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(54) **COOKER HOOD**

(57) A cooker hood includes a smoke collecting hood, a box located above the smoke collecting hood, and a fan assembly arranged in the box. The fan assembly includes a volute, an impeller configured to generate negative pressure, and a motor configured to provide power for the impeller and mounted to the volute through a support. The cooker hood further includes an elastic connecting portion, and the volute is mounted in the box through the elastic connecting portion. In this way, the vibration transmitted from the fan assembly to the box can be reduced, thereby reducing the low-frequency vibration of the cooker hood and significantly alleviating the shake of the cooker hood. In addition, the structural noise radiated by the box and the volute of the cooker hood can be reduced.

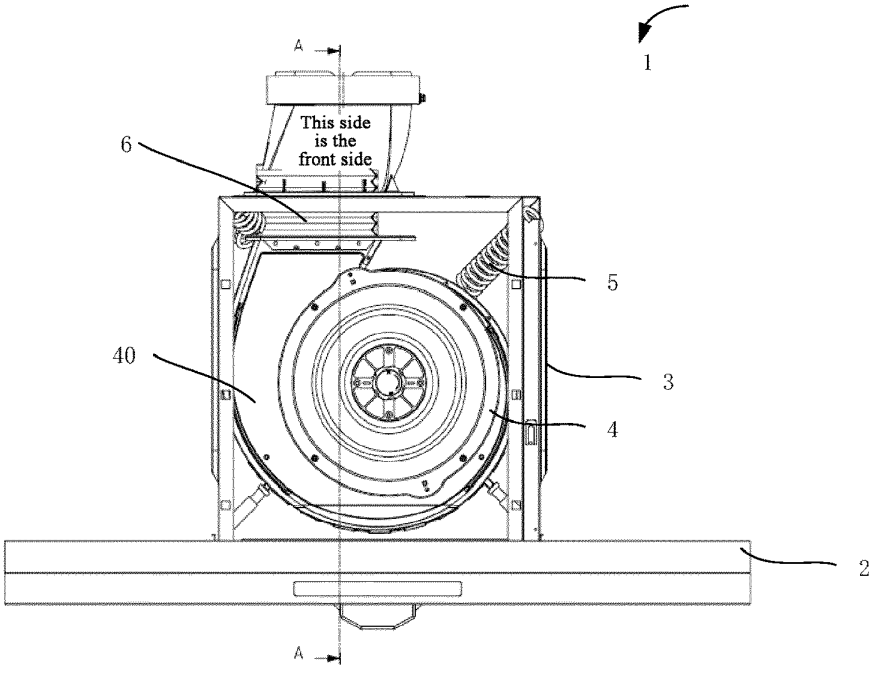

FIG. 1

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Description

TECHNICAL FIELD

[0001] The utility model relates to the technical field of household appliances, and in particular, to a cooker hood.

BACKGROUND

[0002] A cooker hood is an indispensable kitchen appliance in modern families, which is mounted above burners and cooktops in kitchens. The cooker hood operates according to the principle of fluid dynamics, and sucks and exhausts smoke through a centrifugal fan mounted inside the cooker hood.

[0003] With the development of science and technology and the improvement of people's life, in addition to smoke suction and exhaust required by people on the cooker hood, vibration and noise also become important performance parameters of the cooker hood. Excessive vibration and noise of the cooker hood bring discomfort to consumers and affect use experience and satisfaction of the consumers.

[0004] The cooker hood is mainly composed of an external cavity and a fan system. The external cavity includes a gas collecting hood and an air box. The fan system mainly includes components such as a volute, an impeller, a motor, and a support. The fan system is rigidly connected to the external cavity (the air box) through screws.

[0005] A current noise reduction technology for the cooker hood mainly includes the following aspects: optimizing an aerodynamic design of the cooker hood to reduce aerodynamic noise; adding silencer cotton/sound insulation cotton to the fan system to reduce air noise of the cooker hood through sound absorption/insulation; or adding a damping layer or a damping device to the fan system to reduce structural noise of the cooker hood through vibration attenuation.

[0006] Current approaches for alleviating the vibration of the cooker hood mainly include: reducing an unbalanced mass of the fan system during product designing; disassembling the impeller and cleaning oil stain on the impeller after the cooker hood operates for a period of time, to reduce the overall vibration of the cooker hood; and designing a cooker hood cavity with a relatively large rigidity, which increases the quality and costs of the whole cooker hood.

[0007] Although the above measures can alleviate the noise and medium and high frequency vibration of the cooker hood, these measures hardly alleviate the low frequency vibration (for example, 20 Hz) of the cooker hood, that is, the vibration of the whole machine.

SUMMARY

[0008] In order to resolve at least the above problem, the utility model provides a cooker hood, including a smoke collecting hood, a box located above the smoke collecting hood, and a fan assembly arranged in the box. The fan assembly includes a volute, an impeller configured to generate negative pressure, and a motor configured to provide power for the impeller and mounted to the volute through a support. The cooker hood further includes an elastic connecting portion, and the volute is mounted in the box through the elastic connecting portion.

[0009] In this way, the vibration transmitted from the fan assembly to the box can be reduced, thereby reducing the low-frequency vibration of the cooker hood and significantly alleviating the shake of the cooker hood. In addition, the structural noise radiated by the box and the volute of the cooker hood can be reduced.

[0010] Further, the cooker hood allows a relatively large unbalanced mass, and does not require a dynamic balance test for the fan system during production. The demand for the rigidity of the box of the cooker hood can be further reduced, and a cooker hood box with a relatively large rigidity for restraining the vibration of the whole machine is not required. Moreover, the cooker hood in this solution is prevented from increased vibration and shake of the whole machine caused by an increase of oil stain of the impeller, which can reduce the frequency of disassembly and cleaning of the impeller.

[0011] In a possible embodiment, the elastic connecting portion includes a first connecting portion and a second connecting portion, where the volute is connected to the box through the first connecting portion and the second connecting portion, the first connecting portion is arranged above the volute to lift the volute, and the second connecting portion is arranged below the volute to support the volute. The first connecting portion and the second connecting portion realize the elastic connection between the volute and the box, which reduces the vibration transmitted from the fan assembly to the box, thereby alleviating the shake and structural noise of the cooker hood.

[0012] In a possible embodiment, a rigidity of the first connecting portion is less than a rigidity of the second connecting portion. When the cooker hood is operating, the first connecting portion with the less rigidity can bear the tension, and the second connecting portion can bear the pressure (a supporting force), to ensure the vibration isolation effect and the normal operation of the fan assembly.

[0013] In a possible embodiment, a lower end of the first connecting portion is connected to the volute, and another higher end of the first connecting portion is connected to a position on a top of the box close to an edge.

[0014] In a possible embodiment, the box includes a frame, and the other higher end of the first connecting portion is connected to the frame.

[0015] In a possible embodiment, a higher end of the second connecting portion is connected to the volute, and another lower end of the second connecting portion

is connected to a position on a bottom of the box close to an edge.

[0016] In a possible embodiment, the box includes a frame, and the other lower end of the second connecting portion is connected to the frame.

[0017] Connecting the first connecting portion and the second connecting portion to the box in such a manner can ensure the structural rigidity of the connecting position, so that the position has relatively large structural rigidity, thereby ensuring the vibration attenuation performance.

[0018] In a possible embodiment, a plurality of first connecting portions and a plurality of second connecting portions are connected in a balanced manner to the box and the volute respectively on the top and at the bottom, and the volute is arranged in the box in a non-contact manner.

[0019] In a possible embodiment, the first connecting portions are springs, and the second connecting portions are dampers. The springs can reduce the transmission of an exciting force of the fan assembly to the box. The dampers can absorb/dissipate the exciting force of the fan assembly, convert vibration energy to heat energy, and limit a maximum vibration displacement of the fan assembly, to ensure the normal operation of the fan assembly. In addition, the box and the volute are connected through the springs and the dampers. The springs bear the tension and the dampers bear the pressure, which can ensure a correct position of the fan assembly in the box and ensure that the box and the volute do not contact each other.

[0020] In a possible embodiment, the volute includes a first air outlet, and the box includes a second air outlet, where the first air outlet is in communication with the second air outlet through an elastic pipe. The elastic pipe is arranged to realize elastic connection between the box and the volute, which further reduces the vibration transmitted from the fan assembly to the box, thereby alleviating the shake and structural noise of the cooker hood more effectively.

BRIEF DESCRIPTION OF THE DRAWINGS

[0021]

FIG 1 is a structural diagram of a cooker hood according to an embodiment of the utility model.

FIG 2 is a structural cross-sectional view of A-A in FIG. 1.

FIG. 3 is a schematic structural diagram of a frame of the cooker hood in FIG. 1.

DETAILED DESCRIPTION

[0022] A cooker hood generates noise and vibration during operation, which affects the user experience.

[0023] The noise generated by the cooker hood includes two types: 1) air noise, which is a majority of the noise of the cooker hood and is produced from an interaction between a rotating impeller and air, and is the main noise that disturbs users; and 2) structural noise, which is noise generated by structural vibration of the cooker hood.

[0024] The vibration generated by the cooker hood means that low-frequency vibration generated by the cooker hood during operation causes a control panel of the cooker hood to shake. An unbalanced mass of a fan system is a main reason for vibration of the fan system and shake of the cooker hood. The control panel of the cooker hood is equipped with a touch screen and a display screen for controlling the cooker hood and displaying operating status information of the cooker hood. When the control panel of the cooker hood shakes severely, a user feels strong vibration when using the touch screen, and characters on the display screen become fuzzy.

[0025] In order to resolve the problem regarding low-frequency vibration and noise, especially structural noise of the cooker hood, the utility model provides a cooker hood capable of vibration attenuation. An elastic connecting portion is arranged inside the cooker hood, and a fan assembly is connected to a box through the elastic connecting portion, so as to replace rigid connection between the box and the fan assembly with elastic connection, which significantly reduces the vibration transmitted from the fan assembly to a cavity of the cooker hood, thereby significantly alleviating the shake of the cooker hood.

[0026] The solution of the utility model is described below in detail.

[0027] With reference to FIG 1 and FIG 2, a cooker hood 1 includes: a smoke collecting hood 2 configured to collect and gather smoke, a box 3 located above the smoke collecting hood 2, and a fan assembly 4 arranged in the box 3 and configured to provide power for smoke suction. The fan assembly 4 includes a volute 40, an impeller 41 configured to generate negative pressure, and a motor 42 configured to provide power for the impeller 41 and mounted to the volute 40 through a support.

[0028] The cooker hood 1 further includes an elastic connecting portion 5, and the volute 40 is mounted in the box 3 through the elastic connecting portion 5. The elastic connection between the volute 40 and the box 3 can reduce the vibration transmitted from the fan assembly to the box, thereby reducing the low-frequency vibration of the cooker hood and significantly alleviating the shake of the cooker hood. In addition, the structural noise radiated by the box and the volute of the cooker hood can be reduced.

[0029] Further, in the prior art, in order to reduce the shake of the cooker hood, a relatively strict allowable value needs to be defined for an unbalanced mass of a fan. The vibration attenuation allows a relatively large unbalanced mass, and does not require a dynamic balance test for the fan system during production.

[0030] Further, the design of the cooker hood can reduce the demand for the rigidity of the box of the cooker hood, and does not require a cooker hood box with a

relatively larger rigidity for restraining the vibration of the whole machine. The box of the cooker hood may be designed with a light weight to reduce the overall weight and costs of the cooker hood.

[0031] Moreover, the cooker hood in this solution is prevented from increased vibration and shake of the whole machine caused by an increase of oil stain of the impeller after long-term operation of the cooker hood, which can reduce the frequency of disassembly and cleaning of the impeller.

[0032] In an embodiment, with reference to FIG 3, the elastic connecting portion 5 may include a first connecting portion 50 and a second connecting portion 51. The volute 40 is connected to the box 3 through the first connecting portion 50 and the second connecting portion 51, the first connecting portion 50 is arranged above the volute 40 to lift the volute 40, and the second connecting portion 51 is arranged below the volute 40 to support the volute 40. The first connecting portion and the second connecting portion realize the elastic connection between the volute and the box, which reduces the vibration transmitted from the fan assembly to the box, thereby alleviating the shake and structural noise of the cooker hood.

[0033] Preferably, a rigidity of the first connecting portion 50 is less than a rigidity of the second connecting portion 51. When the cooker hood is operating, the first connecting portion 50 with the less rigidity can bear the tension, and the second connecting portion 51 can bear the pressure (a supporting force), to ensure the vibration isolation effect and the normal operation of the fan assembly 4.

[0034] Specifically, the first connecting portion 50 may be a hanging spring for reducing the transmission of an exciting force of the fan assembly 4 to the box 3. The second connecting portion 51 may be a damper for absorbing/dissipating the exciting force of the fan assembly 4, converting vibration energy to heat energy, and limiting a maximum vibration displacement of the fan assembly 4, to ensure the normal operation of the fan assembly 4.

[0035] In other cases, for example, during product transportation, the hanging spring and damper can define a relative position of fan assembly 4 in box 3. The damper may be a large damping element, which can absorb/dissipate an external force during the transportation, thereby preventing damage to the fan assembly caused by the external force during the transportation.

[0036] When mounted in a customer's home (not operating), the hanging spring bears the tension and the damper bears the pressure, to ensure the correct position of the fan system in the box.

[0037] Further, the first connecting portion 50 may connect the box 3 to the volute 40 in the following manner. A lower end of the first connecting portion 50 is connected to the volute 40, and another higher end of the first connecting portion is connected to a position on a top of the box 3 close to an edge.

[0038] Preferably, the box 3 includes a frame, and the other higher end of the first connecting portion 50 is connected to the frame. For example, the frame includes a plurality of panels, and the first connecting portion 50 is connected to a connecting position (folding position) between two panels, for example, a folding position between a rear panel and a side panel, between the side panel and a top panel, or between the rear panel and the top panel. Connecting the first connecting portion to the box in such a manner can ensure the structural rigidity of the connecting position, so that the position has relatively large structural rigidity, thereby ensuring the vibration attenuation performance.

[0039] Further, the second connecting portion 51 may connect the box 3 to the volute 40 in the following manner. A higher end of the second connecting portion 51 is connected to the volute 40, and another lower end of the second connecting portion is connected to a position on a bottom of the box 3 close to an edge. The second connecting portion 51 is stretchable.

[0040] Preferably, the other lower end of the second connecting portion 51 is connected to the frame of the box 3. Likewise, for example, the frame includes a plurality of panels, and the second connecting portion 51 is connected to a connecting position (folding position) between two panels, for example, a folding position between a rear panel and a side panel, between the side panel and a bottom panel, or between the rear panel and the bottom panel. Connecting the second connecting portion to the box in such a manner can ensure the structural rigidity of the connecting position, so that the position has relatively large structural rigidity, thereby ensuring the vibration attenuation performance.

[0041] The second connecting portion 51 may be a damping absorber, which can reduce a vibration amplitude of the cooker hood during operation, and can reduce a fan vibration amplitude of the cooker hood under external excitation during transportation, thereby protecting the fan assembly of the cooker hood.

[0042] In an embodiment, the box 3 and the volute 40 may be connected by a plurality of first connecting portions 50 and a plurality of second connecting portions 51. Specifically, the plurality of first connecting portions 50 and the plurality of second connecting portions 51 are connected in a balanced manner to the box 3 and the volute 40 respectively on the top and at the bottom, and the volute 40 is arranged in the box 3 in a non-contact manner.

[0043] It should be noted that a number and location of dampers and hanging springs are specially designed. A corresponding theoretical calculation may be performed according to an actual weight of the fan system, a position of the center of gravity, a rigidity of the selected spring, a rigidity and a damping value of the damper, and the like, to determine an optimal arrangement solution, thereby realizing a maximum vibration attenuation effect.

[0044] In an embodiment, the volute 40 further includes a first air outlet 401, and the box 3 includes a second air outlet 30. The first air outlet 401 is in communication with

the second air outlet 30 through an elastic pipe 6. The elastic pipe 6 may be made of elastic or flexible materials, or may be made deformable by a structure, for example, may be a corrugated pipe. The elastic pipe is arranged to realize elastic connection between the box and the volute, which further reduces the vibration transmitted from the fan assembly to the box, thereby alleviating the shake and structural noise of the cooker hood more effectively.

[0045] The foregoing descriptions are merely specific embodiments of the utility model, but are not intended to limit the protection scope of the utility model. Any equivalent modification or replacement readily figured out by a person skilled in the art within the technical scope disclosed in the utility model shall fall within the protection scope of the utility model. Therefore, the protection scope of the utility model shall be subject to the protection scope of the claims.

Claims

1. A cooker hood, **characterized by** comprising:

   a smoke collecting hood;
   a box, located above the smoke collecting hood;
   a fan assembly, arranged in the box and comprising a volute, an impeller configured to generate negative pressure, and a motor configured to provide power for the impeller and mounted to the volute through a support, wherein
   the cooker hood further comprises an elastic connecting portion, and the volute is mounted in the box through the elastic connecting portion.

2. The cooker hood according to claim 1, **characterized in that** the elastic connecting portion comprises a first connecting portion and a second connecting portion, wherein the volute is connected to the box through the first connecting portion and the second connecting portion, the first connecting portion is arranged above the volute to lift the volute, and the second connecting portion is arranged below the volute to support the volute.

3. The cooker hood according to claim 2, **characterized in that** a rigidity of the first connecting portion is less than a rigidity of the second connecting portion.

4. The cooker hood according to claim 2, **characterized in that** a lower end of the first connecting portion is connected to the volute, and another higher end of the first connecting portion is connected to a position on a top of the box close to an edge.

5. The cooker hood according to claim 4, **characterized in that** the box comprises a frame, and the other higher end of the first connecting portion is connected to the frame.

6. The cooker hood according to claim 2, **characterized in that** a higher end of the second connecting portion is connected to the volute, and another lower end of the second connecting portion is connected to a position on a bottom of the box close to an edge.

7. The cooker hood according to claim 6, **characterized in that** the box comprises a frame, and the other lower end of the second connecting portion is connected to the frame.

8. The cooker hood according to claim 2, **characterized in that** a plurality of first connecting portions and a plurality of second connecting portions are connected in a balanced manner to the box and the volute respectively on the top and at the bottom, and the volute is arranged in the box in a non-contact manner.

9. The cooker hood according to any of claims 2 to 8, **characterized in that** the first connecting portions are springs, and the second connecting portions are dampers.

10. The cooker hood according to claim 1, **characterized in that** the volute comprises a first air outlet, and the box comprises a second air outlet, wherein the first air outlet is in communication with the second air outlet through an elastic pipe.

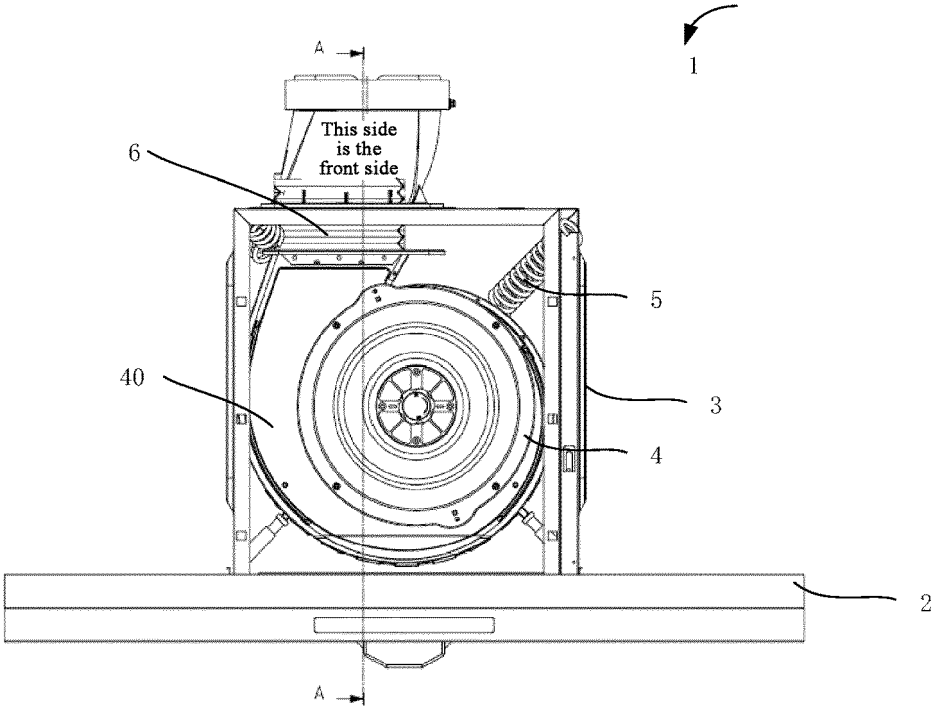

FIG. 1

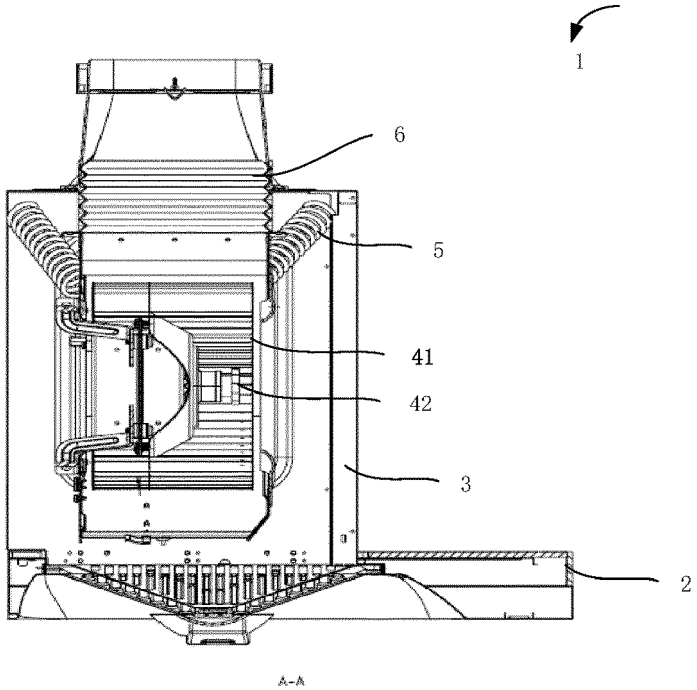

FIG. 2

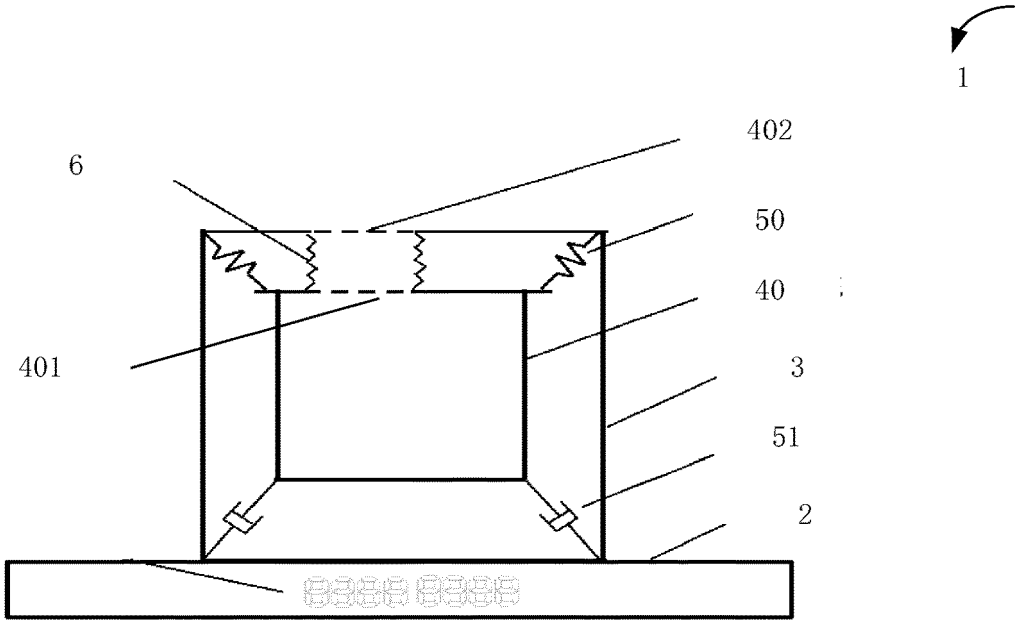

FIG. 3

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EUROPEAN SEARCH REPORT

Application Number
EP 22 20 7399

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	CN 214 007 620 U (NINGBO FOTILE KITCHEN WARE CO) 20 August 2021 (2021-08-20) * figures 1-36 *	1	INV. F24C15/20 F04D29/66
X	CN 208 186 472 U (GREE ELECTRIC APPLIANCES INC ZHUHAI) 4 December 2018 (2018-12-04) * claim 1; figures 1-2 *	1-10	
X	CN 214 536 365 U (NINGBO FOTILE KITCHEN WARE CO) 29 October 2021 (2021-10-29) * figures 1,2,4 *	1,10	

TECHNICAL FIELDS SEARCHED (IPC)

F24C
F04D

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	29 March 2023	Meyers, Jerry

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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A : technological background
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ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 22 20 7399

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29-03-2023

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
CN 214007620 U	20-08-2021	NONE	
CN 208186472 U	04-12-2018	NONE	
CN 214536365 U	29-10-2021	NONE	

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