CLAIMS

1. An exhaust device (10), comprising:

a housing having an aspect ratio of width to height of at least ten;

the housing having surfaces defining at least one recess (108, 217, 860) having an exhaust intake (114, 210, 292, 370);

the housing having a perimeter adjacent the at least one recess (108, 217, 860) having a jet register located below the exhaust intake (114, 210, 292, 370, 312) and configured to simultaneously generate a first jet (201, 202, 203, 290, 230, 311, 807) directed toward the exhaust intake (114, 210, 292, 370) and located below it, and a second jet (218, 291, 808) directed substantially vertically downward, the first and second jets originate from approximately the same location; and

a control system (302) configured to control one of the first (201, 202, 203, 290, 230, 311, 807) and second jets (218, 291, 808) responsively to real time measured draft conditions in a space in which the housing is located.

2. The device of Claim 1, wherein lower edges of a portion of the housing containing the exhaust intake (114, 210, 292, 370) and of a portion of the housing containing the jet register are substantially vertically aligned.

3. The device of Claim 1, wherein the surfaces defining each of the at least one recess (108, 217, 860) form a piecewise arcuate continuous surface with a light source having a light diffuser, a light cover, or a lens located adjacent the jet register,

the first jet is aimed upwardly such that it flows along the recess (217) surface (215), and

the first jet helping to trap fumes and keep the light cover (214) clean.

4. The device of Claim 1, wherein the exhaust intake (114, 210, 292, 370) defines a linear horizontal intake area, at least one portion of which is covered by a removable blank.

5. The device of Claim 4, wherein the jet register has at least one directable nozzle forming the first jet (201, 202, 203, 290, 230, 311, 807), which is aimed at the exhaust intake area (1 14, 210, 292, 370) not covered by the removable blank.

6. The device of Claim 1, wherein the first jet (201, 202, 203, 290, 230, 311, 807) terminates at or immediately short of the exhaust intake (114, 210, 292, 370).

7. The device of Claim 1, further comprising:

a fume source (121) located below the housing; and

an edge of the fume source (121) being positioned such that a line from the fume source edge to the jet register forms at least a 20 degree angle from vertical, and such that all of the fume source (121) lies below the at least one recess (108, 217, 860).

8. The device of Claim 1, wherein the control system (302) is configured to control at least the volume flow rate of the second jet (218, 291, 808) responsively to real time

measured draft conditions in the space in which the housing is located, the control system including air velocity sensors (310a) indicating the average or maximum velocities or other statistic responsive to movement of air in the conditioned space, which air movement affects the stability of a rising plume.

9. The device of Claim 1, wherein the control system (320) is configured to control at least the volume flow rate of the first jet (201, 202, 203, 290, 230, 311, 807) responsively to real time measured draft conditions in the space in which the housing is located, the control system including air velocity sensors (310a) indicating the average or maximum velocities or other statistic responsive to movement of air in the conditioned space, which air movement affects the stability of a rising plume.

10. The device of Claim 1, further comprising a general ventilation register located adjacent the jet register, the general ventilation register directing ventilation air downwardly at non-mixing velocities.

11. The device of Claim 1, wherein the jet register surrounds the housing perimeter.

12. The device of Claim 1, wherein the first (201, 202, 203, 290, 230, 311, 807) and second jets (218, 291, 808) are supplied from a common plenum.

13. The device of Claim 1, wherein the first (201, 202, 203, 290, 230, 311, 807) and second jets (218, 291, 808) are supplied from separate plenums, which are supplied by air sources at separately controlled flow rates.

14. The device of any of the foregoing claims where the recess depth (842) is more than five times a distance between a blind end of the recess (108, 217, 860) and the fume source.

15. The device of any of the foregoing claims where the recess depth (842) is more than eight times a distance between a blind end of the recess (108, 217, 860) and the fume source (121).

16. The device of Claims 8 or 9, wherein the control system further includes activity level sensors (310b) responsive to the movement in the conditioned space that may cause air movement that can disrupt the plume, including information extracted from event recognition in a video stream, activity from a proximity or infrared distance detector, or range finder.

17. The device of Claims 8 or 9, wherein the control system further includes a sensor of fume load (310d), which may be indicated by means of:

a fuel usage indicator of heat source such as a range or grill;

a carbon dioxide detector;

a temperature or moisture sensor, or other composition sensor which may indicate a composition of a fume plume; or

a video stream-based event recognition device configured to recognize zero, light, medium, and heavy use of an appliance and the nature of the use.

18. The device of Claims 8 or 9, wherein the control system includes a sensor of temperature (310e) such as indoor, outdoor, and plume temperatures.

19. The device of Claim 1, wherein the device comprises a ventilated ceiling, the first jet terminates at or immediately short of the exhaust intake, and the second jet terminates above approximately 1.8 meters above a floor level.

CLAIMS

1. An exhaust device, comprising:

a housing having an aspect ratio of at least ten;

the housing having surfaces defining at least one recess having an exhaust intake within the recess for receiving fumes captured in the recess and drawing the fumes out of the recess;;

the housing having a perimeter adjacent the at least one recess having a jet register located below the exhaust intake and configured to generate jets, a first of the jets being directed toward the exhaust intake and located below it and a second of the jets being directed substantially vertically downward;

lower edges of a portion of the housing containing the exhaust intake and portion of the housing containing the jet register being substantially vertically aligned;

the surfaces defining each of the at least one recess forming a piecewise arcuate continuous surface with a light source located adjacent the jet register; the first of the jets terminating at or immediately short of the exhaust intake;

the second of the jets terminating above approximately 1.8 meters above a floor level;

a fume source located below the housing;

the light source including a light diffuser, lamp cover, or lens and being located adjacent the first jet, which is horizontal, so that the first jet keeps it clean whereby the horizontal jet does double duty by helping to trap fumes by guiding pollution-containing plumes from the fume source, and keeping the light source clean;

an edge of the fume source being positioned to form at least a 20 degree angle from the vertical with the jet register such that all of the fume source lies below the at least one recess.

2. The device of claim 1, including a control system which is configured to control the first of the jets responsively to real time measured draft conditions in a space in which the housing is located.

3. The device of claim 1, further comprising a general ventilation register located adjacent the jet register, the general ventilation register directing ventilation air downwardly at non-mixing velocities.

4. The device of claim 1, wherein the jet register surrounds the housing perimeter.

5. The device of claim 1, wherein the first and second of the jets are supplied from a common plenum.

6. The device of any of the preceding claims where the recess depth is more than five times a distance between the blind end of the recess and the fume source.

7. The device of any of the preceding claims where the recess depth is more then eight times a distance between the blind end of the recess and the fume source.

8. The device of any of the preceding claims, wherein the first jet has a velocity of 6 to 10 m/s and a volume flow rate per linear meter of 21 to 35 cm/hr per linear meter of the jet register.

9. The device of claim 8, wherein the ratio of total volume rate of the second jet to the total volume rate of the horizontal jets is in the range of 0.25 to 0.35