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(54) EXHAUST HOOD WITH AUTOMATIC OPERATION PERFORMANCE

DUNSTABZUGSHAUBE MIT AUTOMATISCHER BETRIEBSLEISTUNG

HOTTE ASPIRANTE À FONCTIONNEMENT AUTOMATIQUE

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EP-A1- 1 258 687 **JP-A- 2022 086 131**

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Description

[0001] The present invention relates to an exhaust hood wherein the sensors are efficiently positioned to increase the automatic operation performance.

[0002] The exhaust hood provides the discharge of the water vapor and odor generated during the cooking process to the outside environment. With the development of sensor technologies, there are also important additional functions such as automatic operation and air purification.

[0003] The exhaust hood generally comprises a suction fan and a suction channel. The exhaust hood can be operated at different levels depending on the motor power in order to provide the discharge of the water vapor and odor generated during the cooking process to the outside environment. Said different levels can be selected by the user at appropriate stages according to the load of the cooking process.

[0004] In the state of the art, the user operates the exhaust hood when required during the cooking process and selects the appropriate level. In addition, there are applications where the exhaust hood is operated automatically to increase user comfort and to determine the most accurate level. In applications where the exhaust hood is operated and controlled automatically, sensors which monitor changes such as odor and temperature are used.

[0005] One of at least two temperature sensors on the exhaust hood measures the ambient temperature while the other temperature sensor detects whether the cooking device is operational or not from the temperature changes caused by the cooking process. By using at least two temperature sensors, it can be determined whether the cooker under the exhaust hood is operational or not, from the relative change (differences) between the temperature information measured by said sensors. Accordingly, it is provided that the exhaust hood is activated, the level is increased, and when the thermal load disappears, the level is reduced and the exhaust hood is closed. However, the position of the sensor which measures the temperature of the air rising from the cooking device or the cooking vessel thereon is very important since the load of the cooker must be detected without error when the cooking process is started on the cooker.

[0006] The sensor placed anywhere under the exhaust hood can measure the cooker load temperature when the exhaust hood is not operational. The sensor can also enable the exhaust hood to automatically switch to the first level at the specified stage. However, since after the exhaust hood starts to operate, the air flow path changes direction towards the ventilation channel due to the suction, from this moment on, if the sensor is not placed in a correct position, in an area suitable for the air flow path, the exhaust hoot does not switch to the next level although the cooker continues to operate. Since the hot air is drawn by the exhaust hood at this time, the sensor remains out of the air flow path and starts to cool down even if the cooker is operational, transmitting incorrect information to the exhaust hood and causing the same to stop.

[0007] Moreover, there is a great variety of designs for cooking devices, especially cookers. In the cookers, the cooking zones can be located at different positions. The thermal load which occurs during the cooking process in the cooking zones at these different positions follows a different flow path. The sensor, which is placed in any position under the exhaust hood, may remain within the air flow path of some cooking zones, while remaining outside the air flow path of some cooking zones. In this case, in the cooking processes performed in the cooking zones where the sensor is outside the air flow path, the latter cannot carry out an error-free detection. Moreover, it becomes difficult to make homogeneous and accurate detection during the cooking process made in different cooking zones. There may be differences in the detection capabilities during the cooking process performed in a cooking zone away from the sensor and the cooking process performed in a cooking zone close to the sensor.

[0008] Due to all these reasons, the sensor must be placed at a position that does not cause such problems in the proper conditions in order to detect the cooker load, that is, the heat released due to the cooking process.

[0009] In order for the exhaust hood to perform the automatic operation function correctly, the sensor must be within the air flow path when the exhaust hood is operational or not, at every level and in every mode, in every type of cooker and in every cooking zone. To meet this condition, it is not sufficient to use only one sensor other than the sensor which monitors the ambient temperature. The need for correctly detecting the temperature released by following more than one air flow path from different cooking zones in cooking devices which may have various designs necessitates the use of a plurality of temperature sensors. While increasing the number of sensors results in increased sensing sensitivity, it also requires additional sensor cost, a more costly processor, more circuit elements, and the need for designing a larger circuit board.

[0010] In the state of the art German Patent Application No. DE102006041581, an exhaust hood which is prevented from overheating and a control method are disclosed.

[0011] In the state of the art Chinese Utility Model Document Application No. CN2491733, a smart exhaust hood comprising a control device is disclosed. In this document, two negative temperature coefficient thermistors are used as sensors. The thermistors are mounted directly onto the lower corners of the exhaust hood.

[0012] In the state of the art German Patent Application No. DE3922090, an exhaust hood is disclosed, comprising a temperature sensor placed on the outer surface thereof and measuring the ambient temperature and at least two temperature sensors placed on the suction surface, wherein the fan is controlled according to tem-

perature difference based on the information received from the sensors.

[0013] In the state of the art International Patent Application No. WO2020078670, an exhaust hood is disclosed, which is positioned above cooking devices such as cooker, oven, etc., comprising a body; a suction channel; a fan which enables the air to be sucked and discharged to the outer environment; a guiding plate which is disposed on the lower surface of the body; an air suction duct; and one or more than one temperature sensor which measures the temperature of the air rising from the cooking device by heating up. This document also discloses the temperature sensor which is mounted at the center of the air suction duct between the guiding plate and the front panel, which is positioned in the flow path of the air, and which is enabled to be affected from the air flow at maximum. Thus, incorrect measurement is prevented while the temperature sensor performs its automatic operating functions. Further relevant prior art is disclosed in EP 1 258 687 A1 and JP 2022 086131 A.

[0014] The aim of the present invention is the realization of an exhaust hood wherein the sensors are efficiently positioned to increase the automatic operation performance. The exhaust hood realized in order to attain the aim of the present invention, explicated in the first claim and the respective claims, comprises at least one first temperature sensor which detects the ambient temperature; at least one second temperature sensor which detect the temperature of the air rising from a cooking device such as countertop cooker, oven, etc. or a cooking vessel thereon; a control unit which enables the exhaust hood to automatically operate according to the information received from the first and second temperature sensors and which also enables the operation level to be automatically adjusted; and a surface which is positioned on the side facing the cooking device and which has thermal conductivity by radiation or convection; and the second temperature sensor detects the temperature of said surface. Thus, almost the entire surface of the exhaust hood is used as a sensor which measures the temperature of the air rising from a cooking device such as cooktop, oven, etc. or from a cooking vessel thereon, in other words measures the activity of the cooker.

[0015] In an embodiment of the invention, the surface is a metal surface and is located on the side of the exhaust hood facing the cooking zones. Thus, instead of measuring the temperature of the air flow, the temperature of the outer metal surface of the exhaust hood is measured by the second temperature sensor. According to the present invention, the second temperature sensor is disposed on the surface from the inside of the exhaust hood. Thus, any accumulation of dust, dirt, etc. on the second temperature sensor is prevented. Moreover, the second temperature sensors are prevented from being visible from the outside, and are enabled to be kept in a safe position and as far away from external factors as possible.

[0016] By means of the present invention, a lesser number of second temperature sensors are used instead of using multiple second temperature sensors. Moreover, instead of measuring the hot air, the temperature of the exhaust hood is measured. By using the metal surface of the exhaust hood like a sensor, data can be obtained from all surfaces of the exhaust hood, from many regions, while erroneous measurements caused by the sudden change in the air flow during the measurement of the temperature are prevented.

[0017] The problems arising from varying designs, shapes, types, dimensions of the cooker used under the exhaust hood as well as the number and position of cooking zones make it impossible to collect the hot air rising from the cooking zones in a single path. By means of the present invention, the heating caused by the hot air coming from the cooking zones on the surface of the exhaust hood is measured by using the exhaust hood as a sensor, by means of a second temperature sensor disposed so as to measure the metal surface from the inside. Instead of directing the air flow to a region and measuring the temperature of the air flow in said area, the outer metal surface of the entire exhaust hood is used as a sensor.

[0018] By means of the present invention, by measuring the temperature of the surface manufactured from preferably metal or similar heat-conducting material, which forms the outer part of the exhaust hood, where one and/or more than one second temperature sensor measuring the temperature of the surface is used, in different types, powers and levels of cookers, in different exhaust hood levels, in different types and positions of cooking vessels, it is efficiently provided that the cooking process in any cooking zone of the cooking device is detected, that the load of cooking process as well as the powers/levels of the cooker are detected, that the automatic exhaust hood operating level (motor suction power) is automatically graded and that the termination of the cooking process is detected.

[0019] In the present invention, the second temperature sensor is disposed on the exhaust hood, on a surface of the exhaust hood facing the cooker, on the outer sheet metal thereof. The homogeneous temperature change occurring in this heat-conducting region is detected as a result of the heat reaching by radiation or spreading through the hot air flow path. When the cooking process ends, the exhaust hood starts to cool down since there is no longer a heat source in the environment. Said cooling process does not show a high inertia thanks to the air flow provided by the fan in operation and the high heat conduction characteristic of the surface selected for the measurement of the cooker load temperature, and is completed in the desired time. Thus, it can be detected in a suitable time that a heat source is no longer available in the cooking device and the operation of the exhaust hood is terminated in line with the automatic operation function.

[0020] In an embodiment of the present invention, the

second temperature sensor which measures the load of the cooker is disposed at a position on the outer surface of the exhaust hood, which is the hottest during the cooking process, so as to measure the temperature of said surface with contact. In the preferred embodiment of the present invention, the second temperature sensor is disposed on the metal surface of the exhaust hood facing the cooker. Thus, without the need for the use of a plurality of sensors, since the heat conductive surface distributes the temperature information at different points homogeneously in accordance with the principles of heat conduction, detection is made from only one point, and a high-performance automatic operation function is provided independent of variables such as the type and/or power of the cooker, the position of the cooking zone, the type of the cooking vessel, the suction level, etc.

[0021] An exhaust hood realized in order to attain the aim of the present invention is illustrated in the attached figures, where:

Figure 1 - is the sideways view of an exhaust hood and a cooking device.

Figure 2 - is the sideways cross-sectional view of the exhaust hood.

[0022] The elements illustrated in the figures are numbered as follows:

1. Exhaust hood
2. Body
3. Suction channel
4. Fan
5. First temperature sensor
6. Second temperature sensor
7. Control unit
8. Cooking device
9. Surface

[0023] The exhaust hood (1) comprises a body (2); a suction channel (3) which is provided in the body (2); a fan (4); at least one first temperature sensor (5) which detects the ambient temperature; at least one second temperature sensor (6) which detect the temperature of the air rising from a cooking device (8) such as countertop cooker, oven, etc. or a cooking vessel thereon; a control unit (7) which enables the exhaust hood (1) to automatically operate according to the information received from the first and second temperature sensors (5 and 6) and which also enables the operation level to be automatically adjusted; and a surface (9) which is positioned on the side facing the cooking device (8) and which has thermal conductivity by radiation or convection; and the second temperature sensor (6) detects the temperature of said surface (9). Thus, almost the entire surface of the exhaust hood (1) is used as a sensor which measures the temperature of the air rising from a cooking device (8) such as cooktop, oven, etc. or from a cooking vessel thereon, in other words measures the activity of the cooker (Figure 1).

[0024] In an embodiment of the present invention, the surface (9) is metal. In the preferred embodiment of the present invention, the surface (9) is located on the side of the exhaust hood (1) facing the cooking zones on the cooking device (8). Thus, instead of measuring the temperature of the air flow, the temperature of the outer metal surface (9) of the exhaust hood (1) is measured by the second temperature sensor (6). The second temperature sensor (6) is disposed on the surface (9) from the inside of the exhaust hood (1). Thus, any accumulation of dust, dirt, etc. on the second temperature sensor (6) is prevented. Moreover, the second temperature sensors (6) are prevented from being visible from the outside, and are enabled to be kept in a safe position and as far away from external factors as possible.

[0025] In the present invention, the second temperature sensor (6) is disposed on the exhaust hood (1), on the surface of the exhaust hood (1) facing the cooking device (8), preferably on the outer sheet metal thereof. The homogeneous temperature change occurring in this heat-conducting region is detected as a result of the heat reaching by radiation or spreading through the hot air flow path. When the cooking process ends, the exhaust hood (1) starts to cool down since there is no longer a heat source in the environment. Said cooling process does not show a high inertia thanks to the air flow provided by the fan (4) in the suction channel (3) in operation and the high heat conduction characteristic of the surface (9) selected for the measurement of the cooker load temperature, and is completed in the desired time. Thus, it can be detected in a suitable time that a heat source is no longer available in the cooking device (8) and the operation of the exhaust hood (1) is terminated in line with the automatic operation function (Figure 2).

[0026] In an embodiment of the present invention, the second temperature sensor (6) which measures the load of the cooking device (8) is disposed at a position on the outer surface of the exhaust hood (1), which is the hottest during the cooking process, so as to measure the temperature of said surface (9) with contact. In the preferred embodiment of the present invention, the second temperature sensor (6) is disposed on the metal surface (9) of the exhaust hood (1) facing the cooking device. Thus, without the need for the use of a plurality of sensors, since the heat conductive surface (9) distributes the temperature information at different points homogeneously in accordance with the principles of heat conduction, detection is made from only one point, and a high-performance automatic operation function is provided independent of variables such as the type and/or power of the cooker, the position of the cooking zone, the type of the cooking vessel, the suction level, etc.

[0027] By means of the present invention, a lesser number of second temperature sensors (6) are used instead of using multiple second temperature sensors (6). Moreover, instead of measuring the hot air, the temperature of the exhaust hood (1) is measured. By using

the metal surface (9) of the exhaust hood (1) like a sensor, data can be obtained from all surfaces of the exhaust hood (1), from many regions, while erroneous measurements caused by the sudden change in the air flow during the measurement of the temperature are prevented.

[0028] The problems arising from varying designs, shapes, types, dimensions of the cooker used under the exhaust hood (1) as well as the number and position of cooking zones make it impossible to collect the hot air rising from the cooking zones in a single path. By means of the present invention, the heating caused by the hot air coming from the cooking zones on the surface (9) of the exhaust hood (1) is measured by using the exhaust hood (1) as a sensor, by means of a second temperature sensor (6) disposed so as to measure the metal surface (9) from the inside. Instead of directing the air flow to a region and measuring the temperature of the air flow in said area, the outer metal surface (9) of the entire exhaust hood (1) is used as a sensor.

[0029] By means of the present invention, by measuring the temperature of the surface (9) manufactured from preferably metal or similar heat-conducting material, which forms the outer part of the exhaust hood (1), where one and/or more than one second temperature sensor (6) measuring the temperature of the surface (9) is used, in different types, powers and levels of cookers, in different exhaust hood (1) levels, in different types and positions of cooking vessels, it is efficiently provided that the cooking process in any cooking zone of the cooking device (8) is detected, that the load of cooking process as well as the powers/levels of the cooker are detected, that the automatic exhaust hood (1) operating level (motor suction power) is automatically graded and that the termination of the cooking process is detected.

Claims

1. An exhaust hood (1) **comprising** a body (2); a suction channel (3) which is provided in the body (2); a fan (4); at least one first temperature sensor (5) which detects the ambient temperature; at least one second temperature sensor (6) which detect the temperature of the air rising from a cooking device (8) such as countertop cooker, oven, etc. or a cooking vessel thereon; a control unit (7) which enables the exhaust hood (1) to automatically operate according to the information received from the first and second temperature sensors (5 and 6) and which also enables the operation level to be automatically adjusted; **characterized by** a surface (9) which is positioned on the side facing the cooking device (8) and which has thermal conductivity by radiation or convection and the second temperature sensor (6) which detects the temperature of said surface (9) wherein the surface (9) is located on the side thereof facing the cooking zones on the cooking device (8) and the second temperature sensor (6) is disposed on the surface (9) from the inside of the exhaust hood (1).

2. An exhaust hood (1) as in Claim 1, **characterized by** the surface (9) which is manufactured from heat conductive material.

3. An exhaust hood (1) as in Claim 1 or 2, **characterized by** the surface (9) which is metal.

4. An exhaust hood (1) as in any one of Claims 1 to 3, **characterized by** the second temperature sensor (6) which is disposed on the exhaust hood (1), on the outer sheet metal of the exhaust hood (1) facing the cooking device (8).

5. An exhaust hood (1) as in Claim 1, **characterized by** the second temperature sensor (6) which is disposed so as to measure the temperature of the surface (9) with contact.

Patentansprüche

1. Eine Abzugshaube (1), umfasst einen Körper (2); einen Ansaugkanal (3), der in dem Körper (2) vorgesehen ist; ein Gebläse (4); mindestens einen ersten Temperatursensor (5), der die Umgebungstemperatur erfasst; mindestens einen zweiten Temperatursensor (6), der die Temperatur der Luft erfasst, die von einer Kochvorrichtung (8), wie z.B. einem Arbeitsplattenherd, einem Ofen usw., aufsteigt. oder eines Kochgefäßes aufsteigt; eine Steuereinheit (7), die den automatischen Betrieb der Abzugshaube (1) in Abhängigkeit von den von den ersten und zweiten Temperatursensoren (5 und 6) empfangenen Informationen ermöglicht, und die auch die automatische Einstellung des Betriebsniveaus ermöglicht; gekennzeichnet ist sie dadurch, dass eine Oberfläche (9), die auf der der Kocheinrichtung (8) zugewandten Seite angeordnet ist und die Wärmeleitfähigkeit durch Strahlung oder Konvektion aufweist, und der zweite Temperatursensor (6), der die Temperatur der Oberfläche (9) erfasst, wobei die Oberfläche (9) auf der den Kochzonen zugewandten Seite der Kocheinrichtung (8) angeordnet ist und der zweite Temperatursensor (6) von der Innenseite der Dunstabzugshaube (1) her auf der Oberfläche (9) angeordnet ist.

2. Eine Abzugshaube (1), wie in Anspruch 1 aufgeführt, **ist dadurch gekennzeichnet, dass** die Oberfläche (9) aus wärmeleitendem Material hergestellt ist.

3. Eine Abzugshaube (1), wie in Anspruch 1 oder 2 aufgeführt, **ist dadurch gekennzeichnet, dass** die Oberfläche (9) aus Metall hergestellt ist.

4. Eine Abzugshaube (1), wie in einem der Ansprüche 1 bis 3 aufgeführt, **ist dadurch gekennzeichnet, dass** der zweite Temperatursensor (6), der an der Abzugshaube (1) angeordnet ist, an dem dem Kochgerät (8) zugewandten Außenblech der Abzugshaube (1).

5. Eine Abzugshaube (1), wie in Anspruch 1 aufgeführt, **ist dadurch gekennzeichnet, dass** der zweite Temperatursensor (6), der so angeordnet ist, dass er die Temperatur der Oberfläche (9) mit Kontakt misst.

Revendications

1. Une hotte aspirante (1) **comprenant** un corps (2) ; un canal d'aspiration (3) qui est disposé dans le corps (2) ; un ventilateur (4) ; au moins un premier capteur de température (5) qui détecte la température ambiante ; au moins un second capteur de température (6) qui détecte la température de l'air provenant d'un dispositif de cuisson (8) tel qu'une plaque de cuisson, un four, etc., ou d'un récipient de cuisson s'y trouvant ; une unité de commande (7) qui permet à la hotte aspirante (1) de fonctionner automatiquement en fonction des informations reçues des premier et second capteurs de température (5 et 6) et qui permet d'ajuster automatiquement le niveau de fonctionnement ; **caractérisée par** une surface (9) qui est positionnée sur le côté faisant face au dispositif de cuisson (8) et qui possède une conductivité thermique par rayonnement ou convection, et le second capteur de température (6) qui détecte la température de ladite surface (9), où la surface (9) est située sur le côté de la hotte faisant face aux zones de cuisson sur le dispositif de cuisson (8), et le second capteur de température (6) est disposé sur la surface (9) à l'intérieur de la hotte aspirante (1).

2. Une hotte aspirante (1) selon la Revendication 1, **caractérisée par** la surface (9) qui est fabriquée en matériau conducteur de chaleur.

3. Une hotte aspirante (1) selon la Revendication 1 ou 2, **caractérisée par** la surface (9) qui est en métal.

4. Une hotte aspirante (1) selon l'une quelconque des revendications 1 à 3, **caractérisée par** le second capteur de température (6) qui est disposé sur la hotte aspirante (1), sur la tôle extérieure de la hotte aspirante (1) faisant face au dispositif de cuisson (8).

5. Une hotte aspirante (1) selon la Revendication 1, **caractérisée par** le second capteur de température (6) qui est disposé de manière à mesurer la température de la surface (9) par contact.

Figure 1

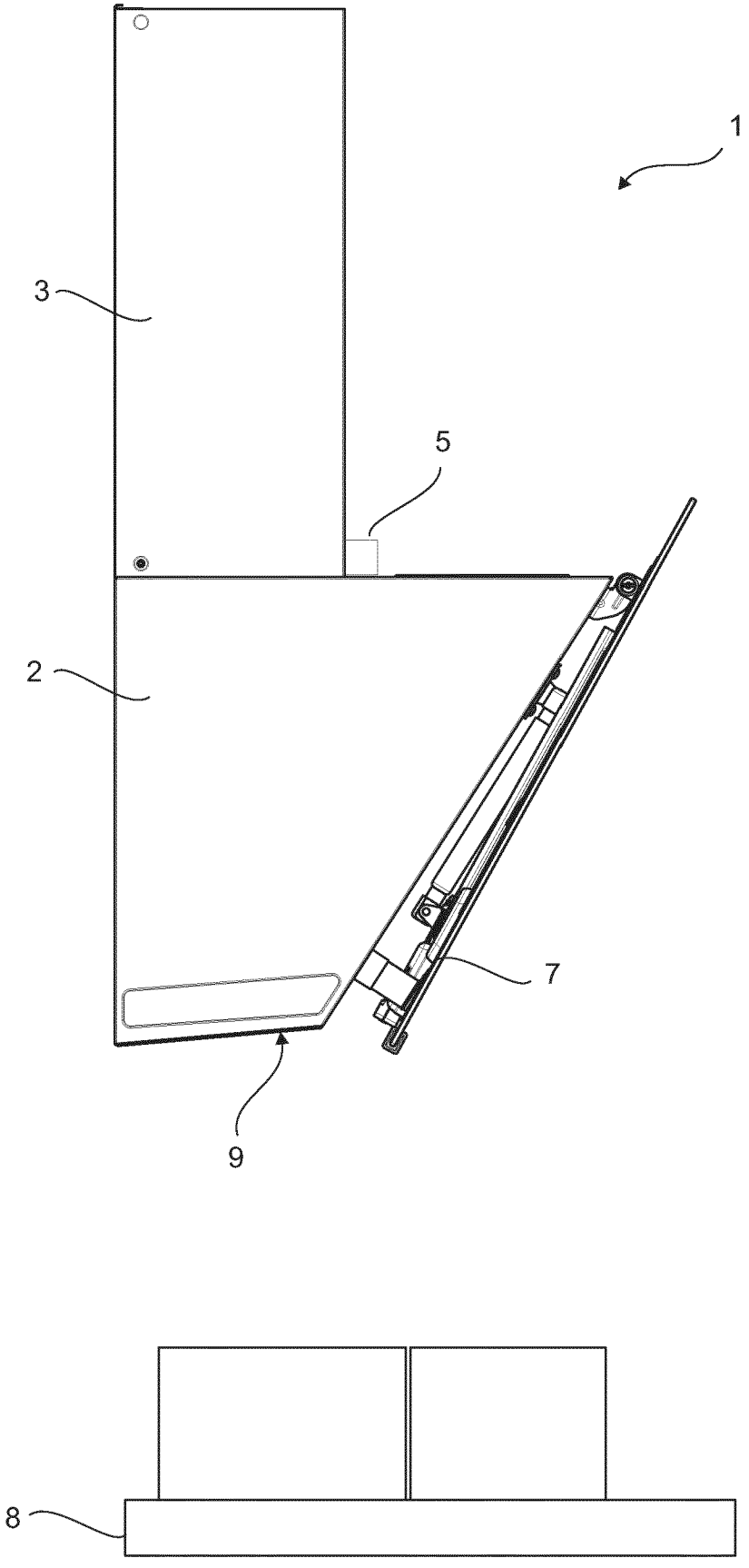
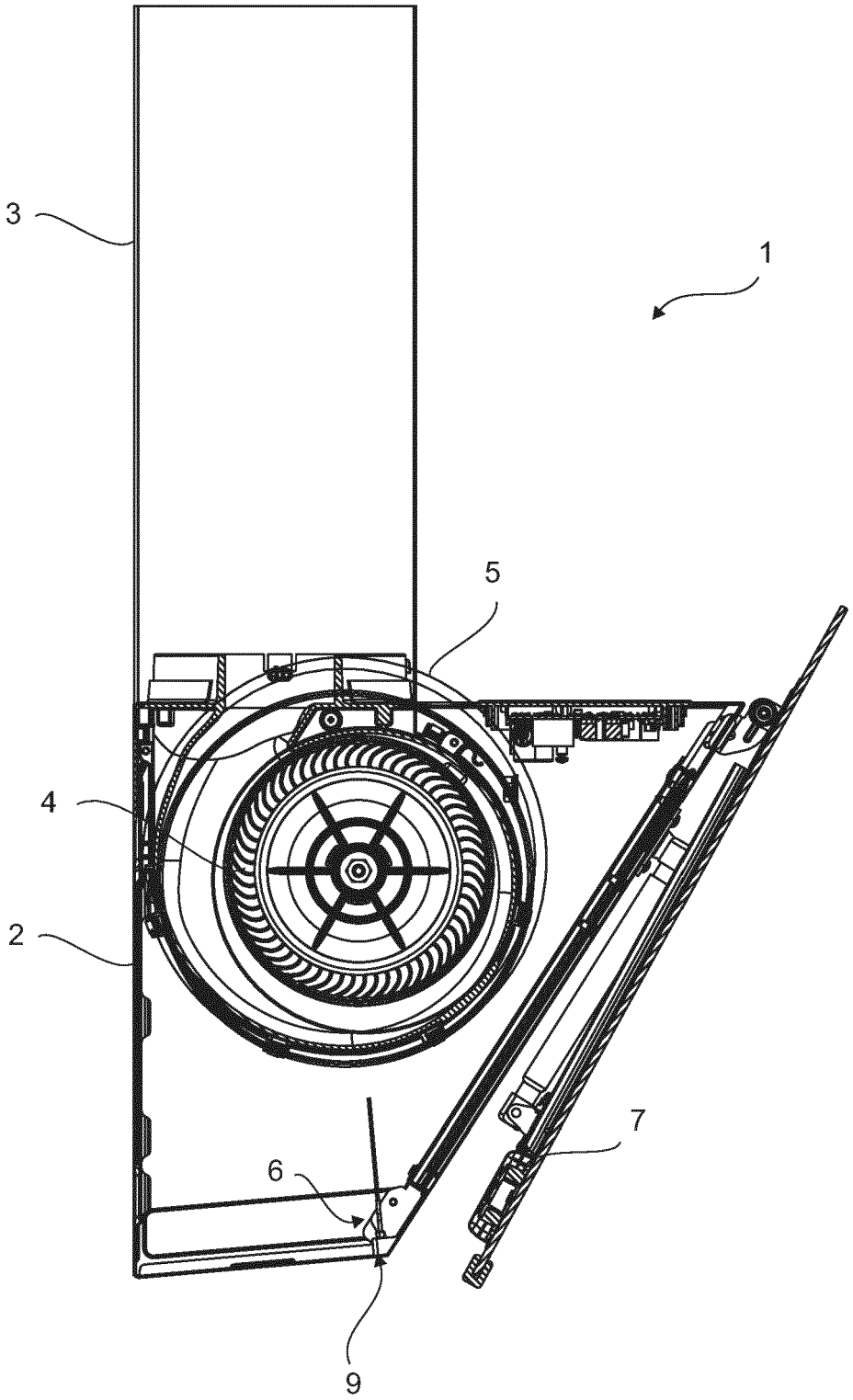


Figure 2



REFERENCES CITED IN THE DESCRIPTION

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