

DESCRIPTION

TITLE OF INVENTION: AN EXTRACTION SYSTEM OF ENVIRONMENTALLY FRIENDLY KITCHEN FOR FUME PURIFICATION

FIELD OF THE INVENTION

The present invention relates to an exhaust system for purifying kitchen oil fume, specifically an environmentally friendly exhaust system that combines indoor ventilation and kitchen oil fume purification.

BACKGROUND OF THE INVENTION

The restaurant kitchen will produce a large amount of oil fume during the cooking process, especially when frying, stir-frying, etc. The oil fume emissions from most existing restaurants are untreated, and the oil fume is exhausted directly from the kitchen by the negative pressure generated by the fan and discharged directly to the external environment. The direct discharge of such high-temperature oil fumes may contain carcinogens which will affect human health if inhaled. Even for the sake of environmental protection, some oil fume exhaust systems will add oil fume separation devices. The oil fume condenses on the lower-temperature fan blades and then is thrown out by the centrifugal force while the fan blade rotates. However, while the large amount of high-temperature oil fume is heated, the temperature of the fan blades will increase simultaneously, and affect the effect of oil fume condensing on the surfaces. Actually, the proportion of oil fume collected is low, and the effect of

separating oil fume is not good.

SUMMARY OF THE INVENTION

The present invention is to provide an environmentally friendly kitchen fume purification and extraction system, which inhales air from the ventilation space through a vortex tube to achieve ventilation and simultaneously generates low-temperature air and is transported to the extraction system to condense and collect the fume, thereby achieving ventilation and separation of the fume at the same time. It is more environmentally friendly and greatly improves the separation efficiency of oil fumes.

The invention achieves this by:

An extraction system of environmentally friendly kitchen for fume purification, comprising:

an oil fume extraction system, of which an air inlet is located in the kitchen and inhales the oil fume of the kitchen by a negative pressure device to generate negative pressure and transmits by a pipeline;

an oil fume condensation chamber, which is equipped with a filter for cooling and condensing the oil fume inside; and the oil fume condensation chamber is provided with an inlet of condensed air;

a vortex tube;

a ventilation device, which inhales the air in the ventilation space by the compression device to be compressed and sent to the compressed air inlet of the vortex tube, the low-temperature gas outlet of the vortex tube is connected to the condensed gas inlet of the oil fume condensation chamber;

the air in the ventilation space is turned into high-pressure air by the

compression device and is sent to the vortex tube; the low-temperature air outlet of the vortex tube generates low-temperature air and is transported to the oil fume condensation chamber to cool the filter; the oil fume generated in the kitchen passes is inhaled into the oil fume condensation chamber by the negative pressure device; and the oil fume condenses and separates by the cooled filter under the cooling of low-temperature air; the separated air is discharged from the outlet of the oil fume condensation chamber to the vent port of the system through a pipeline.

Preferably, a high-temperature air outlet of the vortex tube is connected to the vent port of the system and mixed with the air in the vent port.

Preferably, a water storage tank and a heat exchanger are provided; the high-temperature air outlet of the vortex tube is connected to the heat exchanger, the heat exchanger is immersed in the water storage tank to heat up the water inside.

Preferably, the heat exchanger is a closed cabinet with an air inlet and an air outlet at both ends, the gas inlet is connected to the high-temperature air outlet of the vortex tube through a pipeline, and the air outlet is connected to the vent port of the system; heat-absorbing fins are arranged diagonally along the flow direction of the air in the cabinet to form a tortuous air channel.

Preferably, the heat exchanger is a closed cabinet with an air inlet and an air outlet at both ends, the gas inlet is connected to the high-temperature air outlet of the vortex tube through a pipeline, and the air outlet is connected to the vent port of the system; heat-absorbing fins in honeycomb-shaped are arranged in the cabinet along the flow direction of the air.

Preferably, a tableware preheating cabinet is provided, where exhaust holes are evenly provided at the bottom, the high-temperature air outlet of the vortex tube is connected to the exhaust holes, the tableware is placed above the exhaust holes and is heated by the high-temperature air.

Preferably, the negative pressure device of the oil fume extraction system is set after the oil fume condensation chamber by the pipeline, that is, the air outlet of the oil fume condensation chamber is connected to the air inlet of the negative pressure device, and the air outlet of the negative pressure device is connected to the high-temperature air outlet of the vortex tube by the pipeline.

Compared with existing technology, the beneficial effects of the present invention are: the device of the present invention uses the oil fume condensation chamber to cool the internal temperature to 5-8°C through the low-temperature air generated by the vortex tube, and maintains the filter in a low-temperature environment; the oil fume is cooled and collected when passing through the low-temperature filter, then the oil fume condenses into a liquid state from the smoke point and is retained in the oil fume condensation chamber for collection, thereby greatly reducing the amount of oil fume emissions. The oil fume condensed in the oil fume condensation chamber and the filter can be cleaned and replaced regularly as needed. The air inlet of the vortex tube is connected to the ventilation device, so the air in the ventilation space can be compressed and supplied to the vortex tube for cooling. The combination of the above two can make full use of energy to complete different functions. Moreover, the device of the present invention is low-cost and only requires simple modifications to the existing oil fume emission system, so that it can reduce the emission of harmful

substances in the air and is more environmentally friendly.

BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 is a schematic structural diagram of the present invention.

Fig. 2 is a schematic structural diagram of the water storage tank.

Fig. 3 is a schematic structural diagram of the preheating cabinet.

DESCRIPTION OF THE EMBODIMENTS

The technical solutions in the embodiments of the present invention will be clearly and completely described below concerning the accompanying drawings in the embodiments of the present invention. Obviously, the described embodiments are only some of the embodiments of the present invention, rather than all the embodiments. Based on the embodiments of the present invention, all other embodiments obtained by those of ordinary skill in the art without creative efforts fall within the scope of protection of the present invention.

In order to solve the technical problem in the existing technology that the kitchen oil fume emission system does not perform oil fume separation processing, refer to Fig. 1, and provide the following technical solutions:

The extraction system of environmentally friendly kitchen for fume purification comprises an oil fume extraction system 1, an oil fume condensation chamber 3, a ventilation device 5 and a vortex tube 7, etc. The oil fume extraction system 1 can be the oil fume emission equipment used in existing kitchens. Specifically, the oil fume extraction system 1 usually uses a motor and fan blades to generate negative pressure in the air pipeline, inhaling the oil fume in the kitchen through the air inlet 2 and transporting it to the oil fume condensation chamber 3 through the pipeline.

Specifically, the negative pressure device 9 of the oil fume extraction system 1 is set after the oil fume condensation chamber 3 through the pipeline, that is, the air outlet of the oil fume condensation chamber 3 is connected to the air inlet of the negative pressure device 9, and the air outlet of the negative pressure device 9 is connected to the high-temperature air outlet of the vortex tube 7 through the pipeline. So, a negative pressure can be developed in the oil fume condensation chamber 3. Even if the filter 4 is partially blocked in case of the oil fume condensation, the oil fume in the kitchen can be kept inhaling for better effect.

The oil fume condensation chamber 3 is provided with the filter 4 and the an inlet of condensed air in the chamber. The filter 4 usually adopts a grille made of metal, which can quickly cool down and facilitate the condensation of oil fume on its surface, and does not hinder the passage of air, thus not affecting the normal operation of the oil fume extraction system. The oil fume condensation chamber 3 is provided with the inlet of condensed air connected to the low-temperature air outlet of the vortex tube 7. The low-temperature air generated by the vortex tube 7 is transported to the oil fume condensation chamber 3 to cool the filter 4.

The ventilation device 5 is usually installed in a restaurant to introduce outdoor fresh air into the restaurant and discharge the dirty air to the outside. The more commonly used ones are ventilation fans or central air-conditioning systems. The ventilation device 5 involved in the present invention is different from the existing one in that it uses a compression device 6 to inhale in the air in the restaurant, and then transports the compressed air into the air inlet of the

vortex tube 7. Based on the working characteristics of the vortex tube 7, low-temperature air and high-temperature air will be output to both sides of the vortex tube 7 respectively. By adjusting the airflow at the air inlet, the temperatures of the low-temperature air and the high-temperature air can be adjusted. And then it can simultaneously achieve ventilation in the restaurant and use the ventilation air to produce cooling or heating effects.

The low-temperature air generated by the vortex tube 7 is transported to the oil fume condensation chamber 3 to condense the oil fume, and the high-temperature air generated can also be further utilized. Such as the following relevant embodiments.

Embodiment 1, if the high-temperature air outlet of the vortex tube 7 is directly discharged to the environment without heat exchange utilization, it may cause discomfort to people. The air in the oil fume will be cooled by the condensation chamber 3, so the low-temperature air in the condensation chamber 3 and the high-temperature air of the vortex tube 7 can be mixed at the vent port 8 of the system to cool down the temperature of the high-temperature air for further discharging into the environment.

Embodiment 2: The kitchen often needs hot water, so the high-temperature air generated by the vortex tube 7 can be fully utilized for heating, such as heating the water in the water storage tank. Referring to Fig. 2, connect the high-temperature air outlet of the vortex tube 7 to the heat exchanger 10 for heating up the water in the water storage tank. In order to achieve a higher heat exchange rate, it is necessary to increase the specific surface area of the heat exchanger 10 in contact with the high-temperature air. Specifically, the present

invention will provide two structures for implementation. One is that the heat-absorbing fins 11 are arranged diagonally along the flow direction of the air in the cabinet to form a tortuous air channel. When the high-temperature air enters the heat exchanger 10, it will flow along the heat-absorbing fins 11 and the flow rate will be reduced. That is, the residence time of the high-temperature air in the heat exchanger 10 will be increased so that the heat can be fully conducted to the heat-absorbing fins 11, the heat-absorbing fins 11 can also greatly increase the surface area of the heat exchanger 10 in contact with high-temperature air to improve heat exchange efficiency. Second, honeycomb-shaped heat-absorbing fins 11 are arranged in the cabinet along the flow direction of the gas. The honeycomb-shaped design can increase the heat-absorbing area but has less resistance to high-temperature air, which can reduce the fluid resistance of the air to meet different usage needs. The above-mentioned heat exchanger 10, heat-absorbing fins 11, etc. are usually made of materials with good thermal conductivity, such as copper.

Embodiment 3, the high-temperature air of the vortex tube 7 can also be used to preheat the tableware. Referring to Fig. 3, the tableware preheating cabinet is evenly provided with exhaust holes 12, and the high-temperature air outlet of the vortex tube 7 is connected to exhaust holes 12. The tableware is placed above the exhaust hole 12 and heated by high-temperature air. for example, to be sterilized at high temperature.

It should be stated that in this article, relational terms such as first and second are only used to distinguish one entity or operation from another entity or operation, and do not necessarily require or imply that these entities or

operations are mutually exclusive. any such actual relationship or sequence exists between them. Furthermore, the terms "comprises," "comprises" or any other variations thereof are intended to cover a non-exclusive inclusion such that a process, method, article, or apparatus that includes a list of elements includes not only those elements, but also those not expressly listed other elements, or elements inherent to the process, method, article or equipment.

Although the embodiments of the present invention have been shown and described, those of ordinary skill in the art will understand that various changes, modifications, and substitutions can be made to these embodiments without departing from the principles and spirit of the invention. and modifications, the scope of the invention is defined by the appended claims and their equivalents.

CLAIMS

1. An extraction system of environmentally friendly kitchen for fume purification, comprising:

an oil fume extraction system, of which an air inlet is located in the kitchen and inhales the oil fume of the kitchen by a negative pressure device to generate negative pressure and transmits by a pipeline;

an oil fume condensation chamber, which is equipped with a filter for cooling and condensing the oil fume inside; and the oil fume condensation chamber is provided with an inlet of condensed air;

a vortex tube;

a ventilation device, which inhales the air in the ventilation space by the compression device to be compressed and sent to the compressed air inlet of the vortex tube, the low-temperature gas outlet of the vortex tube is connected to the condensed gas inlet of the oil fume condensation chamber;

the air in the ventilation space is turned into high-pressure air by the compression device and is sent to the vortex tube; the low-temperature air outlet of the vortex tube generates low-temperature air and is transported to the oil fume condensation chamber to cool the filter; the oil fume generated in the kitchen passes is inhaled into the oil fume condensation chamber by the negative pressure device; and the oil fume condenses and separates by the cooled filter under the cooling of low-temperature air; the separated air is discharged from the outlet of the oil fume condensation chamber to the vent port of the system through a pipeline.

2. The extraction system of environmentally friendly kitchen for fume

purification of claim 1, wherein a high-temperature air outlet of the vortex tube is connected to the vent port of the system and mixed with the air in the vent port.

3.The extraction system of environmentally friendly kitchen for fume purification of claim 2, wherein a water storage tank and a heat exchanger are provided; the high-temperature air outlet of the vortex tube is connected to the heat exchanger, the heat exchanger is immersed in the water storage tank to heat up the water inside.

4.The extraction system of environmentally friendly kitchen for fume purification of claim 3, wherein the heat exchanger is a closed cabinet with an air inlet and an air outlet at both ends, the gas inlet is connected to the high-temperature air outlet of the vortex tube through a pipeline, and the air outlet is connected to the vent port of the system; heat-absorbing fins are arranged diagonally along the flow direction of the air in the cabinet to form a tortuous air channel.

5.The extraction system of environmentally friendly kitchen for fume purification of claim 3, wherein the heat exchanger is a closed cabinet with an air inlet and an air outlet at both ends, the gas inlet is connected to the high-temperature air outlet of the vortex tube through a pipeline, and the air outlet is connected to the vent port of the system; heat-absorbing fins in honeycomb-shaped are arranged in the cabinet along the flow direction of the air.

6.The extraction system of environmentally friendly kitchen for fume purification of claim 1, wherein a tableware preheating cabinet is provided,

where exhaust holes are evenly provided at the bottom, the high-temperature air outlet of the vortex tube is connected to the exhaust holes, the tableware is placed above the exhaust holes and is heated by the high-temperature air.

7.The extraction system of environmentally friendly kitchen for fume purification of claim 1, wherein the negative pressure device of the oil fume extraction system is set after the oil fume condensation chamber by the pipeline, that is, the air outlet of the oil fume condensation chamber is connected to the air inlet of the negative pressure device, and the air outlet of the negative pressure device is connected to the high-temperature air outlet of the vortex tube by the pipeline.