ABSTRACT OF THE DISCLOSURE

An oven exhaust unit comprising an expansive filter through which oven exhaust gases pass and a blower means arranged alongside the filter to blow air transversely across it so that the oven gases which come from a relatively small oven vent opening will be caught up in the air stream and distributed over the expanse of the filter, thereby rendering the filter more efficient and the average temperature of the gases entering it at a lower value.

This invention relates to oven exhaust units and more particularly it concerns a novel method and apparatus for disposing of oven exhaust gases.

The present invention finds particular suitability to use in connection with wall ovens. Generally a wall oven is mounted at eye level and is integrated with an overall kitchen design in such manner that the front face or door of the oven is nearly flush with the surrounding wall surfaces. Thus the oven would protrude slightly from the wall surface however, and vent openings are provided on the upper exposed surface of the oven for expelling the various flue and other exhaust gases which are generated within the oven.

Various types of hood and filter arrangements have been designed for handling and disposing the hot exhaust gases which are emitted through the oven vent openings. However, most of these prior arrangements have been incapable of satisfactory prolonged operation, due to the highly concentrated hot gases which are emitted from the oven vent openings. These hot gases, which often reach 950°F, produce localized heating at the first filter in the exhaust system. Since the first filter is usually a grease filter, and is usually at least partially saturated with highly flammable greasy material, any localized heating beyond approximately 500°F, will present a highly dangerous situation. Further, the concentration of oven exhaust in one area of the filter soon reduces its effectiveness in cleaning the air incident upon it.

Because of the small size of the oven vent openings and because of the restricted space available in the vicinity of the oven, it has been very difficult to provide sufficient diffusion of the oven exhaust gases prior to their impingement and entrapment through this localized heating and general ineffective use of the first filter.

These and other problems have been eliminated by the present invention. According to the present invention there is provided a lateral blowing against the oven gases as they are emitted up through the oven vent openings. This lateral blowing is such as to diffuse or distribute the gases over a rather large area so that they become cooled and applied to filter means in a more efficient manner. Means are provided to produce a continuous recirculating stream of air which passes laterally across and above the oven vent openings, into and through filter means through blower means and back across the vent openings. A major portion of the output of the filter means is discharged or exhausted, however, while the remainder is forced in a high velocity stream across the inlet to the filter means.

According to one feature of the present invention there is provided an oven exhaust unit for use with wall type ovens, and which, without occupying more space than prior units have required, serves to prevent localized heating of the first filter. The present invention makes use of an air entrainment principle whereby a portion of the oven exhaust gases, after being drawn through the exhaust unit and prepared for discharge, are directed along an elongated path in a manner such that they produce firstly, a diffusion of the oven exhaust gases over an elongated inlet opening, and secondly, an entrainment of additional cool room air which mixes with the oven exhaust gases and together with them proceeds through the unit at a lower temperature.

The principles of the present invention may be utilized with the so-called "ductless" type oven exhaust units which purify the exhaust and return it again to the room. Also, they may be utilized in conjunction with the so-called "ducted" type exhaust unit which discharges the oven exhaust to a remote location. In both cases, a portion of the oven exhaust is directed through a wind chamber which extends along above the oven exhaust openings. This wind chamber is provided with a lower surface having specially shaped jet openings distributed along its surface. As the portion of the discharge air passes through the wind chamber it escapes through these various jet openings at high velocity. This produces a flowing effect which causes the air immediately rising out of the oven exhaust openings to be flown laterally toward a filter opening. This lateral flowing of the oven exhaust causes it to be distributed over the entire region of the filter opening. Also, the oven exhaust unit is designed with a swing out hood which produces a ducting effect so that the oven exhaust and discharge gases which move rapidly in a lateral direction toward the filter region of the unit serve to entrain additional cool room air which mixes with these gases to reduce their temperature so that as they pass through the oven exhaust unit they are well below the dangerous temperature.

There has thus been outlined rather broadly the more important features of the invention in order that the detailed description thereof that follows may be better understood, and in order that the present contribution to the art may be better appreciated. There are, of course, additional features of the invention that will be described hereinafter and which will form the subject of the claims appended hereto. Those skilled in the art will appreciate that the conception upon which this disclosure is based may readily be utilized as a basis for the designing of other structures for carrying out the several purposes of the invention. It is important, therefore, that the claims be regarded as including such equivalent constructions as do not depart from the spirit and scope of the invention.

A specific embodiment of the invention has been chosen for purposes of illustration and description, and is shown in the accompanying drawings, forming a part of the specification, wherein:

FIG. 1 is a perspective view, partially cut away, illustrating a wall oven exhaust unit installation embodying the principles of the present invention;

FIG. 2 is a front elevational view of the oven exhaust unit installation of FIG. 1 taken along lines 2—2 of FIG. 1;

FIG. 3 is a side elevational view taken along lines 3—3 of FIG. 2;

FIG. 4 is a top plan view of the oven exhaust unit installation of FIG. 1 with the top wall thereof removed;

FIG. 5 is an enlarged fragmentary view showing in perspective a typical entrainment jet opening forming a portion of the structure of the present invention;

FIG. 6 is a top plan view similar to FIG. 4 but showing an alternate arrangement of components.

The installation of FIG. 1, includes a wall oven 10 and an exhaust unit 11 positioned immediately above the wall.
oven. The wall oven 10 may be mounted in the usual manner at eye level with its outer face nearly flush with the surfaces of surrounding cabinets or other structures. The wall oven 10 is provided with the usual door opening 14 in the front wall 12. The front of the oven protrudes forwardly of the surrounding surfaces by a small amount so that a forward strip 16 of its top surface is exposed. A series of oven vent openings 18 are located toward one end of this forward strip. The various flue and other exhaust gases and vapors are emitted upwardly from the oven and outlet openings 19.

The oven exhaust unit 11, as stated, is mounted immediately above the oven 10. This oven exhaust unit includes a box-like outer housing 22, of generally rectangular configuration. The outer housing which rests flatwise above the wall oven 10, is made up of a lower wall 24, a back wall 26, a top wall 28 and a front end structure to be more fully described hereinafter. The lower wall 24 extends from the back of the wall oven 10, along its top surface to the edge of the strip 16, thus leaving the oven vent openings 18 in exposed condition. The back wall 26 rises vertically up from the rear edge of the bottom wall 24 while the top wall 28 extends forwardly from the top of the back wall 26 out to a location slightly beyond the front face of the wall oven 10, thus extending over the oven vent openings 18. As shown in FIGS. 2 and 4, the sides of the outer housing 22 are closed by means of walls and outer side walls 30 and 32. A swinging out hood 34 is pivotedly connected along its top edge to the front edge of the top wall 28. This swing out hood extends down to the level of the bottom wall 24 and is formed with an inwardly bent front flange 36. The swing out hood is provided with a forwardly extending side flap 38 which fits between the inner and outer side wall 30 and 32 at each side of the oven. This provides a canopy or hood effect so that when, as illustrated in FIG. 3, the oven is in normal operation, the exhaust which moves up and out from its vent openings 18, is fully trapped underneath the swing out hood. The hood during this time is swung out to an open position whereby it aids in the entrainment of cool room air along with the oven exhaust.

The interior of the outer housing 22 of the oven exhaust unit 11 is divided laterally (side to side) into a blower region 40 and a filter region 42. This division is effected by means of a filter region sidewall 44 which extends from a point along the front edge of the top wall 28, back toward the back wall 26. The blower region 40 is enclosed along its front by means of a blower region front wall 46 which rises vertically from the front edge of the lower wall 24 to the top wall 28. A centrifugal type blower motor 20 is housed within a blower casing 50, and is mounted within the blower region 40 of the outer housing 22. As shown in FIG. 3, the blower 48 includes an electric motor 52 mounted with its axis extending in a vertical direction, and a bladed rotor 54 driven by the motor 52. The blower casing 50 houses both the motor 52 and the rotor 54. It is mounted on the top of a blower cooling duct member 56 and has openings 58 communicating with the duct member 56. The duct member 56 itself opens out to the back wall 26 of the outer housing 22 and allows fresh room air to be brought into the regions of the blower motor 52 for cooling purposes. Further blowing inlet openings 60 are provided around the bottom edge of the upper portion of the blower casing 50 and these serve to let the oven exhaust into the blower for being distributed throughout the system. The blower casing 50 is further provided with a tangentially directed large rectangular blower outlet 62 which opens out through a corresponding opening in the blower region front wall 46.

The filter region 42 has a rectangular front opening 63 extending in the plane of the blower region front wall 46. A front filter support 64 extends along the lower edge of the back wall 26 and a rear filter support 66 extends in parallel fashion along the top wall 28 back toward the back wall 26. A flat expanse filter 68 is mounted between the front and rear filter supports 64 and 66 in slantwise orientation within the filter region 42. This permits of a relatively large filtering area in the system, even though the front opening 63 of the filter region is somewhat restricted in height. The oven exhaust gases, which pass into the front opening 63 and through the filter 68 then proceed around behind the filter region sidewall 44 and into the blower region 40 where they are drawn in through the blower inlet openings 60 and discharged through the blower outlet 62.

A pair of walls 70 and 72, designated respectively as the upper and lower wind chamber walls, rise in parallel spaced apart relationship from locations about midway up the blower region front wall 46 to the outer edge of the top wall 28. These walls enclose a narrow wind chamber 74 which extends along in front of the blower region between the left inner side wall 30 and the filter region sidewall 44. In addition, the upper wind chamber wall 70 together with the upper portion of the blower region front wall 46 and the forward portion of the top wall 28, forms a triangularly cross sectional discharge chamber 76. A plurality of discharge openings 78 are provided along the top wall 28 above the discharge chamber 76 for exhausting the blower output back into the room.

As can be seen in FIG. 3, the lower wind chamber wall 72 rises up from the blower region front wall 46 at the bottom edge of the filter region, while the upper wind chamber wall 70 rises in parallel fashion from a point slightly above the bottom edge of the blower outlet 62. Thus the blower outlet 62 opens partially into the wind chamber 74. As a result a portion of the air passing out from the blower outlet enters into the wind chamber 74 and passes along its length.

As shown most clearly in FIGS. 1 and 2, the lower wind chamber wall 72 is provided along its surface with a plurality of entrainment jet openings 80. A typical one of these jet openings is shown in the enlarged perspective view of FIG. 5. These openings are shaped by cutting a slit through the wall and stamping the wall surface along one side of the slit so that it bulges downwardly. There are also provided additional outlet openings 82 at the far end of the wind chamber 74. Thus the portion of the blower outlet which passes into the wind chamber 74 proceeds at high velocity out through the various entrainment jet openings 80 and the additional outlet openings 82. The effect of this is to blow the upwardly rising oven exhaust from the oven vent openings 18 in a lateral direction toward the front opening 63 of the filter region 42. By so blowing the oven exhaust it is caused to diffuse so that it will become evenly distributed over the entire area of the filter 68, thus making full use of the filter and avoiding localized heating in any region of the filter.

The rapid movement of the air out through the entrainment jet openings 80 along with the lateral movement of the oven exhaust from the oven vent openings 18 produces a venturi type effect which causes the aspiration of cooling room air (as indicated by the arrows in FIG. 3) into the stream of laterally moving air where it becomes mixed with the oven exhaust thus cooling and aiding the distribution of same to provide a more effective and efficient processing of the oven exhaust through the filter region of the unit.

Where it is possible to utilize a ducted type arrangement, the above described structure can be modified for this purpose simply by reorienting the blower motor 20 so that its outlet 62 extends through the back wall 26 of the outer housing 22. Suitable ducting means (not shown) may be provided to convey the blower outlet to a remote location such as the outer atmosphere.

An additional modification, as shown in FIG. 6, is also made for the purpose of directing a portion of the blower outlet 62. This support 66 extends in parallel to the filter region 42 constitutes a further opening 84 cut into the periphery of the blower casing 50 at a point such that it
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5 communicates with the wind chamber 74 at a point between the upper and lower wind chamber walls 70 and 72. Having thus described my invention with particular reference to the preferred form thereof, it will be obvious to those skilled in the art to which the invention pertains, after understanding my invention, that various changes and modifications may be made therein without departing from the spirit and scope of my invention, as defined by the claims appended thereto.

What is claimed is new and desired to be secured by Letters Patent is:

1. An oven exhaust unit comprising a housing formed with an intake opening and a separate exhaust opening, expansive filter means located within said housing, means for moving vented oven gases through said housing between said intake and exhaust openings and through said filter means, means arranged laterally of said filter means to blow a stream of air transversely across in front of said filter means to diffuse the incident vented oven gases over the expanse of said filter means; and said housing having a filter means arranged horizontally across said filter means including an air stream outlet located alongside said filter means and a blower located upstream of said outlet.

2. An oven exhaust unit comprising a housing formed with an intake opening and a separate exhaust opening, expansive filter means located within said housing, means for moving vented oven gases through said housing between said intake and exhaust openings and through said filter means, a wall located laterally of said filter means and having formed on said wall a plurality of spaced jet openings directed transversely across said filter means, and means located upstream of said filter means for supplying air under pressure to the other side of said wall whereby at least a portion of said air passes through said openings and transversely across said filter means.

3. An oven exhaust unit comprising a housing formed with an enlarged front opening and a separate exhaust opening, expansive filter means located inside and across the front opening, means located within said housing for moving gases in through said front opening, through said filter means and out through said exhaust opening, and means arranged alongside said filter means for directing at least a portion of the output of said blower means laterally across said front opening to diffuse the incident vented oven gases over the expanse of said filter means.

4. An oven exhaust unit comprising a housing formed with an intake opening and a separate exhaust opening, expansive filter means located inside and across said intake opening, blower means located within said housing and arranged to move gases in through said front opening, through said filter means, and out through said outlet opening, and a wall located out from in front of said discharge outlet opening, said wall having formed thereon in jet openings positioned alongside of said front openings and directed laterally thereof, and means for directing a portion of the gases blown by said blower means to pass through jet openings at high velocity transversely across said front opening to diffuse the incident oven exhaust gases over the expanse of said filter means.

5. An oven exhaust unit comprising a housing formed with an intake opening and a separate exhaust opening, expansive filter means located inside and across said intake opening, blower means arranged to move vented gases in through said intake opening, through said expansive filter means, and out through said exhaust opening, a wind chamber having one wall extending along one side of said front opening, said one wall being formed with jet openings therethrough directed transversely across said front opening, and means for directing a portion of the gases which pass through said filter means into said wind chamber whereby they pass through said jet openings, and are directed at high velocity across the front of said front opening to diffuse the incident vented oven gases over the expanse of said filter means.

6. An oven exhaust unit as in claim 5 wherein said wall is provided with slits which extend transversely with respect to a line extending toward said front opening the portions of said wall on one side of said slits being bulged to define openings through which air flows parallel to said wall and laterally across said front opening.

7. An oven exhaust unit comprising a substantially rectangular outer housing divided laterally into a filter region and a blower region communicating with each other within said housing, said housing further being formed with an inlet opening and an exhaust opening in communication with said filter region and said blower region respectively, an expansive filter located within and extending across said filter region immediately inside of said inlet opening, a blower located within said blower region and arranged to receive gases from said filter region and discharge them through said exhaust opening, a wind chamber having one wall thereof formed with a plurality of spaced jet openings located alongside or directed across said inlet opening, and means arranged to direct a portion of the output of said blower into said wind chamber to pass through said jet openings and form a distributed stream of air which passes laterally of said intake opening to diffuse incident vented oven gases over the expanse of said filter means.

8. An oven exhaust unit comprising a substantially rectangular outer housing divided laterally into a filter region and a blower region communicating with each other within said housing, said housing being formed with a substantially rectangular inlet opening in front of and in communication with said filter region, said housing further being formed with an exhaust opening communicating with said blower region, an expansive filter located within and extending across said filter region immediately inside of said inlet opening, a blower located within said blower region and arranged to receive gases from said filter region and to discharge them through said exhaust opening, a wind chamber located in front of said blower, an inner wall of said blower adjacent said rectangular inlet opening, said wind chamber having one wall thereof formed with a plurality of spaced jet openings directed across said inlet opening, and means arranged to direct a portion of the output of said blower into said wind chamber to pass through said jet openings and form a distributed stream of air which passes laterally to said intake opening to diffuse incident vented oven gases over the expanse of said filter means.

9. An oven exhaust unit as in claim 8 wherein said wind chamber comprises a pair of closely spaced parallel walls which extend upwardly and outwardly from the front of said blower region alongside said inlet openings, the lowermost of said walls being formed with said plurality of spaced jet openings, and means operative to direct a portion of the blower output into said wind chamber.

10. An oven exhaust unit comprising a substantially rectangular outer housing divided laterally into a filter region and a blower region communicating with each other within said housing, said housing further being formed with a substantially rectangular inlet opening in front of and in communication with said filter region, said housing being further being formed with an exhaust opening communicating with said blower region, said housing including a top wall which extends out over and beyond said front opening, a front hood member extending down from along the front edge of said top wall to provide a canopy effect in front of said inlet opening, an expansive filter located within and extending across said inlet region immediately inside of said inlet opening, a blower located within said blower region and arranged to receive gases from said filter region and to discharge them through said exhaust openings, a wind chamber comprising a pair of closely spaced parallel walls extending upwardly from in front of said blower region alongside said rectangular opening, the lowermost of said walls being formed with a plurality of spaced jet openings oriented to direct air being emitted therethrough across in front of said inlet opening, said air means arranged to direct a portion of the output of said
blower into said wind chamber to pass through said jet openings and to form a distributed stream of air which passes laterally of said intake opening to diffuse incident vented oven gases over the expanse of said filter means.

11. An oven exhaust unit as in claim 10 wherein said hood member is pivotally attached along its upper edge to the front edge of said top wall to swing outwardly during operation for causing entrainment of cooler room air by the high velocity stream of air which passes through said jet openings.

12. An oven exhaust unit as in claim 10 wherein said top wall in front of said blower region is provided with exhaust openings and said blower is arranged with its outlet opening partially into said wind chamber and partially into the region thereabove for exhausting out through said openings in said top wall.

13. Apparatus as in claim 10 wherein said blower is of the centrifugal type and is arranged to discharge out through the rear of said outer housing and said wind chamber is connected via ducting means through the periphery of the casing of said blower.

14. An oven exhaust unit comprising a housing formed with an intake opening and a separate exhaust opening, expansive filter means located inside and across said intake opening, blower means arranged to move vented oven gases in through said intake opening, through said expansive filter means, and out through said exhaust opening, a wind chamber having one wall extending along one side of said front opening, said one wall being formed with jet openings therethrough directed transversely across said front opening, and means for directing a portion of the gases which pass through said filter means into said wind chamber whereby they pass through said jet openings and are directed at high velocity across the front of said front opening to diffuse the incident vented oven gases over the expanse of said filter means and means defining a canopy extending out over and down in front of said intake opening to effect direction of the diffused oven gases into said intake opening.

15. An oven exhaust unit comprising a housing formed with an intake opening and a separate exhaust opening, expansive filter means located inside and across said intake opening, blower means arranged to move vented oven gases in through said intake opening, through said expansive filter means, and out through said exhaust opening, a wind chamber having one wall extending along one side of said front opening, said one wall being formed with jet openings therethrough directed transversely across said front opening, means for directing a portion of the gases which pass through said filter means into said wind chamber whereby they pass through said jet openings and are directed at high velocity across the front of said front opening to diffuse the incident vented oven gases over the expanse of said filter means, said outer housing further having a top surface extending out over and beyond said intake opening and a swing out hood extending downwardly from the front edge of said top surface and pivotally attached thereto to swing outwardly during operation of the unit and enhance the entrainment of room air to be mixed with the diffusing oven exhaust gases.

References Cited

UNITED STATES PATENTS

2,535,863 12/1950 Pledger 98—115
2,868,108 1/1959 Petersen 98—115
2,886,124 5/1959 Scharmer 98—115
3,089,479 5/1963 Perl 98—115
3,176,605 4/1965 Jenson 98—115
3,251,290 5/1966 Jenson et al. 98—115

FOREIGN PATENTS

206,258 10/1939 Switzerland.

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