May 26, 1970

W. K. AHLRICH

3,513,766

VENTILATING HOOD

Filed June 24, 1968

4 Sheets-Sheet 1

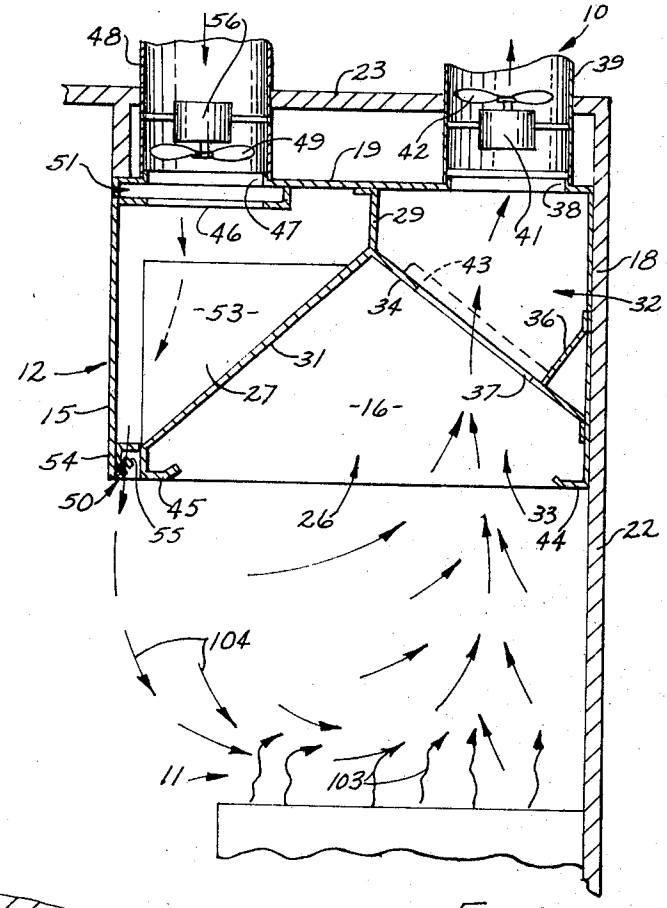
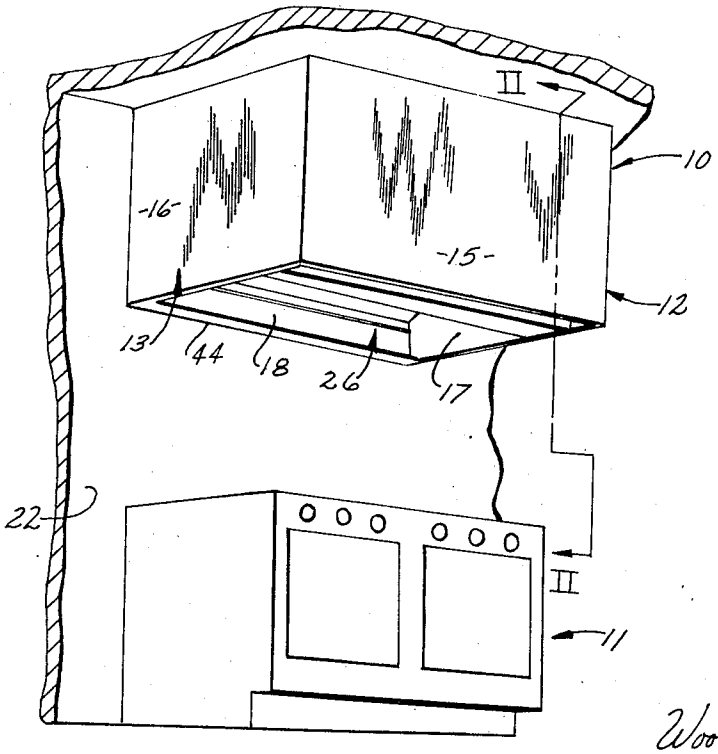


FIG. 2

FIG. 1



INVENTOR.
WILLARD K. AHLRICH
BY
Woodhams, Blanchard and Flynn
ATTORNEYS

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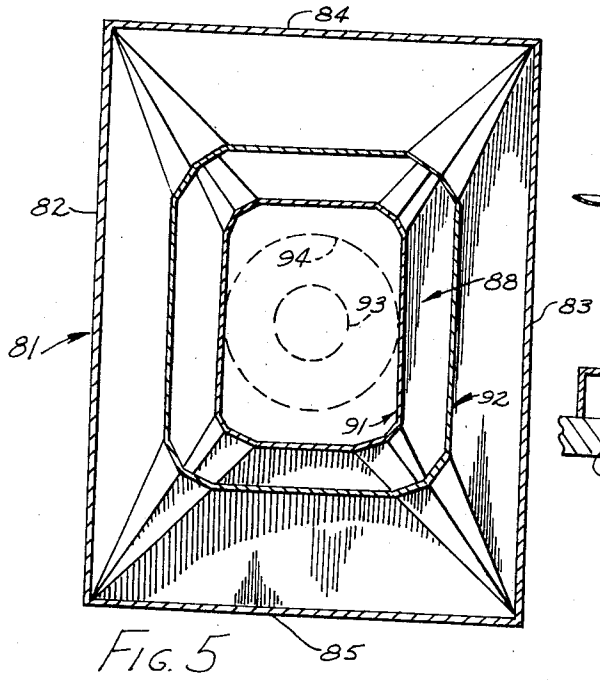


FIG. 5

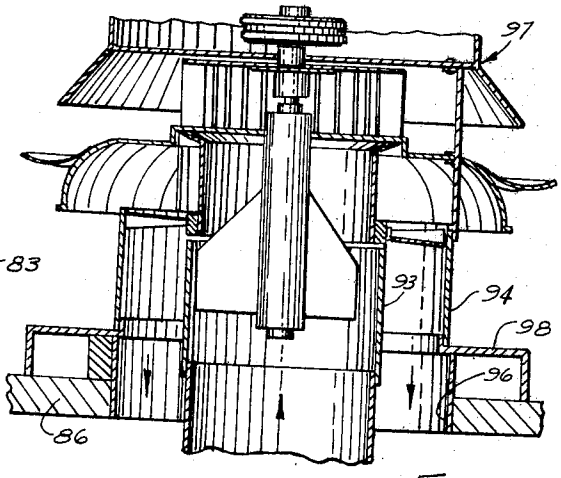


FIG. 6

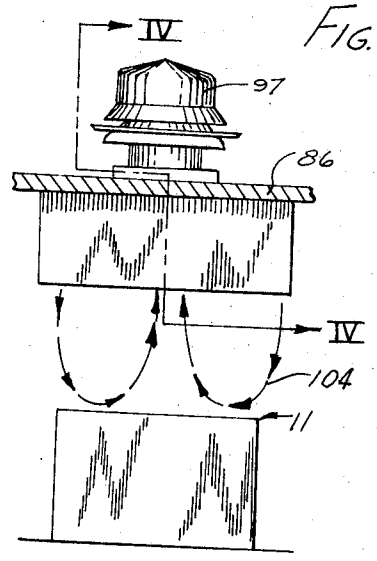


FIG. 3

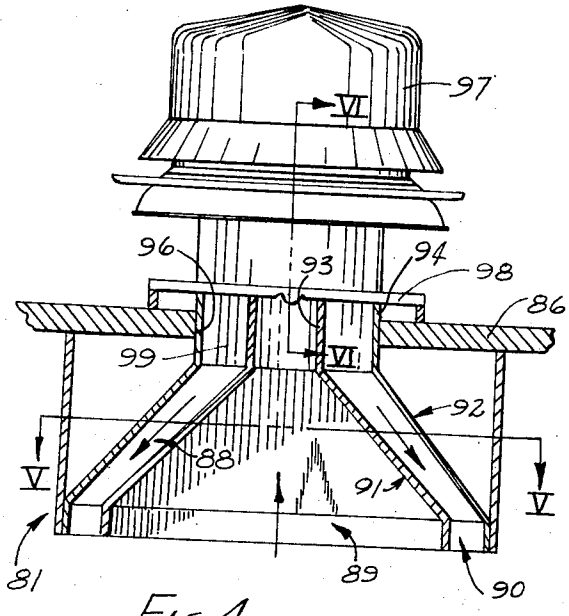


FIG. 4

INVENTOR.
WILLARD K. AHLRICH

BY
Woodhams, Blanchard & Flynn
ATTORNEYS

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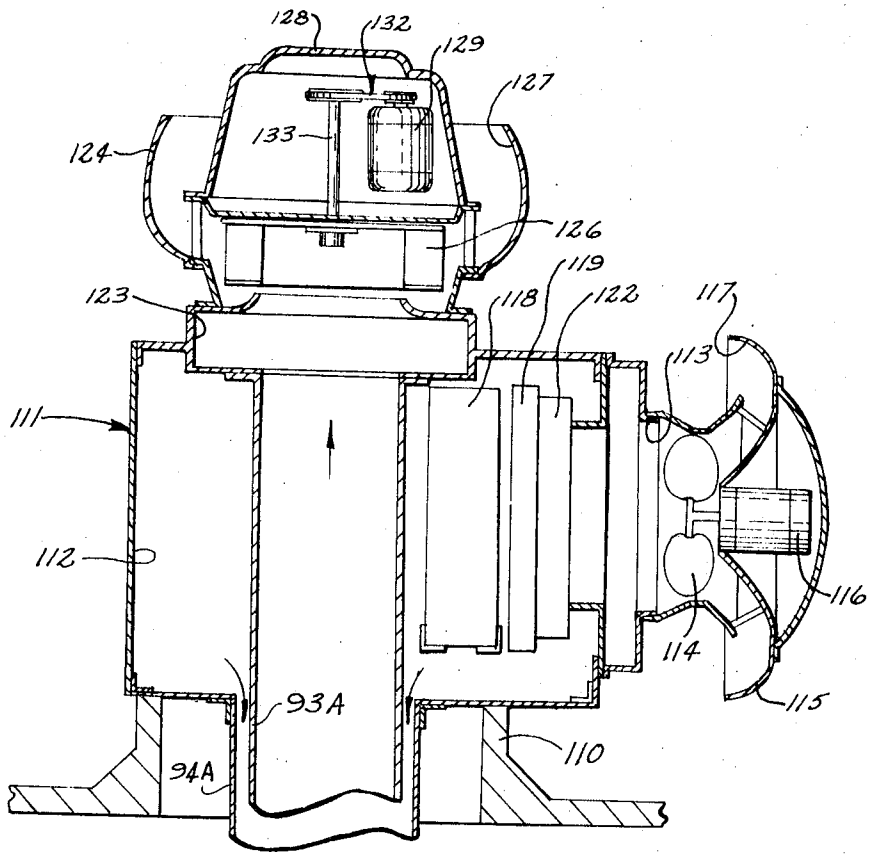


FIG. 7

INVENTOR.
WILLARD K. AHLRICH
BY
Woodhams, Blanchard and Flynn
ATTORNEYS

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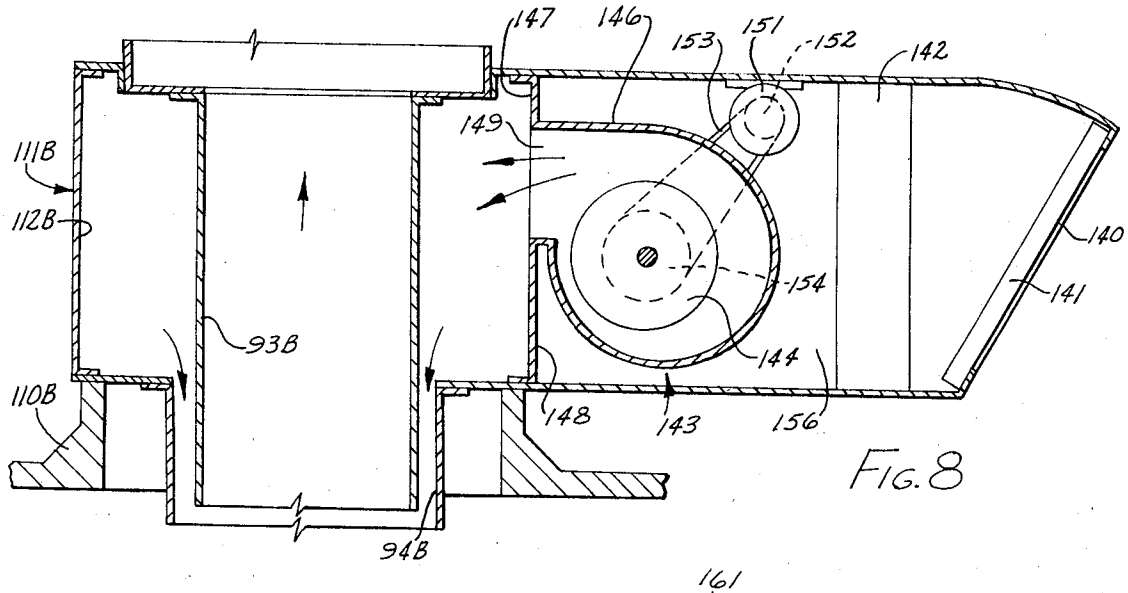


FIG. 8

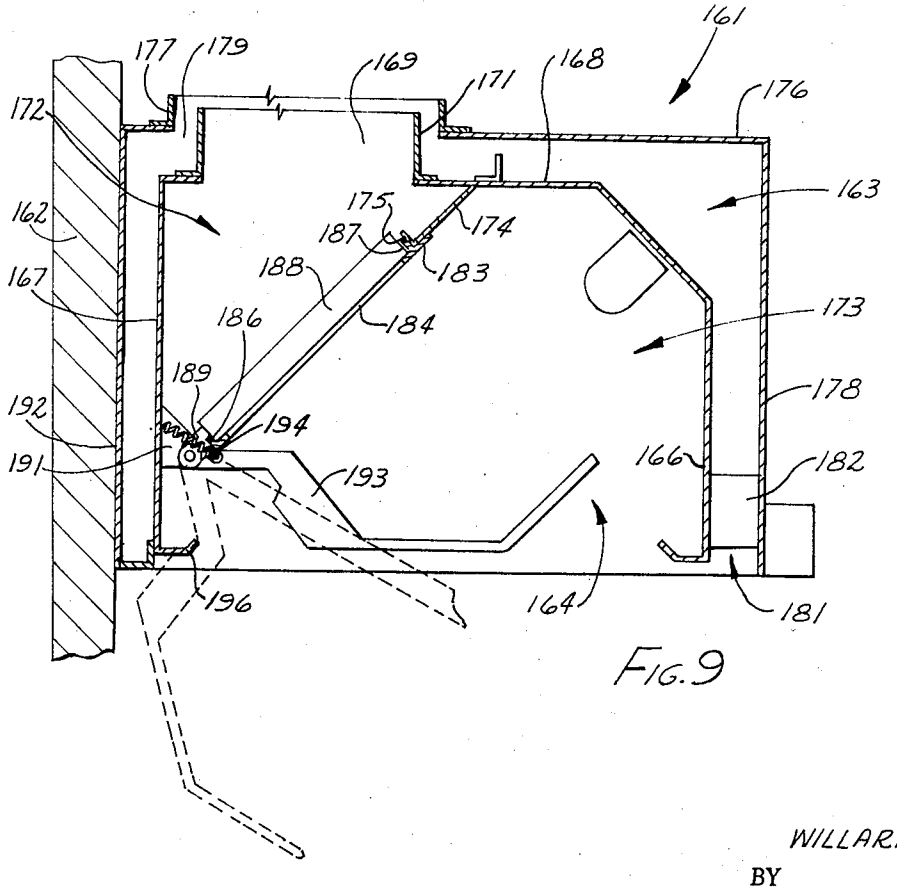


FIG. 9

INVENTOR.
WILLARD K. AHLRICH
BY
Woodhams, Blanchard and Flynn
ATTORNEYS

United States Patent Office 3,513,766
Patented May 26, 1970

3,513,766

VENTILATING HOOD

Willard K. Ahlrich, 511 Hamilton Road, Parchment, Mich. 49004

Continuation-in-part of application Ser. No. 560,401, June 27, 1966. This application June 24, 1968, Ser. No. 739,518

Int. Cl. F23j *11/00*

U.S. Cl. 98—115 11 Claims

ABSTRACT OF THE DISCLOSURE

A hood structure for exhausting fumes from a food-cooking device located below the hood structure. An exhaust chamber is connected to a gas-moving assembly to withdraw the fumes released from the food on the cooking device, and an air supply chamber is also connected to said gas-moving assembly for replacing with relatively fresh air most of the air and the fumes which are withdrawn. The air flow velocity and volume are maintained at levels assuring movement of the supply air and fumes in a pattern which will remove the fumes without adversely affecting the temperature or other characteristics of the food being cooked.

CROSS REFERENCE TO RELATED APPLICATIONS

This application is a continuation-in-part of my copending application Ser. No. 560,401 filed June 27, 1966 and entitled "Ventilating Hood," now Pat. No. 3,411,428.

FIELD OF THE INVENTION

This invention relates in general to a hood structure for collecting fumes and hot gases which are produced by a heating unit, for example, and would otherwise move into and circulate around the room in which the unit is disposed.

BACKGROUND OF THE INVENTION

Specific reference will be made hereinafter to the use of the apparatus of the invention in association with a cooking stove or the like, primarily because it was out of this background that the invention was developed. However, it will be recognized that the apparatus can be adapted for other purposes, such as the control or removal of noxious gases developed during an experiment being performed in a chemical laboratory, for example.

Fume collecting or ventilating hoods have been used for many years in association with both domestic and commercial cookstoves, for example. However, it has been quite evident to any person capable of detecting odors that existing hoods have not been satisfactory.

The ventilating hoods, with which I am familiar, have been operated as though the fumes from a specific source, such as a cookstove, located within a closed space, such as a kitchen, could be removed by connecting a strong exhaust fan to the room and then opening a window or door into the room to replenish the air removed by the fan. However, this approach to the problem of fume removal has been based upon three erroneous assumptions.

In the first place, the average exhaust fan capable of use in a hood is completely unable to develop a suction pressure which draws the air from all directions. Thus, at best, the air flow will tend to channelize between the fan and the supply opening into the room. Accordingly, substantial amounts of the fumes are relatively free to migrate away from the source because they are not influenced by the channels of air flow. It was also discovered that the volume of air introduced into the room is usually neither controlled nor consistent with the amount required. That is, the volume is either too large or too small and thereby defeats the purposes of the ventilating system.

In the second place, air flow currents produced by convection and/or by movements of people in the vicinity of the source of fumes will often disrupt the channeled air flow so that the fumes are actually moved away from the exhaust fan.

In the third place, the temperature within the room may be such that air adjacent the opening, such as a window, into the room will flow out of the opening and thereby draw the fumes into the room toward such opening.

While studying this problem, I discovered that a supply of gas, such as air, could be introduced into the zone between the source of fumes and adjacent the exhaust unit without spreading the fumes into the room. Moreover, the flow of air could be fed uniformly into all sides of the zone to entrain the fumes and thereby move them to the exhaust unit.

It is, therefore, an object of this invention to provide an apparatus for collecting fumes adjacent their source by postively pressurizing the zone adjacent the source of the fumes and entraining them in the flow of air from the pressurized zone to an exhaust unit.

It is a further object of this invention to provide a hood construction for supplying air and removing gases from a source and thereby eliminating the need for a supply opening elsewhere in the room containing the source.

It is a further object of this invention to provide a hood construction, as aforesaid, which is easy to install, substantially conventional in appearance, inexpensive to manufacture, capable of using conventional exhaust and supply fans, adaptable to various applications and operable by any person capable of operating existing exhaust fans and/or hoods.

It is a further object of this invention to provide a hood construction, as aforesaid, which contains means for permitting easy maintenance and replacement of the exhaust filter.

It is a further object of this invention to provide a hood construction, as aforesaid, which contains an improved fan structure of the penthouse type having both supply and exhaust fans mounted therein.

Other objects and purposes of this invention will become aparent to persons familiar with this type of equipment upon reading the following descriptive material and examining the accompanying drawings, in which:

FIG. 1 is an oblique view of a hood embodying the invention position over a source of fumes, such as a stove.

FIG. 2 is a sectional view of the hood taken along the line II—II in FIG. 1.

FIG. 3 is a side elevational view of modified hood structure embodying the invention.

FIG. 4 is a sectional view taken along the line IV—IV in FIG. 3.

FIG. 5 is a sectional view taken along the line V—V in FIG. 4.

FIG. 6 is a sectional view taken along the line VI—VI in FIG. 4.

FIG. 7 is a central cross-sectional view of a modified fan construction for the hood structure of the invention.

FIG. 8 is a fragment of a central crosssectional view of a modification of the fan construction illustrated in FIG. 7.

FIG. 9 is a sectional view of a modified hood construction similar to FIG. 2.

Certain terminology is used in the following description for convenience in reference, only, and will not be limiting. The terms "upper," "lower," "front," "rear" and words of similar import will have reference to the apparatus of the invention as appearing in FIG. 1 which dis-

closes the front and left sides of a hood. The words "inner," "outer" and derivatives thereof will refer to directions toward and away from, respectively, the geometric center of the hood and parts associated therewith.

SUMMARY OF THE INVENTION

The above-mentioned objects and purposes have been met by providing a hood structure for collecting fumes from a source by introducing a supply of air through the hood which exhausts the fumes. Said hood comprises panel means defining an exhaust chamber opening toward said source and an exhaust fan connected to the chamber for drawing the fumes into the chamber. The hood also includes panel means defining a supply chamber adjacent the exhaust chamber and having a discharge opening along at least one of the edges of the exhaust opening. A supply fan moves air from the supply chamber through the supply opening and toward the source.

DETAILED DESCRIPTION

The ventilating apparatus **10** (FIG. 1) for collecting fumes from a source **11**, such as a stove, located under the hood **12**, comprises panel means defining a vertical front wall **15**, two vertical side walls **16** and **17**, a rear wall **18** and a top wall **19**. The hood **12** can be secured to a vertical wall **22** or the ceiling **23** or both as indicated in FIG. 2. The hood could also be mounted on a support structure (not shown) surrounding the source, or it could be suspended from the ceiling.

The interior of the hood **12** (FIG. 2) is divided by panel means into two chambers hereinafter referred to as the exhaust chamber **26** and the supply chamber **27**. The exhaust chamber **26** has an upright back wall **29**, which extends lengthwise between the side walls **16** and **17**, and downwardly from the top wall **19**. Said wall **29** has a lower section **31** which converges downwardly with the front wall **15** to form a discharge slot or opening **50** between the lower ends of each. The edges of the walls in the hood **12** may, where required, be held together by soldering, rivets, or the like.

The exhaust chamber **26** is divided into upper and lower parts **32** and **33**, respectively, by a panel member **34** extending downwardly and rearwardly from the upper end of the wall section **31** to the rear wall **18** and is secured thereto by means including a stiffening member **36**. An opening **37** is provided in the panel member **34** to interconnect the upper and lower parts of the exhaust chamber.

The top wall **19** has an opening **38** between chamber **32** and exhaust duct **39** in which an exhaust fan **42** is mounted and driven by an electric motor **41**.

A filter **43** (FIG. 2) may be placed over the opening **37** to filter particulate material from the fumes that come from the source **11** and which would otherwise coat the walls of the upper chamber **32**, exhaust duct **39** and exhaust fan **42**.

The lower edges of the rear wall **18** and the lower wall section **31** have integral flanges **44** and **45** which extend inwardly toward each other and stiffen the hood.

An opening **47** (FIG. 2) is provided in the top wall **19** to connect the supply chamber **27** with a supply duct **48** having a supply fan **49** mounted therein and driven by an electric motor **56**.

Angle members **46** are secured to the top wall **19** and extend downwardly therefrom adjacent and below the opening **47** to support a filter **51** across the opening **47**.

The chamber **27** is provided with air guide vanes **53** which are secured to the upper side of the wall **31**, as by welding, to distribute the air supply evenly through the supply chamber **27** and thence through opening **50** along the full length thereof. In this embodiment, there are three guide vanes **53**, but more or less may be used.

The rate of air flow from the supply chamber **27** through the opening **50** is regulatable by a gate **54** (FIG. 2), which is positioned within the opening **50** and which is hingedly affixed to the front wall **15**. A screw **55** is threadedly received through the gate **54** and is in contact with the front wall **15**, so that the width of the opening **50** can be altered by turning the screw **55**, which may be a thumbscrew.

MODIFICATION

In the modified construction shown in FIGS. 3–6, the hood is comprised of a substantially rectangular outer housing **81** having vertical side walls **82** and **83** and vertical end walls **84** and **85** depending from a support structure or ceiling **86**. A pair of conically shaped, inner and outer funnels **91** and **92** are positioned substantially concentrically within the housing **81**. An exhaust passageway or chamber **89** is defined within the inner funnel **91**, and a supply passageway **88** is defined between the two funnels. The two funnels **91** and **92** are preferably similar and symmetrical.

The lower free ends of the inner and outer funnels **91** and **92** are spaced to define a discharge opening **90** which preferably extends completely around the exhaust chamber **89** and is substantially uninterrupted.

The upper ends of the inner and outer funnels **91** and **92** are connected to the spaced and concentric ducts **93** and **94** which extend upwardly through an opening **96** in the ceiling or support wall **86** and are preferably part of the dual flow fan assembly **97** illustrated in FIG. 6. The inner duct **93** connects the exhaust chamber **89** to the exhaust fan section and the outer duct **94** connects the supply chamber **88** to the supply fan section of the fan unit **97**. A shroud **98** is positioned around the junction of the duct **94** and the ceiling **86** to prevent water seepage. Other details of a fan assembly capable of the desired performance can be found in Pat. 3,122,307.

OPERATION

Although the operation of the apparatus of the invention are at least broadly disclosed in the foregoing description, the following discussion may be helpful in understanding the invention.

The several hood structures disclosed hereinabove operate on the same principles. That is, the fan means **42**, **49** and **97**, for example, are energized so that air is simultaneously supplied to replace that which is exhausted. More particularly, the supply fan **49** draws ambient air through the supply duct **48** into the supply chamber **27** and then discharges said air through the opening **50** as indicated by the arrows **104** in FIG. 2.

The exhaust fan **42** (FIG. 2) draws adjacent air and fumes through the exhaust chamber **26** and moves it out through the exhaust duct **39**, whereby a low pressure zone is created near the source **11**. Simultaneously, a quantity of air is fed through the opening **50** into the region adjacent said low pressure zone. The flow of supply air, as indicated by arrows **104**, is such that it sweeps inwardly adjacent the source **11** to entrain the fumes indicated by the arrows **103** and then move upwardly in response to the action of the exhaust fan. The air and fumes are then expelled through the duct **39**.

The discharge or outlet velocity of the air from the opening **50** is preferably in the range of between 4.2 and 13.5 feet per second.

In a preferred embodiment of the invention, the size of the discharge opening **50** (FIG. 2) is controlled by the gate **54** so that the volume of air discharged per unit of time therethrough is approximately 75 percent of the volume moved through the duct **39** during the same unit of time. The volume of air flowing through the discharge opening is preferably between 60 percent and 90 percent of the volume of air drawn into the exhaust chamber. Accordingly, a low pressure zone is continuously maintained between the source **11** and the superimposed hood **12**, which tends to prevent migration of fumes from the zone until they can be entrained with the supply air and withdrawn from such zone.

The discharge velocity and volume ratio set forth above have been found satisfactory where the apparatus **10** is

located in a typical room and the source **11** is a stove upon which food is cooked, so that excessive discharge velocities and/or volumes of supply air might cool excessively the food cooked on said stove. However, the ratio between the volume of air supplied and the volume of air exhausted, as well as the velocity of the air discharged through the open **50**, may be varied substantially while remaining within the scope of the invention. For example, where the source **11** is a laboratory bench upon which chemicals or the like are being handled, velocities and volumes of substantially different values could be completely satisfactory.

If the apparatus **10** is located in a room or other enclosure in which a subatmospheric pressure exists, it may be desirable to use said apparatus to relieve this negative pressure. That is, the volume of supply air map actually exceed the volume of air exhausted through the duct **39**. However, by proper design the volume of air discharged through the outlet opening **50** may be less than the volume exhausted through the duct **39**. Thus, the relative low pressure is relieved in the space adjacent theh apparatus **10** without disturbing the relative low pressure in the zone above the source **11**.

Under normal circumstances, the supply air is obtained from an outside source and, therefore, may be relatively cold in northern latitudes. Thus, where the apparatus of the invention is being used in association with a cooking surface, it would be at least desirable to raise the temperature of the supply air before it is discharged through the opening **50**. Such preheating of the air can be accomplished by heating coils or by other conventional heating means. Moreover, it is apparent that the heating means can be located in the inlet duct **48** (FIG. 2).

FIG. 7 illustrates a modified fan construction mounted in a penthouse and connectible to a hood structure of the invention, such as that disclosed in FIG. 4, for example. More specifically, the ducts **93A** and **94A** are concentrically disposed where they extend through the roof curb **110**, which supports a casing **111** defining a chamber **112** which communicates with the upper end of the supply duct **94A**. The casing **111** has a side opening **113** adjacent to which the shroud **115** of an axial flow impeller **114** is mounted. The impeller **114** is supported by the shaft of a motor **116** which is secured to the shroud **115**. A preheater coil **118**, a filter **119** and/or an inlet damper **122** may be mounted within the casing **111** in a conventional manner and for the usual purposes.

The casing **111** has an opening **123** in the upper wall thereof through which the upper end of the discharge duct **93A** communicates with the inline housing **124** containing a centrifugal impeller **126**. The housing **124** has an upwardly directed, axial discharge opening **127** which encircles a motor housing **128** supported upon the fan housing **124**. A motor **129** is supported within the housing **128** and connected by drive means **132** to a vertical shaft **133**, the lower end of which is connected to the back plate of the centrifugal impeller **126**.

From the foregoing, it will be seen that the centrifugal impeller **126** draws air from the duct **93A** and discharges it axially through the opening **127**. The axial flow impeller **114** draws air through the opening **117** defined by the shroud **115** and discharges it into the chamber **112** from which it can move into the supply duct **94A**.

FIG. 8, which illustrates a modification of the penthouse type fan construction of FIG. 7, is connectible to the hood structure of the present invention. The casing **111B** has an opening **140** in the side thereof which opens in a slightly downward direction and is used to receive fresh air moved through the supply duct **49B**. A filter **141** is mounted within the inlet opening **140** in any conventional manner for the usual purpose. A preheating device **142** perferably a gas fired heater, is positioned directly behind the filter **141** so as to heat the incoming air.

A centrifugal blower **143** is mounted in the casing **111B** and its impeller **144** is surrounded by a conventional shroud **146** for directing the air to the supply duct **94B**. The shroud **146** may be supported upon a pair of spaced, transverse plates **147** and **148** which define an air inlet opening **149**. The blower wheel **144** is rotatably driven from a motor **151** mounted within the casing, the motor and blower wheel having pulleys **152** and **154**, respectively, thereon interconnected by a drive belt **153** in a conventional manner.

The centrifugal blower **143** draws air through the inlet opening **140**, the filter **141** and the heating device **142** where the air may be heated, the air then being drawn into the chamber **156** which surrounds the shroud **146**. The air in the chamber **156** is then drawn into the fan in a conventional manner and discharged through the inlet **149** into the chamber **112B** and through the supply duct **94B**. Similarly, the air is exhausted from the hood by being drawn up through the exhaust duct **93B** by means of a conventional fan having a centrifugal impeller **126**, as illustrated in FIG. 7.

FIG. 9 illustrates a sectional view of a hood construction similar to the hood illustrated in FIG. 2 but illustrating a modification wherein the filter in the exhaust chamber is mounted on a swingable wall section so as to simplify maintenance and replacement thereof. Specifically, the hood **161**, which can be secured to the vertical wall **162** (or to a ceiling not shown) is divided by panel means into a supply chamber **163** and an exhaust chamber **164**. The exhaust chamber **164** has upright front and back walls **166** and **167** interconnected by a top wall **168** containing an opening **169** therein. The top wall is fixedly secured to an upwardly extending exhaust duct **171** concentrically arranged around said opening **169**. The exhaust chamber **164** is divided into upper and lower parts **172** and **173** by a sloping partition **174** which extends downwardly and rearwardly from the upper wall **168** to the rear wall **167** and has a rectangular opening **175**. A movable panel member **183**, which will be described in detail hereinbelow, is arranged to close theo pening **175**.

The supply chamber **163**, which surrounds the exhaust chamber **164** and is separated therefrom by the walls **167**, **168** and **169**, is defined by a casing **176** which has an opening **179** in the upper wall thereof, through which opening extends the exhaust duct **171**. The casing **176** is fixedly secured to an intake duct **177** which concentrically surrounds and is spaced from the exhaust duct **171** so as to define an annular supply passage in communication with the supply chamber **163**. The concentric exhaust and supply ducts **171** and **177**, respectively, can be connected to a suitable fan construction, such as illustrated in FIGS. 7 and 8. The exhaust chamber **163** is provided with a discharge slot or opening **181** between the lower ends of the walls **166** and **178**, which discharge opening preferably contains therein a plurality of fins **182** for directing the downward flow of air as it is discharged through the opening **181**.

The movable panel member **183** has a rectangular opening **184** therein defined by plural flanges, two of which appear at **186** and **187** along opposite edges of the opening **184** for holding a filter **188** in place over the opening **184**. The lower end of the movable panel member **183** is provided with a hinge structure **189** thereon which is pivotally mounted on a bracket **191** secured to the rear wall **167**.

An operating handle or lever **193** is rigidly connected to the movable panel **183** as to control the pivotal movement thereof. A spring **194**, which extends between the wall **167** and the operating handle **193**, is connected to the handle **193** at a location spaced from the pivot axis. The spring **194** functions as an overcenter toggle device to maintain the handle and the associated movable panel **183** in either the open or the closed position.

The movable panel **183** with the filter **188** thereon is normally maintained in the closed position illustrated in FIG. 9 by means of the spring **194** biasing the movable panel **183** upwardly (counterclockwise in FIG. 9).

Upward movement of the panel **183** is limited by engagement of the free edge of the panel **183** with the edge of the wall **174**. With the movable panel **183** in the closed position, the operating lever **193** is held in an upward position substantially above the lowermost portion of the hood casing so as to be hidden from view. However, the handle is maintained in a position substantially adjacent the lower edge of the hood so as to be readily engageable by a person standing on the floor below the hood so as to permit easy replacement of the filter.

Operation of the panel **183** is accomplished by grasping the handle **193** and pivoting same downwardly into the open position, as illustrated by the dotted lines in FIG. 9. This downward pivoting movement of the lever **193** causes a corresponding downward pivoting movement of the movable panel **183** whereupon same is positioned adjacent the lower edge of the casing **176** so as to permit the filter **188** to be easily reached whereupon same can be easily removed from the panel member **183** so as to be either cleaned or replaced. Further, in moving from the closed or operative position to the open or maintenance position, the spring **194** passes from one side to the other side of the pivot axis, whereupon the spring **194** biases the lever **193** against the flange **196** and thus maintains the operating lever **193** and the movable panel **183** in the maintenance position, thereby not requiring a person to hold same in the maintenance position when it is desired to service the filter.

The embodiments of the invention in which I claim an exclusive property or privilege are defined as follows:

1. A hood structure for collecting fumes from a food-cooking device located below the hood, comprising:

a housing having first wall means defining an exhaust chamber opening downwardly toward said device and second wall means defining a supply chamber adjacent said exhaust chamber and having a discharge opening near the opening of said exhaust chamber;

first and second duct means defining a pair of passageways communicating respectively with said exhaust and supply chambers;

filter means mounted in said exhaust chamber for filtering particles from said fumes; and

movable mounting means pivotally securing said filter means to said housing for permitting said filter means to be movable between an operative position wherein said filter means is positioned within said exhaust chamber and said fumes are caused to flow therethrough and a maintenance position in which said filter means extends below the opening of said discharge chamber;

said movable mounting means including a panel member pivotally connected adjacent one edge thereof to said housing with said panel member having an opening therein and means on said panel member for permitting said filter means to be mounted thereon adjacent said opening.

2. A structure according to claim **1**, further including overcenter spring means coacting between said housing and said movable mounting means for biasing said movable mounting means and said filter means into either said operative position or said maintenance position.

3. A structure according to claim **2**, further including handle means fixedly connected to said movable mounting means for permitting same to be manually moved between said operative position and said maintenance position.

4. In combination with a hood and fan unit for removing fumes from a source located within a closed structure and for circulating air which entrains said fumes, the hood being located within the structure and the fan unit being located externally of the closed structure on a wall thereof with the wall having an opening therethrough for permitting communication between the fan unit and the hood;

said hood including first wall means defining an exhaust chamber located within said closed structure, said exhaust chamber having an inlet opening located near said source;

said hood including second wall means defining a supply chamber located within said closed structure adjacent said exhaust chamber, said supply chamber having a discharge opening located near the inlet opening of said exhaust chamber;

said fan unit being mounted externally of said closed structure for supplying air to said supply chamber and withdrawing air from said exhaust chamber;

discharge conduit means having an inner end connected to and communicating with said exhaust chamber and an outer end connected to and communicating with said fan unit, said discharge conduit means having an exhaust conduit portion positioned within and extending through the opening formed in said wall;

supply conduit means having an inner end connected to and communicating with said supply chamber and having an outer end connected to and communicating with said fan unit, said supply conduit means also having a supply conduit portion positioned within and extending through said opening, said exhaust and supply conduit portions being positioned one within the other in concentric but spaced relationship;

said fan unit including first gas moving means in communication with the outer end of said discharge conduit means for withdrawing air with entrained fumes from said exhaust chamber;

said fan unit further including second gas moving means in communication with the outer end of said supply conduit means for supplying air to said supply chamber, said second gas moving means having an air inlet spaced a substantial distance from the air outlet of said first gas moving means for substantially preventing the air exhausted from said first gas moving means from being resupplied to the inlet of said second gas moving means; and

said fan unit further including housing means adapted to be mounted on said wall adjacent said opening with said housing means having said first and second gas moving means mounted thereon.

5. A structure according to claim **4**, wherein said housing means includes top, bottom and sidewalls defining an enlarged chamber, said housing means having substantially opposed openings in the top and bottom walls and also having an opening in the sidewall;

one of said conduit portions being fixedly connected to said bottom wall in surrounding relationship to the opening therein for providing communication between said conduit portion and said enlarged chamber;

one of said gas moving means being fixedly mounted on said housing means for controlling flow of air through the opening in the sidewall;

the other conduit portion being concentrically positioned within said one conduit portion and extending through said enlarged chamber; and

the other gas moving means being fixedly mounted on said top wall in flow communication with said other conduit portion for controlling flow of air through the opening in said top wall and through the said other conduit portion.

6. A structure according to claim **5**, wherein said one conduit portion comprises the supply conduit portion, and wherein said one gas moving means comprises the second gas moving means for causing air to flow through the opening in the sidewall into the enlarged chamber with the air then flowing from the enlarged chamber into

the supply chamber so as to be supplied to the supply chamber.

7. A structure according to claim 6, further including filter means disposed within said housing means on the downstream side of said second gas moving means.

8. A structure according to claim 4, further including heater means mounted on said housing means for heating the intake air supplied to said supply conduit means.

9. A structure according to claim 4, wherein said first gas moving means comprises a centrifugal fan having an upwardly facing discharge opening, which is substantially spaced vertically above and horizontally from the intake opening of said second gas moving means.

10. A structure according to claim 4, wherein said supply and discharge conduit portions extend substantially vertically with said discharge conduit portion being substantially concentrically positioned within said supply condit portion;

said first gas moving means comprising a centrifugal fan positioned adjacent the upper end of said discharge conduit and having a rotor mounted for rotation substantially coaxially of said discharge conduit means;

said second gas moving means comprising a second fan having a rotor mounted for rotation about an axis substantially transverse to the central axis of said discharge conduit means;

said housing means including an enlarged chamber positioned in surrounding relationship to a portion of said discharge conduit means and connected to the upper end of said supply conduit means for providing fluid communication therebetween; and

said housing means having an inlet opening in a sidewall thereof and said second fan being mounted on said housing for controlling flow of air through said inlet opening into said enlarged chamber.

11. The combination of a hood and fan unit for removing fumes from the zone above a food cooking surface located within a closed structure by circulating air which entrains said fumes, the hood being located within the structure directly above the food cooking surface and the fan unit being mounted externally of the closed structure on a wall thereof with the wall having means defining an opening therethrough for permitting communication between the fan unit and the hood, comprising:

food-cooking means located within said closed structure and having an upper cooking surface;

hood means located within said closed structure and including first wall means defining an exhaust chamber, said exhaust chamber having a downwardly directed inlet opening located directly above and spaced from said cooking surface;

said hood means including second wall means defining a supply chamber located within said closed structure adjacent said exhaust chamber, said supply chamber having a downwardly directed discharge opening extending along the inlet opening of said exhaust chamber and disposed above said cooking surface;

fan housing means mounted on and externally of said wall of said closed structure;

exhaust conduit means having an inner end connected to and communicating with said exhaust chamber and an outer end connected to and communicating with said fan housing means, said exhaust conduit means having a portion positioned within and extending through said opening in said wall;

supply conduit means having an inner end connected to and communicating with said supply chamber and having an outer end connected to and communicating with said fan housing means, said supply conduit means having a portion positioned within and extending through said opening in said wall;

first gas moving means in fan housing means communicating with the outer end of said exhaust conduit means for withdrawing air with entrained fumes from the zone below said exhaust chamber;

second gas moving means in said fan housing means communicating with the outer end of said supply conduit means for supplying air to said supply chamber, the volume of air flowing through the discharge opening of said supply chamber being between 60 percent and 90 percent of the volume of air and fumes drawn into the exhaust chamber, and the velocity of the air flowing downwardly through the discharge opening being in the range from 4.2 feet per second to 13.5 feet per second; and

said second gas moving means having an air inlet spaced a substantial distance from the air outlet of said first gas moving means for substantially preventing the air exhausted from said first gas moving means from being resupplied to the inlet of said second gas moving means.

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