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3,410,195

KITCHEN EXHAUST HOOD

Filed May 11, 1967

2 Sheets-Sheet 1

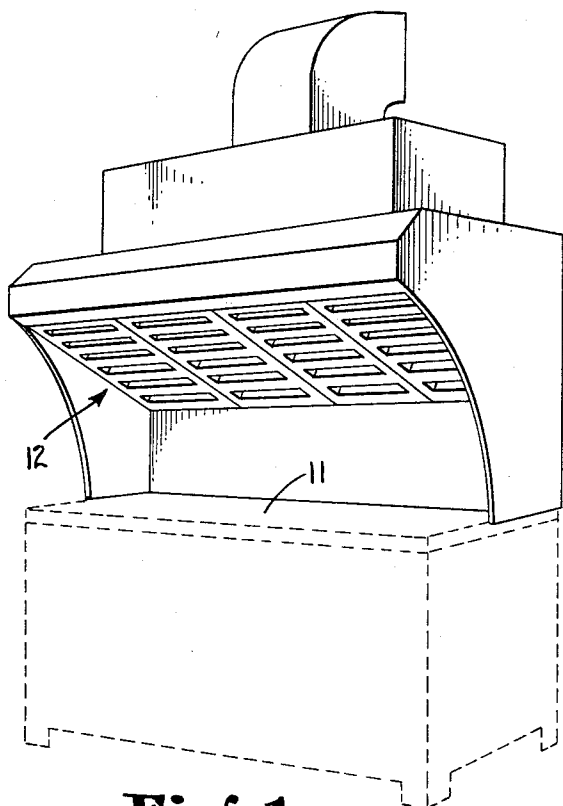


Fig. 1.

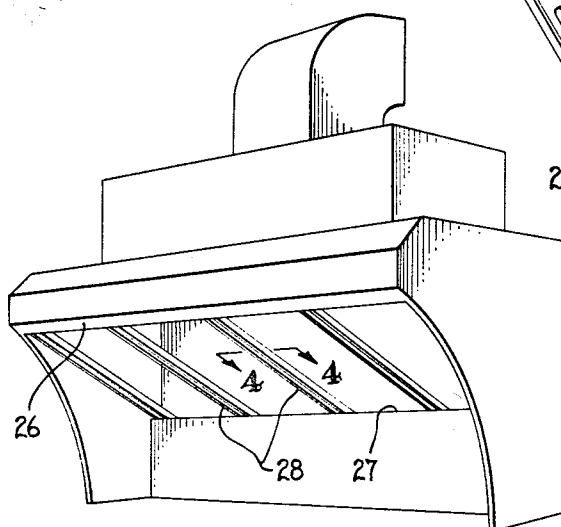


Fig. 2.

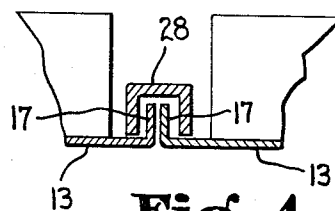


Fig. 4.

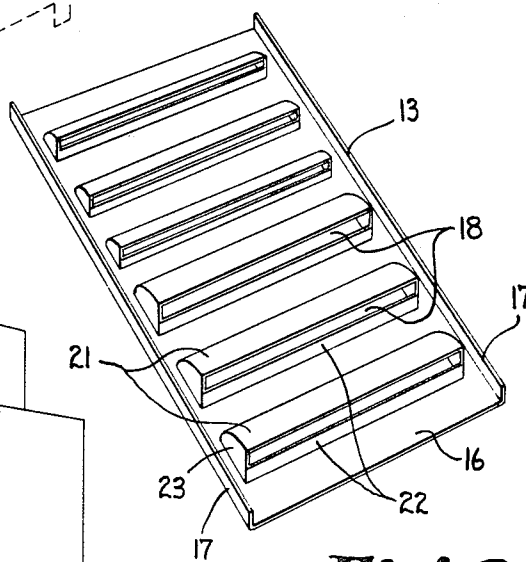


Fig. 3.

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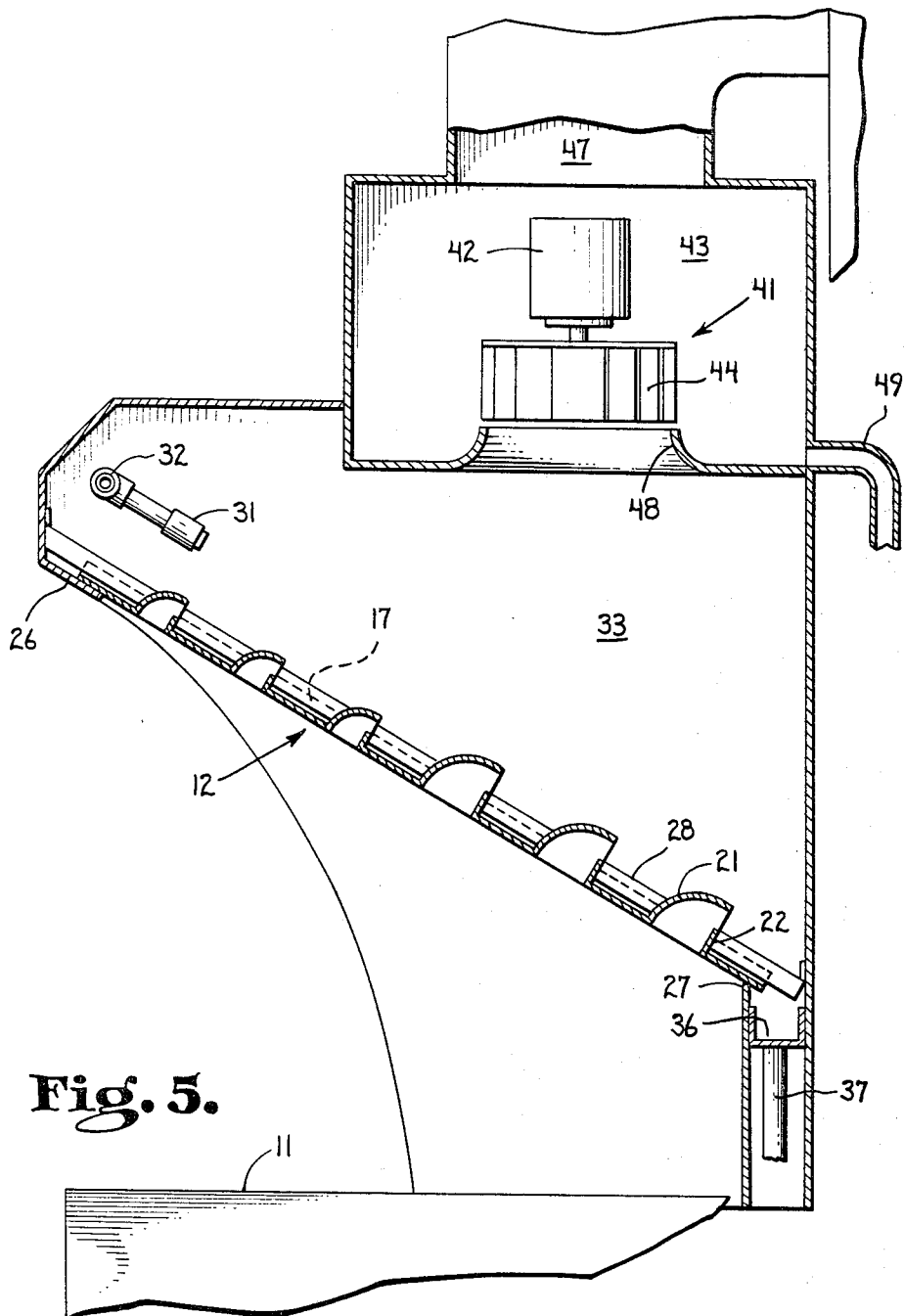
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ABSTRACT OF THE DISCLOSURE

A kitchen exhaust hood having a drip-proof louver for receiving hot grease-laden air, water spray to cool the hot air and condense the grease and a blower for discharging air drawn into the hood and centrifugally separating water droplets therefrom.

Background of the invention

Field of the Invention.—The field of the invention is generally ventilation, and more specifically, hoods and off-takes.

Description of the Prior Art.—Many different designs of exhaust hoods are known in the art. The earliest apparatus merely vented the hot grease-laden air to the atmosphere. Grease condensed on the inner surfaces of the ducts in these early apparatus and created an appreciable fire hazards. Filters, steam spray and water spray have been used to remove grease from the air and thereby eliminate the fire hazard. A spray system is shown in Gaylord 3,055,285, Gaylord 3,207,058 and Gaylord 3,247,776. A closed cycle system using a filter, water spray and electrostatic separation is shown in Jensen 3,260,189.

Each of the above mentioned prior art devices is comparatively complex in structure and operation. The need exists for a comparatively simple apparatus that eliminates the fire hazard, requires little maintenance, and effectively removes oil and grease from the air.

The present invention provides such an apparatus, and further, provides a drip-proof louver which will not drip condensed grease and oil back onto the cooking surface. The apparatus of the present invention also provides increased air handling capacity and improved grease removal by using centrifugal separation of condensed grease and water droplets from the air stream.

Summary of the invention

The present invention provides an improved and simplified kitchen exhaust hood for ventilating cooking areas, such as grills, deep fryers and cooking ranges, and for cooling the air so exhausted and removing therefrom the cooking oils and grease. A water spray cools the air drawn into the hood, causing the cooking oils and grease to condense. A drip-proof louver prevents any of the water droplets or condensed oil or grease from dropping onto the cooking area under the hood as frequently occurs in many hoods, especially those having filters positioned over the cooking area. The use of the water spray and drip-proof louver eliminates the need for a filter, and thereby eliminates the well-known fire hazard attendant the use of filters. Proper adjustment of the water flow to the air flow maintains the temperature within the hood above the melting point of the cooking oils, allowing them to flow freely with the water down the sides of the

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hood and the drip-proof louver into collecting troughs for drainage.

The hood of the present invention also include a radial blower for drawing air over the cooking surface, into the hood, and exhausting it to the atmosphere. As the air is drawn over the cooking surface, it is heated and receives oil and grease vapors, which are carried into the hood through the drip-proof louver as mentioned above. Most of the oil and grease is separated from the air by the water spray and collected in the collecting trough. However, some of the water droplets are sufficiently small to be carried upward by the air current to the blower. To prevent these droplets with condensed grease and oil adhering to them from being exhausted into the atmosphere, the blower is adapted to centrifugally separate them from the air stream. The water droplets being of greater density than the air are thrown against the blower housing where they collect and run down into another collecting trough for drainage.

Another feature of the hood of the present invention is that substantially all of the members having external surfaces which receive radiant heat from the cooking area, and which are in contact with the flame should a fire occur on the cooking area, have an inner surface in contact with the water spray. This arrangement prevents heat from a fire from warping or otherwise damaging these members.

Additionally, the water spray is effective to prevent significant temperature rise within the hood should a fire occur on the cooking area, thereby eliminating the possibility of fire within the hood or exhaust ducting connected thereto.

It is therefore an object of the present invention to provide an improved kitchen exhaust hood.

It is a further object to provide a kitchen exhaust hood which removes substantially all of the vaporized oil and grease from the air before exhausting it to the atmosphere.

It is a further object of the present invention to provide an improved kitchen exhaust hood which is simple in construction and will require little maintenance.

A still further object of the present invention is to provide a kitchen exhaust hood which effectively eliminates the fire hazard generally attendant the use of filters.

These and other objects and advantages of the present invention will become apparent as the description proceeds, reference being had to the drawings and appended claims.

Brief description of the drawings

FIG. 1 is a perspective view of the exhaust hood of the present invention in place over a cooking area.

FIG. 2 is a perspective view of the hood of the present invention with the drip-proof louver sections removed.

FIG. 3 is a perspective view of a drip-proof louver section.

FIG. 4 is a cross-sectional view taken generally along the line 4—4 of FIG. 3 and shows two adjacent drip-proof louver sections and a downward-opening channel member.

FIG. 5 is a cross-sectional side elevation view of the exhaust hood of the present invention.

Description of the preferred embodiments

Referring now to FIG. 1, there is shown the kitchen exhaust hood of the present invention in position over a

cooking surface 11 such as a grill. The cooking surface 11 may also include a gas or electric cooking range and deep frying apparatus. A blower, to be subsequently described, pulls air from over the cooking area into the hood through the drip-proof louver 12. As the air passes over the cooking area, it is heated and mixed with smoke, oil and grease vapor, and steam generated by the food being cooked.

The drip-proof louver 12 has a plurality of louver sections 13 as best shown in FIG. 3. Each louver section 13 includes a substantially rectangular flat portion 16 with upturned flanges 17. The portion 16 has a plurality of elongated rectangular openings 18. Each opening 18 has a curved vane 21 affixed to one elongated side and a straight vane 22 affixed to the other elongated side. End closure members 23 are affixed to the ends of the openings 18, and to the curved vanes 21 and the straight vanes 22 as best shown in FIG. 3.

The louver sections 13 are supported in place over the cooking area 11 by upper and lower support members 26 and 27 respectively as shown in FIG. 2. A plurality of downward-opening channel members 28 overlie the flanges 17 of adjacent louver sections 13, as best shown in FIG. 4, to prevent water and grease droplets from passing between two adjacent louver sections when they are in place. The louver sections 13 are proportioned and positioned so that when in place over the cooking area 11, they form the drip-proof louver 12. Each louver section 13 is preferably about 1½ to 2 feet wide and 3 to 4 feet long. This permits easy handling and cleaning of the louver sections. To insert a louver section 13 in place, it is first entered in the upper support member 26, pushed into the upper support member 26 far enough to permit the lower end to be entered in the lower support member 27 and then allowed to slide downwardly into the lower support member 27 which has a stop (not shown) that prevents the louver section from sliding downwardly far enough to disengage from the upper support member 26. To remove the louver sections 13, the above procedure is reversed.

A plurality of nozzles 31 located as shown in FIG. 5 direct a spray of water into the flow of air coming into the hood through the drip-proof louver 12. The nozzles receive water from a pipe 32 and create a very fine spray, wherein the water droplets have a very large area to volume ratio and therefore are quite effective in cooling the incoming air. The vaporized oils and grease are also cooled and condense out of the air, forming films of oil and grease on the water droplets. The volume 33 enclosed within the hood is sufficiently large that the velocity of the air flowing within it is comparatively slow, permitting the oil coated droplets of water to fall under the force of gravity onto the drip-proof louver 12 and other parts of the hood from which they flow into a collector trough 36 which runs the length of the exhaust hood and is pitched toward a drain 37.

A blower 41 driven by a motor 42 is mounted in a blower housing 43 located substantially above the volume 33 from which the blower 41 takes its suction. The blower 41 is of the radial type, taking its suction upwardly through the center of the cage 44. Air is discharged radially about the cage 44 impinges on the housing and flows upwardly to the duct 47. Any water droplets taken into the blower 41, having greater mass than the air, are thrown by centrifugal force against the walls of the blower housing 43, where they accumulate and run down to the bottom of the blower housing. A bell-shaped intake flange 48 cooperates with the sides and bottom of the blower housing 43 to form a trough or receptacle for the water flowing down the blower housing walls. A drain 49 is provided to carry away the grease-laden water from the blower housing 43. In some installations it may be desirable to provide two or more blowers instead of one to provide more even air flow over the length of the drip-proof louver 12.

In operation, the flow of water through the spray nozzles 31 should be sufficient to adequately cool the air flowing into the hood and to condense the oils and grease therefrom, but should not be so great that it causes the cooking grease to congeal within the hood. The temperature of the air drawn into the hood from the cooking area generally ranges between 200° F. and 300° F. Because most cooking oils and grease solidify at a temperature below normal body temperature (approximately 98.6° F.), the temperature within the hood should not be allowed to fall below approximately 100° F. during normal operation to insure that the cooking grease will not congeal. With the exception of a short time during start-up after the cooking apparatus has been turned off, the temperature within the hood may easily be maintained above 100° F.

One of the hazards attendant many kitchen operations is fire. In many instances, a fire on the cooking area has been drawn into an exhaust hood, giving a blowtorch effect to the fire. Even if there were no grease accumulation within the hood or its associated ducting, the increase in temperature within the hood and ducting may be sufficient to ignite portions of a building surrounding the ducting and hood. The hood of the present invention eliminates such a fire hazard. Under actual test, an exhaust hood embodying the features of the present invention was subjected to grease fire and temperature in ducts did not exceed 175° F.

Also, during this test, the louver sections 13 did not seriously warp or otherwise distort. This is because the spray of water on the inner surface of the louver sections kept them sufficiently cool to prevent damage to them. It will be seen that substantially all of the portions and members exposed to radiant heat from the cooking area, and therefore those surfaces that are exposed to flame should a fire occur on the cooking area, have an inner surface in contact with the water spray.

Often, when a fire has occurred on the cooking area in a kitchen, the hood fan has been turned off to prevent spreading the fire to another part of the building. This well-intended preventive step frequently makes matters worse because without the hood fan running, the heat build-up in the kitchen may be great enough to cause a major fire there. With the hood of the present invention, this danger is eliminated. The blower is merely left "on" to pull the hot gasses of combustion away from the cooking area and out of the kitchen. The flow of cooler air pulled in over the heating area makes it possible for a person to approach near to the fire and easily extinguish it. Should the fire occur when nobody is in the kitchen, for example in a deep fryer, it would quite likely burn itself out without spreading.

It will be seen that the present invention provides an improved kitchen exhaust hood which is simple in construction and easily maintained. It removes substantially all of the vaporized oil and grease from the air before exhausting it to the atmosphere. It also eliminates the fire hazard attendant many hoods, especially those with filters which if not kept clean obstruct the air flow and hold grease in a condition in which it is easily ignited.

While the invention has been illustrated and described in detail in the drawings and foregoing description, the same is to be considered as illustrative and not restrictive in character, it being understood that only the preferred embodiment has been shown and described and that all changes and modifications that come within the spirit of the invention and the scope of the claims are also desired to be protected.

What is claimed is:

1. In a kitchen exhaust hood having a drip-proof louver, spray means for spraying water within said hood and a blower for drawing air into said hood through said drip-proof louver and exhausting it to the atmosphere, the blower being adapted to centrifugally separate water droplets and condensed grease and oil from the air, wherein

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the improvement comprises forming said drip-proof louver to include a plurality of louver sections, each of said sections including a generally rectangular flat portion having a plurality of elongate rectangular openings therein, upturned flanges on opposite sides of said flat portion, and associated with each opening a flat vane, a curved vane and two end closure members, said curved vane being affixed to said flat portion along one side of said opening, said flat vane being affixed to said flat portion along the other side of said opening, and one of said end closure members being affixed to said flat portion, said curved vane and said flat vane at each end of said opening.

2. The invention of claim 1 further comprising a plurality of downward opening channel members adapted to overlie the upturned flanges of said louver sections to prevent water and grease droplets from passing between two adjacent louver sections.

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3. The invention of claim 2 wherein said spray means includes a plurality of nozzles mounted within said hood.

4. The invention of claim 3 further comprising first trough means for collecting water, oil and grease separated from the air within said hood by gravity and second trough means for collecting water, oil and grease separated from the air by said blower.

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