the vicinity of the latch in such a position that eyelet 14 can be engaged by hook 15, preferably a Reed sensor (not shown) that detects a magnet 23 mounted on door 1. A control unit (not shown), once it receives confirmation from the aforementioned position sensor, activates motor 20 so that the rotation of crankshaft 18 causes the backward movement of the connecting rod 17 which rotates hook 15 clockwise around the pin 16.

[0014] Consequently, hook 15 pulls inwards eyelet 14 and therefore door 1, which compresses seal 24 without

the need for a push by the user or the motorised device of door 1. A microswitch (not shown) is actuated by hook 15 when the fully closed position of door 1 is reached in which seal 24 is compressed (Fig.2), so as to authorize the start of the operating cycle of the appliance.

[0015] The crankshaft 18 is also provided with a cam profile 21 that is able to operate a second microswitch 22 that is used to detect the position in which hook 15 has disengaged from eyelet 14 (Fig.3), so as to authorize the activation of the motorised device for the start of the opening phase, or to signal to the user that door 1 can be opened manually. Note that in the passage from the locked position of Fig.2 to this disengagement position, the central portion of hook 15 comes into contact with eyelet 14, pushing it outwards, whereby door 1 is detached from seal 24 even before the start of the opening phase.

[0016] It is clear that the embodiment of the appliance according to the invention described and illustrated above is only an example susceptible to numerous variations. In particular, the exact nature, form and arrangement of the elements could be varied according to specific constructional requirements, for example by using mechanical equivalents of the elements described above such as a different type of sensor/detector than the Reed sensor and microswitches 12, 22 (e.g. optical sensors, resistive sensors, etc.), a different type of actuator than unidirectional motor 20 and so on, as long as the general structure of the latch is maintained with an engagement element that actively pulls inwards door 1 in the closing phase and pushes it outwards in the opening phase.

[0017] Similarly, the rotation mechanism of hook 15 could also be different from the connecting rod 17+crankshaft 18 combination, and the rotation pin 16 of hook 15 could be vertical if the mechanism is intended to act on an eyelet 14 arranged in the vertical plane. Alternatively, hook 15 could be reversed and pivot 16 located below eyelet 14 to engage it from below, in which case motor 20 would rotate clockwise.

[0018] Furthermore, the engagement element on door 1 could also be different from eyelet 14, whereby the latch could be consequently modified in the structure and movement of its engagement element that goes to engage the engagement element on the door.

Claims

1. An appliance having a hinged door (1), which closes a compartment of the appliance provided with a perimetral seal (24) on which said door (1) goes into abutment, and a motorised latch comprising an actuator which operates an engagement element which locks and unlocks the door (1) by engaging and disengaging a corresponding engagement element of the door (1), **characterized in that** said engagement element of the motorised latch is connected to said actuator and arranged relative to said en-

gagement element of the door (1) so as to engage the door (1) in order to make it perform the last stretch of the closing stroke and the first stretch of the opening stroke, the length of said stretch performed by the door (1) under the action of the motorised latch being sufficient to obtain the compression of said seal (24) in the closing phase and the subsequent detachment of the door (1) from the seal (24) in the opening phase.

2. Appliance according to claim 1, **characterized in that** the engagement element of the door (1) is an eyelet (14) and the engagement element of the latch is a hook (15) swinging around a pin (16), parallel to the plane of said eyelet (14), between a locking position in which it engages said eyelet (14) pulling the door (1) inwards until it compresses the seal (24), and a position in which it does not engage said eyelet (14), the oscillation between said locking position and said disengagement position implying a push of the hook (15) on the eyelet (14) such as to cause the door (1) to be detached from the seal (24).
3. Appliance according to the preceding claim, **characterized in that** the hook (15) oscillates under the action of a connecting rod (17) pivoted between the hook (15) and a crank of a crankshaft (18) driven by a unidirectional motor (20).
4. Appliance according to the preceding claim, **characterized in that** the crankshaft (18) is provided with a cam profile (21) arranged to actuate a microswitch (22) in correspondence with the disengagement position of the hook (15), said microswitch (22) being operatively connected to the control unit to signal the unlocking of the door (1) and/or to authorize the activation of a movement device of the door (1) for starting the opening phase.
5. Appliance according to any of claims 2 to 4, **characterized in that** it further comprises a microswitch which is activated by the hook (15) in correspondence with its locking position, said microswitch being operatively connected to the control unit so as to authorize the start of the operating cycle of the appliance.
6. Appliance according to any of the preceding claims, **characterized in that** it further comprises a sensor that detects the presence of the door (1) when it arrives in proximity to the latch in a position where it can be engaged by the latch, preferably a Reed sensor that detects a magnet (23) mounted on the door (1).

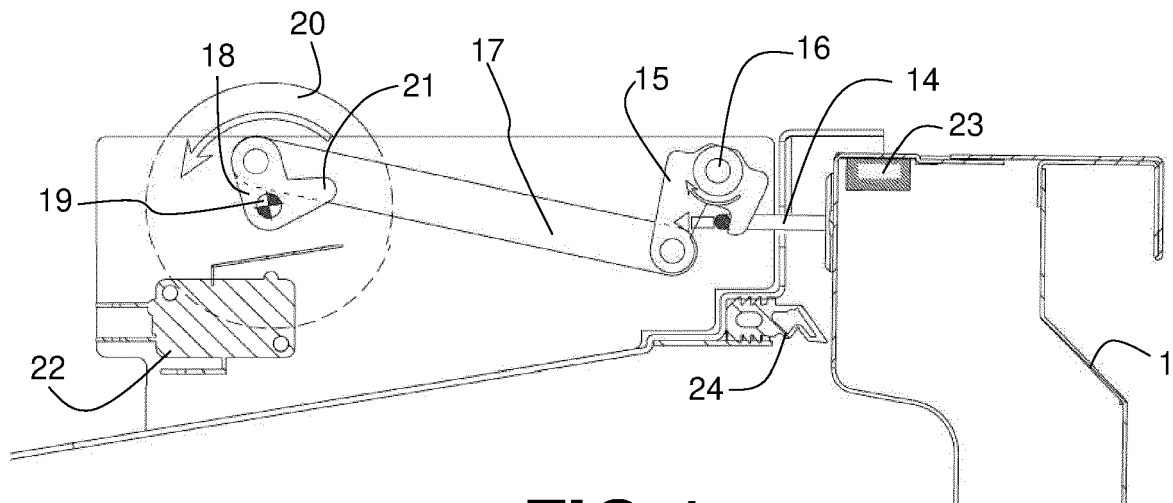


FIG.1

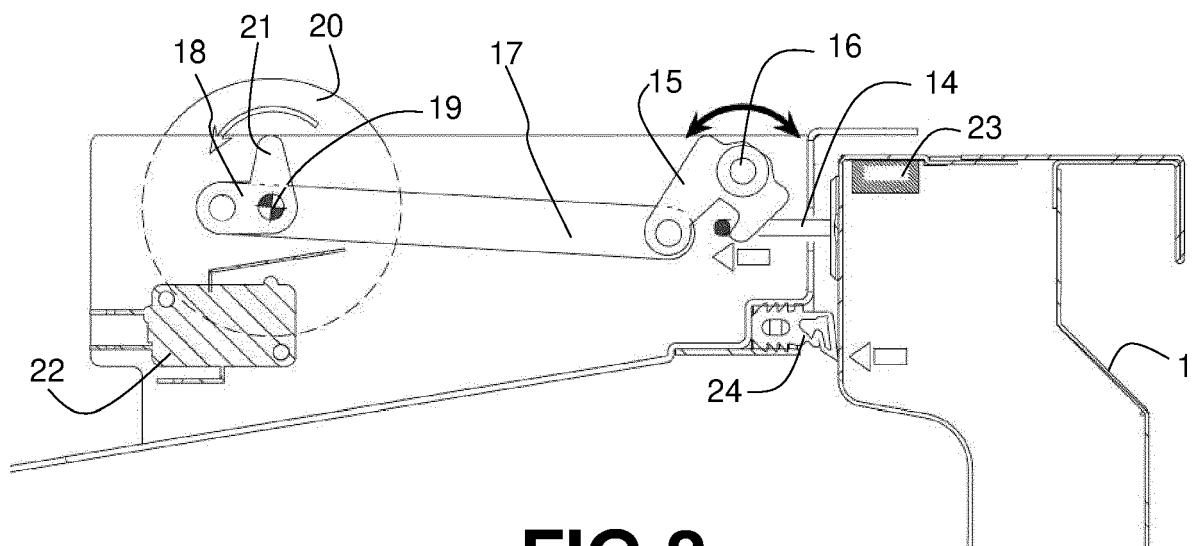
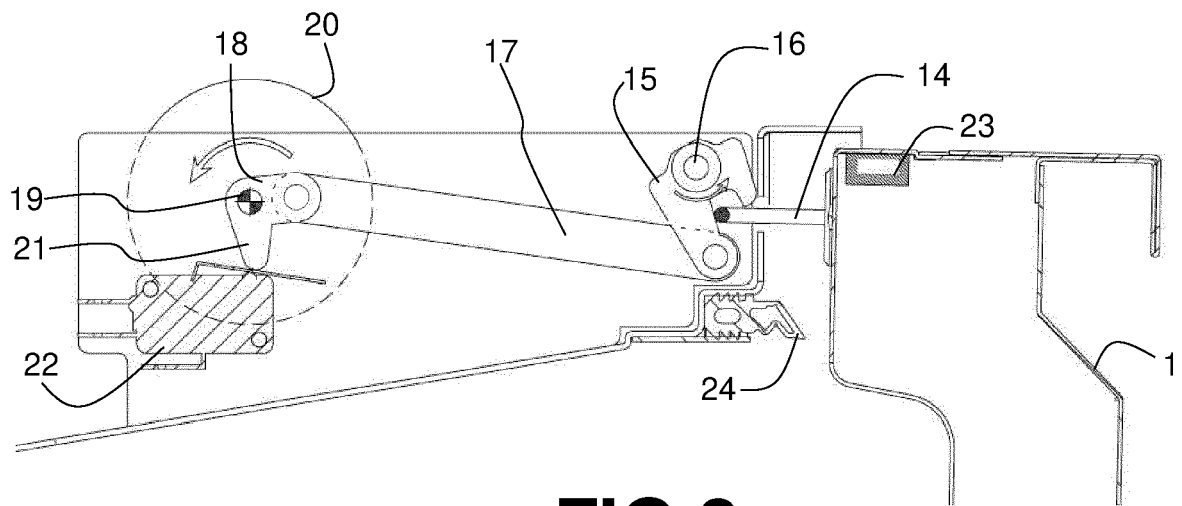


FIG.2





EUROPEAN SEARCH REPORT

Application Number

EP 22 15 1147

5

10

15

20

25

30

35

40

45

50

55

1

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 2004/163684 A1 (HAPKE KENYON A [US]) 26 August 2004 (2004-08-26) * paragraphs [0004], [0006] - [0009], [0078] - [0114]; figures 10-14, 17-19 * -----	1-6	INV. A47L15/42
X	WO 2017/200680 A1 (ILLINOIS TOOL WORKS [US]) 23 November 2017 (2017-11-23) * paragraphs [0004], [0001], [0012], [0043] - [0054]; figures 1-4 * -----	1, 5, 6	
X	DE 43 19 518 A1 (STIERLEN MAQUET HYGIENETECHNIK [DE]) 15 December 1994 (1994-12-15) * the whole document * -----	1	
A	US 2020/071963 A1 (CHIRUMBOLO DINO [IT]) 5 March 2020 (2020-03-05) * the whole document * -----	1-6	
A	US 3 415 961 A (BARNARD WALTER C) 10 December 1968 (1968-12-10) * the whole document * -----	1-6	TECHNICAL FIELDS SEARCHED (IPC)
A	KR 2021 0066415 A (SK MAGIC CO LTD [KR]) 7 June 2021 (2021-06-07) * the whole document * -----	1-6	A47L
The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 21 June 2022	Examiner Lodato, Alessandra
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 15 1147

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.

21-06-2022

10

15

20

25

30

35

40

45

50

55

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 2004163684 A1	26-08-2004	NONE	
WO 2017200680 A1	23-11-2017	CN 109195496 A	11-01-2019
		EP 3457906 A1	27-03-2019
		US 2019150701 A1	23-05-2019
		WO 2017200680 A1	23-11-2017
DE 4319518 A1	15-12-1994	NONE	
US 2020071963 A1	05-03-2020	CN 113038861 A	25-06-2021
		EP 3846670 A1	14-07-2021
		US 2020071963 A1	05-03-2020
		WO 2020051015 A1	12-03-2020
US 3415961 A	10-12-1968	NONE	
KR 20210066415 A	07-06-2021	NONE	