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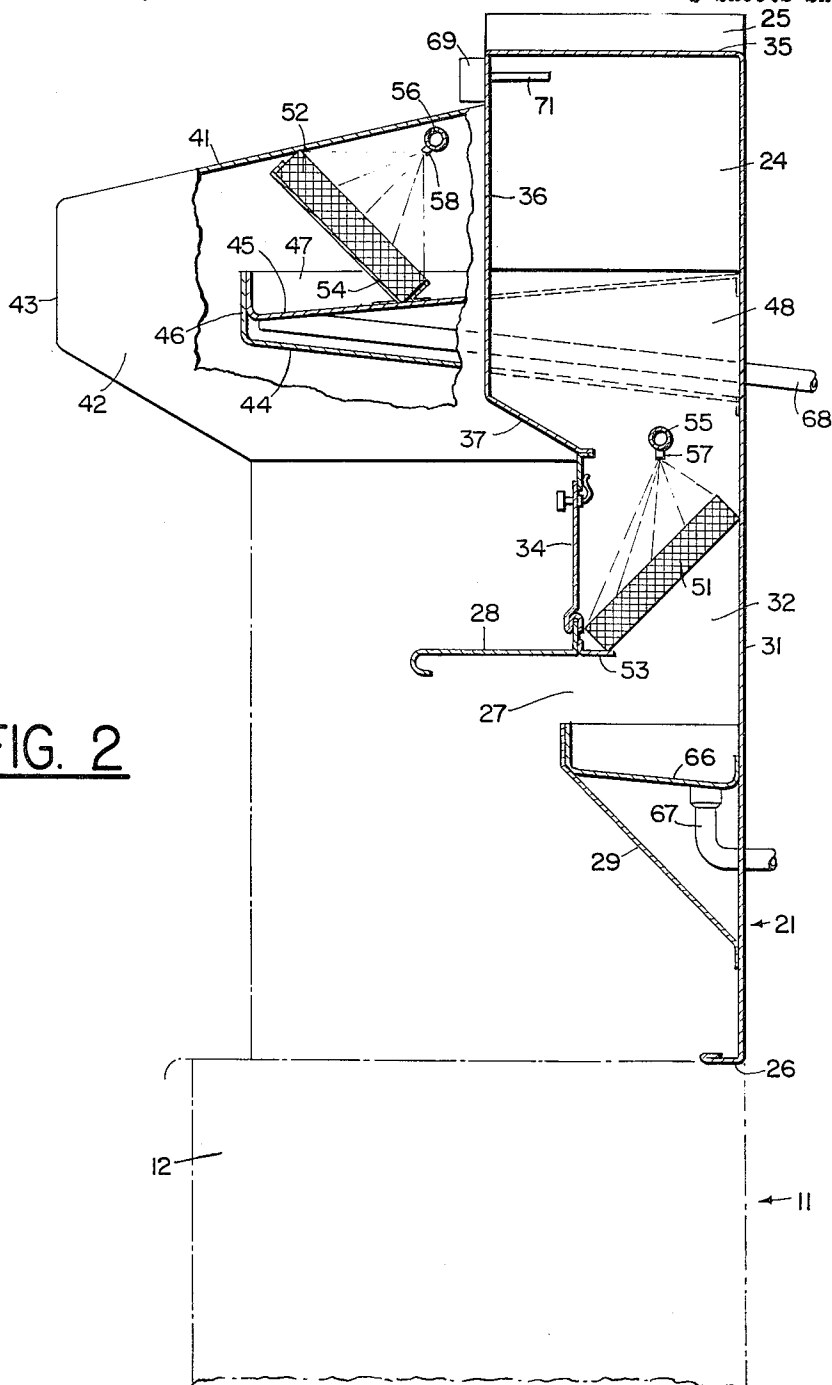
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VENTILATION SYSTEM FOR COOKING UNIT

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FIG. 2



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VENTILATION SYSTEM FOR COOKING UNIT

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This invention relates to a ventilating unit adapted to remove grease and steam laden vapors from the vicinity of cooking ranges, ovens, broilers, deep fat fryers, grills, and the like. More particularly it relates to a ventilating unit adapted for use with commercial or restaurant type cooking units, and provided with means for removing grease from the vapors, means for cleaning the grease removing means, and means for inhibiting the spread of fires in the ventilator and the attached flues and chimneys.

It is quite conventional to provide cooking units, especially the larger ones used in restaurants and other commercial establishments with a forced ventilating system for the removal of the odors, vapors and heat created during cooking. Such vapors are normally laden with vaporized or entrained fats, greases and oils liberated during the cooking process or from frying units, especially deep fat frying units. Unless removed from the vapors these fats, oils and greases tend to condense on to the cooler surfaces of the ventilating unit and on the cooler surfaces of the flues, and chimneys to which the unit is connected. These accumulations of fats, oils and greases are very inflammable and quite frequently fires of destructive proportions occur in the duct work, flues and chimneys associated with cooking unit ventilating systems.

It has previously been proposed to provide the exhaust side of ventilating units with filters or baffles to remove the fats, oils, greases from the gas stream passing therethrough. To a degree these filters or baffles have been fairly successful. Clean filters, for example, remove the fatty materials almost completely from the vapor stream. However, it is a dirty, messy job to remove and change the filters, and frequently this job is postponed as long as possible, most often until the filters are so clogged that the air flow in the ventilating unit is unduly impeded. In the meantime after a substantial quantity of oils and fats have accumulated in the filter there is a tendency for this accumulation to revaporize, or to steam distill in the warm vapors passing through the filter and in this way a proportion of accumulated fats and oils are transferred from the filter into the flues and chimneys. Thus, a filter itself, if it is not changed or cleaned, frequently becomes a fire hazard since a dirty filter serves as a repository for fats and oils and does not necessarily prevent an accumulation of fats and oils from forming in the flues and chimneys.

Baffle systems suffer from the same basic deficiency. Since baffles placed in the exhaust air stream are relatively inaccessible they are difficult to clean. As a result there is a tendency to permit the fatty oily deposits to accumulate facilitating the retransfer of these deposits to the duct work flue and chimneys. As in the case of filters an oil and grease laden baffle does not prevent the accumulation of oily and fatty deposits in the flue and chimneys and in addition may provide in themselves a deposit of oils and fats suitable for spreading a fire.

It is an object of this invention to provide a ventilating system with means for readily cleaning filters inserted in the air stream of the oily and fatty deposits contained therein, said means also acting to extinguish any fire that may start in said filter or in the duct work of said ventilating system.

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In the drawings:

FIG. 1 is a perspective view of a typical commercial cooking unit provided with my improved ventilating unit;

FIG. 2 is a vertical cross-section of the ventilating unit shown in FIG. 1.

In the drawing a typical commercial cooking unit is indicated generally at 11 and as shown consists of two range units 12, a grill unit 13, a deep fat frying unit 14 and a broiler unit 15, together with appropriate ovens indicated generally at 16. The selection and the arrangement of the particular units is a matter of choice and can be varied at will without affecting the operation or the principle of operation of the present invention.

Cooking unit 11 is provided with a ventilating unit indicated generally at 21. Because of the differences in height and in the point of emission of vapors, the ventilating unit 21 is made in a plurality of sections, one being a low level hood 22 adapted to be arranged over surface cooking units such as 12, 13, 14 and 15, and the other being a higher level hood 23 adapted to be arranged above higher level unit, such as broiler unit 15. Since, in the arrangement shown in the drawing, all of the surface units are arranged next to each other, and since the broiler unit is at one end of the cooking unit, only one of each of the two hoods is shown. Both hoods 22 and 23 are connected to a common air chamber 24 which in turn is connected to a flue as indicated by flue connection 25 located near the center of the top of chamber 24. The flue connection 25 may be connected to normal duct work acting as a flue which may be either vented to the atmosphere outside the structure or be connected to a chimney in a conventional manner. An exhaust fan or blower is provided in the flue at some convenient location for the purpose of inducing an air flow from the kitchen through the ventilating unit out into the atmosphere. Neither the duct work nor the fan is shown.

The function of ventilating unit 21 is to collect the smoke and vapors coming from the cooking units and to exhaust the smoke and vapors to the atmosphere. This is accomplished as mentioned above by maintaining a positive flow of air from the kitchen across the cooking unit and out through the ventilating unit and the flue. Unit 21 is adapted to rest on and be supported by cooking unit 11 by means of brackets as indicated by in-turned flange 26 shown in FIG. 2, and to fit closely around the sides and back of unit 11 as shown in order to direct the air flow in the desired direction. Optionally the sheet metal comprising ventilating unit 21 can be extended so that the unit can rest on the floor surrounding cooking unit 11, or unit 21 may be mounted on a wall.

In the case of surface unit hood section 22 a continuous opening 27 is provided along the length of the surface cooking units 12, 13, and 14 and directly above these units at a point approximately midway between the front and rear. Opening 27 of hood 22 is defined by horizontal shelf 28 and baffle 29. Baffle 29 in turn is attached to rear wall 31 of section 22. Opening 27 is purposely restricted in order to maintain a sufficient air velocity through the opening and this restriction is accomplished by provided baffle 29 which extends diagonally, upwardly and outwardly from a point on rear wall 31 somewhat above the bottom of rear wall 31 to a point below and slightly forward of the rear extremity of shelf 28. Shelf 28 in turn extends from a point above and rearward of the upper edge of baffle 29 horizontally to a point substantially toward the front part of cooking unit 11. The height and width of shelf 27 and baffle 29 are such that opening 27 is as close as possible to the surface of the units comprising cooking unit 11 while at the same time allowing sufficient clearance for the necessary pots and

pans associated with cooking operations. A vertical air passage 32 is provided between opening 27 and air chamber 24 across the length of the surface units 12, 13 and 14. Rear wall 31 constitutes the rear wall of passage 32 and the front wall 33 extends from a point at the top surface of shelf 28 slightly to the rear of the forward extremity of baffle 29. The forward wall 33 of vertical air passage 32 is provided with one or more transverse openings which openings are provided with doors 34 which are, as shown, hinged at the bottom. Vertical air passage 32 terminates at a point substantially longitudinal with the top surface of broiler unit 15 in air chamber 24 which in turn extends laterally the full width of cooking unit 11. As shown, air chamber 24 is somewhat wider than air passage 32 and comprises rear wall 31, top 35, front wall 36 and sloping bottom wall 37. Sloping bottom wall 37 extends between wall 36 and the front wall 33 of passage 32. At the free end of cooking unit 11 a single side wall 38 is provided for baffle 29, opening 27, passage 32 and air chamber 24. A portion of side wall 38 as shown (FIG. 1) extends diagonally downward from the front edge of shelf 28 to a point on the side of range unit 12 substantially forward of rear wall 31.

Hood 23 for broiler unit 15 extends above the top of the broiler unit from the forward wall 36 of air chamber 24 to a point substantially forward of the front of broiler unit 15. Hood 23 comprises top 41, two side walls 42 (only one of which is shown) and a front 43. The outside side wall (the one not shown) extends to the rear wall 31 and serves also as a side wall for air chamber 24 at the broiler unit end of cooking unit 11.

Hood 23 is provided with two transverse baffles 44 and 45. Lower baffle 44 extends from rear wall 31 at a point above the top of broiler 15 to a point slightly beyond the vertical projection of the front of broiler 15. The forward end of baffle 44 is at a slightly higher level than the rear portion and is provided with an upstanding lip 46. Upper baffle 45 extends from rear wall 31 to a point within the lip 46 of baffle 44, the forward end of baffle 45 being at a slightly lower level than the rearward end. For reasons to be explained later baffle 45 may be provided with side walls 47 which extend horizontally at the level of the intersection of the top surface of baffle 45 with rear wall 31. A side wall 48 (which may be an extension of side wall 42) is provided inside air chamber 24 at the junction between broiler unit 15 and the remainder of unit 11 from the top of the broiler up to at least the level of upper baffle 44. Top 41 may be hinged at the rear to provide easy access to the inside. Smoke and vapor coming from the broiler unit either from the vent near the rear of the unit, or from the doors of the broiler when they are opened are drawn forward between the top of broiler unit 15 and the bottom of baffle 44 around lip 46 and then across the top of baffle 45 to the chamber 24, then passing through the opening left above side wall 48.

Conventional grease filters 51 and 52 which may be formed from metal turnings or metal wool, or from glass or asbestos fibres retained in a frame are provided the entire width of vertical air passage 32 and the entire width of the air passage between upper baffle 45 and top 41 of hood 23 respectively. Filters 51 are wedged between rear wall 31 and extension 53 of shelf 28 at an angle of approximately 45°. Access to filters 51 is provided through doors 34. The filters 52 are supported again at an angle of about 45° on bracket 54 mounted on upper baffle 45 in such manner that the upper and lower end of filter 52 are located slightly behind lip 46. Filters 51 and 52 respectively are arranged in side to side abutting relationship so that all of the air passing through ventilating unit 21 passes through one of the filter units.

The particular improvement contemplated in the present invention is the provision of means for washing filters 51 and 52 which means also serves as an effective means for preventing the spread of grease fires in the ventilating unit, the duct work and the flues. This means comprises manifolds 55 and 56. Manifold 55 is located in vertical

air passage 32 above filter 51, extends the entire width of passage 32 and is provided with a plurality of spray nozzles 57 or the like arranged to provide a spray pattern that will cover the entire top of surface of filters 51. In a similar manner manifold 56 is located within hood 23 and the air passage between top 24 and baffle 45 of hood 23, extends the full width of hood 23 and is provided with a plurality of spray nozzles 58 or the like arranged to provide a spray pattern that will cover the entire top surface of filter 52.

Manifold 55 and manifold 56 are both connected to pipe 59 which in turn is connected to a hot water or steam supply indicated at pipe 61. Two alternate means for admitting water or steam from pipe 61 to pipe 59 and thus two manifolds 55 and 56 are provided. A direct connection is provided through normally closed solenoid actuated valve 62. An alternate connection is provided through parallel pipe loop 63 provided with a manually operated valve 64 and between valve 64 and pipe 59 with a detergent dispensing container 65.

Filters 51 and 52 may be cleaned periodically by opening valve 64 thus permitting water or steam to flow from supply pipe 61 around loop 33 past detergent dispensing container 65 into manifolds 55 and 56 out through nozzles 57 and 58 and onto filters 51 and 52. The detergent containing hot water or steam impinges on filters 51 and 52 in a pressure spray pattern covering the entire surface of the filters and cleans the fat and grease collected in these filters quite effectively.

Provision is made for collecting the fat and grease containing water and removing this from the ventilating inlet. In the case of surface unit section 22 a trough 66 is provided within baffle 29. Trough 66 is arranged so that any water coming from filter 51 will be collected therein and will flow to a low point which is connected to drain 67. In the case of hood 23 baffle 45 acts as a water collecting tray in view of side walls 47 and front lip 46. A drain 68 is provided between baffle 44 and baffle 45 from the forward and lower end of baffle 45 to a point outside ventilating unit 21 where like drain 67 it can be run to a convenient sink or wash basin and then into the sanitary plumbing system. It is preferable not to connect drain 67 and 68 directly to the sanitary system in order to avoid any possibility of a back flow through the drain and also so that the wash water may be inspected visually. In normal operation when the cooking unit is being secured from use the ventilating fan is turned off and valve 64 opened for a few minutes, or until the wash water begins to turn clear. This can be done very easily on a regular daily basis with practically no effort, and if done regularly completely prevents the build up of any greasy or fatty deposits in the filters, ducts or flues.

As mentioned above, manifolds 55 and 56 also serve as a fire preventive means. A fire detecting thermostat 69 is provided in air chamber 24 with probe 71 extending into the air stream and to flue connection 25. Thermostat 69 is of the type that will either be actuated when the air temperature reaches a predetermined temperature higher than the anticipated air temperature under normal operating conditions, or by any sudden rise in temperature. When actuated as by a fire thermostat 69 closes the circuit which actuates the solenoid on valve 62 and opens valve 62 and which disconnects the power supply to the exhaust fan. The sudden flow of water or steam accomplishes two purposes. In the first place it acts as a sprinkler system quenching any fire in the grease filter or in the lower parts of the ventilating unit. In the second place the water fills the voids in the filter thus cutting off the air supply and the oxygen supply to the duct work flues and chimneys. In the absence of an air supply any fire in these areas quickly dies out. Unlike a conventional sprinkler system, however, as the water draining out of filters 51 and 52 is immediately collected beneath the filters and drained off in drains 67 and 68 thereby

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avoiding any possibility of water damage to the range or the ventilating unit.

I claim:

1. In a ventilating system adapted to be arranged above a cooking unit in close proximity thereto and to remove from the surroundings thereof vapors and gases emanating therefrom, said ventilating system including a ventilating duct for conveying a current of air, said duct including an inlet portion located above said unit, and means associated with said duct and remote from said inlet portion for inducing a current of air to pass over said cooking unit through said inlet portion and out through said duct, means for removing oil and grease from said current of air comprising a flow-through grease filter comprising one or more filter elements each comprising a fibrous mat retained in a frame and presenting a pair of substantially parallel planer surfaces adapted to intercept a flow of air, said filter arranged across said duct from wall to wall thereof in a manner whereby any air passing through said duct passes through at least one said filter element, said filter being located in said duct as close to the said inlet thereof as practicable, said filter elements being so oriented that the planer surfaces thereof extend at an angle of about 45° to the vertical; a manifold mounted within said duct at a position above said filter, said manifold provided with a plurality of spray forming elements and adapted to spray a hot liquid on said filter for washing oil and grease therefrom, said spray forming elements forming a spray pattern of said hot fluid covering the

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entire exposed surface of said filter adjacent said manifold; and drain means within said duct below said filter for collecting said liquid after said liquid leaves said filter and for removing said liquid from said duct.

2. A ventilating system as claimed in claim 1 wherein said manifold is adapted to be connected to a source of hot water or steam.

3. A ventilating system as claimed in claim 2 wherein said manifold is connected to said source both by a connector means including an automatic valve and by a connector means including a manual valve and a source of detergent.

4. A ventilating system as claimed in claim 3 wherein said automatic valve is actuated by a fire detecting thermostat located in said ventilating duct and when actuated admits fluid to said manifold.

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