

DESCRIPTION

[Title of Invention]

OILY SMOKE TRAPPING DEVICE

[Technical Field]

[0001]

The present invention relates to an oily smoke trapping device.

[Background Art]

[0002]

There has conventionally been proposed an oily smoke trapping device of a range hood and the like in which the interior thereof is made soundproof so that the sound generated by a blower (fan) of the oily smoke trapping device is not transmitted to a room. For example, PTL 1 discloses a range hood that includes a box-shaped hood main body having an entire surface and a lower surface opened and having a blower in the interior thereof, a front hood provided so as to cover the front surface of the hood main body, and a noise-insulating cylinder in a bottomed cylindrical shape in which a noise-absorbing material is attached to an inner surface, a suction port is provided in a cylindrical part near a bottom part, and an opening-side end part is communicatedly connected to a blower suction port. This range hood includes a noise-insulating cylinder with a noise-absorbing material attached thereinside at the suction port of the blower. The sound generated from the blower propagates through the interior of the noise-insulating cylinder while being absorbed by the noise-absorbing material, so the sound decays by the time the sound propagates to the outside of the range hood. Thus, such a configuration does not cause discomfort to the people in the room.

[Citation List]

[Patent Literature]

[0003]

[PTL 1] Japanese Utility Model Application Publication No. H03-052534

[Summary of Invention]

[Technical Problem]

[0004]

However, in this range hood (oily smoke trapping device) described above, the noise-insulating cylinder is provided at the suction port of the blower, resulting in increased ventilation resistance and poor intake/exhaust performance of the range hood (oily smoke trapping device). Consequently, there is a possibility of new noise being generated due to the presence of the noise-insulating cylinder. Moreover, because the

suction port of the blower functions as a flow path for air having oil content, the suction port becomes easily contaminated with the oil and therefore needs to be cleaned frequently.

5 Therefore, the present invention provides an oily smoke trapping device that prevents noise generated by a fan from being transmitted to a room without reducing the performance of the intake/exhaust of air and cleanability.

[Solution to Problem]

[0005]

10 In order to achieve the above object, there is provided an oily smoke trapping device including a motor, a fan that is attached to a rotary shaft of the motor and generates an air flow, and a fan casing including the fan at the interior thereof, wherein the fan casing has an intake opening that draws in the air, an exhausting opening that exhausts the air, and a communication opening that is provided to face the intake opening and is not on a flow path which is a flow of air generated by rotation of a fan, a
15 noise-absorbing material is provided on the opposite side of the intake opening with the communication opening interposed therebetween, the communication opening spatially communicates the fan and the noise-absorbing material to each other, and an outer edge of the communication opening is provided so as to be positioned on the same position as or inside an outer diameter of the fan.

20 According to this configuration, since the communication opening that spatially communicates the fan and the noise-absorbing material to each other is provided and the noise-absorbing material is provided outside a flow path for the air including oil content, the noise-absorbing material can be prevented from being contaminated or having resistance to the air flow. Thus, there can be provided the oily smoke trapping device
25 capable of transmitting the noise generated by the fan from being transmitted to a room without reducing the performance of the intake/exhaust of air and cleanability.

[0006]

Further, the noise-absorbing material may be characterized by being provided to have a first space between the noise-absorbing material and the communication opening.

30 According to this configuration, since the noise-absorbing material is provided to have the first space between the noise-absorbing material and the communication opening, the sound spreads and propagates from the communication opening, allowing the sound to be absorbed in a wider area and enabling sound absorption with efficiency.

[0007]

35 Furthermore, the fan may have a power transmission plate connected to the

rotary shaft and a plurality of fins around the power transmission plate, and the power transmission plate may have a ring part connected to the plurality of fins, a central part connected to the rotary shaft, a spoke part provided between the central part and the ring part, and a plurality of power transmission plate opening parts enclosed by the ring part, the central part, and the spoke part.

According to this configuration, by providing the opening parts in the power transmission plate, it becomes easy for the sound to propagate toward the communication opening, thereby allowing the sound to be absorbed more.

[0008]

Moreover, the power transmission plate may be characterized by being provided on the communication opening side from a center position of the fans in a rotary shaft direction.

According to this configuration, since the power transmission plate is provided on the communication opening side from the center position of the fans, the power transmission plate does not become a resistance when the air is exhausted, enabling exhaustion with higher efficiency and reducing noise. Moreover, since the distance between the power transmission plate and the noise-absorbing material becomes short, the sound generated by the power transmission plate can be absorbed with higher efficiency.

[0009]

In addition, at least a part of the motor may be characterized by being provided so as to be positioned farther away from the intake opening than the closest part of the fans to the communication opening side is.

According to this configuration, since at least a part of the motor is provided so as to be positioned farther away from the intake opening than the closest part of the fans to the communication opening side is, the motor does not become a resistance when the air is exhausted, enabling exhaustion with higher efficiency and reducing noise. Moreover, since the distance between the motor and the noise-absorbing material becomes short, the sound generated by the motor can be absorbed with high efficiency.

[0010]

Furthermore, the oily smoke trapping device may be characterized by having a second space which is positioned farther away from the intake opening than the noise-absorbing material, the second space being an enclosed space that causes the sound to decay.

According to this configuration, the second space that is enclosed so as to cause the sound to decay is provided on the opposite side of the communication opening

with the noise-absorbing material interposed therebetween. Thus, the sound that cannot be absorbed completely by the noise-absorbing material propagates to the interior of the cover and is absorbed by reflection inside the cover, thereby preventing the sound from propagating to the outside of the oily smoke trapping device.

[0011]

In addition, the second space may be characterized by being a closed space.

According to this configuration, since the second space is closed, the sound propagated to the second space is less likely to escape to the outside of the second space, and therefore can be absorbed with high efficiency.

[Advantageous Effects of Invention]

[0012]

As described above, the present invention can provide an oily smoke trapping device that can prevent noise generated by the fans from being transmitted to a room without reducing the performance of exhaustion and cleanability.

[Brief Description of Drawings]

[0013]

[Fig. 1]

Fig. 1 is a six-view drawing of a range hood according to a first embodiment of the present invention, where Fig. 1(A) is a top view, Fig. 1(B) a front view, Fig. 1(C) a bottom view, Fig. 1(D) a right side view, Fig. 1(E) a rear view, and Fig. 1(F) a left side view.

[Fig. 2]

Fig. 2(A) is a cross-sectional diagram of the range hood according to the first embodiment of the present invention, in the cross section taken along A-A shown in Fig. 1, and Fig. 2(B) is an enlarged diagram of the cross-section showing the vicinity of a noise-absorbing material.

[Fig. 3]

Fig. 3(A) is a cross-sectional diagram of the range hood according to the first embodiment of the present invention, in the cross section taken along B-B shown in Fig. 1, and Fig. 3(B) is an enlarged diagram of the cross-section showing the vicinity of the noise-absorbing material.

[Fig. 4]

Fig. 4(A) is a cross-sectional diagram of the range hood according to a modification of the first embodiment of the present invention, in the cross section taken along A-A shown in Fig. 1, and Fig. 4(B) is an enlarged cross-sectional diagram showing the vicinity of the noise-absorbing material.

[Fig. 5]

Fig. 5(A) is a cross-sectional diagram of the range hood according to the modification of the first embodiment of the present invention, in the cross section taken along B-B shown in Fig. 1, and Fig. 5(B) is an enlarged cross-sectional diagram showing the vicinity of the noise-absorbing material.

[Fig. 6]

Fig. 6 is a six-view drawing of a range hood according to a second embodiment of the present invention, where Fig. 6(A) is a top view, Fig. 6(B) a front view, Fig. 6(C) a bottom view, Fig. 6(D) a right side view, Fig. 6(E) a rear view, and Fig. 6(F) a left side view.

[Fig. 7]

Fig. 7(A) is a cross-sectional diagram of a range hood according to the second embodiment of the present invention, in the cross section taken along A-A shown in Fig. 6, and Fig. 7(B) is an enlarged cross-sectional diagram showing the vicinity of a noise-absorbing material.

[Fig. 8]

Fig. 8(A) is a cross-section diagram of the range hood according to the second embodiment of the present invention, in the cross section taken along B-B shown in Fig. 6, and Fig. 8(B) is an enlarged cross-sectional diagram showing the vicinity of the noise-absorbing material.

[Fig. 9]

Fig. 9 shows a range hood according to a third embodiment of the present invention, where Fig. 9(A) is a top view, Fig. 9(B) a front view, Fig. 9(C) a bottom view, Fig. 9(D) a right side view, Fig. 9(E) a left side view, Fig. 9(F) a perspective view from the upper right, Fig. 9(G) a perspective view from the lower right, Fig. 9(H) a perspective view from the upper left, and Fig. 9(I) a perspective view from the lower left.

[Fig. 10]

Fig. 10 is a cross-sectional diagram of the range hood according to the third embodiment of the present invention, in the cross section taken along A-A shown in Fig. 9.

[Fig. 11]

Fig. 11 is a cross-sectional diagram of the range hood according to a modification of the third embodiment of the present invention, in the cross section taken along A-A shown in Fig. 9.

[Description of Embodiments]

[0014]

Embodiments of the present invention are now described hereinafter with reference to the drawings.

<First Embodiment>

An oily smoke trapping device 100 provided in a range hood 1 according to the present embodiment is now described with reference to Figs. 1 to 3. The range hood 1 is installed around a cooking device (not shown), collects steam, oily smoke and the like generated by cooking, and exhausts to the outside through a duct (not shown) to which a duct connecting part 6 is connected. The range hood 1 includes a main body 2 having the duct connecting part 6, a cover 50 connected to an upper surface of the main body 2 and having a part of a motor 30 and a noise-absorbing material 40 in the interior thereof, a thin hood part 3 for collecting steam, oily smoke and the like and having, on an inner surface thereof, a depressed inner face panel 4 at an upper section, and a straightening plate 5 for straightening air between the straightening plate 5 and the inner face panel 4. The hood part 3 is coupled to the main body 2 so as to communicate with a suction opening 7 provided on the inner face panel 4.

[0015]

The oily smoke trapping device 100 is provided in the interior of the main body 2 and the cover 50. The oily smoke trapping device 100 includes the motor 30, a fan 20 that is attached to a rotary shaft 31 of the motor 30 and generates an air flow, and a fan casing 10 including the fan 20 in the interior thereof. Since the motor 30 is provided with the oily smoke trapping device 100 of the present embodiment in the range hood 1 installed in a room, it is preferred that an AC motor be used as the motor 30, but the motor 30 is not limited thereto and may be a DC motor that can be used outdoors. The fan 20 is a sirocco fan with high static pressure. In the present embodiment, the fan 20 sucks air including oily smoke and the like from the suction opening 7 located in a lower section, and forms an exhaust air flow in the horizontal direction. The fan 20 has a power transmission plate 21 connected to the rotary shaft 31 of the motor 30, and a plurality of fins around the power transmission plate 21.

[0016]

The fan casing 10 includes an intake opening 11 that draws in air, an exhausting opening 12 that exhausts the air drawn in from the intake opening 11, and a communication opening 13 that is provided so as to face the intake opening 11. When the motor 30 is energized and the fan 20 present at the interior of the fan casing 10 rotates, air including oily smoke and the like is sucked in from a gap between the straightening plate 5 and the inner face panel 4. The air is then drawn in to the interior of the fan casing 10 from the intake opening 11 via the suction opening 7 opened in the

substantially central part of the inner face panel 4. The oil content that is included in the air drawn in to the fan casing 10 is removed from the air by colliding and adhering to the fins 22 of the fan 20. The air from which the oil content has been removed forms an exhaust air flow in the centrifugal direction (horizontal direction) of the fan 20 and is exhausted from the exhausting opening 12. The flow (flow path) of the air generated by the rotation of the fan 20 has a flow (flow path) in which the air is drawn in by the intake opening 11 from the bottom to the top, then changes the direction to the horizontal direction in the centrifugal direction, and is exhausted from the exhausting opening 12.

[0017]

The communication opening 13 is provided on an upper surface of the fan casing 10 so as to face the intake opening 11 provided on a lower surface of the fan casing 10. The fan 20 is disposed on the lower side of the communication opening 13, a main body of the motor 30 is disposed on the upper side of the communication opening 13, and the rotary shaft 31 of the motor 30 is disposed to cross the communication opening 13. The motor 30 is supported at a height of about 1/3 from the bottom of the main body of the motor 30, by a motor attaching tool 32 attached to the upper surface of the fan casing 10 and provided so as to straddle the communication opening 13. The motor attaching tool 32 has a belt shape that can support the motor 30 as shown only in the cross-sectional diagram taken along B-B (Fig. 3(B)). An outer edge E of the communication opening 13 is provided so as to be positioned on the same position as an edge formed from an outer diameter L of the fan 20 or on the inside of the edge formed from the outer diameter L of the fan 20, i.e., closer to the rotary shaft 31.

[0018]

In the present embodiment, the main body of the motor 30 is disposed on the upper side of the communication opening 13 and the rotary shaft 31 of the motor 30 is disposed to cross the communication opening 13; however, the present invention is not limited thereto, and the main body of the motor 30 may be disposed to the interior of the fan 20. However, as in the present embodiment, at least a part of the motor 30 is provided so as to be positioned farther away from the intake opening 11 than a closest portion P of the fan 20 to the communication opening 13 is, so that the motor 30 does not become a resistance when the air is exhausted, enabling exhaustion with higher efficiency and reducing noise. Moreover, since the distance between the motor 30 and the noise-absorbing material 40 is short, the sound generated by the motor 30 can be absorbed with higher efficiency.

[0019]

The noise-absorbing material 40 is provided on the opposite side of the intake opening 11 with the communication opening 13 interposed therebetween, which is located on a lower surface of the motor attaching tool 32, i.e., close to the communication opening 13 from the motor attaching tool 32, so as to substantially cover the interior of the cover 50. The presence of the noise-absorbing material 40 in this manner enables the communication opening 13 to establish spatial communication between the fan 20 and the noise-absorbing material 40. In other words, the fins 22 of the fan 20, which are the source of sound, and the noise-absorbing material 40 are in a positional relationship where the fins 22 and the noise-absorbing material 40 are spatially communicated with each other via the communication opening 13. Furthermore, the communication opening 13 is located on the motor 30 side (upper side) from the fan 20 and is not on the air flow path described above, and the noise-absorbing material 40 is disposed even farther above the communication opening 13 and on the inside of the cover 50 to which the air does not flow, and is not positioned in the above-mentioned air flow path. Thus, the noise-absorbing material 40 is disposed in a position where the air including oily smoke does not enter. The noise-absorbing material 40 indicates, for example, a sound-absorbing member or a sound-absorbing resonator, and non-limiting examples thereof include a fibrous sound-absorbing member made of glass wool, rock wool, metal fiber or the like, a porous sound-absorbing member made from urethane foam, melamine foam, powder sintering or the like, and a member using interference of sound in a space such as a perforated plate, Helmholtz type sound absorber, an interference type silencer such as a side branch.

[0020]

By providing the communication opening 13 that spatially communicates the fan 20 and the noise-absorbing material 40 to facilitate sound transmission, and providing the noise-absorbing material 40 outside the flow path of the air including oil, the noise-absorbing material 40 can be prevented from being contaminated or becoming a resistance to the air flow. Accordingly, the oily smoke trapping device 100 can be provided that is capable of preventing the noise generated by the fan 20 from being transmitted to a room, without reducing performance of the intake/exhaust of the air and cleanliness.

[0021]

The noise-absorbing material 40 is provided to have a first space S1 between the noise-absorbing material 40 and the communication opening 13. In other words, the communication opening 13 is provided at a position crossing the rotary shaft 31 of

the motor 30, and the noise-absorbing material 40 is located about 1/3 from the bottom of the main body of the motor 30; thus, the first space S1, which is approximately 1/3 of the height of the main body of the motor 30, is provided over the inner surface of the cover 50. Since the noise-absorbing material 40 is provided to have the first space S1 between the noise-absorbing material 40 and the communication opening 13, even if an obstacle that blocks the sound propagation is present between the noise-absorbing material 40 and the communication opening 13, the sound spreads and propagates from the communication opening 13 and can be absorbed in a wider area, enabling sound absorption with higher efficiency. Note that a plurality of the noise-absorbing materials 40 may be provided in a stacked manner. In this case, it is preferred that a gap (space) be provided between the noise-absorbing materials 40. Also, it is preferred that an edge of each noise-absorbing material 40 be positioned on the outer side (away from the rotary shaft 31) than the outer edge E of the communication opening 13. In this manner, the sound propagated from the communication opening 13 to the outside of the fan casing 10 can be absorbed with high efficiency.

[0022]

In addition, the oily smoke trapping device 100 includes the cover 50 that is positioned farther away from the intake opening 11 than the noise-absorbing material 40 is, i.e., upward, and positioned so as to form a second space S2 communicated with the first space S1 at both ends of the noise-absorbing material 40. By providing the second space S2 that is communicated with the first space S1 at a part on the opposite side of the communication opening 13 with the noise-absorbing material 40 interposed therebetween, the second space S2 can be a space that is enclosed to cause sound to decay. The expression “enclosed to cause sound to decay” means that there exists a space behind the noise-absorbing material, the space being enclosed by the back of the noise-absorbing material so as to cause sound to decay by causing the sound entering the space to reflect and interfere in the space. By providing the second space on the opposite side of the communication opening with the noise-absorbing material interposed therebetween, the second space being enclosed so as to cause sound to decay, the sound that cannot be absorbed completely by the noise-absorbing material is propagated to the interior of the cover by being reflected inside the cover, thereby preventing the sound from propagating to the outside of the oily smoke trapping device. Note that a gap is present between the noise-absorbing material and the cover and between the noise-absorbing material and the motor, and the second space is an opened space; however, the present invention is not limited to this configuration, and these gaps do not need to be provided, and the second space may be a closed space. Since the

second space is closed, the sound propagated to the second space cannot escape to the outside of the second space easily, enabling sound absorption with higher efficiency.

[0023]

The fan 20 has a power transmission plate 21 connected to the rotary shaft 31 and the plurality of fins 22 around the power transmission plate 21. The power transmission plate 21 has a ring part 211 that forms the outermost periphery of the power transmission plate 21 and are connected to the plurality of fins 22, a central part 212 to be actually connected to the rotary shaft 31, a spoke part 213 provided between the central part 212 and the ring part 211, and a plurality of power transmission plate opening parts 214 enclosed by the ring part 211, the central part 212, and the spoke part 213. For example, if there exist three spoke parts 213, then there also exist three power transmission plate opening parts 214, and if there exist four spoke parts 213, then there also exist four power transmission plate opening parts 214. The spoke part 213 needs to have a strength to transmit the rotational driving force of the motor 30 from the central part 212 to the ring part 211, and the width of the spoke part 213 is preferably narrow so as not to reduce the total area of the power transmission plate opening parts 214 in order to increase the aperture ratio in the power transmission plate 21. Thus, by providing the power transmission plate 21 with the power transmission plate opening parts 214, the sound of the fan 20 can be easily propagated toward the communication opening 13 and can be absorbed more efficiently.

[0024]

In the present embodiment, the power transmission plate 21 is positioned at the closest part of the fan 20 to the communication opening 13 in the direction of the rotary shaft 31; however, the present invention is not limited to this configuration, and the power transmission plate 21 may be provided at the communication opening 13 side from the center position of the fan 20. Since the power transmission plate 21 is provided at the communication opening 13 side from the center position of the fan 20, the power transmission plate 21 does not become a resistance when the air is exhausted, enabling exhaustion with higher efficiency and reducing the noise. Furthermore, since the distance between the power transmission plate 21 and the noise-absorbing material 40 becomes short, the sound generated by the power transmission plate 21 can be absorbed with high efficiency.

[0025]

<Modification of First Embodiment>

An oily smoke trapping device 100' provided in a range hood 1' according to the present embodiment is now described with reference to Figs. 4 and 5. In order to

avoid repeated description, the differences between the present embodiment and the foregoing embodiment are mainly described. The range hood 1' includes a main body 2 having a duct connecting part 6, a cover 50 connected to an upper surface of the main body 2 and having a part of a motor 30 in the interior thereof, a thin hood part 3 for collecting steam, oily smoke and the like, the hood part 3 having, on an upper inner surface thereof, a depressed inner face panel 4, and a straightening plate 5 for straightening air between the inner face panel 4 and the straightening plate 5.

[0026]

The oily smoke trapping device 100' is provided in the interior of the main body 2 and the cover 50. The oily smoke trapping device 100' includes the motor 30, a fan 20 that is attached to a rotary shaft 31 of the motor 30 and generates an air flow, and a fan casing 10 having the fan 20 therein. The fan 20 is a sirocco fan with high static pressure. In the present embodiment, the fan 20 sucks air including oily smoke and the like from the suction opening 7 located in a lower section, and forms an exhaust air flow in the horizontal direction. The fan 20 has a power transmission plate 21 connected to the rotary shaft 31 of the motor 30, and a plurality of fins around the power transmission plate 21.

[0027]

The fan casing 10 includes an intake opening 11 that draws in air, an exhausting opening 12 that exhausts the air drawn in from the intake opening 11, and a communication opening 13 that is provided so as to face the intake opening 11. When the motor 30 is energized and the fan 20 present at the interior of the fan casing 10 rotates, air including oily smoke and the like is sucked in from a gap between the straightening plate 5 and the inner face panel 4. The air is then drawn in to the fan casing 10 from the intake opening 11 via the suction opening 7 opened in the substantially central part of the inner face panel 4. The oil content that is included in the air drawn in to the fan casing 10 is removed from the air by colliding and adhering to the fins 22 of the fan 20. The air from which the oil content has been removed forms an exhaust air flow in the centrifugal direction (horizontal direction) of the fan 20 and is exhausted from the exhausting opening 12. The flow (flow path) of the air generated by the rotation of the fan 20 has a flow (flow path) in which the air is drawn in by the intake opening 11 from the bottom to the top, then changes the direction to the horizontal direction in the centrifugal direction, and is exhausted from the exhausting opening 12.

[0028]

The communication opening 13 is provided on an upper surface of the fan

casing 10 so as to face the intake opening 11 provided on a lower surface of the fan casing 10. The fan 20 is disposed on the lower side of the communication opening 13, a main body of the motor 30 is disposed on the upper side of the communication opening 13, and the rotary shaft 31 of the motor 30 is disposed to cross the communication opening 13. An outer edge E of the communication opening 13 is provided so as to be positioned on the same position as an edge formed from an outer diameter L of the fan 20 or on the inside of the edge formed from the outer diameter L of the fan 20, i.e., closer to the rotary shaft 31.

[0029]

The noise-absorbing material 40' is provided on the opposite side of the intake opening 11 with the communication opening 13 interposed therebetween, which is located on the inner surface side of the main body 2 in the vicinity of a connecting part between the noise-absorbing material 40' and the cover 50, the noise-absorbing material 40' being larger than the cover 50. The presence of the noise-absorbing material 40' in this manner enables the communication opening 13 to establish spatial communication between the fan 20 and the noise-absorbing material 40'. In other words, the fins 22 of the fan 20, which are the source of sound, and the noise-absorbing material 40' are in a positional relationship where the fins 22 and the noise-absorbing material 40' are spatially communicated with each other via the communication opening 13. Furthermore, the communication opening 13 is located on the motor 30 side (upper side) from the fan 20 and is not on the air flow path described above, and the noise-absorbing material 40' is disposed even farther above the communication opening 13 and is not positioned in the above-mentioned air flow path.

[0030]

By providing the communication opening 13 that spatially communicates the fan 20 and the noise-absorbing material 40' to facilitate sound transmission, and providing the noise-absorbing material 40' outside the flow path of the air including oil, the noise-absorbing material 40' can be prevented from being contaminated or becoming a resistance to the air flow. Accordingly, the oily smoke trapping device 100' can be provided that is capable of preventing the noise generated by the fan 20 from being transmitted to a room, without reducing the performance of the intake/exhaust of air and cleanability.

[0031]

The noise-absorbing material 40' is provided to have a first space S1 between the noise-absorbing material 40' and the communication opening 13. In other words, since the noise-absorbing material 40' is provided on the inner surface side of the main

body 2, the first space S1 is provided between the communication opening 13 and the noise-absorbing material 40'. Since the noise-absorbing material 40' is provided to have the first space S1 between the noise-absorbing material 40' and the communication opening 13, the sound spreads and propagates from the communication opening 13 and can be absorbed in a wider area, enabling sound absorption with higher efficiency. Also, it is preferred that an edge of the noise-absorbing material 40' be positioned on the outer side (away from the rotary shaft 31) than the outer edge E of the communication opening 13. In this manner, the sound propagated from the communication opening 13 to the outside of the fan casing 10 can be absorbed with higher efficiency.

[0032]

In addition, the oily smoke trapping device 100' includes the cover 50 that is positioned farther away from the intake opening 11 than the noise-absorbing material 40' is, i.e., upward, and positioned so as to form a closed second space S2. By providing the closed second space S2 on the opposite side of the communication opening 13 with the noise-absorbing material 40' interposed therebetween, the sound that cannot be absorbed completely by the noise-absorbing material 40' is propagated to the interior of the cover 50 by being reflected inside the cover 50, thereby preventing the sound from propagating to the outside of the oily smoke trapping device 100'.

[0033]

<Second Embodiment>

An oily smoke trapping device 100A provided in a range hood 1A according to the present embodiment is now described with reference to Figs. 6 to 8. In order to avoid repeated description, the differences between the present embodiment and the foregoing embodiment are mainly described. The range hood 1A has a main body 2A having a duct connecting part 6 and provided with the oily smoke trapping device 100A in the interior thereof, a thin hood part 3 for collecting steam, oily smoke and the like, the hood part 3 having, on an upper inner surface thereof, a depressed inner face panel 4, and a straightening plate 5 for straightening air between the inner face panel 4 and the straightening plate 5. The hood part 3 is coupled to the main body 2A in a communicable manner by a suction opening 7 provided in the inner face panel 4.

[0034]

The oily smoke trapping device 100A is provided in the interior of the main body 2A. The oily smoke trapping device 100A includes the motor 30, a fan 20 that is attached to a rotary shaft 31 of the motor 30 and generates an air flow, and a fan casing 10 having the fan 20 in the interior thereof. The fan 20 is a sirocco fan with high static pressure. In the present embodiment, the fan 20 sucks air including oily smoke and the

like from the suction opening 7 located in a lower section, and forms an exhaust air flow in the horizontal direction. The fan 20 has a power transmission plate 21 connected to the rotary shaft 31 of the motor 30, and a plurality of fins around the power transmission plate 21.

[0035]

The fan casing 10 includes an intake opening 11 that draws in air, an exhausting opening 12 that exhausts the air drawn in from the intake opening 11, and a communication opening 13 that is provided so as to face the intake opening 11. When the motor 30 is energized and the fan 20 present in the interior of the fan casing 10 rotates, air including oily smoke and the like is sucked in from a gap between the straightening plate 5 and the inner face panel 4. The air is then drawn in to the interior of the fan casing 10 from the intake opening 11 via the suction opening 7 opened in the substantially central part of the inner face panel 4. The oil content that is included in the air drawn in to the fan casing 10 is removed from the air by colliding and adhering to the fins 22 of the fan 20. The air from which the oil content has been removed forms an exhaust air flow in the centrifugal direction (horizontal direction) of the fan 20 and is exhausted from the exhausting opening 12. The flow (flow path) of the air generated by the rotation of the fan 20 has a flow (flow path) in which the air is drawn in by the intake opening 11 from the bottom to the top, then changes the direction to the horizontal direction in the centrifugal direction, and is exhausted from the exhausting opening 12.

[0036]

The communication opening 13 is provided on an upper surface of the fan casing 10 so as to face the intake opening 11 provided on a lower surface of the fan casing 10. The fan 20 is disposed on the lower side of the communication opening 13, a main body of the motor 30 is disposed on the upper side of the communication opening 13, and the rotary shaft 31 of the motor 30 is disposed to cross the communication opening 13. An outer edge E of the communication opening 13 is provided so as to be positioned on the same position as an edge formed from an outer diameter L of the fan 20 or on the inside of the edge formed from the outer diameter L of the fan 20, i.e., closer to the rotary shaft 31.

[0037]

In the present embodiment, the main body of the motor 30 is disposed on the upper side of the communication opening 13 and the rotary shaft 31 of the motor 30 is disposed to cross the communication opening 13; however, the present invention is not limited thereto, and the main body of the motor 30 may be disposed so as to be

contained in the interior of the fan 20. However, as in the present embodiment, at least a part of the motor 30 is provided so as to be positioned farther away from the intake opening 11 than a closest portion P of the fan 20 to the communication opening 13 is, so that the motor 30 does not become a resistance when the air is exhausted, enabling exhaustion with higher efficiency and reducing noise. Moreover, since the distance between the motor 30 and a noise-absorbing material 40A is short, the noise generated by the motor 30 can be absorbed with higher efficiency.

[0038]

The noise-absorbing material 40A is provided on the opposite side of the intake opening 11 with the communication opening 13 interposed therebetween, to cross the main body of the motor 30 so as to substantially cover the interior of the main body 2A. The presence of the noise-absorbing material 40A in this manner enables the communication opening 13 to establish spatial communication between the fan 20 and the noise-absorbing material 40A. In other words, the fins 22 of the fan 20, which are the source of sound, and the noise-absorbing material 40A are in a positional relationship where the fins 22 and the noise-absorbing material 40A are spatially communicated with each other via the communication opening 13. Furthermore, the communication opening 13 is located on the motor 30 side (upper side) from the fan 20 and is not on the air flow path described above, and the noise-absorbing material 40A is disposed even farther above the communication opening 13 and on the inside of the main body 2A to which the air does not flow, and is not positioned in the above-mentioned air flow path. Thus, the noise-absorbing material 40A is disposed in a position where the air including oily smoke does not enter.

[0039]

By providing the communication opening 13 that spatially communicates the fan 20 and the noise-absorbing material 40A to facilitate sound transmission, and providing the noise-absorbing material 40A outside the flow path of the air including oil, the noise-absorbing material 40A can be prevented from being contaminated or becoming a resistance to the air flow. Accordingly, the oily smoke trapping device 100A can be provided that is capable of preventing the noise generated by the fan 20 from being transmitted to a room, without reducing the performance of the intake/exhaust of air and cleanability.

[0040]

The noise-absorbing material 40A is provided to have a first space S1 between the noise-absorbing material 40A and the communication opening 13. In other words, the communication opening 13 is provided at a position crossing the rotary shaft 31 of

the motor 30, and the noise-absorbing material 40A is disposed to cross the main body of the motor 30; thus, the first space S1, which is approximately 1/3 of the height of the main body of the motor 30, is provided over the inner surface of the main body 2A. Since the noise-absorbing material 40A is provided to have the first space S1 between the noise-absorbing material 40A and the communication opening 13, the sound spreads and propagates from the communication opening 13 and can be absorbed in a wider area, enabling sound absorption with higher efficiency.

[0041]

Moreover, in the oily smoke trapping device 100A, the noise-absorbing material 40A is disposed in the interior of the main body 2A so as to form a closed second space S2 positioned farther away from the intake opening 11 than the noise-absorbing material 40A is, i.e., upward. By providing the closed second space S2 on the opposite side of the communication opening 13 with the noise-absorbing material 40A interposed therebetween, the sound that cannot be absorbed completely by the noise-absorbing material 40A is propagated to the interior of the main body 2A by being reflected inside the main body 2A, thereby preventing the sound from propagating to the outside of the oily smoke trapping device 100A.

[0042]

<Third Embodiment>

An oily smoke trapping device 100B provided in a range hood 1B according to the present embodiment is now described with reference to Figs. 9 and 10. In order to avoid repeated description, the differences between the present embodiment and the foregoing embodiment are mainly described. The range hood 1B has a main body 2B having a duct connecting part 6 and includes the oily smoke trapping device 100B in the interior thereof, a thin hood part 3 for collecting steam, oily smoke and the like, the hood part 3 having, on an upper inner surface thereof, a depressed inner face panel 4, and a straightening plate 5 for straightening air between the inner face panel 4 and the straightening plate 5. The hood part 3 is coupled to the main body 2B in a communicable manner by a suction opening 7 provided in the inner face panel 4.

[0043]

The oily smoke trapping device 100B is provided in the interior of the main body 2B. The oily smoke trapping device 100B includes the motor 30, a fan 20 that is attached to a rotary shaft 31 of the motor 30 and generates an air flow, and a fan casing 10B including the fan 20 in the interior thereof. Unlike the foregoing embodiments, the motor 30 is provided in such a manner that the rotary shaft 31 thereof is disposed along the horizontal direction. The fan 20 is a sirocco fan with high static pressure.

In the present embodiment, the fan 20 sucks air including oily smoke and the like from the suction opening 7 located in a lower section, and forms an exhaust air flow in the vertical direction. The fan 20 has a power transmission plate 21 connected to the rotary shaft 31 of the motor 30, and a plurality of fins around the power transmission plate 21.

[0044]

The fan casing 10B includes an intake opening 11 that draws in air, an exhausting opening 12 that exhausts the air drawn in from the intake opening 11, and a communication opening 13 that is provided so as to face the intake opening 11. When the motor 30 is energized and the fan 20 present at the interior of the fan casing 10B rotates, air including oily smoke and the like is sucked in from a gap between the straightening plate 5 and the inner face panel 4. The air is then drawn in to the interior of the fan casing 10B from the intake opening 11 opened substantially in the vertical direction, via the suction opening 7 and a smoke path 8 that are opened in the substantially central part of the inner face panel 4. The oil content that is included in the air drawn in to the fan casing 10B is removed from the air by colliding and adhering to the fins 22 of the fan 20. The air from which the oil content has been removed forms an exhaust air flow in the centrifugal direction (vertical direction) of the fan 20 and is exhausted from the exhausting opening. The flow (flow path) of the air generated by the rotation of the fan 20 has a flow (flow path) in which the air is drawn in by the intake opening 11 from the front to the back (from the left to the right in Fig. 10), then changes the direction to the vertical direction in the centrifugal direction, and is exhausted from the exhausting opening.

[0045]

The communication opening 13 is provided on a surface on the back of the fan casing 10B so as to face the intake opening 11 provided on a surface in front of the fan casing 10B. The fan 20 is disposed in front of the communication opening 13, a main body of the motor 30 is disposed behind the communication opening 13, and the rotary shaft 31 of the motor 30 is disposed to cross the communication opening 13. An outer edge of the communication opening 13 is provided so as to be positioned on the same position as an edge formed from an outer diameter of the fan 20 or on the inside of the edge formed from the outer diameter of the fan 20, i.e., closer to the rotary shaft 31.

[0046]

The noise-absorbing material 40B is provided on the opposite side of the intake opening 11 with the communication opening 13 interposed therebetween, so as to be in abutment with the entire inner surface on the back of the main body 2B. The presence

of the noise-absorbing material 40B in this manner enables the communication opening 13 to establish spatial communication between the fan 20 and the noise-absorbing material 40B. In other words, the fins 22 of the fan 20, which are the source of sound, and the noise-absorbing material 40B are in a positional relationship where the fins 22 and the noise-absorbing material 40B are spatially communicated with each other via the communication opening 13. Furthermore, the communication opening 13 is located on the motor 30 side (on the rear face side) from the fan 20 and is not on the air flow path described above. The noise-absorbing material 40B is disposed even closer to the rear face side from the communication opening 13 and on the inside of the main body 2B to which the air does not flow, in such a manner as to be in abutment with the inner surface on the back, and is not positioned in the above-mentioned air flow path. Thus, the noise-absorbing material 40B is disposed in a position where the air including oily smoke does not enter.

[0047]

By providing the communication opening 13 that spatially communicates the fan 20 and the noise-absorbing material 40B to facilitate sound transmission, and providing the noise-absorbing material 40B outside the flow path of the air including oil, the noise-absorbing material 40B can be prevented from being contaminated or becoming a resistance to the air flow. Accordingly, the oily smoke trapping device 100B can be provided that is capable of preventing the noise generated by the fan 20 from being transmitted to a room, without reducing the performance of the intake/exhaust of air and cleanability.

[0048]

The noise-absorbing material 40B is provided to have a first space S1 between the noise-absorbing material 40B and the communication opening 13. In other words, the communication opening 13 is provided at a position crossing the rotary shaft 31 of the motor 30, and the noise-absorbing material 40B is disposed to be in abutment with the entire inner surface on the back of the main body 2B; thus, the first space S1 is provided over the inner surface of the main body 2B behind the communication opening 13. Since the noise-absorbing material 40B is provided to have the first space S1 between the noise-absorbing material 40B and the communication opening 13, the sound spreads and propagates from the communication opening 13 and can be absorbed in a wider area, enabling sound absorption with higher efficiency.

[0049]

<Modification of Third Embodiment>

An oily smoke trapping device 100B' provided in a range hood 1B' according

to the present embodiment is now described with reference to Fig. 11. In order to avoid repeated description, the differences between the present embodiment and the foregoing embodiment are mainly described. The range hood 1B' is the same as that of the foregoing third embodiment, except for the location of a noise-absorbing material 40B' in the main body 2B.

[0050]

The noise-absorbing material 40B' is provided on the opposite side of the intake opening 11 with the communication opening 13 interposed therebetween, in such a manner as not to be in abutment with an inner surface on the back of the main body 2B. The presence of the noise-absorbing material 40B' in this manner enables the communication opening 13 to establish spatial communication between the fan 20 and the noise-absorbing material 40B'. In other words, the fins 22 of the fan 20, which are the source of noise, and the noise-absorbing material 40B' are in a positional relationship where the fins 22 and the noise-absorbing material 40B' are spatially communicated with each other via the communication opening 13. Furthermore, the communication opening 13 is located on the motor 30 side (on the rear face side) from the fan 20 and is not on the air flow path described above, and the noise-absorbing material 40B' is disposed even closer to the rear face side the communication opening 13 and on the inside of the main body 2B to which the air does not flow, and is not positioned in the above-mentioned air flow path. Thus, the noise-absorbing material 40B' is disposed in a position where the air including oily smoke does not enter.

[0051]

Thus, by providing the communication opening 13 that spatially communicates the fan 20 and the noise-absorbing material 40B' to facilitate sound transmission, and providing the noise-absorbing material 40B' outside the flow path of the air including oil, the noise-absorbing material 40B' can be prevented from being contaminated or becoming a resistance to the air flow. Accordingly, the oily smoke trapping device 100B' can be provided that is capable of preventing the noise generated by the fan 20 from being transmitted to a room, without reducing the performance of the intake/exhaust of air and cleanability.

[0052]

The noise-absorbing material 40B' is provided to have a first space S1 between the noise-absorbing material 40B' and the communication opening 13. In other words, the communication opening 13 is provided at a position crossing the rotary shaft 31 of the motor 30, and the noise-absorbing material 40B' is disposed in the vicinity of the back of the motor 30, which is on the back of the main body 2B; thus, the first space S1

is provided to cross the width of the main body of the motor 30 of the main body 2B behind the communication opening 13. Since the noise-absorbing material 40B' is provided to have the first space S1 between the noise-absorbing material 40B' and the communication opening 13, the sound spreads and propagates from the communication opening 13 and can be absorbed in a wider area, enabling sound absorption with higher efficiency.

[0053]

Moreover, with the oily smoke trapping device 100B', the noise-absorbing material 40B' is disposed in the interior of the main body 2B so as to form a closed second space S2 positioned farther away from the intake opening 11 than the noise-absorbing material 40B' is, i.e., on the back. By providing the closed second space S2 on the opposite side of the communication opening 13 with the noise-absorbing material 40B' interposed therebetween, the sound that cannot be absorbed completely by the noise-absorbing material 40B' is propagated to the interior of the main body 2B by being reflected inside the main body 2B, thereby preventing the sound from propagating to the outside of the oily smoke trapping device 100B'. Note that, in the present embodiment, the second space S2 is closed but may be communicated with the first space S1 at a part.

[0054]

Note that the present invention is not limited to the illustrated embodiments and can be implemented with configurations within the scope that does not depart from the contents described in the respective claims. Specifically, the present invention has been illustrated and described with reference to particular embodiments, but the numbers and other detailed configurations in the embodiments described above can be modified in various ways by those skilled in the art without departing from the technical concepts and objects of the present invention.

[0055]

For example, the oily smoke trapping devices described above are installed in a range hood but may be installed in an electric lamp provided above a dining table.

[Reference Signs List]

[0056]

- | | |
|---|---------------------|
| 1 | Range hood |
| 2 | Main body |
| 3 | Hood part |
| 4 | Inner face panel |
| 5 | Straightening plate |

6	Duct connecting part
7	Suction opening
8	Smoke path
100	Oily smoke trapping device
10	Fan casing
11	Intake opening
12	Exhausting opening
13	Communication opening
20	Fan
21	Power transmission plate
211	Ring part
212	Central part
213	Spoke part
214	Power transmission plate opening part
22	Fin
30	Motor
31	Rotary shaft
32	Motor attaching tool
40	Noise-absorbing material
50	Cover
S1	First space
S2	Second space
E	Outer edge of communication opening
L	Outer diameter of fan
P	Closest part of fan to communication opening side

[CLAIMS]

[Claim 1]

An oily smoke trapping device, comprising:

5 a motor;

a fan attached to a rotary shaft of the motor and generating a flow of air; and

a fan casing including the fan in the interior thereof,

wherein the fan casing includes:

an intake opening that draws in the air;

10 an exhausting opening that exhausts the air; and

a communication opening that is provided to face the intake opening and

is not on a flow path which is a flow of air generated by rotation of a fan,

a noise-absorbing material is provided on the opposite side of the intake opening

with the communication opening interposed therebetween,

15 the communication opening spatially communicates the fan and the noise-

absorbing material, and

an outer edge of the communication opening is provided so as to position on the

same position as an outer diameter of the fan or on the inside of the outer diameter of

the fan.

20

[Claim 2]

The oily smoke trapping device according to claim 1, wherein the noise-

absorbing material is provided to have a first space between the noise-absorbing

material and the communication opening.

25

[Claim 3]

The oily smoke trapping device according to any of claim 1 or 2, wherein the fan

has a power transmission plate connected to the rotary shaft and a plurality of fins

around the power transmission plate,

the power transmission plate having a ring part connected to the plurality of fins, a central part connected to the rotary shaft, a spoke part provided between the central part and the ring part, and a plurality of power transmission plate opening parts enclosed by the ring part, the central part, and the spoke part.

5

[Claim 4]

The oily smoke trapping device according to claim 3, wherein the power transmission plate is provided on the communication opening side from a center position of the fan in a direction of the rotary shaft.

10

[Claim 5]

The oily smoke trapping device according to any one of claims 1 to 4, wherein at least a part of the motor is provided so as to be positioned farther away from the intake opening than a closest portion of the fan to the communication opening is.

15

[Claim 6]

The oily smoke trapping device according to any one of claims 1 to 5, having a second space which is positioned farther away from the intake opening than the noise-absorbing material, the second space being a space enclosed so as to cause a sound to decay.

20

[Claim 7]

The oily smoke trapping device according to claim 6, wherein the second space is a closed space.