(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) EP 3 136 002 A1

(12) EUROPEAN PATENT APPLICATION

(43) Date of publication:
01.03.2017 Bulletin 2017/09

(51) Int Cl.:
F24C 7/08 *(2006.01)* ***F24C 15/02*** *(2006.01)*
F25D 23/02 *(2006.01)*

(21) Application number: **15182703.7**

(22) Date of filing: **27.08.2015**

(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

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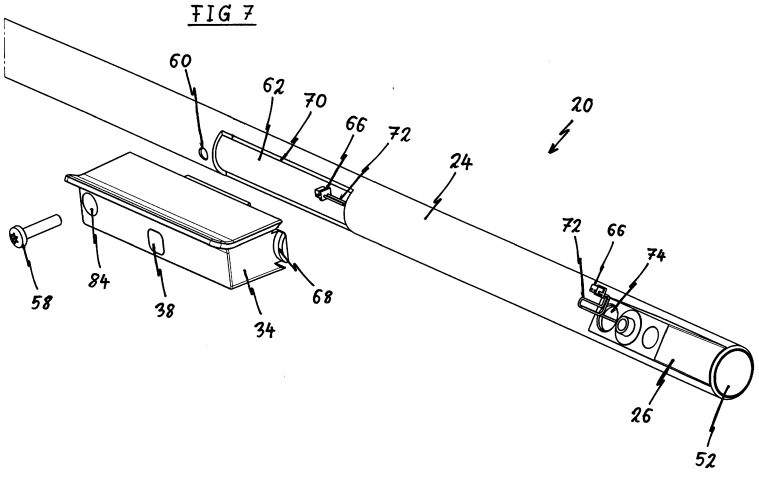
(54) DOOR HANDLE FOR A DOOR OF A DOMESTIC APPLIANCE

(57) The present invention relates to a door handle (20) for a door (16) of a domestic appliance (10), in particular for an oven door (16) of a cooking oven (10). The door handle (20) comprises an elongated handle bar (24) formed as a hollow profile part or as a pipe and at least one handle adapter (26), preferably two handle adapters (26), connectable or connected to the handle bar (24) at its front side and connectable to the door (16) at its rear side. The door handle (20) comprises at least one housing (34) removably attached at the handle bar (24). The handle bar (24) includes at least one recess (70) for receiving at least partially the housing (34). The housing (34) includes an open side facing the recess (70) of the door handle (20), so that an inner space (62) of the door handle (20) is enlarged by said housing (34). The door handle (20) comprises an electric device (28) arranged or arrangeable inside the housing (34) and/or inside the handle bar (24) next to said housing (34). The handle adapter (26) includes at least one cable opening (74) at its rear side. The door handle (20) comprises at least one wiring cable (72) extending inside the handle bar between the electric device (28) and the cable opening (74) of the handle adapter (26).

FIG 7



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Description

[0001] The present invention relates to a door handle for a door of a domestic appliance. In particular, the present invention relates to a door handle for an oven door of a cooking oven. Further, the present invention relates to a door with a door handle for a domestic appliance. Moreover, the present invention relates to a domestic appliance including a door with a door handle.

[0002] In a door handle attached at a door of the domestic appliance one or more different electric device can be arranged. In particular, a network interface unit (e.g. WIFI, Bluetooth, INFC, Zig Bee), a WLAN module, an antenna, a camera, an LED display, various sensors, light guides, displays and/or a projector may be arranged inside the door handle. For example, a digital camera in the door handle of a cooking oven may provide pictures of a foodstuff being cooked inside the oven cavity through a glass window or full glass oven door, wherein said pictures are transmitted via the network interface unit to an external computer or computer network, e.g. to a user's mobile computer device in order to allow remote live visual monitoring of the cooking by the user.

[0003] Furthermore, there are requirements on the market for exchangeable door handles as well as for door handles with more integrated functions. Door handles with some simple features, e.g. integrated LED displays or touch sensors are well known. However, due to the wiring concept and the connection to a power supply, said door handles are not exchangeable by the user. It would be advantageous, that the user could upgrade his domestic appliance or a dedicated furniture with an new door handle, which provides some additional electric features without having replacing the whole domestic appliance.

[0004] Some recent domestic appliances are increasingly being upgraded or developed in order to include WIFI connectivity, so that the domestic appliance is connectable to the internet and exchange information with smartphones or computers of the user. The WIFI module together with the antenna is usually placed into the chassis of the domestic appliance or dedicated furniture. However, it is difficult to find out a suitable place for the WIFI module, because there are temperature limits of about -40°C and +85°C for said WIFI module, while a cooking oven with pyrolytic self-cleaning function is heated up to about 450°C. Often, an additional cooling of the WIFI module would be required.

[0005] Furthermore, it is quite difficult that an antenna arranged inside the chassis provides a good wireless signal with respect to the position and orientation of the WIFI module. If there is a metal casing between a router and WIFI module and its antenna, then said router cannot receive the wireless signal. If the WIFI module is placed on, close to or against a metal part, then problems may occur. The signals can easily propagate through a wood desk or furniture, but metal will obstruct the signals. Further, furniture cabinets, cooking hobs and cooking hoods may also obstruct the signals.

[0006] Furthermore, domestic appliances are usually installed very close to each other. If neighboring domestic appliances are equipped with single WIFI modules, then the signal may be obstruct. Interference from other wireless networks in the area can cause issues with the wireless signal. The lower the distance between WIFI module and router, the better the transmitted signal is. An arrangement of the WIFI module near the router reduces interference and usually provides the best signal. Thus, the WIFI module with the antenna should be placed at the outer part of the domestic appliance or dedicated furniture, but not inside of them.

[0007] It is an object of the present invention to provide a door handle for a door of a domestic appliance, which door handle overcomes the drawbacks mentioned above.

[0008] The object is achieved by the door handle according to claim 1.

[0009] The door handle according to the present invention is provided for a door of a domestic appliance, in particular for an oven door of an cooking oven, wherein

- the door handle comprises an elongated handle bar formed as a hollow profile part or as a pipe,
- the door handle comprises at least one handle adapter, preferably two handle adapters, connectable or connected to the door handle at its front side and connectable to the door at its rear side,
- the door handle comprises at least one housing removably attached at the handle bar,
- the door handle includes at least one recess for receiving at least partially the housing,
- the housing includes an open side facing the recess of the door handle, so that an inner space of the handle bar is enlarged by said housing,
- the door handle comprises an electric device arranged or arrangeable inside the housing and/or in the inner space of the handle bar next to said housing,
- the handle adapter includes at least one cable opening at its rear side, and
- the door handle comprises at least one wiring cable extending inside the handle bar between the electric device and the cable opening of the handle adapter.

[0010] The main idea of the present invention is the housing removably attached at the handle bar on one hand and the wiring cable inside the handle bar between the electric device and the cable opening of the handle adapter on the other hand. The house allows the installation of different electric features, e.g. network interface unit, WLAN module, antenna, camera, LED display, LED indicator, light guide, different sensors. The wiring cable allows a power and/or signal connection between the electric device and the door. Since the housing is removable, the electric device or components thereof can be easily exchanged. The present invention allows an up-

grade without exchanging the whole domestic appliance.

[0011] In particular, the handle bar is made of metal, preferably of aluminium. Aluminium fulfills the modern aesthetical requirements.

[0012] Further, the handle adapter and/or the housing may be made of plastics. The plastic housing provides an electric isolation.

[0013] Moreover, the housing may be fixable at the handle bar by at least one housing screw and/or at least one clip element, wherein preferably the housing is fixable at the handle bar by one housing screw and one clip element.

[0014] Preferably, the handle bar includes at least one flow drill thread for receiving the housing screw and/or at least one handle screw. The flow drill thread technology allows a thin wall for the handle bar resulting in a large inner space of said handle bar.

[0015] In particular, the electric device comprises at least one network interface unit, wherein preferably said network interface unit includes a WIFI unit, a Bluetooth unit, an INFC unit and/or a Zig Bee unit.

[0016] Further, the electric device may comprise at least one camera, camera lens, camera module, LED display, antenna, projector, sensor and/or USB interface. These features allow a plurality of applications.

[0017] Alternatively or additionally, the at least one antenna and/or USB interface are arranged in or at the handle adapter.

[0018] Preferably, the wiring cable includes one wiring connector element at one end or two wiring connector elements at both ends, wherein preferably said wiring connector element is provided for connecting to the electric device and/or for connecting to a connector element of the door. The wiring connector elements contribute to an easy exchange of the electric device or components thereof.

[0019] Furthermore, the handle bar may comprise at least one plug element, preferably two plug elements, wherein said plug element is provided for closing an end of the handle bar and for receiving a handle screw connecting the handle bar, the handle adapter and/or the door or a front panel of said door. The plug element allows a reliable closing of the handle bar.

[0020] In particular, the recess and the housing are arranged in a central portion of the handle bar, wherein preferably said recess and housing are arrangeable between the handle bar and the door. This contributes to the aesthetical requirements.

[0021] Further, the present invention relates to a door for a domestic appliance, in particular an oven door for a cooking oven, wherein the door comprises the door handle mentioned above. Preferably, the camera lens is directed to a door window of the door, so that a cavity behind the door is within a view field of said camera lens.

[0022] Preferably, the door includes holes for the handle screws and one or more openings, preferably formed as slotted holes, for wiring cables. In particular, the door includes at least one cable opening, preferably formed as slotted hole, for wiring cables, wherein said cable opening is opposite the cable opening of the handle adapter, and wherein preferably the door comprises an outer glass panel including the holes for the handle screws and the cable opening.

[0023] Moreover, the present invention relates to a domestic appliance, in particular a cooking oven, comprising a door and a door handle attached or attachable at said door, wherein the domestic appliance comprises the door handle and/or the door mentioned above.

[0024] At last, the domestic appliance may comprise chassis contact elements and door contact elements being in contact to each other in a closed state of the door, wherein preferably a galvanic or inductive contact occurs between the chassis contact elements and door contact elements.

[0025] Novel and inventive features of the present invention are set forth in the appended claims.

[0026] The present invention will be described in further detail with reference to the drawing, in which

FIG 1 illustrates a schematic perspective view of a domestic appliance according to a preferred embodiment of the present invention,

FIG 2 illustrates a schematic side view of a door handle attached at an oven door of a cooking oven according to the preferred embodiment of the present invention,

FIG 3 illustrates a schematic top view of the door handle attached at the oven door of the cooking oven according to the preferred embodiment of the present invention,

FIG 4 illustrates a schematic perspective view of the cooking oven according to the preferred embodiment of the present invention,

FIG 5 illustrates a schematic perspective view of an upper part of the oven door for the cooking oven according to the preferred embodiment of the present invention,

FIG 6 illustrates a schematic sectional side view of the door handle attached at the oven door of the cooking oven according to the preferred embodiment of the present invention,

FIG 7 illustrates a schematic exploded perspective view of the door handle for the oven door of the cooking oven according to the preferred embodiment of the present invention,

FIG 8 illustrates a schematic partial sectional perspective view of the upper part of the oven door for the cooking oven according to the preferred embodiment of the present invention,

FIG 9 illustrates two scaled up details of the partial sectional perspective view of the upper part of the oven door shown in FIG 8, and

FIG 10 illustrates a schematic perspective view of a housing for an electric device attachable to the door handle for the oven door of the cooking oven according to the preferred embodiment of the present invention.

[0027] FIG 1 illustrates a schematic perspective view of a domestic appliance 10 according to a preferred embodiment of the present invention. In this embodiment, the domestic appliance 10 is a cooking oven 10.

[0028] The cooking oven 10 comprises a chassis 12, an oven cavity 14, an oven door 16 and a front panel 22. The oven cavity 14 is arranged inside the chassis 12. A front side of the oven cavity 14 is closed by the oven door 16. The front panel 22 is arranged above the closed oven door 16. The oven door 16 comprises a door window 18 arranged in a central portion of said oven door 16.

[0029] A door handle 20 is attached at an outer side of the oven door 16. In this example, the door handle 20 is arranged above the door window 18. The door handle 20 includes an elongated handle bar 24 and two handle adapters 26. In this example, the handle bar 24 of the door handle 20 extends horizontally. The handle adapters 26 are interconnected between the oven door 16 and one end portion of the handle bar 24 in each case. The handle adapters 26 are attached at the outer side of the oven door 16. In turn, the handle bar 24 is attached at the handle adapters 26. In this example, the door handle 20 includes two handle adapters 26. In general, the door handle 20 may include one or more handle adapters 26.

[0030] At least one electric device 28 is arranged inside the handle bar 24. In this example, the electric device 28 is arranged inside a central portion of the handle bar 24.

[0031] FIG 2 illustrates a schematic side view of the door handle 20 attached at the oven door 16 of the cooking oven 10 according to the preferred embodiment of the present invention. In FIG 2 the oven door 16 is in the closed state. The front panel 22 is arranged above the oven door 16.

[0032] The door handle 20 is attached at an outer glass panel 30 of the oven door 16. The handle adapters 26 are directly attached at the outer glass panel 30. In turn, the handle bar 24 is attached at the handle adapters 26. The electric device 28 is attached at the central portion of the handle bar 24. The electric device 28 is arranged inside a housing 34. In this example, the housing is made of plastics. The electric device 28 comprises a camera 36. A camera lens 38 of said camera 36 is attached at the housing 34 and directed through the door window 18 of the oven door 16 into the oven cavity 14. Preferably, the camera lens 38 is arranged substantially in the centre of the door handle 20, so that the complete oven cavity 14 is visible by said camera lens 38. Further, the electric device 28 comprises an LED display 40 arranged substantially at the front side of the door handle 20, and/or an LED indicator.

[0033] FIG 3 illustrates a schematic top view of the door handle 20 attached at the oven door 16 of the cooking oven 10 according to the preferred embodiment of the present invention.

[0034] The handle adapters 26 are attached at the outer glass panel 30 of the oven door 16. Each end portion of the handle bar 24 is attached at one of the handle adapters 26. The housing 34 is attached at the central portion of the handle bar 24. The housing 34 is substantially arranged between the handle bar 24 and the outer glass panel 30 of the oven door 16. The electric device 28 is arranged inside the housing 34.

[0035] FIG 4 illustrates a schematic perspective view of the cooking oven 10 according to the preferred embodiment of the present invention. In FIG 4 the oven door 16 of the cooking oven 10 is open.

[0036] The oven door 16 comprises a door frame including two door columns 42 and a top door frame part 44. In this example, the top door frame part 44 is removable. Further, the cooking oven 10 comprises chassis contact elements 46 and door contact elements 48. The chassis contact elements 46 are arranged at a front frame enclosing the oven cavity 14. The door contact elements 48 are arranged at the door frame of the oven door 16. In this example, the door contact elements 48 are arranged at the top door frame part 44.

[0037] The chassis contact elements 46 and the door contact elements 48 are in an electric contact to each other, when the oven door 16 is closed. In this example, the chassis contact elements 46 are arranged in the right upper corner of the front frame enclosing the oven cavity 14. In a similar way, the door contact elements 48 are arranged in the right upper corner of the door frame, when the oven door 16 is in the closed state. The chassis contact elements 46 and the door contact elements 48 provide electric contacts between the chassis 12 and the oven door 16, when the oven door 16 is in the closed state.

[0038] When the chassis contact elements 46 and the door contact elements 48 are in contact, then the electric current can flow from the power supply in the chassis 12 to the electric device 28. Additionally or alternatively, a wireless electrical contact or a wireless connection the oven door 16 and the chassis 12 may be provided. This may be realized by wireless energy transfer and without any physical contacts for the transfer of electric current, for example by using inductive coupling between the door 16 and the chassis 12 of the domestic appliance 10. A primary coil may be arranged in the chassis 12 and a secondary coil may be part of the oven door 16. The coils are aligned in the operating position in such a way to each other, so that a very high inductive coupling between the primary and secondary coil results. If the door 16 removes from its operating and closed position, with increasing distance of the door 16 and/or increasing tilt angle between the coils, the wireless inductive coupling

dissolves. Besides electrical power, additional signals may be transmitted between the oven door 16 and the chassis 12 as well.

[0039] FIG 5 illustrates a schematic perspective view of an upper part of the oven door 16 for the cooking oven 10 according to the preferred embodiment of the present invention.

[0040] The door handle 20 is attached at the outer glass panel 30 of the oven door 16. The handle adapters 26 are directly attached at the outer glass panel 30, while the handle bar 24 is attached at the handle adapters 26. The electric device 28 is arranged in the central portion of the handle bar 24. In this example, the electric device 28 includes a network interface unit 50, an LED display 40 and/or an LED indicator 40.

[0041] The handle bar 24 is formed as a hollow profile part. At both ends of the handle bar 24 a plug element 52 is inserted in each case. A USB interface 54 is an integrated part of the handle adapter 26 on the left hand side. An antenna 56 is an integrated part of the handle adapter 26 on the right hand side.

[0042] Preferably, the USB interface 54 is a standard type. The USB interface 54 may also be arranged inside the housing 34. For example, a WLAN stick may be plugged in the USB interface 54 for a data transmission. Thus, a personal computer may be connected via a USB cable and the USB interface 54 to a control unit of the cooking oven 10. In particular, this may be advantageous in a service case, because a function of appliance can be checked or a software update can be performed without disassembling the domestic appliance in order to obtain access to the control unit. The USB interface 54 may be placed on the top wall of the handle adapter 26, on its side walls, but also in the handle bar 24 as well.

[0043] FIG 6 illustrates a schematic sectional side view of the door handle 20 attached at the oven door 16 of the cooking oven 10 according to the preferred embodiment of the present invention.

[0044] The door handle 20 is attached at the outer glass panel 30 of the oven door 16, wherein the handle adapters 26 are directly attached at the outer glass panel 30, while the handle bar 24 is attached at the handle adapters 26. FIG 6 clarifies that the handle bar 24 is formed as the round hollow profile part. Thus, an inner space 62 is formed in the handle bar 24. The electric device 28 is arranged inside said inner space 62 of the handle bar 24 and in the housing 34. In this example, the electric device 28 includes a network interface unit 50, a WIFI unit 64 and a wiring connector element 66.

[0045] The housing 34 allows the reception of the WIFI unit 64, which is usually bigger than the inner space 62 of the handle bar 24. Further, the housing 34 avoids a direct contact to the handle bar 24 made of metal. Moreover, the housing 34 insures an easy assembling. The housing 34 is made of plastic and protects sufficiently the WIFI unit 64 and other components of the electric device 28. Additionally, the housing 34 made of plastic provides an electric isolation for the electric device 28.

[0046] The WIFI unit 64 with the antenna 56 may be placed into at least one of the handle adapter(s) 26, by which the handle bar 24 is fixed to the oven door 16 and/or in the housing 34 fixed to the handle bar 24. WIFI units 64 are available on the market as standard modules. The advantage of standard modules is that the ready developed WIFI unit 64 reduces the development effort and the costs.

[0047] If the standard WIFI unit 64 is relative big, then the antenna 56 may be placed in the handle adapter 26. For example, the antenna 56 is chip or stripe type. In this case, data can be transmitted by means of a wiring or electric conductors to a WLAN module in the chassis 12. In order to obtain best possible signals in each of both handle adapters 26 at either ends of the handle bar 24 one antenna 56 with different characteristics may be placed as well. In that case the both antennas 56 are connected by means of wiring which is going through the inner space 62 of the handle bar 24. Moreover, the antenna 56 may be placed in a plastic housing arrangeable in each position of the door handle 20 as well.

[0048] The housing 34 is fixed at the handle bar 24 by a housing screw 58. Said housing screw 58 penetrates a screw hole 84 in the housing 34 and a flow drill thread 60 formed in the handle bar 24.

[0049] The flow drill screw technology insures a fixation of the housing screw 58 in the flow drill thread 60 with higher torque values, so that a strong fixation is ensured. The flow drill screw technology also simplifies the fixation on the hollow handle bar 24 without using any additional components or tools. Furthermore, if the electric device 28 includes a touch sensor or a touch dimmer, then the flow drill screw technology ensures a reliable contact between said touch sensor or touch dimmer and the handle bar 24.

[0050] FIG 7 illustrates a schematic exploded perspective view of the door handle 20 for the oven door 16 of the cooking oven 10 according to the preferred embodiment of the present invention.

[0051] In the central portion the handle bar 24 includes a recess 70 provided for receiving the housing 34. At one side the housing 34 includes a clip element 68 for inserting into one face side of the recess 70. At the other side the housing 34 may be fastened by the housing screw 58, which is insertable into the flow drill thread 60 formed in the handle bar 24. The camera lens 38 is attached at the housing 34.

[0052] The use of only one housing screw 58 and the clip element 68 for the fixing the housing 34 with the electric device 28 at the handle bar 24 avoid a possible contact between a further screw and component of the electric device 28. Preferably, the housing screw 58 is spaced from the wiring cables 72 and wiring connector elements 66 inside the handle bar 24.

[0053] The handle adapter 26 includes a cable opening 74 at that side, which contacts the oven door 16, while the outer glass panel 30 includes at least one cable opening 88 at opposite. A wiring cable 72 extends between

the recess 70 of the handle bar 24 on the one hand and the cable opening 74 of the handle adapter 26 and the cable opening 88 of the outer glass panel 30 on the other hand. Two wiring connector elements 66 are attached at the ends of the wiring cable 72. The wiring connector element 66 in the recess 70 of the handle bar 24 is provided for a connection to the electric device 28 in the housing 34. The wiring connector element 66 in the cable opening 74 of the handle adapter 26 provided for penetrating the opening 88, preferably formed as slot hole or hole, in the outer glass panel 30 and a connection behind said outer glass panel 30. The open ends of the handle bar 24 formed as the round hollow profile part are filled by the plug elements 52.

[0054] The power supply from the chassis 12 of the domestic appliance 10 or cooking oven 10 to the door or oven door 16, respectively, may be provided by means of the wiring cable 72, by means of wireless inductive technology or by means of electric conductors, which are engaged, when the oven door 16 is closed and disengaged, when said oven door 16 is open.

[0055] The flow drill technology allows the use of relative long screws in very thin walls. The use of the flow drill technology allows the very thin material for the handle bar 24, so that the hollow handle bar 24 provides enough inner space 62 for the wiring cables 72 and wiring connector elements 66 inside the handle bar 24.

[0056] FIG 8 illustrates a schematic partial sectional perspective view of the upper part of the oven door 16 for the cooking oven 10 according to the preferred embodiment of the present invention.

[0057] The handle adapters 26 are directly attached at the outer glass panel 30, while the handle bar 24 is attached at the handle adapters 26. A handle screw 76 penetrates the outer glass panel, the handle adapter 26 and a thread formed in the plug element 52. After fixing the door handle 20 at the outer glass panel 30, the wiring cable 72 and wiring connector element 66, which is coming out from a rear side of outer glass panel 30, can be connected to an electric connector of the oven door 16.

[0058] Further, another conduction system arranged inside the oven door 16 door can be directly connected to the wiring cable 72 of the door handle 20, for example by means of a plug-in connector element. This contributes also to a very easy exchangeability of the door handle 20.

[0059] FIG 8 clarifies the course of the wiring cable 72 between the electric device 28 on the one hand and the cable opening 74 in the handle adapter 26 as well as the cable opening 88 in the outer glass panel 30 on the other hand.

[0060] The wiring cable 72 from the electric device 28 in the handle bar 24 propagates through the inner space of the hollow profile part of said handle bar 24 up to the handle adapter 26, afterward through the cable opening 74 in the handle adapter 26 and at last through the cable opening 74 in the outer glass panel 30. Thus, the handle bar 24, the adapter 26, the housing 34, the electric device 28, the wiring cable 72 and wiring connector elements 66 can be preassembled together, and afterward of the door handle 20 is fixed on the outer glass panel 30 of the oven door 16. In the case of the cooking oven 10, the outer glass panel may be provided with a bigger hole or slot, so that the handle screw 76 for the door handle 20 as well as the wiring cable 72 with the wiring connector element 66 can penetrate said hole or slot, respectively.

[0061] FIG 9 illustrates two scaled up details of the partial sectional perspective view of the upper part of the oven door 16 shown in FIG 8.

[0062] The first scaled up detail on the left hand side shows the handle screw 76 penetrating the outer glass panel, the handle adapter 26 and the thread formed in the plug element 52. The wiring cable 72 penetrates the outer glass panel 30 behind the cable opening 74 in the handle adapter 26.

[0063] The handle adapter 26 acts as a spacer between the handle bar 24 and the outer glass panel 30 of the oven door 16. At least one handle adapter 26 is required as spacer. Preferably, two handle adapters 26 are placed at either ends of the handle bar 24 in order to connect said handle bar 26 to the oven door 16. In this example, the handle screw 76 penetrates the handle adapters 26 and is fixed in the thread formed in the plug element 52 inserted into the handle bar 24, so that the handle bar 24 and the both handle adapters 26 are fixed by two handle screws 76 all in all. Alternatively, the handle adapter 26 can also be fixed to the handle bar 24 at first, and afterward the whole preassembled door handle 20 may be fixed at the oven door 16, e.g. at the outer glass panel 30 of said oven door 16.

[0064] The second scaled up detail on the right hand side shows the electric device 28 partially inside the central portion of the handle bar 24 and partially inside the housing 34. In this example, the electric device 28 is the network interface unit 50 including the WIFI unit 64, the wiring connector element 66 and the camera 36.

[0065] FIG 10 illustrates a schematic perspective view of the housing 34 for an electric device 28 attachable to the door handle 20 for the oven door 16 of the cooking oven 10 according to the preferred embodiment of the present invention.

[0066] The electric device 28 is partially inside the housing 34. The electric device 28 is the network interface unit 50 including a printed circuit board. The circuit board of the network interface unit 50 is inserted in and supported by a circuit board guide 80. Said circuit board guide 80 is formed within the housing 34. The network interface unit 50 includes the WIFI unit 64, the wiring connector element 66, the LED display 40 and/or LED indicator, a light guide 86, the camera 36, a camera module 78 and a circuit board interface 82.

[0067] The clip element 68 is formed at one side of the housing 34, while the screw hole 84 for receiving the housing screw 58 is formed on its opposite side. The housing screw 58 penetrates the screw hole 84 in the housing 34 and the flow drill thread 60 formed in the han-

dle bar 24.

[0068] Although the preferred embodiment of the present invention relates to the door handle 20 for the oven door 16 of the cooking oven 10, the present invention relates to a door handle for a door of an arbitrary domestic appliance.

[0069] Although an illustrative embodiment of the present invention has been described herein with reference to the accompanying drawing, it is to be understood that the present invention is not limited to that precise embodiment, and that various other changes and modifications may be affected therein by one skilled in the art without departing from the scope or spirit of the invention. All such changes and modifications are intended to be included within the scope of the invention as defined by the appended claims.

List of reference numerals

[0070]

10 domestic appliance, cooking oven
12 chassis
14 oven cavity
16 oven door
18 door window
20 door handle
22 front panel
24 handle bar
26 handle adapter
28 electric device
30 outer glass panel
32 inner glass panel
34 housing
36 camera
38 camera lens
40 LED display
42 door column
44 top door frame part
46 chassis contact elements
48 door contact elements
50 network interface unit
52 plug element
54 USB interface
56 antenna
58 housing screw
60 flow drill thread
62 inner space of the handle bar
64 WIFI unit
66 wiring connector element
68 clip element
70 recess
72 wiring cable
74 cable opening
76 handle screw
78 camera module
80 circuit board guide
82 circuit board interface
84 screw hole
86 light guide
88 cable opening

Claims

1. A door handle (20) for a door (16) of a domestic appliance (10), in particular for an oven door (16) of an cooking oven (10), wherein

- the door handle (20) comprises an elongated handle bar (24) formed as a hollow profile part or as a pipe,
- the door handle (20) comprises at least one handle adapter (26), preferably two handle adapters (26), connectable or connected to the handle bar (24) at its front side and connectable to the door (16) at its rear side,
- the door handle (20) comprises at least one housing (34) removably attached at the handle bar (24),
- the handle bar (24) includes at least one recess (70) for receiving at least partially the housing (34),
- the housing (34) includes an open side facing the recess (70) of the door handle (20), so that an inner space (62) of the door handle (20) is enlarged by said housing (34),
- the door handle (20) comprises an electric device (28) arranged or arrangeable inside the housing (34) and/or inside the handle bar (24) next to said housing (34),
- the handle adapter (26) includes at least one cable opening (74) at its rear side, and
- the door handle (20) comprises at least one wiring cable (72) extending inside the handle bar between the electric device (28) and the cable opening (74) of the handle adapter (26).

2. The door handle according to claim 1,
characterised in that
the handle bar (24) is made of metal, preferably of aluminium.

3. The door handle according to claim 1 or 2,
characterised in that
the handle adapter (26) and/or the housing (34) are made of plastics.

4. The door handle according to any one of the preceding claims,
characterised in that
the housing (34) is fixable at the handle bar (24) by at least one housing screw (58) and/or at least one clip element (68), wherein preferably the housing (34) is fixable at the handle bar (24) by one housing screw (58) and one clip element (68).

5. The door handle according to any one of the preceding claims,
characterised in that
the handle bar (24) includes at least one flow drill thread (60) for receiving the housing screw (58) and/or at least one handle screw (74).

6. The door handle according to any one of the preceding claims,
characterised in that
the electric device (28) comprises at least one network interface unit (50), wherein preferably said network interface unit (50) includes a WIFI unit (64), a Bluetooth unit, an INFC unit and/or a Zig Bee unit.

7. The door handle according to any one of the preceding claims,
characterised in that
the electric device (28) comprises at least one camera (36), camera lens (38), camera module (78), LED display (40) and/or LED indicator (40), light guide (86), antenna (56), projector, sensor and/or USB interface (54).

8. The door handle according to any one of the preceding claims,
characterised in that
the at least one antenna (56) and/or USB interface (54) are arranged in or at the handle adapter (26).

9. The door handle according to any one of the preceding claims,
characterised in that
the wiring cable (72) includes one wiring connector element (66) at one end or two wiring connector elements (66) at both ends, wherein preferably said wiring connector element (66) is provided for connecting to the electric device (28) and/or for connecting to a connector element of the door (16) and/or for preparing an electrical grounding of the handle bar (24) to a chassis (12) of the cooking oven (10).

10. The door handle according to any one of the preceding claims,
characterised in that
the handle bar (24) comprises at least one plug element (52), preferably two plug elements (52), wherein said plug element (52) is provided for closing an end of the handle bar (24), wherein preferably the plug element (52) includes a thread for receiving a handle screw (76) connecting the handle bar (24), the handle adapter (26) and/or the door (16) or a front panel (30) of said door (16), or wherein said plug element (52) is directly pressed into a lateral opening of the door handle (20).

11. The door handle according to any one of the preceding claims,
characterised in that
the recess (70) and the housing (34) are arranged in a central portion of the handle bar (24), wherein preferably said recess (70) and housing (34) are arrangeable between the handle bar (24) and the door (16).

12. A door for a domestic appliance, in particular an oven door (16) for a cooking oven (10), comprising a door handle attached or attachable at said door (16),
characterised in that
the door (16) comprises a door handle (20) according to any one of the claims 1 to 11, wherein preferably the camera lens (38) is directed to a door window (18) of the door (18), so that a cavity (14) behind the door (16) is within a view field of said camera lens (38).

13. The door according to claim 12,
characterised in that
the door (16) includes holes for the handle screws (76) and at least one cable opening (88), in particular formed as a slotted hole, for wiring cables (72), wherein said cable opening (88) is opposite the cable opening (74) of the handle adapter (26), and wherein preferably the door (16) comprises an outer glass panel (30) including the holes for the handle screws (76) and the cable opening (88).

14. A domestic appliance, in particular a cooking oven (10), comprising a door (16) and a door handle attached or attachable at said door (16),
characterised in that
the domestic appliance (10) comprises a door handle (20) according any one of the claims 1 to 11 and/or a door (16) according to claim 12 or 13.

15. The domestic appliance according to claim 14,
characterised in that
the domestic appliance (10) comprises chassis contact elements (46) and door contact elements (48) being in contact to each other in a closed state of the door (16), wherein preferably a galvanic or inductive contact occurs between the chassis contact elements (46) and door contact elements (48).

FIG 1

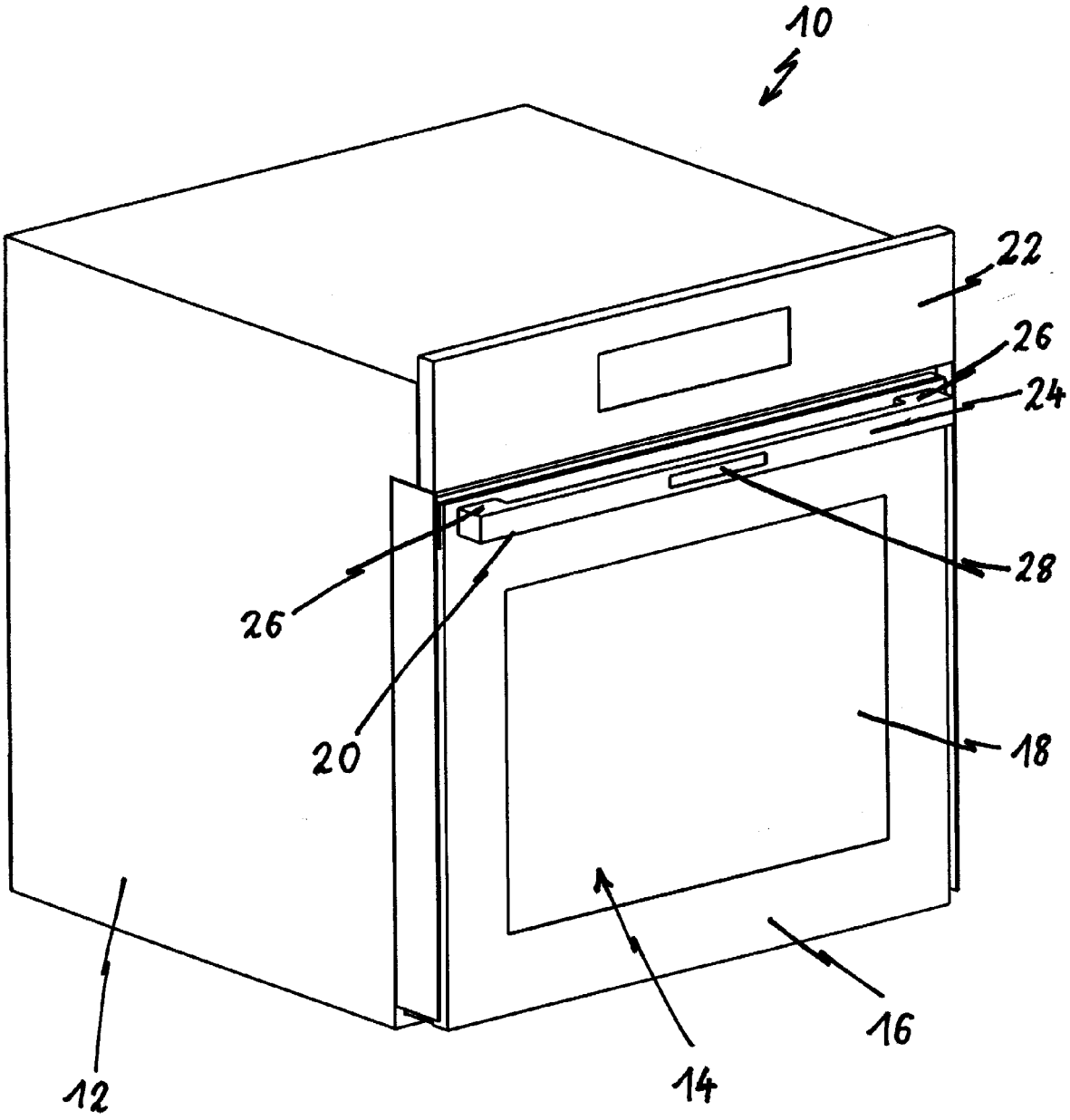
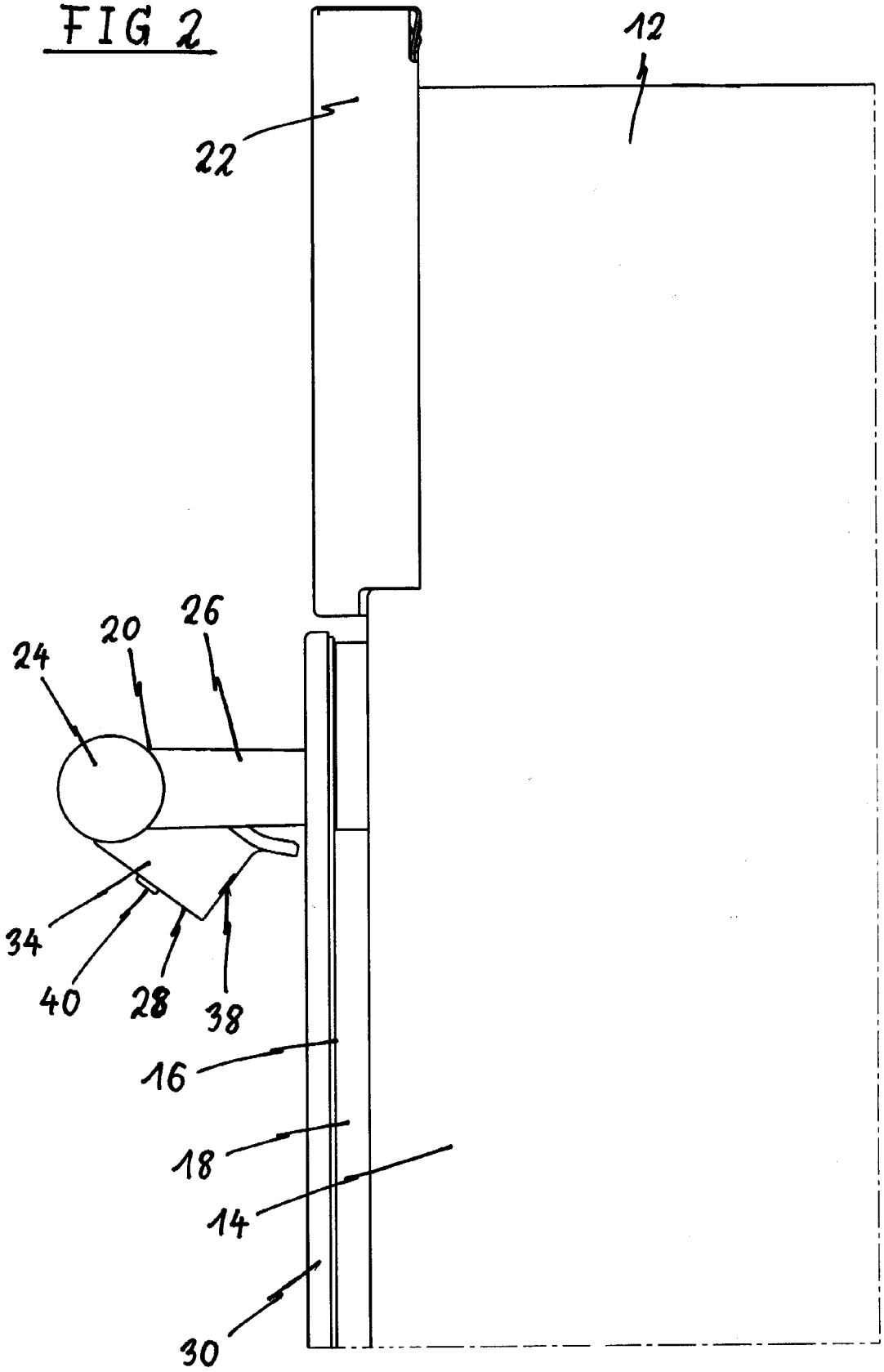


FIG 2



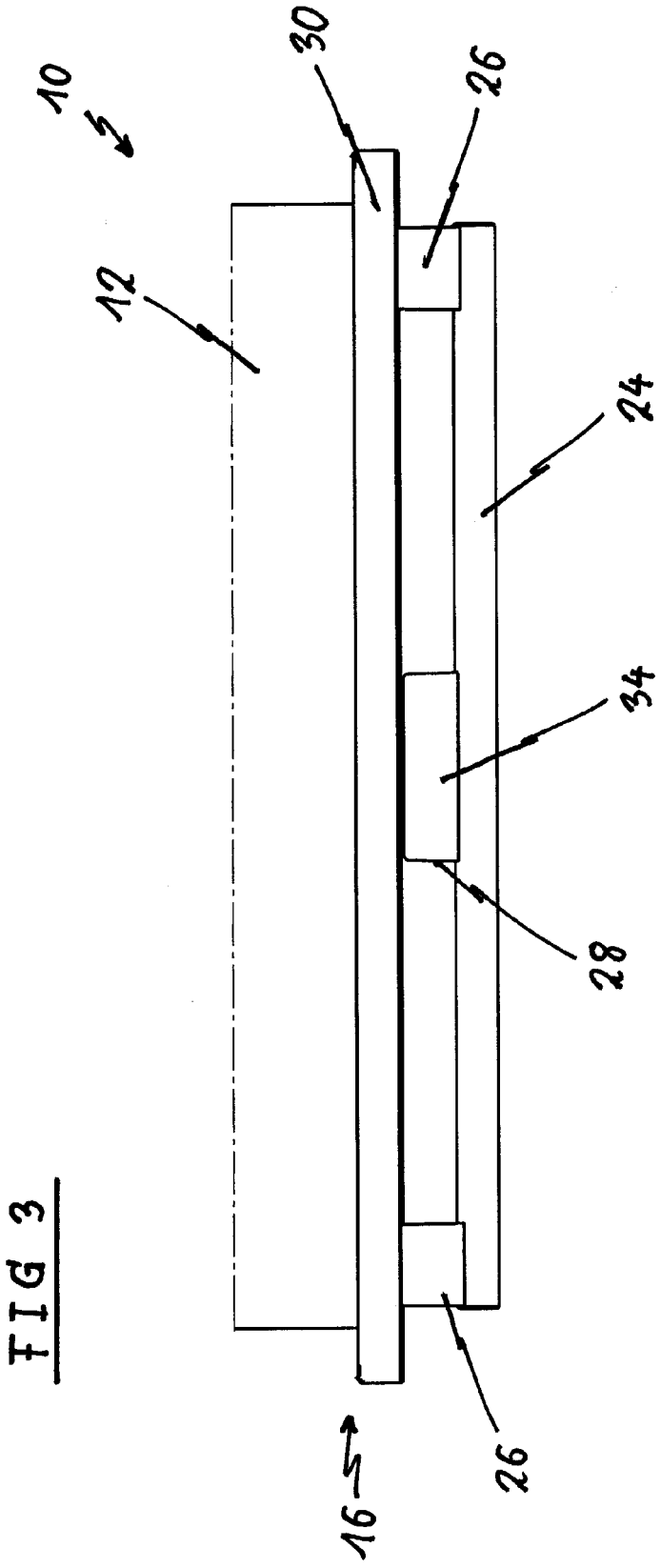


FIG 3

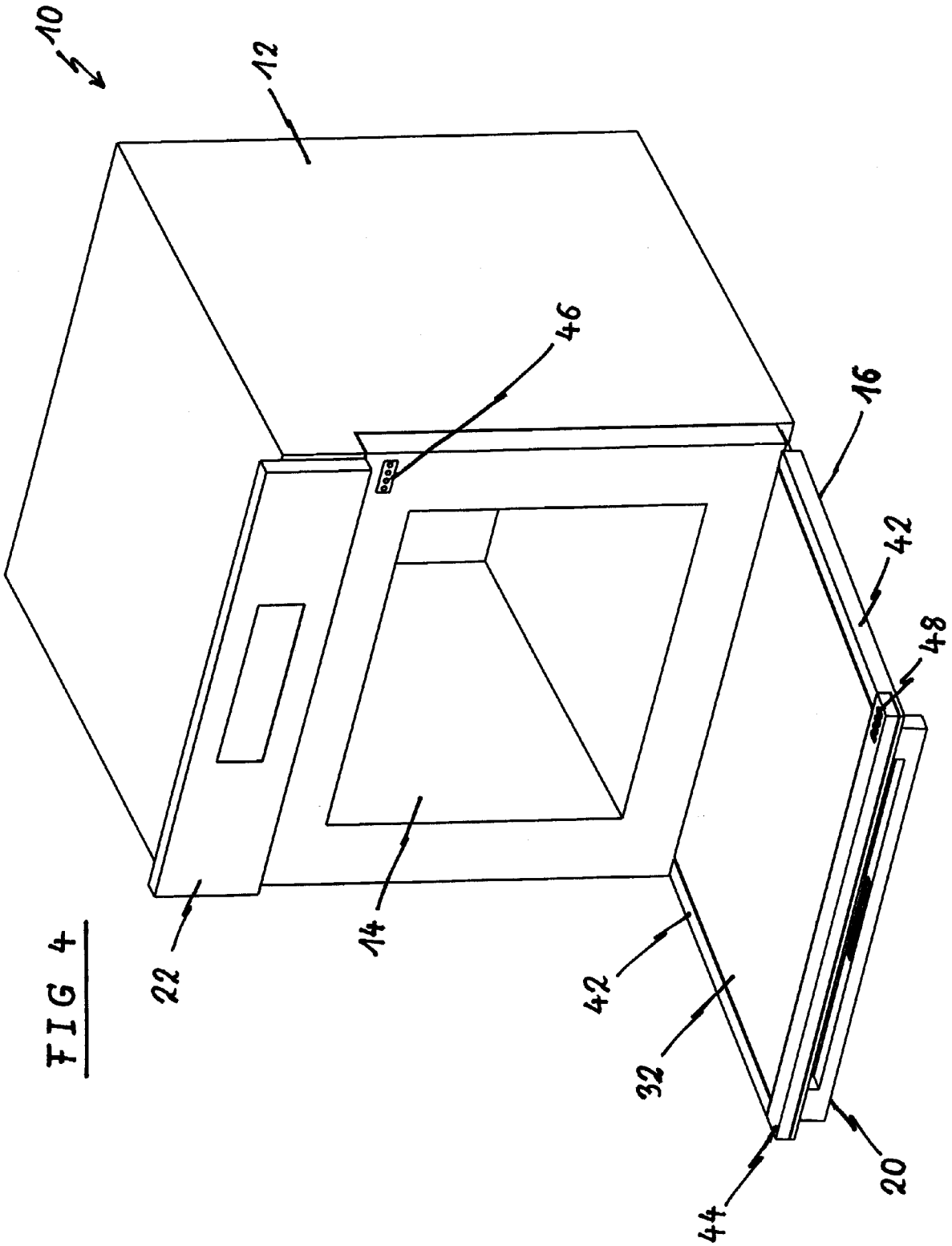


FIG 4

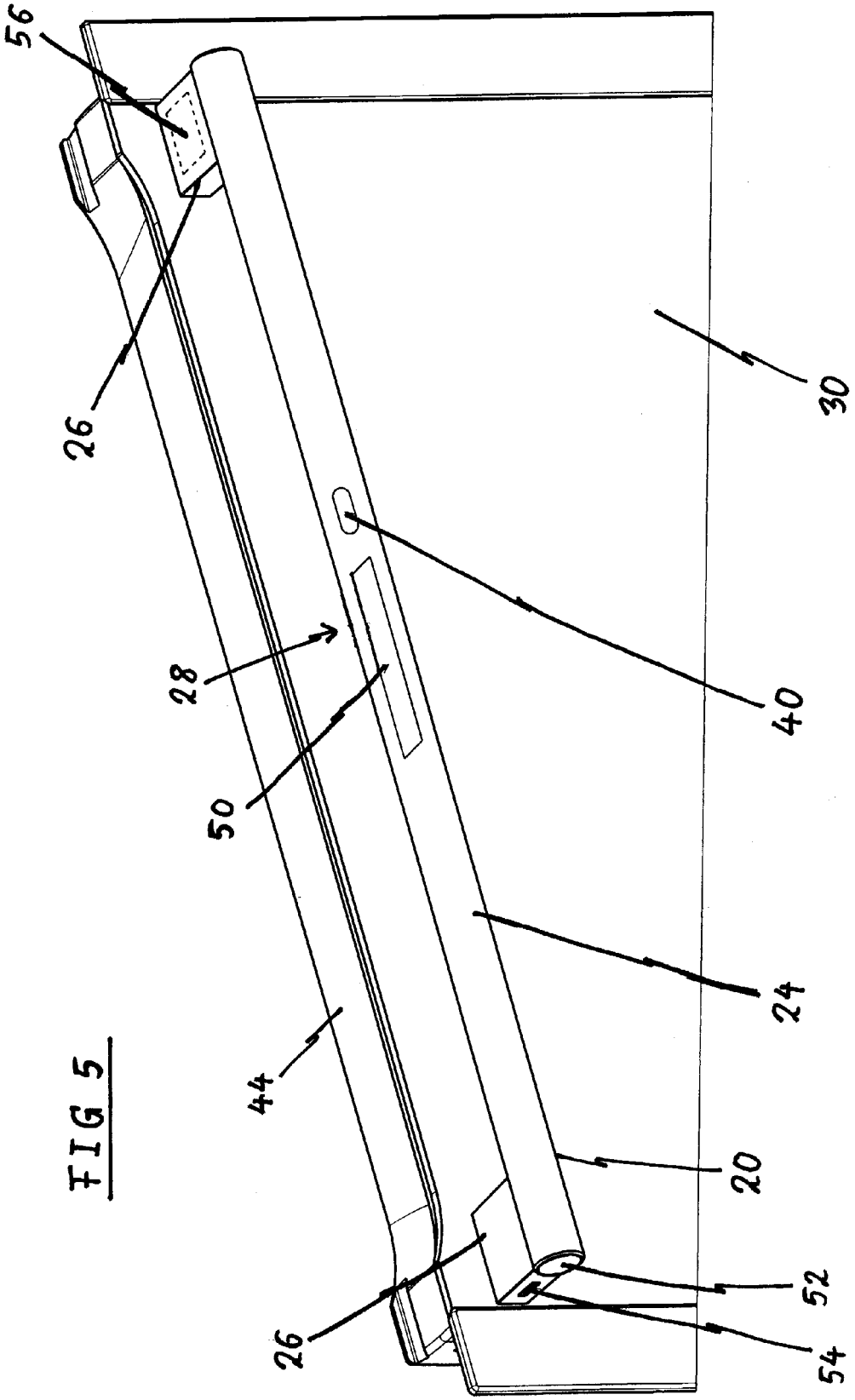


FIG 5

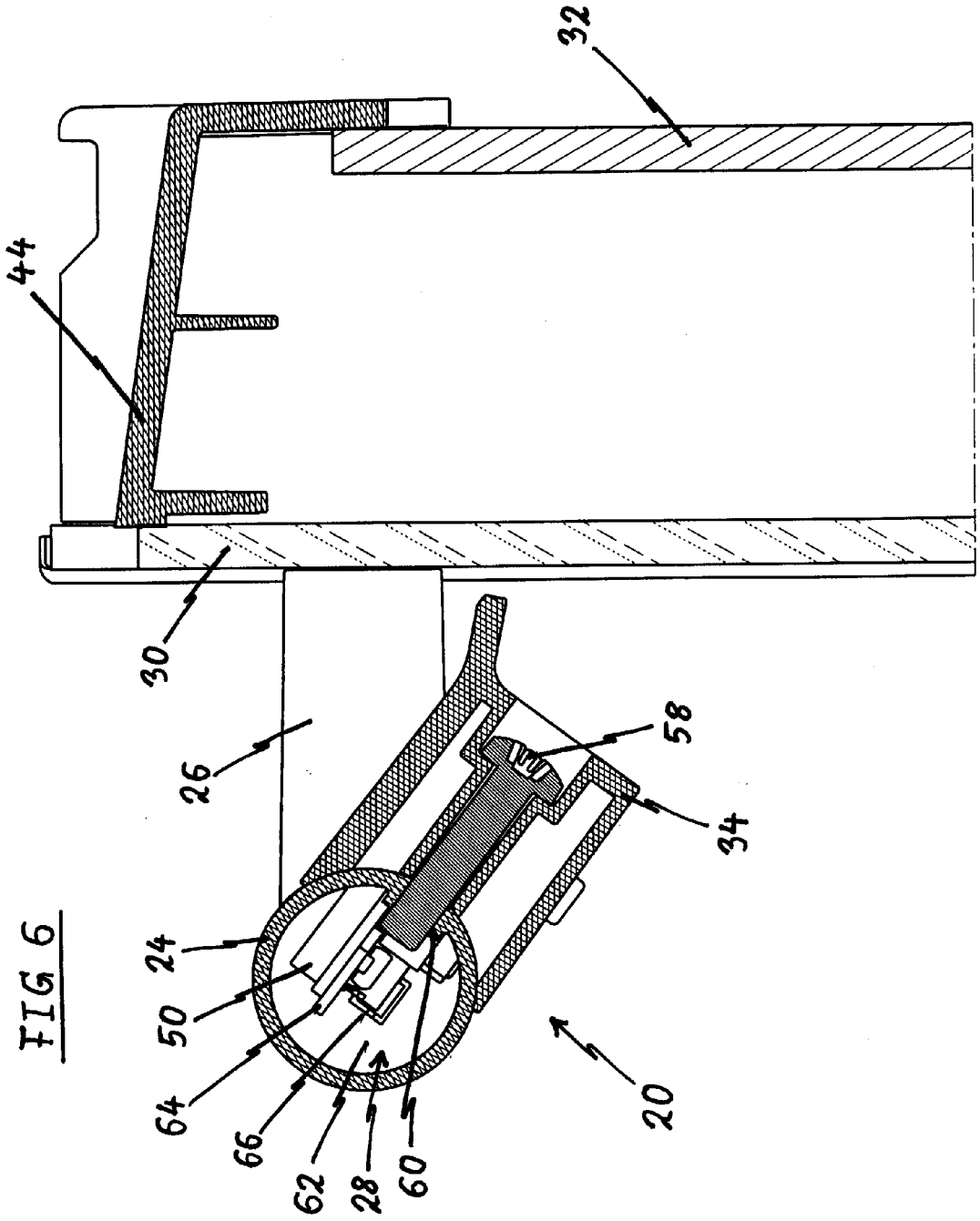


FIG 6

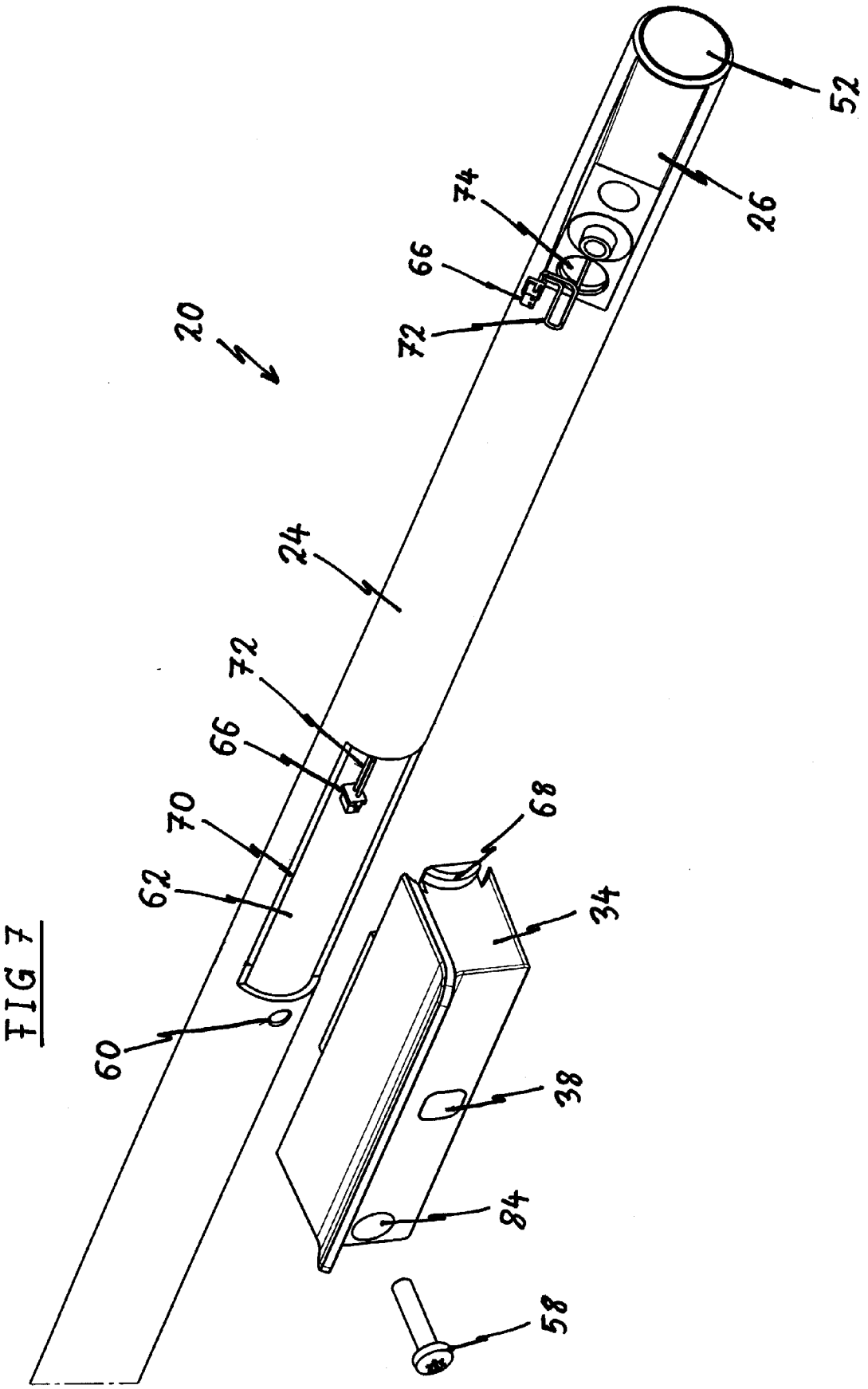


FIG 7

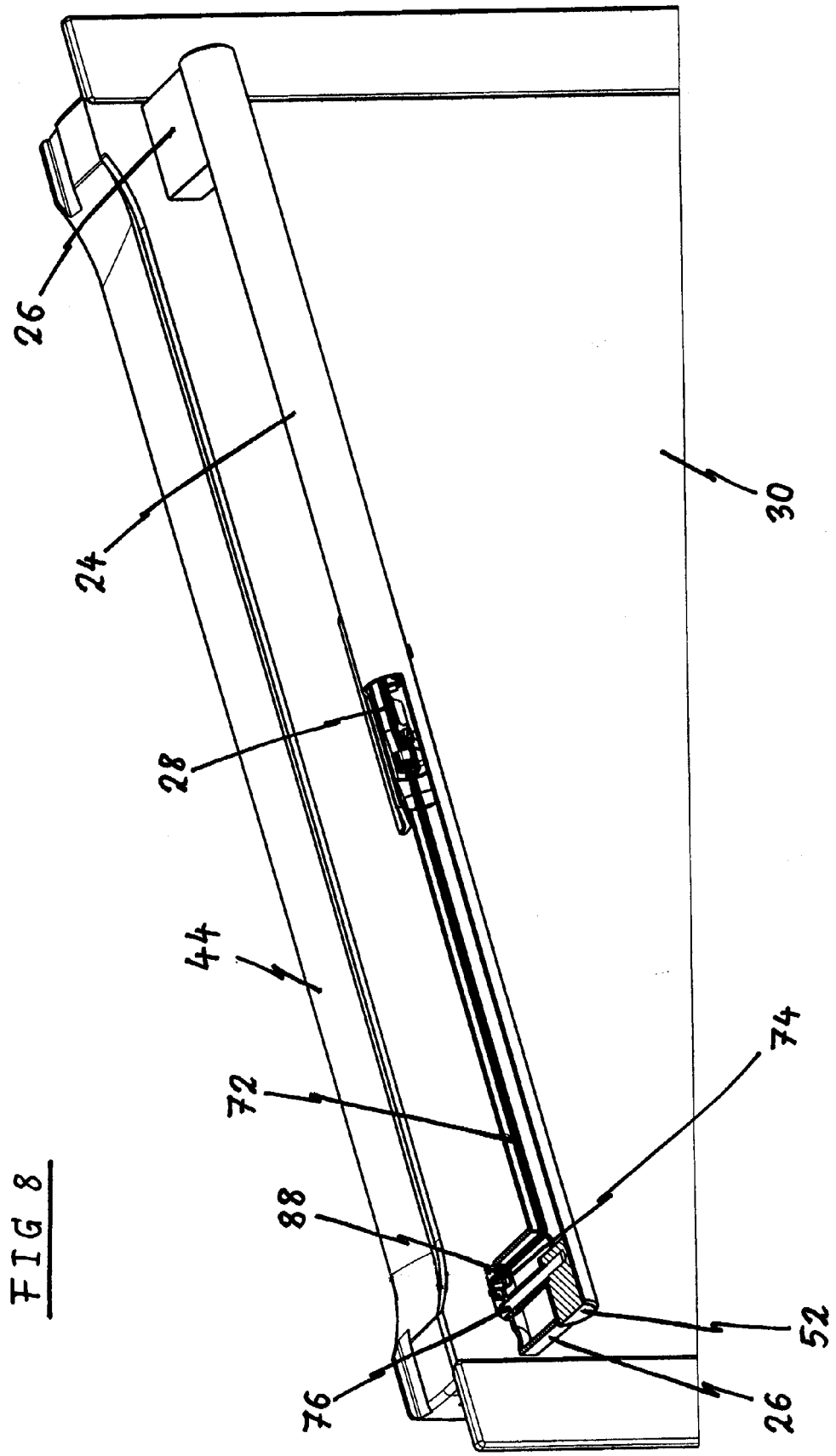


FIG 8

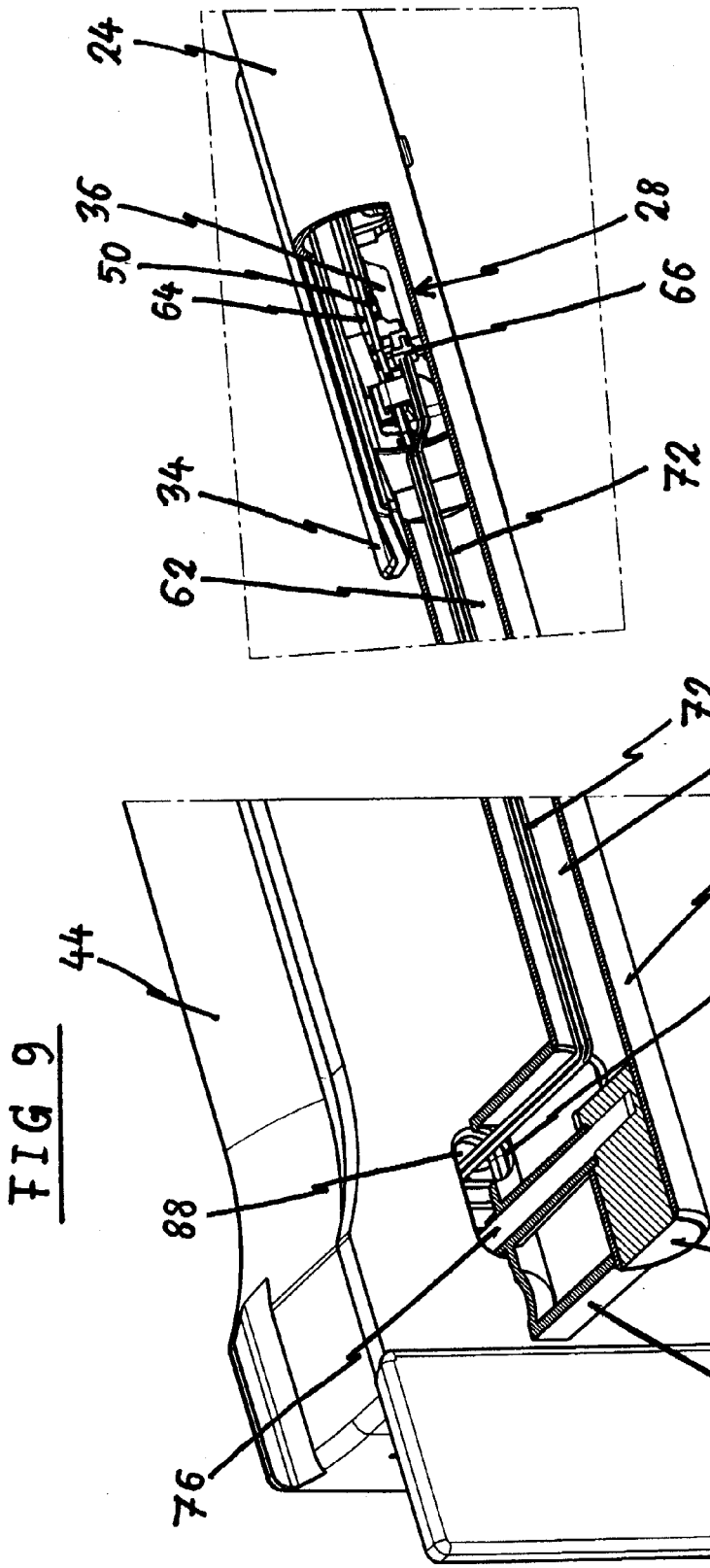


FIG 9

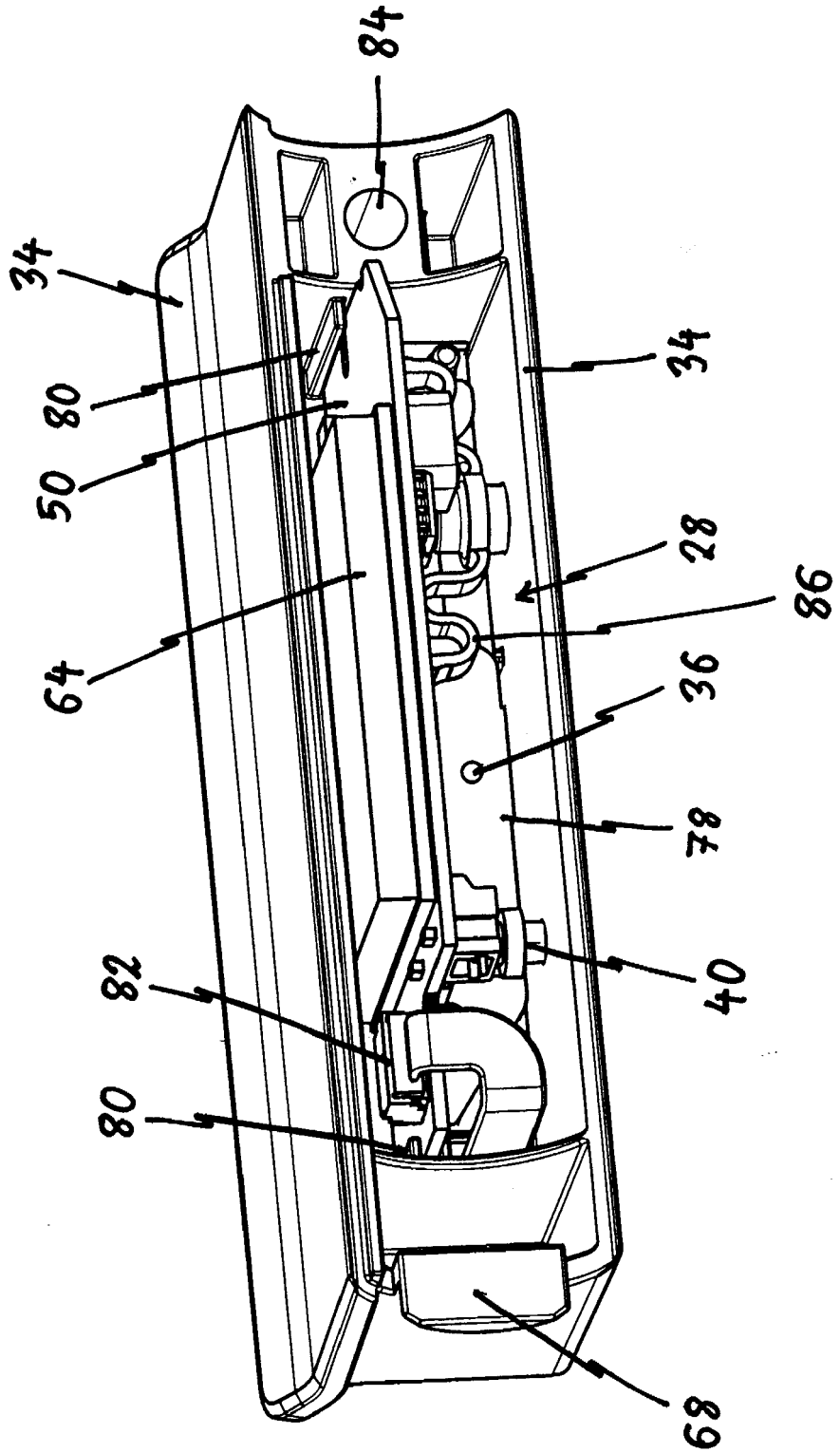


FIG 10

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Application Number
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The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	20 November 2015	Fest, Gilles

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& : member of the same patent family, corresponding document

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EUROPEAN SEARCH REPORT

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The Hague	20 November 2015	Fest, Gilles

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