



(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
06.03.2019 Bulletin 2019/10

(51) Int Cl.:
F24C 7/08^(2006.01) F24C 15/02^(2006.01)

(21) Application number: **17188192.3**

(22) Date of filing: **28.08.2017**

(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

(72) Inventors:
 • **KÄSER, Erhard**
91541 Rothenburg ob der Tauber (DE)
 • **HILDNER, Dietmar**
91541 Rothenburg ob der Tauber (DE)
 • **BUNZEL, Volkmar**
91541 Rothenburg/Tauber (DE)
 • **WINKELMANN, Klaus**
91541 Rothenburg ob der Tauber (DE)

(71) Applicant: **ELECTROLUX APPLIANCES AKTIEBOLAG**
105 45 Stockholm (SE)

(74) Representative: **Electrolux Group Patents AB Electrolux Group Patents**
105 45 Stockholm (SE)

(54) **CAMERA ASSEMBLY FOR A COOKING OVEN**

(57) A camera assembly (36) configured to be mounted within a door handle (30; 108) of an oven door (106), wherein the camera assembly comprises: a camera module (38) comprising an optical sensor (39) and an interface for outputting sensor data obtained from the optical sensor; and housing means for housing the camera module (38), the housing means comprising a cover (42) with a window

(44) for the optical sensor (39), and fixation means (48) for fixedly attaching the housing means at the door handle (30; 108); wherein the housing means comprises orientation means (72, 84) for mounting the camera module (38) in a single pre-determined angular orientation with respect to the housing means.

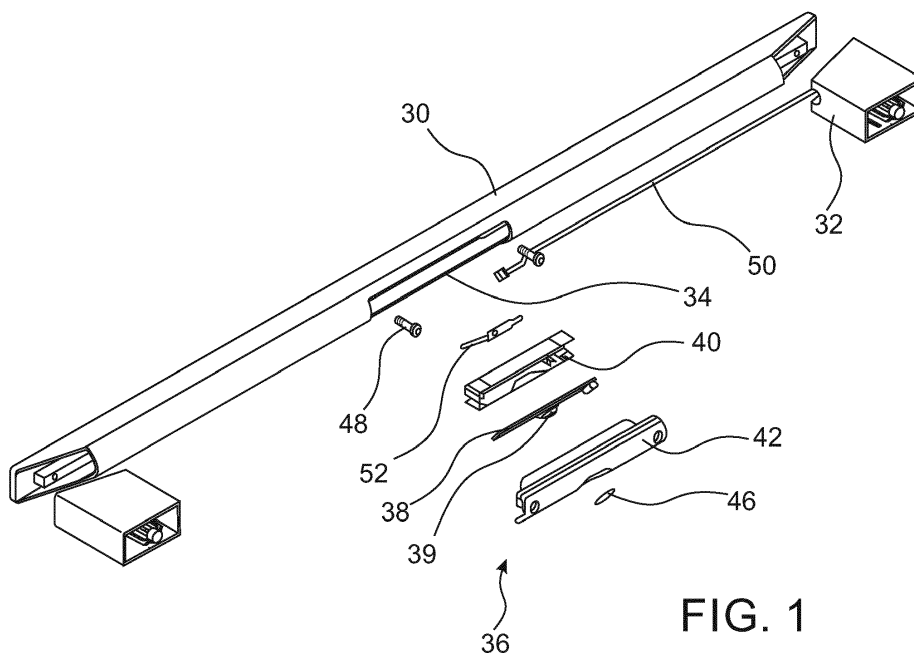


FIG. 1

Description

[0001] Modern ovens for food preparation, briefly referred to herein as cooking ovens, sometimes are equipped with camera systems for monitoring the interior of the cooking chamber, for example to allow remote monitoring of the cooking progress such as by transmitting picture data to a remote device, for example a mobile phone.

[0002] While locating a camera within the oven cavity is problematic due to the difficult conditions prevailing within the oven cavity during a cooking process, such as high temperature and high humidity, it was suggested for example in WO 2016/034295 to locate the camera at the exterior side of the front door of the oven, where the camera is to be positioned so as to view through a transparent window in the front door, into the oven cavity.

[0003] An advantageous position for installation of a camera is at the door handle, which in most cooking ovens is provided in an upper portion of the door. Installing the camera at the door handle not only offers a view into the oven which is similar to the view from the perspective of a user, but also is to be preferred for constructional reasons and for design reasons over a dedicated fixture for holding the camera.

[0004] A problem encountered when installing an oven camera in a door handle is that in order to provide for the intended viewing angle, the camera has to be mounted in an exact angular position with respect to the oven, which is difficult to realize.

[0005] It is an object of the present invention to provide a camera assembly for an oven door which provides for an exact angular orientation of the camera.

[0006] The present invention solves the above object by providing for a camera assembly configured to be mounted within a door handle of an oven door, the camera assembly comprising a camera module having an optical sensor and an interface for outputting sensor data obtained from the optical sensor, housing means for housing the camera module, the housing means comprising a cover with a window for the optical sensor, i.e. a camera, and fixation means for fixedly attaching the housing means at the door handle, wherein the housing means comprises orientation means for mounting the camera module in a single pre-determined angular orientation with respect to the housing means.

[0007] In the camera assembly suggested herein, the camera module can be a custom off-the-shelf component, such as a standard fix focus or autofocus USB camera module, for example a DELOCK® USB Camera Module, which comprises a printed circuit board on which there is mounted an optical sensor and circuitry for processing data obtained from the sensor. The present invention provides a camera assembly in which the orientation means prevents any misalignment of the camera module during mounting the camera module in a door handle of a cooking oven.

[0008] Furthermore, the present invention provides for

a camera assembly which can be fully integrated into the door handle of a cooking oven, where the camera module can be well protected against potentially damaging influences as they usually are experienced in cooking ovens, such as high temperatures, high humidity and oven fumes as can be experienced within the oven cavity or in the vicinity of the oven cavity. Furthermore, versus oven cameras that are mounted at the exterior of an oven door, such as at a door handle or in a separate holder, by providing for a design where the camera assembly is integrated into the door handle, the camera assembly can be well protected against external forces, so as to avoid a misorientation of the camera by inadvertent exertion of force onto the camera. Finally, by integrating the camera assembly into the door handle, wherein the camera is to be located at the rear side of the door handle so as to have a proper view towards the oven cavity, the camera assembly is hidden and thus does not influence the overall design of the cooking oven.

[0009] Preferred embodiments of the present invention are defined in the dependent claims.

[0010] To provide for a single pre-determined angular orientation of the camera module with respect to the housing means, the orientation means can comprise at least one slanted abutment surface which engages the camera module, wherein preferably the housing means comprises means for angular alignment of the housing means with respect to the door handle. Particularly in embodiments of the cooking oven in which the door handle has a cross-sectional shape which has at least one feature with a defined angular orientation, such as a door handle having at least one flat wall element, for example a horizontal rear wall, or a door handle the cross-sectional shape of which has at least one feature of defined angular orientation that can serve as marker for orientation of the housing means, such as an edge, a projection or a recess at a certain angular position, there can be provided for an accurate and well-defined orientation of the camera module which is independent from any means for fixing the assembly, by providing for a housing means having a slanted abutment surface which provides for an exact angular orientation of the camera module with respect of the housing means, wherein the angular orientation of the housing means with respect to the door handle and hence with respect to the oven cavity then can be ascertained by the shaping of the mounting member with respect to the door handle.

[0011] In preferred embodiments the housing means comprises a mounting member, a cover with a window for the camera, and fixation means for fixedly attaching the mounting member and/or the cover at the door handle. While in such embodiments the slanted abutment surface which engages the camera module generally can be provided either at the mounting member or at the cover, in preferred embodiments both the mounting member and the cover comprise at least one the slanted abutment surface, so as that in the assembled state the camera module is engaged from both sides by the slanted abut-

ment surfaces and hence the camera module is trapped between the slanted abutment surfaces in the respective angular orientation specified by the orientation of the slanted abutment surfaces.

[0012] In preferred embodiments the camera module comprises a support plate which supports the optical sensor and the interface and which engages the orientation means. While such support plate can be a printed circuit board on which there are mounted the optical sensor, the interface for outputting sensor data, and optionally further electronic components of the camera assembly, in alternative embodiments the support plate can be a structural component which only acts as a mechanical support for the optical sensor and the interface, such as a carrier plate carrying a printed circuit board with the optical sensor and the interface. While in such latter embodiment the printed circuit board thus can have a different size than the support plate, providing for a separate carrier plate as the support plate allows using various commercially available camera modules.

[0013] In order to secure the spatial arrangement of the support plate, and hence of the optical sensor, with respect to the housing means, at least one of the support plate and the abutment surface comprises a projecting member that engages a corresponding recess or receptacle provided at the respective other one of the support plate and the abutment surface.

[0014] Considering that when mounting the support plate at the abutment surface, wherein in such context the term "abutment surface" designates the respective one or more surface areas of the mounting member against which the support plate rests, any misalignment between support plate and abutment surface(s) can be avoided by providing for at least two points at the support plate that are to be arranged at respective fixed reference points at the abutment surface(s). Thus, the support plate can be provided with two male members, such as pins, which engage two corresponding female members, such as recesses or receptacles, at the abutment surface. Alternatively, there could be provided two male members at the abutment surface that engage two female members at the support plate, or there could be provided one male member at each of the support plate and the abutment surface, that engage respective female members provided at the support plate and the abutment surface. While theoretically there could be provided further such projecting members, given that the spatial arrangement of the support plate with respect to the housing means already can be fixed by two pairs of male and female members, providing further such members does not achieve any further advantage. Thus, in order to provide for an exact alignment of the support plate with respect to the housing means, rather than providing for additional pairs of male and female members the accuracy of the alignment can be further improved by minimizing the tolerances of the engagement between the male and female members.

[0015] To further facilitate the assembly to provide for

further fixation of the camera module, the housing means can comprise at least one catch for fixation of the camera module, such as a plurality of spring latches provided at either the mounting member or the cover which are designed for a snap-in connection of the camera module. Thus, for example when the camera module comprises a support plate, such as a printed circuit board having mounted thereon the optical sensor and the interface, the mounting member can be provided with a number of spring latches, for example two along a longitudinal side of a printed circuit board of generally elongate shape, and at least one further along the opposite longitudinal side of the board. In embodiments in which the housing means or the support plate are provided with projections for aligning the support plate with respect to the housing means, it is possible to provide for fixation of the camera module also by the combined action of the pair or pairs of male and female members and at least one latch. In preferred embodiments, the camera assembly suggested herein further comprises means for earthing the door handle so as to secure the camera module against the risk of damage by electrostatic discharge.

[0016] Such means for earthing the door handle can be implemented by providing for a conductive spring which is supported by the housing means so as to contact a conductive portion of the door handle and which is electrically connected to a ground wire. While the conductive spring thus preferable is provided at the housing means so as to be compressed when mounting the housing means within the door handle so as to provide for a biasing force for contacting the conductive spring with the door handle, the ground wire can be connected to provide for an electrical connection with the chassis of the appliance.

[0017] Preferable the cover of the housing means comprises a transparent element for protecting the camera, which transparent element further can have optical characteristics, and particularly can be a lens and/or an optic filter.

[0018] The camera module can be further protected against mechanical influences such as scratches or dirt by locating the window in a depression of the cover.

[0019] The interface for outputting sensor data obtained from the optical sensor can comprise an integrated circuit for processing and/or pre-processing and/or processing data provided by the optical sensor, such as by buffering, amplifying and providing for an A/D conversion of the sensor data, optionally by filtering and by adjusting various image properties.

[0020] The optical sensor preferably comprises a Charge-Coupled Device (CCD) sensor or a Complementary Metal-Oxide Semiconductor (CMOS) sensor.

[0021] In preferred embodiments of the camera assembly, the housing means comprises at least one bushing for the passage of a bolt for attaching the housing means to a door handle. That is, while the housing means also could be attached at the door handle by gluing, or by a snap-in connection, in order to allow servicing of the

camera module, the housing means preferably is attached in a releasable manner at the door handle. In case that one or more electrical cables for connection of the camera module is provided in the proximity of a bushing, the housing means preferably comprises a cable channel which passes by the bushing so as to avoid a situation that during mounting the camera assembly a cable gets jammed in the region of the bushing where it can be damaged either by clamping forces or by direct contact with a bolt or screw passing through the bushing.

[0022] The present invention further provides a cooking oven which comprises an oven cavity, an oven door having a viewing window, a door handle mounted at the exterior side of the oven door, and a camera assembly as it has been described above which is mounted within the door handle. Such cooking oven can be any kind of household oven or industrial cooking oven, such as an electric oven with conventional heating (top heat, bottom heat), a hot air oven, a steam oven, a microwave oven, a gas oven, or a device that combines any of these heating types.

[0023] Preferred embodiments of the present invention are described below by reference to the drawings

- Fig. 1 is an exploded view of a door handle and of a camera assembly to be mounted therein;
- Fig. 2 is a sectional view of the camera assembly when mounted in the door handle;
- Fig. 3 is a perspective view of a camera module as mounted on the mounting member of the camera housing;
- Fig. 4 is a perspective view of the mounting member of the camera housing;
- Fig. 5 is a perspective view of the mounting member of Fig. 4 when rotated by 180 degrees;
- Fig. 6 is a perspective view of a cover of the camera housing;
- Fig. 7 is a sectional view of the cover of the camera housing;
- Fig. 8 is a perspective view of a door handle; and
- Fig. 9 is a schematic view of a cooking oven equipped with the camera assembly suggested herein.

[0024] Fig. 1 illustrates an exploded view of a door handle with a camera assembly mounted therein when viewed from the rear side of the door handle which faces the oven door. Door handle 30 is an elongate hollow part which is mounted at the oven door by means of two holders 32, which connect the ends of door handle 30 to the oven door. At the rear side of door handle 30 there is

provided a cut out 34 for mounting a camera assembly, generally designated by reference sign 36.

[0025] Camera assembly 36 comprises a camera module 38 and housing means for housing the camera module. In the embodiment shown in Fig. 1, camera module 38 comprises a printed circuit board having mounted thereon an optical sensor 39 and an interface for outputting sensor data obtained from the optical sensor. The camera module can be a commercially available USB camera module, which comprises a printed circuit board on which there is mounted a fix focus or autofocus optical sensor and circuitry for processing data obtained from the sensor.

[0026] In the embodiment shown in Fig. 1, the housing means for housing camera module 38 comprises a mounting member 40 and a cover 42, which both can be plastic parts. As shown in Fig. 6, cover 42 comprises a window 44 for the camera, i.e. the optical sensor 39. To prevent ingress of dirt or liquid, window 44 is closed by a transparent element 46 which can be designed to have optical properties and which thus can be for example a lens or a filter.

[0027] Fig. 1 further illustrates a pair of screws 48 with which the housing means is fixed at the door handle 30, a cable 50 for electrically connecting the camera module 38 to further circuitry of the cooking oven, and a spring connector 52 for protecting the camera module from ESD damages, as will be further explained below.

[0028] Fig. 2 is a sectional view of the assembly shown in Fig. 1 when the camera assembly 36 is mounted with in the door handle 30. In order to provide for a good view of the camera into the oven cavity when the door is closed, the camera module is mounted such that the optical axis 54 of the camera 39 is at an angle α with respect to the vertical axis 56.

[0029] Fig. 3 illustrates in further detail an exemplary embodiment of a camera module 38 when mounted on the mounting member 40. Camera module 38 comprises a printed circuit board 58, on which there is mounted the optical sensor 39 as well as circuitry for processing data obtained from the sensor, such as an integrated component 60 and further electronic components 62. Further there is provided a socket 64, such as a USB connector, for insertion of a plug of cable 50 shown in Fig. 1.

[0030] In order to ensure an exact positioning of camera module 38 on mounting member 40, mounting member 40 has two pins 66 (see also Fig. 4) which engage two correspondingly placed apertures 68 provided in printed circuit board 58. In the embodiment shown in Figs. 3 and 4, the mounting member 40 further comprises a catch 70 for fixation of the camera module 38. Thus, upon assembly of the camera assembly 38 at mounting member 40, the camera module 38 is placed onto mounting member 40, so that the apertures 68 engage the pins 66 and the camera module 38 in the mounted position rests on a number of support ridges 72 of mounting member 40. In the mounted position the camera module 38 is held by the combined action of the engagement of the pins

66 with apertures 68 and the engagement of printed circuit board 58 with catch 70.

[0031] In Fig. 4 there further is shown a dog 74 for fixing a connector 52 having a spring element 78, which when mounting member 40 is mounted within the door handle 30 contacts the door handle 30. As shown in Fig. 5 which illustrates the mounting member 40 when turned by 180 degrees, connector 52 at its end opposite spring element 78 comprises a tap 80 for providing for a plug connection to a wire for connecting the door handle to the chassis of the cooking oven so as to provide for ESD protection of the camera module 38 when mounted in the door handle 30.

[0032] Fig. 6 illustrates the cover 42 into which together with mounting member 40 forms a housing for the camera module 38. In the embodiment depicted herein cover 42 is designed for insertion of the mounting member 40 (i. e. in the orientation shown in Fig. 5), wherein when inserted into cover 42 the mounting member 40 is held in place by a plurality of catches 82 provided at cover 42. Similarly as mounting member 40, also cover 42 comprises support ridges 84 that are engaged by the camera module 38. While in the drawings there is illustrated an embodiment wherein the housing for the camera module 38 comprises mounting member 40 and cover 42, the camera module 38 also could be mounted directly within cover 42, such as by selecting the size of the printed circuit board 58 and the positioning of catches 82 such that the catches 82 are designed for engagement with the printed circuit board 58 rather than with mounting member 40, wherein in such latter embodiments the angular orientation of the camera module with respect to the handle is determined by the support ridges 84. Whereas providing for a housing which consists of only a correspondingly adapted cover 42 provides for less parts and thus would be easier to assemble, a two part housing having mounting member 40 and housing 42 is advantageous in that the two part version allows using different camera modules by adapting only the mounting member which as such is not visible from the outside, whereas the cover 42 which constitutes an aesthetical part needs not to be adjusted.

[0033] For attachment of the camera assembly within handle 30, the cover 42 comprises bushings 86 for insertion of the screws 48 shown in Fig. 1, which screws engage screw holes 96 (see Fig. 8), which optionally can be threaded, provided in the handle 30. To protect a cable 50 that is attached to socket 64, from inadvertently being squeezed during assembly, the cover 42 is provided with a cable channel 88 in which cable 50 can be placed to lead out from the housing of camera assembly 36.

[0034] As illustrated in Fig. 6, the window 44 for the camera is provided in a depression 89 of the cover 42, i. e. in an outer wall section of cover 42 which is recessed relative to the remaining outer wall of cover 42. Providing for a depression 89 serves to further protect the camera module 38 against mechanical influences, such as mechanical forces or dirt to which the door handle may be

exposed when gripping the door handle in the region of the camera module.

[0035] As can be best seen in the sectional view of the cover 42 illustrated in Fig. 7, cover 42 advantageously comprises a collar 90 which extends along the upper wall of cover 42 so as to prevent ingress of liquid in between the edge of cutout 34 of door handle 30 and the cover 42. At its lower side, cover 42 comprises an edge 92, which rests against the wall of the handle when cover 42 is mounted within cutout 34 and which thus acts as a stop for insertion of the cover 42 into cutout 34, where the cover 42 when assembled rests against an edge 94 (see Fig. 8) of cutout 34.

[0036] As can be seen in Fig. 8, handle 30 in the region of the holders 32, is provided with threads or bushings 98 for attachment of the holders 32 at the handle 30, or vice versa, of the handle 30 at the holders 32.

[0037] Fig. 9 illustrates a schematic partial sectional side view of a cooking oven 100 which is equipped with a camera 102. The cooking oven 100 includes a cooking chamber 104 which is openable and closable by an oven door 106 provided at the front side of the cooking oven. The oven door 106 comprises a door handle 108 arranged at an upper portion of an outer side of said oven door 106. The oven door 106 includes a transparent window. While in the example shown in Fig. 9, the oven door 106 includes an outer glass panel 110 and an inner glass panel 112, the oven door 106 alternatively could be provided with only a single glass panel or with more than two glass panels.

[0038] The camera 102 is attached within door handle 108 and is oriented such that the viewing angle 114 of the camera 18 is directed from camera 102 through the oven door 106 to a food item 116 disposed on a cooking tray 118 inside the cooking chamber 104.

Reference signs

[0039]

30	door handle
32	holder
34	cut out in 30
36	camera assembly
38	camera module
39	optical sensor
40	mounting member
42	cover
44	window
46	transparent element
48	screws
50	cable
52	spring connector
54	optical axis
56	vertical axis
58	printed circuit board
60	integrated component
62	electronic component

64 socket
 66 pin
 68 apertures in 58
 70 catch
 72 support ridge
 74 dog
 78 spring element
 80 tap
 82 catch
 84 support ridge
 86 bushing
 88 cable channel
 89 depression
 90 collar
 92 edge
 94 edge
 96 screw hole
 98 screw hole
 100 cooking oven
 102 camera
 104 cooking chamber
 106 oven door
 108 door handle
 110 outer glass panel
 112 inner glass panel
 114 viewing angle
 116 food item
 118 cooking tray

Claims

1. A camera assembly (36) configured to be mounted within a door handle (30; 108) of an oven door (106), the camera assembly comprising:

a camera module (38) comprising an optical sensor (39) and an interface for outputting sensor data obtained from the optical sensor; and housing means for housing the camera module (38), the housing means comprising a cover (42) with a window (44) for the optical sensor (39), and fixation means (48) for fixedly attaching the housing means at the door handle (30; 108); wherein the housing means comprises orientation means (72, 84) for mounting the camera module (38) in a single pre-determined angular orientation with respect to the housing means.

2. The camera assembly of claim 1, wherein said orientation means comprises at least one slanted abutment surface (72, 84) which engages the camera module (38).

3. The camera assembly of claim 1 or 2, wherein said housing means comprises a mounting member (40), a cover (42) with a window (44) for the optical sensor (39), and fixation means (86, 92) for fixedly attaching

the mounting member and/or the cover at the door handle (30; 108).

4. The camera assembly of claim 3, wherein the mounting member (40) and/or the cover (42) comprise at least one slanted abutment surface (72, 84) which engages the camera module (38).

5. The camera assembly of claims 3 or 4, wherein the mounting member (40) comprises means for angular alignment of the mounting member with respect to the door handle (30; 108).

6. The camera assembly of any one of the preceding claims, wherein the camera module (38) comprises a support plate (58) which supports the optical sensor (39) and the interface and which engages the orientation means.

7. The camera assembly of claims 2 and 6, wherein at least one of the support plate (58) and the abutment surface (72, 84) comprises a projecting member (66) that engages a corresponding recess (68) or receptacle provided at the respective other one of the support plate and the abutment surface.

8. The camera assembly of claim 6 or 7, wherein said support plate comprises a printed circuit board (58) on which there are mounted the optical sensor (39) and the said interface.

9. The camera assembly of any one of the preceding claims, wherein the housing means comprises at least one catch (70) for fixation of the camera module (38).

10. The camera assembly of any one of the preceding claims, further comprising means (52) for earthing the door handle (30; 108).

11. The camera assembly of any one of the preceding claims, wherein the means (52) for earthing the door handle (30; 108) comprises a conductive spring (78) supported by the housing means so as to contact a conductive portion of the door handle (30; 108) and electrically connected to a ground wire.

12. The camera assembly of any one of the preceding claims, wherein the cover (42) of the housing means comprises a transparent element (46) for protecting the optical sensor (39).

13. The camera assembly of any one of the preceding claims, wherein the transparent element (46) is a lens and/or an optic filter.

14. The camera assembly of claim 12 or 13, wherein the window (44) is provided in a depression (89) of the

cover (42).

- 15.** The camera assembly of any one of the preceding claims, wherein the interface comprises an integrated circuit for processing and/or pre-processing data provided by the optical sensor (39). 5
- 16.** The camera assembly of any one of the preceding claims, wherein the optical sensor (39) comprises a CCD sensor or a CMOS sensor. 10
- 17.** The camera assembly of any one of the preceding claims, wherein the housing means comprises at least one bushing (86) for the passage of a bolt (48) for attaching the housing means to a door handle (30; 108). 15
- 18.** A cooking oven (100) comprising:
- an oven cavity (104); 20
 - an oven door (106) having a viewing window;
 - a door handle (108) mounted at the exterior side of the oven door (106); and
 - a camera assembly (102) as it is defined in any one of the preceding claims which is mounted within the door handle (106). 25

30

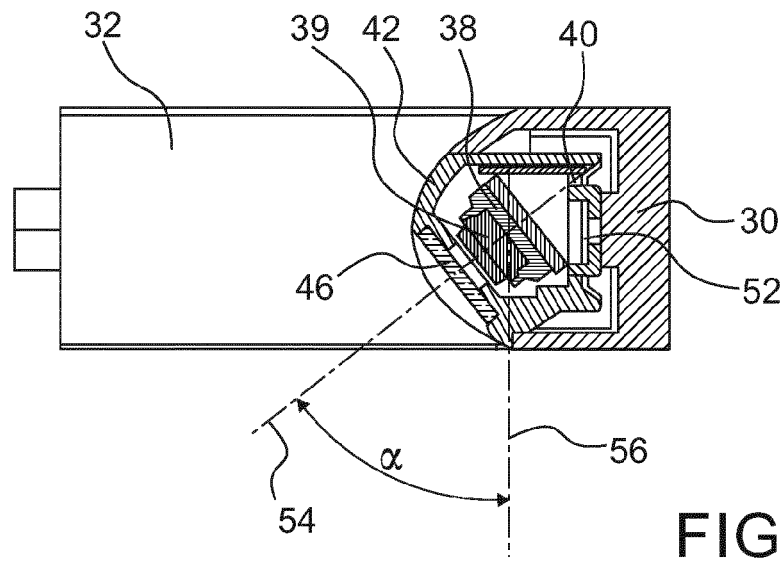
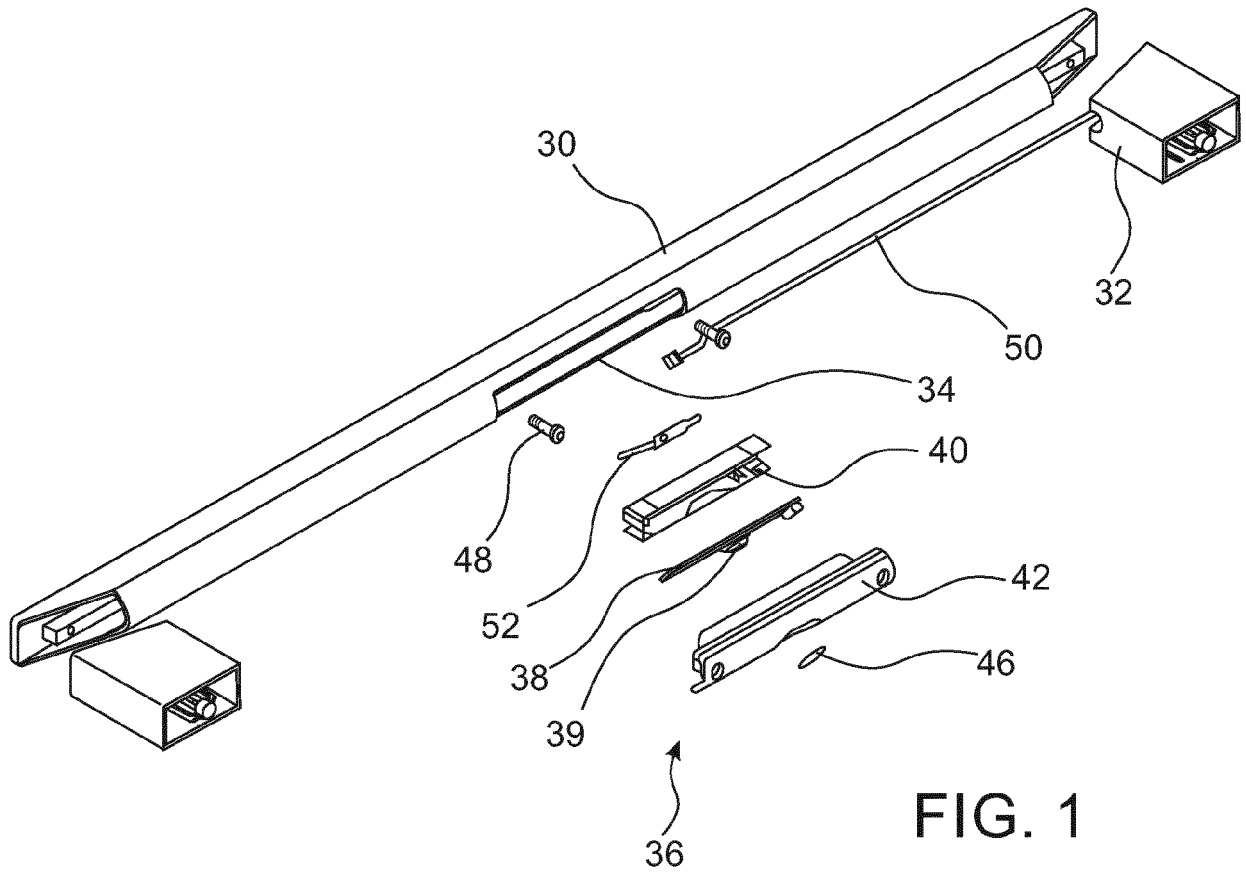
35

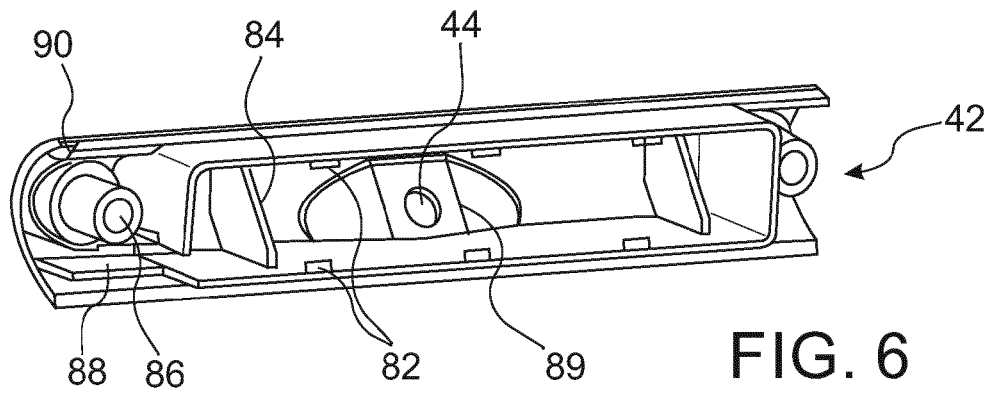
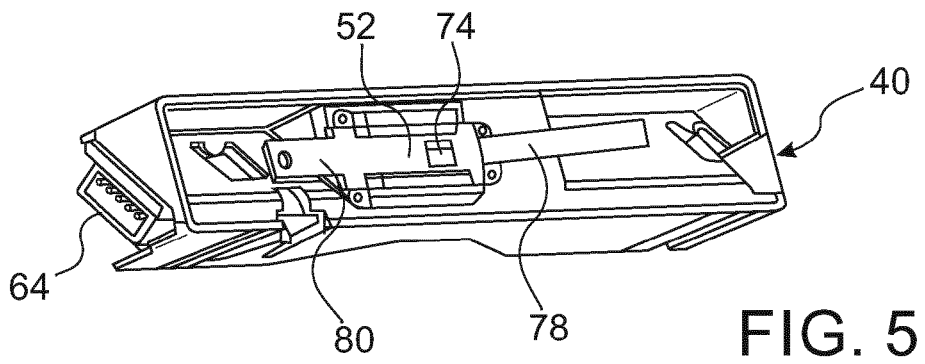
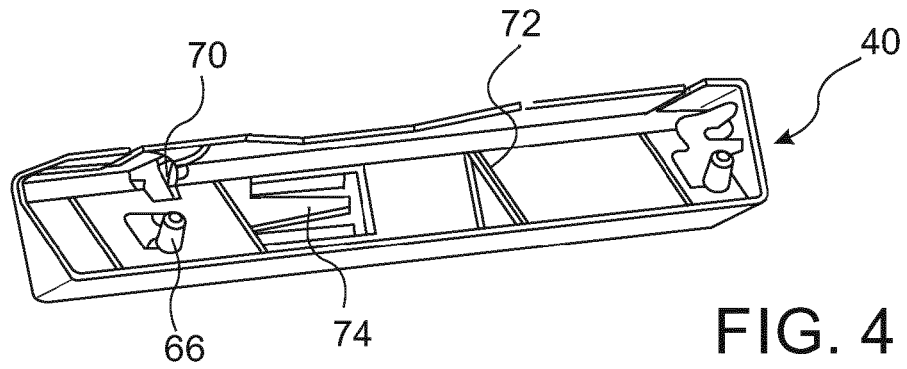
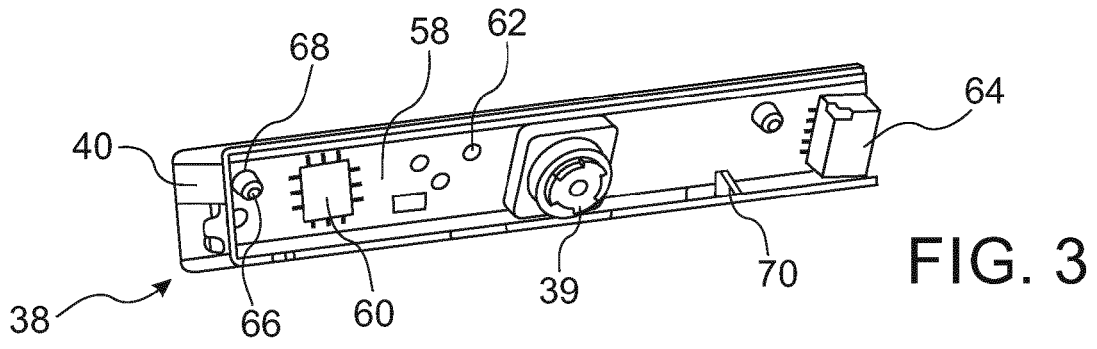
40

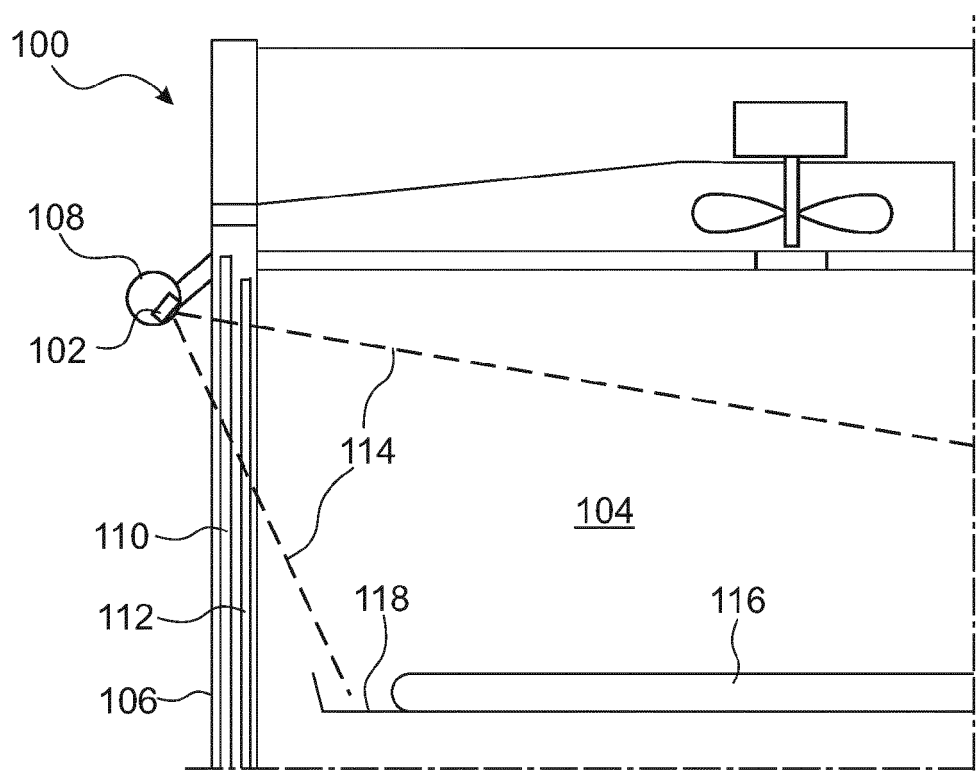
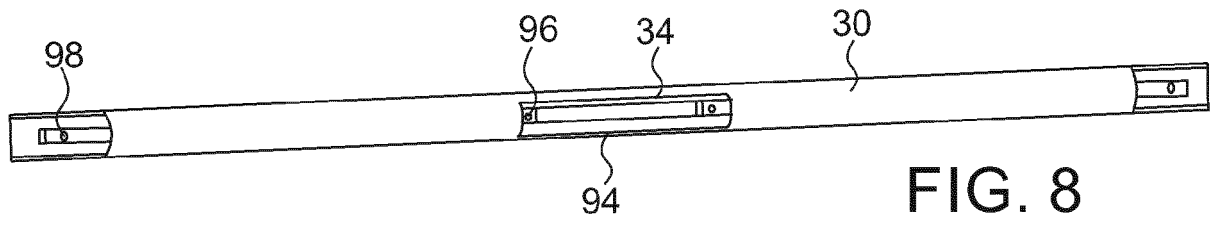
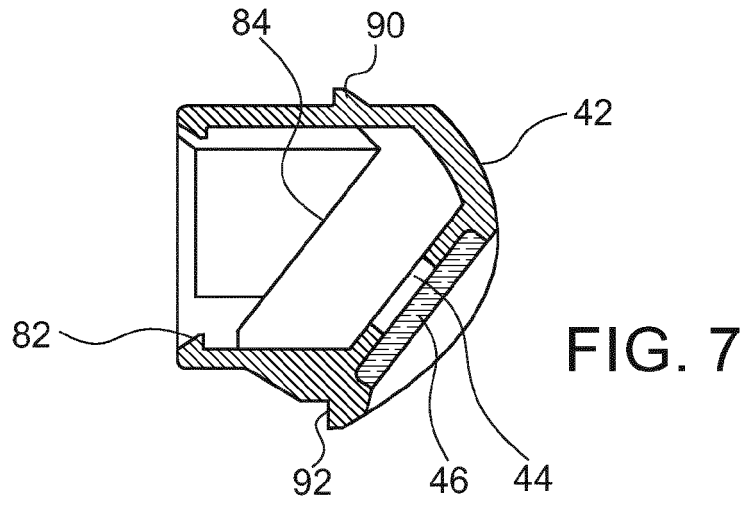
45

50

55









EUROPEAN SEARCH REPORT

Application Number
EP 17 18 8192

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 2017/032515 A1 (ELECTROLUX APPLIANCES AB [SE]) 2 March 2017 (2017-03-02) * page 9, lines 1-15 * * page 13, line 30 - page 14, line 2 * * page 17, lines 13-27 * * figures 1,6,7,10 *	1-6,8, 10-18	INV. F24C7/08 F24C15/02
X	KR 2014 0039733 A (SAMSUNG ELECTRONICS CO LTD [KR]) 2 April 2014 (2014-04-02) * paragraphs [0065] - [0074]; figures 1-5 *	1,3,5,6, 8,12,14, 15,18	
X	US 2017/000292 A1 (PARK SANG JUN [KR] ET AL) 5 January 2017 (2017-01-05) * paragraphs [0112] - [0117], [0125] - [0131]; figures 1-10 *	1-4,6-9, 18	
X	WO 2017/092690 A1 (GUANGDONG MIDEA KITCHEN APPLIANCES MFG CO LTD [CN]; MIDEA GROUP CO LTD) 8 June 2017 (2017-06-08) * figures 2,3 *	1-6,8,9, 18	TECHNICAL FIELDS SEARCHED (IPC) F24C F25D H05B
The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 9 February 2018	Examiner Fest, Gilles
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 17 18 8192

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.

09-02-2018

10

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
WO 2017032515 A1	02-03-2017	AU 2016311014 A1 EP 3136002 A1 WO 2017032515 A1	18-01-2018 01-03-2017 02-03-2017
-----	-----	-----	-----
KR 20140039733 A	02-04-2014	NONE	
-----	-----	-----	-----
US 2017000292 A1	05-01-2017	KR 20170004522 A US 2017000292 A1 WO 2017007186 A1	11-01-2017 05-01-2017 12-01-2017
-----	-----	-----	-----
WO 2017092690 A1	08-06-2017	CN 205181115 U WO 2017092690 A1	27-04-2016 08-06-2017
-----	-----	-----	-----

15

20

25

30

35

40

45

50

55

EPO FORM P0459

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

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

- WO 2016034295 A [0002]