



(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
10.05.2023 Bulletin 2023/19

(51) International Patent Classification (IPC):
F24C 15/20^(2006.01)

(21) Application number: **22204549.4**

(52) Cooperative Patent Classification (CPC):
F24C 15/2071

(22) Date of filing: **28.10.2022**

(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 ME MK MT NL
NO PL PT RO RS SE SI SK SM TR**
Designated Extension States:
BA
Designated Validation States:
KH MA MD TN

(71) Applicant: **The Hong Kong and China Gas
Company Limited**
North Point (HK)

(72) Inventor: **SUN, Ka Kin**
North Point (HK)

(74) Representative: **Marks & Clerk LLP**
15 Fetter Lane
London EC4A 1BW (GB)

(30) Priority: **04.11.2021 HK 32021041891**

(54) **A SUSPENSION DEVICE AND METHOD OF SUSPENDING AN APPLIANCE USING THE
SUSPENSION DEVICE**

(57) A suspension device (100) for suspending a range hood (10), comprises an upper bracket (110) for fixing on a wall, which has a left part (110L) and a right part (110R), and a lower bracket (120) for suspending the range hood, which has a left part (120L) and a right part (120R) which are integral or connected parts of the lower bracket. A left connector (130L) connects the left part of the lower bracket to the left part of the upper bracket. The left connector is adjustable to adjust the position of the left part of the lower bracket relative to the left part of the upper bracket. A right connector (130R) connects

the right part of the lower bracket to the right part of the upper bracket. The right connector is adjustable to adjust the position of the right part of the lower bracket relative to the right part of the upper bracket. The upper bracket and the lower bracket include respective flanges which are arranged adjacent each other and through which the left connector and the right connector connect the lower bracket to the upper bracket. The suspension device allows adjustment of the position of the range hood suspended by the suspension device.

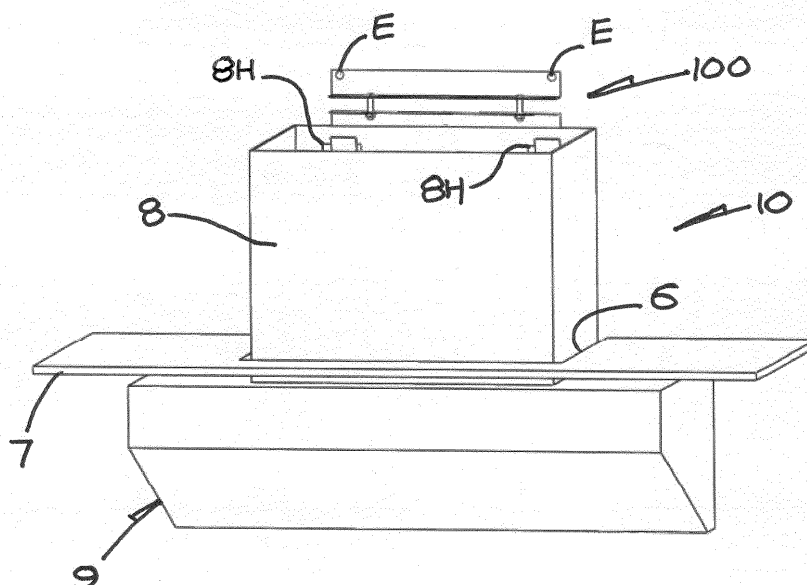


FIG. 1

Description

[0001] The present invention relates to a suspension device for suspending an appliance, and in particular but not exclusively a range hood, and a method of suspending the same.

BACKGROUND OF THE INVENTION

[0002] Many types of appliance and equipment are mounted or suspended on a wall for use. Various mounting or suspension devices are known, many of which involve the use of a bracket in conjunction with one or more screws or nuts and bolts. In the majority of cases when mounting or suspension is completed, it is often hard if not impossible to adjust the position of the mounted or suspended objects by adjusting the mounting/suspension devices.

[0003] The invention seeks to mitigate or to at least alleviate such a problem or shortcoming by providing a new or otherwise improved suspension device and method of using the same.

SUMMARY OF THE INVENTION

[0004] According to a first aspect of the invention, there is provided a suspension device for suspending an appliance, comprising an upper bracket for fixing on a support, the upper bracket having a left part and a right part, a lower bracket provided below the upper bracket for suspending the appliance, the lower bracket having a left part and a right part which are integral or connected parts of the lower bracket, a left connector, and a right connector. The left connector connects the left part of the lower bracket to the left part of the upper bracket, the left connector being adjustable to adjust the position of the left part of the lower bracket relative to the left part of the upper bracket. The right connector connects the right part of the lower bracket to the right part of the upper bracket, the right connector being adjustable to adjust the position of the right part of the lower bracket relative to the right part of the upper bracket. The suspension device allows adjustment of the position of the appliance suspended by the suspension device. The upper bracket and the lower bracket include respective flanges which are arranged adjacent each other and through which the left connector and the right connector connect the lower bracket to the upper bracket.

[0005] Preferably, at least one of the left part and the right part of the lower bracket includes an engaging element for engagement with an engaging part of the appliance to suspend the appliance, the engagement between the engaging element and a said engaging part involving downward movement of the appliance to complete the engagement.

[0006] More preferably, the engaging element comprises a rear part and a front part, with the rear part fixed to the associated left or right part of the lower bracket

and the front part at least partially positioned at a level above the rear part.

[0007] More preferably, the engaging element extends from a first position at the associated left or right part of the lower bracket to a second position above the first position and away from the associated left or right part.

[0008] Further more preferably, the engaging element extends from the associated left or right part of the lower bracket at an acute angle upward.

[0009] It is preferred that the engaging element comprises a hook or hook-like formation.

[0010] In a preferred embodiment, the upper bracket has a one-piece body including its left part and right part.

[0011] It is preferred that at least one of the left connector and the right connector comprises a screw-threaded member.

[0012] It is further preferred that the screw-threaded member comprises a nut and bolt.

[0013] According to a second aspect of the invention, there is provided a method of suspending an appliance on a support using the aforesaid suspension device, comprising the steps of:

providing the suspension device;

fixing the upper bracket to the support;

connecting the lower bracket to below the upper bracket using the left connector and the right connector;

engaging the appliance with the lower bracket to thereby suspend the appliance from the lower bracket;

adjusting the left connector to adjust the position of the left part of the lower bracket relative to the left part of the upper bracket; and

adjusting the right connector to adjust the position of the right part of the lower bracket relative to the right part of the upper bracket;

such that the position of the appliance suspended by the suspension device is adjusted.

[0014] Preferably, the connecting step includes setting the left connector and the right connector to their relatively longer or longest length, such that the lower bracket is located at a relatively lower or lowest position.

[0015] Preferably, the engaging step includes subsequently lowering the appliance to complete the engagement of the appliance with the lower bracket.

[0016] In a preferred embodiment, the method is adapted for use in suspending a range hood on a wall through a cabinet mounted on the wall.

[0017] More preferably, the engaging step includes initially inserting an upper housing of the range hood up-

wardly into the cabinet through an opening in the bottom of the cabinet.

[0018] Further more preferably, the two adjusting steps serve to adjust the position of the range hood upwardly such that a lower housing of range hood, which is relatively larger than the opening, lies flat against or close to the bottom of the cabinet.

BRIEF DESCRIPTION OF DRAWINGS

[0019] The invention will now be more particularly described, by way of example only, with reference to the accompanying drawings, in which:

Figure 1 is a perspective view of an embodiment of a suspension device for suspending an appliance such as a range hood, using an embodiment of a method of suspending an appliance on a support using the suspension device, in accordance with the invention;

Figure 2 is a perspective view corresponding to Figure 1, showing the suspension device tightened to locate the range hood in a "seamless" fit;

Figure 3 is a perspective view of the suspension device of Figure 1;

Figure 4 is a similar perspective view showing the suspension device and an upper part of the range hood of Figure 1 during the method; and

Figure 5 is a further perspective view showing the suspension device and the upper part of the range hood of Figure 3 at the end of the method.

DETAILED DESCRIPTION OF PREFERRED EMBODIMENT

[0020] Referring to Figures 1 to 5 of the drawings, there is shown a suspension device 100 for suspending an appliance embodying the invention. The appliance may be, in this particular embodiment, a range hood 10 installed above a gas stove in a kitchen, where a hanging cabinet is preinstalled across the upper part of a support e.g. a wall behind the gas stove. The range hood 10 has a generally rectangular main housing 9, in which most main components i.e. exhaust fans and motor are fitted, and an upper housing 8 of a reduced footprint and up-standing from the main housing 9. The range hood 10 is mounted on the same wall, with its upper housing 8 concealed within a lower part of the hanging cabinet. More specifically, the hanging cabinet has a horizontal base panel 7 which is cut with a rectangular opening 6 that matches the cross-section of the upper housing 8 of the range hood 10. To install the range hood 10, it is first moved upwardly with its upper housing 8 inserted through the opening 6 into the cabinet, and the upper

housing 8 is then mounted onto the wall right behind using the subject suspension device 100. Inside the cabinet, an exhaust duct is connected within the upper housing 8 for, during use of the gas stove, discharging exhaust gas (e.g. stove burning exhaust and cooking oily vapour) collected by the range hood 10.

[0021] The suspension device 100 suspends the range hood 10 from the wall, at a position directly underneath the hanging cabinet. The range hood 10 and in particular its main housing 9 should be located as close as possible to the cabinet's base panel 7, thereby leaving no or only a barely noticeable gap therebetween for the sake of neatness in design.

[0022] Referring to the suspension device 100, it comprises an upper bracket 110 for fixing on a support i.e. the aforesaid wall, and a lower bracket 120 provided below the upper bracket 110 for suspending the range hood 10. The upper bracket 110 has a left part 110L and a right part 110R. The lower bracket 120 has a left part 120L and a right part 120R. The suspension device 100 includes a left connector 130L connecting the left part 120L of the lower bracket 120 to the left part 110L of the upper bracket 110, and a right connector 130R connecting the right part 120R of the lower bracket 120 to the right part 110R of the upper bracket 110.

[0023] At least one or each, as in the described embodiment, of the left connector 130L and the right connector 130R is preferably provided by a screw-threaded member, such as a screw-threaded shank or bolt that allows rotation or relative rotation to adjust its effective length or position of engagement with another screw-threaded member or part. Specifically, the aforesaid screw-threaded member may comprise a nut N and bolt B.

[0024] In use, the left connector 130L is adjustable to adjust the position of the left part 120L of the lower bracket 120 relative to the left part 110L of the upper bracket 110. Also, the right connector 130R is adjustable to adjust the position of the right part 120R of the lower bracket 120 relative to the right part 110R of the upper bracket 110. The adjustment on both sides allows the vertical and/or angular position, and in general the level or leveling of the range hood 10 suspended by the suspension device 100 to be adjustable, primarily during installation or subsequent repair.

[0025] To suspend the range hood 10, at least one or preferably each, as in the described embodiment, of the left part 120L and the right part 120R of the lower bracket 120 includes an engaging element 120H for engagement with an engaging part 8H of the range hood 10. It is preferred that the engaging element 120H is in the form of a hook 120H or in general comprises a hook-like formation, and the engaging part 8H of the range hood 10 includes a hole 8H on the rear side of the upper housing 8, through which hole 8H the hook 120H engages. In passing, it is understood that in a different embodiment, the engaging element 120H may take any other suitable forms, such as a bolt or peg having an enlarged head to

engage a or the hole 8H.

[0026] In a first perspective, the or each hook (or hook-like formation) 120H comprises a rear part R and a front part F, with the rear part R fixed to the associated left or right part 120L/120R of the lower bracket 120 and the front part F at least partially positioned at a level above the rear part R. In a second perspective, the or each hook 120H extends from a first position R at the associated left or right part 120L or 120R of the lower bracket 120 to a second position F above the first position R and away from the associated left or right part 120L/120R. In either perspective, more specifically as in the case of the described embodiment, the hook 120H extends from the associated left or right part 120L/120R of the lower bracket 120 upward at an acute angle of about 30° to the vertical direction.

[0027] In the light of the foregoing paragraph, it follows that the engagement between each hook 120H, which is fixed, and the hole 8H involves downward movement of the range hood 10, which includes the associated hole 8H, to complete the engagement. To engage the hook 120H, whose front part F is located (at the second position) higher than its rear part R (at the first position), the hole 8H should be raised to a position slightly higher in order to reach over or overcome the hook's front part F and then lowered to rest on or at the hook's rear part R.

[0028] For simplicity, the upper bracket 110 has a one-piece body including its left part 110L and right part 110R as integral formed or distinct but connected parts. The same structural concept is shared by the lower bracket 120, in that the left part 120L and the right part 120R are integral or connected parts of the lower bracket 120. For strength, the upper bracket 110 and the lower bracket 120 include respective flanges 110F and 120F which are arranged adjacent each other and through which the left connector 130L and the right connector 130R connect the lower bracket 120 to the upper bracket 110. In general, it is to be appreciated that the upper and lower brackets 110 and 120 may take any other physical forms e.g. frame or wire structures, and/or shapes e.g. non-rectangular or planar flat.

[0029] The invention also provides a method of suspending an appliance, e.g. the range hood 10, on a support, e.g. the aforesaid wall, using the suspension device 100. In use, the suspension device 100 suspends the range hood 10 on the wall through a cabinet mounted on the wall. More specifically, the suspension device 100 is to engage and suspend the range hood 10 by its upper housing 8 concealed within the lower part of the cabinet.

[0030] The method comprises a number of steps as described below, commencing with the initial step of providing or making the suspension device 100 of a construction as described above. To install the suspension device 100, the upper bracket 110 is fixed onto the wall using a pair of expansion bolts E, preferably at the upper bracket's top left and right corners. The upper bracket 110 is to extend horizontally at a position which is about the height of the upper housing 8 above the base panel

7 of the cabinet. The lower bracket 120 is then connected to below the upper bracket 110 using the left connector 130L and the right connector 130R.

[0031] In this connecting step (Figure 3), the left and right connectors 130L and 130R, which are preferably provided by respective nuts N and bolts B, are initially both set to about their relatively longer or longest operating or fastening length as practical, i.e. loosened for the nuts N and bolts B, such that the lower bracket 120 is located at a relatively lower or lowest position.

[0032] The range hood 10 is subsequently engaged with the lower bracket 120 such that it is suspended from the lower bracket 120. Initially during this engaging step, the range hood 10 is moved upwardly with its upper housing 8 inserted into the cabinet through the opening 6 in the base panel 7 at the bottom of the cabinet. At this time, the lower bracket 120 is located at, for example, the lowest possible position as the nuts N and bolts B (i.e. the connectors 130L and 130R) are loosened. Such a lowest position of the lower bracket 120 is preferred as it allows the upper housing 8 and in particular its holes 8H to reach, and engage, the respective hooks 120H of the lower bracket 120.

[0033] The reason is that in practice there is restriction as to how far the range hood 10, and hence its upper housing 8 inside the cabinet, can move upwardly because its main housing 9 will be blocked upon hitting the cabinet's base panel 7. It should be noted that the range hood 10 should be moved further or sufficiently upwardly to have the holes 8H of its upper housing 8 to overcome and specifically ride over the tips of the respective hooks 120H of the lower bracket 120, before the range hood 10 is subsequently lowered to let the holes 8H rest upon the hooks 120H, thereby completing the engagement and hence suspension of the range hood 10 with the lower bracket 120 (Figure 4).

[0034] Upon suspension of the range hood 10 on the lower bracket 120, the left connector 130L is adjusted i.e. tightened to adjust the position of, i.e. raise, the left part 120L of the lower bracket 120 relative to the left part 110L of the upper bracket 110. Similarly, the right connector 130R is tightened to raise the right part 120R of the lower bracket 120 relative to the right part 110R of the upper bracket 110. These two adjusting steps can be taken in either order, such that the position and in particular the vertical and angular/level position of the range hood 10 suspended by the suspension device 100 is adjusted (Figure 5). The adjusting steps serve to adjust the position of the range hood 10 upwardly such that the main housing 9 of the range hood 10, which is relatively larger than the opening 6, lies flat against or close to the base panel 7 of the cabinet, thereby resulting in a "seamless" fit.

[0035] In general, the suspension device 100 allows adjustment of the vertical position of the range hood 10, subsequent to suspension thereof, in order to place the range hood 10 lie flat against the bottom of the cabinet, thereby resulting in a "seamless" fit. The vertical position

of the range hood 10 that can be adjusted includes its angular position or leveling as may be necessary or desired in the situation where the bottom (i.e. the base panel 7) of the cabinet does not extend perfectly horizontally.

[0036] A further expansion bolt (not shown) is preferably used to secure the upper housing 8 of the range hood 10, through a small hole H thereof, to the wall.

[0037] In the context of this invention, the word "suspension" is used interchangeably with the word "mounting", or between their various different forms.

[0038] The invention has been given by way of example only, and various other modifications of and/or alterations to the described embodiment may be made by persons skilled in the art without departing from the scope of the invention as specified in the appended claims.

Claims

1. A suspension device for suspending an appliance, comprising:

an upper bracket for fixing on a support, the upper bracket having a left part and a right part; a lower bracket provided below the upper bracket for suspending the appliance, the lower bracket having a left part and a right part which are integral or connected parts of the lower bracket; a left connector connecting the left part of the lower bracket to the left part of the upper bracket, the left connector being adjustable to adjust the position of the left part of the lower bracket relative to the left part of the upper bracket; and a right connector connecting the right part of the lower bracket to the right part of the upper bracket, the right connector being adjustable to adjust the position of the right part of the lower bracket relative to the right part of the upper bracket; such that the position of the appliance suspended by the suspension device is adjustable; wherein the upper bracket and the lower bracket include respective flanges which are arranged adjacent each other and through which the left connector and the right connector connect the lower bracket to the upper bracket.

2. The suspension device as claimed in claim 1, wherein at least one of the left part and the right part of the lower bracket includes an engaging element for engagement with an engaging part of the appliance to suspend the appliance, the engagement between the engaging element and a said engaging part involving downward movement of the appliance to complete the engagement.

3. The suspension device as claimed in claim 2, wherein the engaging element comprises a rear part and a front part, with the rear part fixed to the associated

left or right part of the lower bracket and the front part at least partially positioned at a level above the rear part.

4. The suspension device as claimed in claim 2, wherein the engaging element extends from a first position at the associated left or right part of the lower bracket to a second position above the first position and away from the associated left or right part.

5. The suspension device as claimed in claim 4, wherein the engaging element extends from the associated left or right part of the lower bracket at an acute angle upward.

6. The suspension device as claimed in claim 2, wherein the engaging element comprises a hook or hook-like formation.

7. The suspension device as claimed in any one of claims 1 to 6, wherein the upper bracket has a one-piece body including its left part and right part.

8. The suspension device as claimed in any one of claims 1 to 6, wherein at least one of the left connector and the right connector comprises a screw-threaded member.

9. The suspension device as claimed in claim 8, wherein the screw-threaded member comprises a nut and bolt.

10. A method of suspending an appliance on a support using the suspension device as claimed in any one of claims 1 to 6, comprising the steps of:

providing the suspension device;
fixing the upper bracket to the support;
connecting the lower bracket to below the upper bracket using the left connector and the right connector;
engaging the appliance with the lower bracket to thereby suspend the appliance from the lower bracket;
adjusting the left connector to adjust the position of the left part of the lower bracket relative to the left part of the upper bracket; and
adjusting the right connector to adjust the position of the right part of the lower bracket relative to the right part of the upper bracket;
such that the position of the appliance suspended by the suspension device is adjusted.

11. The method as claimed in claim 10, wherein the connecting step includes setting the left connector and the right connector to their relatively longer or longest length, such that the lower bracket is located at a relatively lower or lowest position.

12. The method as claimed in claim 10, wherein the engaging step includes subsequently lowering the appliance to complete the engagement of the appliance with the lower bracket. 5
13. The method as claimed in claim 10, adapted for use in suspending a range hood on a wall through a cabinet mounted on the wall.
14. The method as claimed in claim 13, wherein the engaging step includes initially inserting an upper housing of the range hood upwardly into the cabinet through an opening in the bottom of the cabinet. 10
15. The method as claimed in claim 14, wherein the two adjusting steps serve to adjust the position of the range hood upwardly such that a lower housing of range hood, which is relatively larger than the opening, lies flat against or close to the bottom of the cabinet. 15
20

25

30

35

40

45

50

55

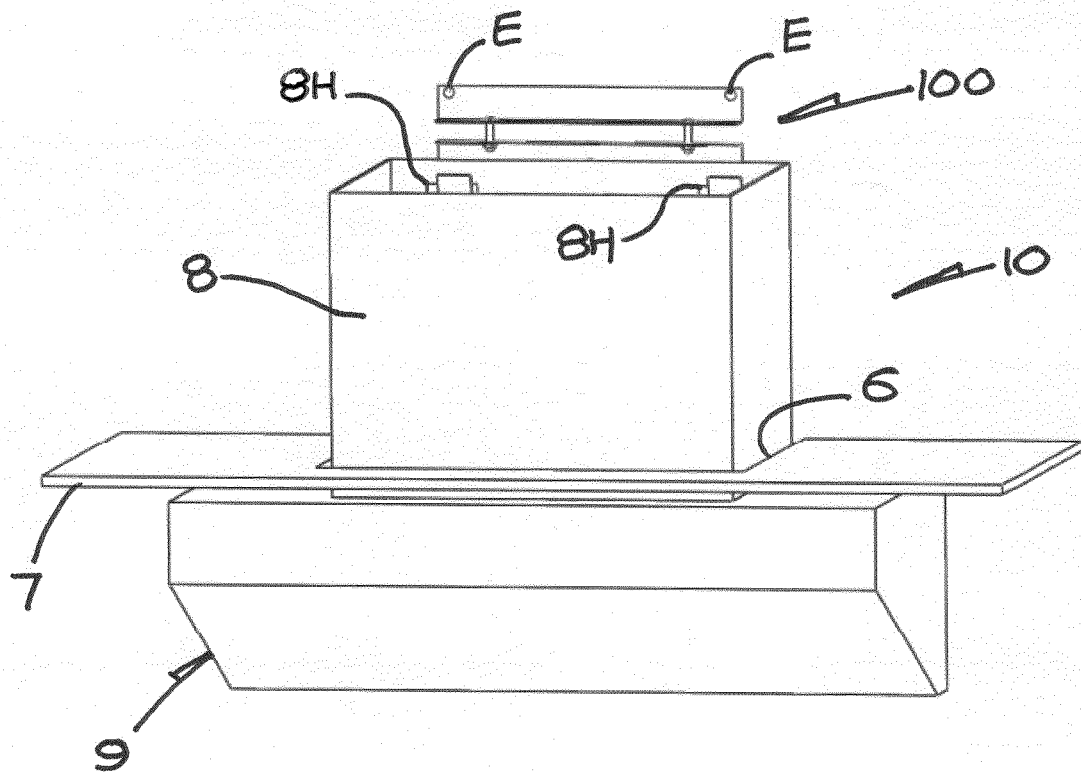


FIG. 1

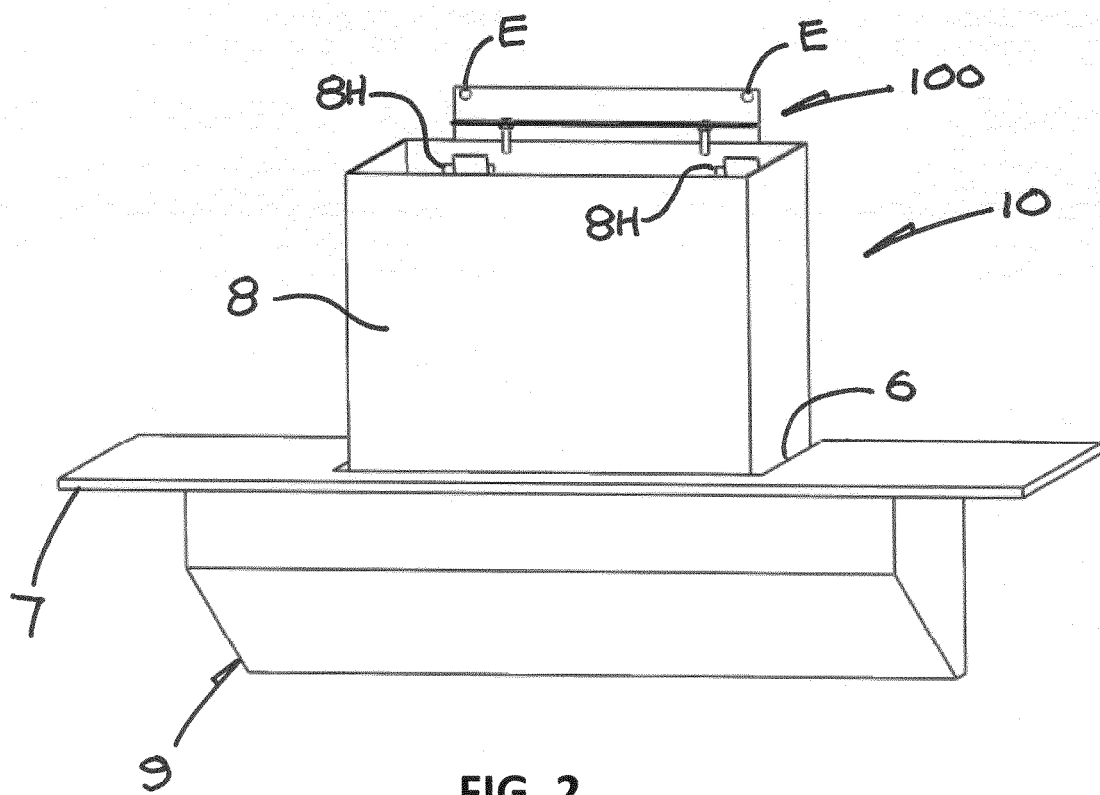


FIG. 2

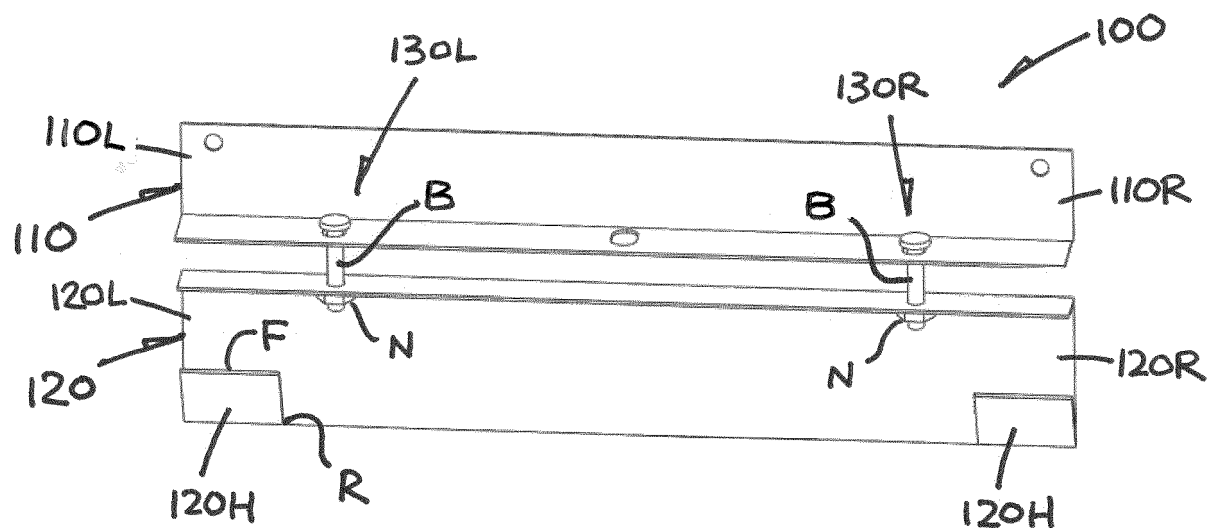


FIG. 3

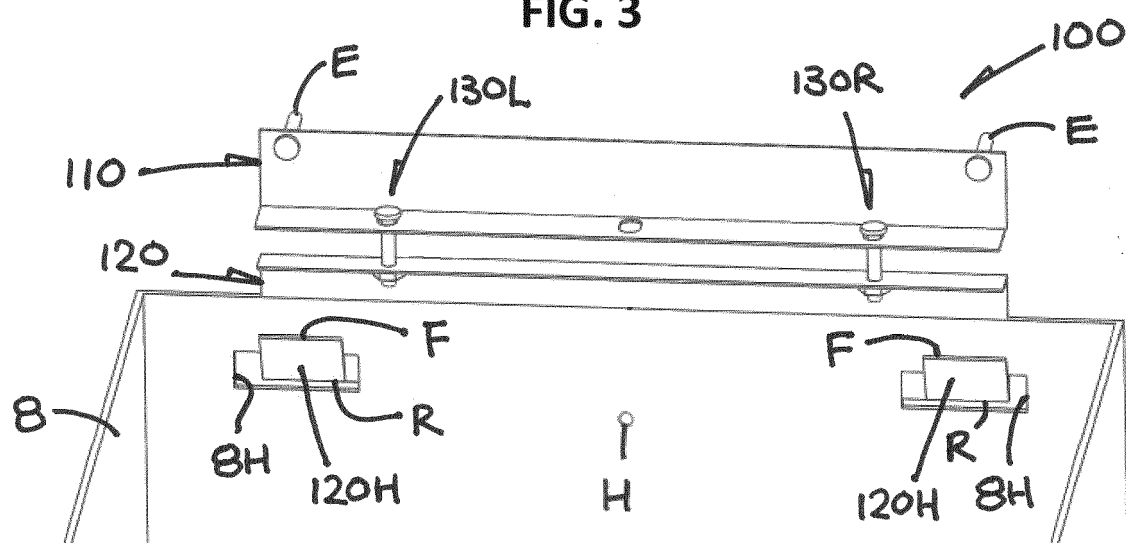


FIG. 4

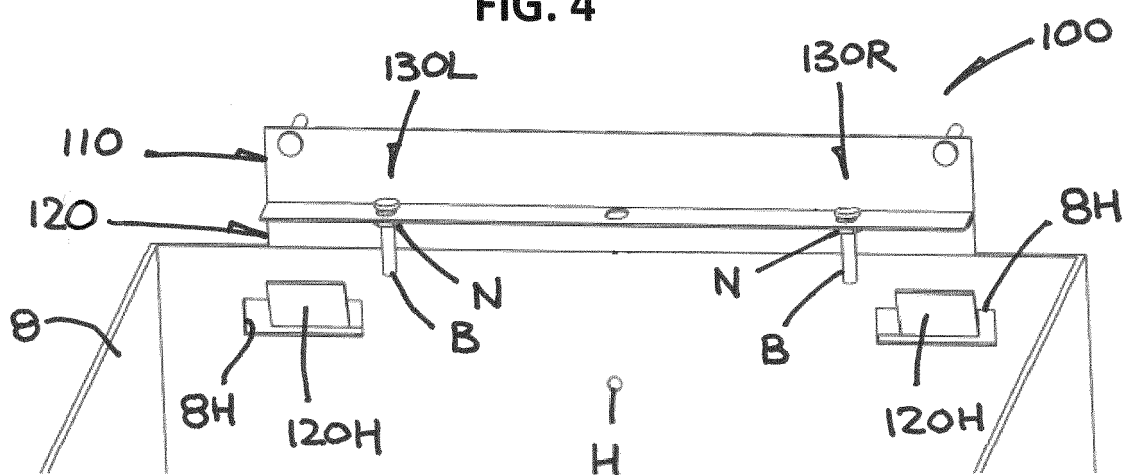


FIG. 5



EUROPEAN SEARCH REPORT

Application Number

EP 22 20 4549

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	EP 2 896 890 A1 (ELECTROLUX APPLIANCES AB [SE]) 22 July 2015 (2015-07-22)	1, 7-15	INV. F24C15/20
Y	* figures *	2-6	
Y	----- CN 106 322 465 A (BSH ELECTRICAL APPLIANCES CO LTD; BSH HOME APPLIANCES CO LTD) 11 January 2017 (2017-01-11) * figures *	2-6	
Y	----- CN 213 810 797 U (BI KUN) 27 July 2021 (2021-07-27) * figures *	2-6	
Y	----- CN 207 935 711 U (QINGDAO HAIER WISDOM KITCHEN APPLIANCE CO LTD) 2 October 2018 (2018-10-02) * figures *	2-6	
Y	----- CN 211 372 537 U (NINGBO FOTILE KITCHEN WARE CO) 28 August 2020 (2020-08-28) * figures *	2-6	
Y	----- CN 206 593 165 U (ZHONGSHAN TIANMEI ELECTRICAL APPLIANCE CO LTD) 27 October 2017 (2017-10-27) * figures *	2-6	TECHNICAL FIELDS SEARCHED (IPC) F24F F24C
The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 3 March 2023	Examiner Verdoodt, Luk
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 20 4549

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.

03-03-2023

10	Patent document cited in search report	Publication date	Patent family member(s)	Publication date
	EP 2896890	A1	22-07-2015	NONE
15	CN 106322465	A	11-01-2017	NONE
	CN 213810797	U	27-07-2021	NONE
	CN 207935711	U	02-10-2018	NONE
20	CN 211372537	U	28-08-2020	NONE
	CN 206593165	U	27-10-2017	NONE
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