March 18, 1969 K. S. RUSSELL 3,433,146

GREASE EXTRACTING VENTILATING APPARATUS

Filed Nov. 30, 1966 Sheet 1 of 4

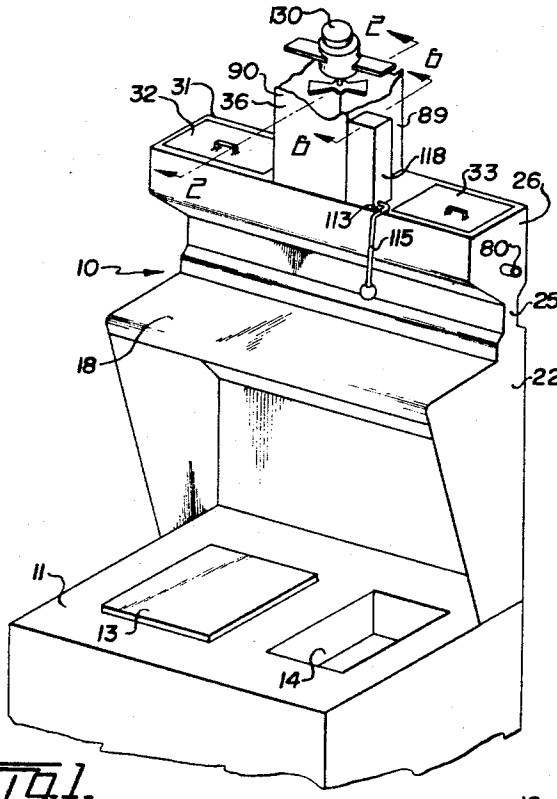

Fig. 1.

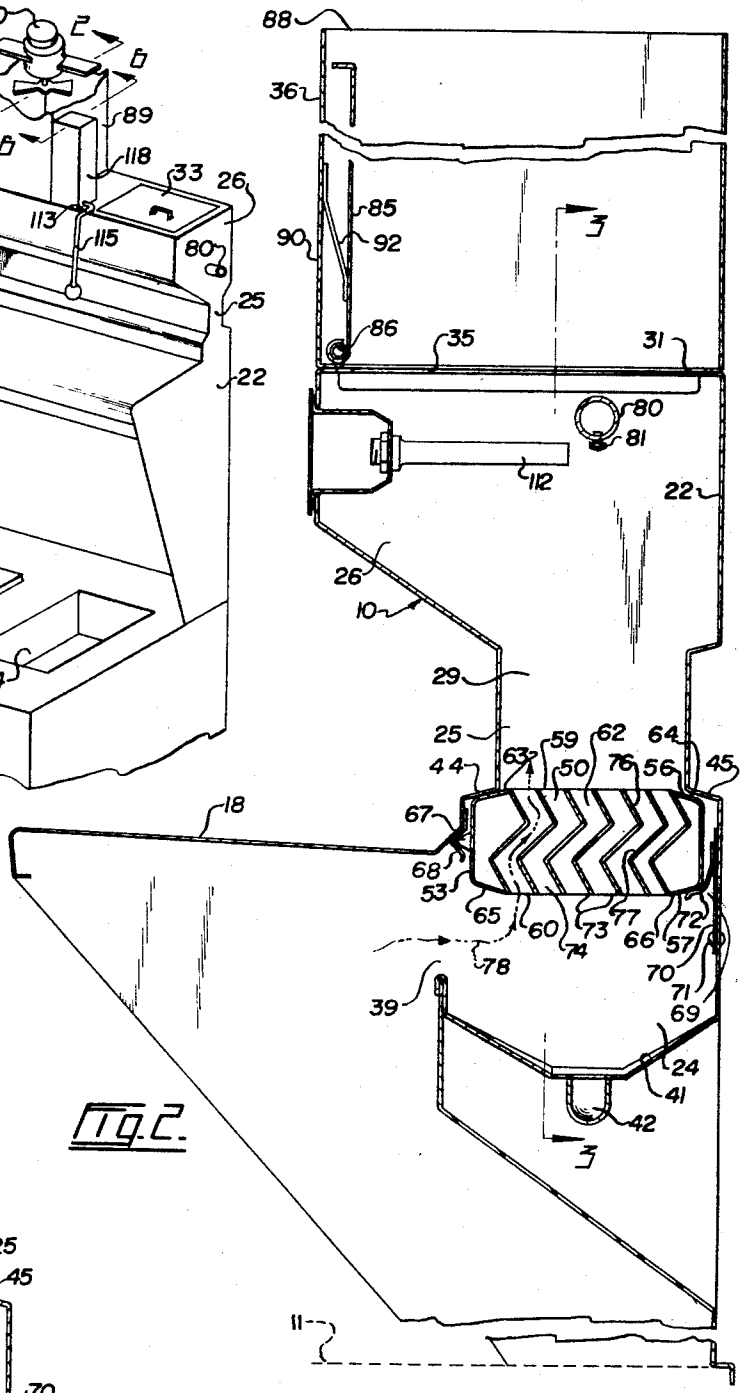

Fig. 2.

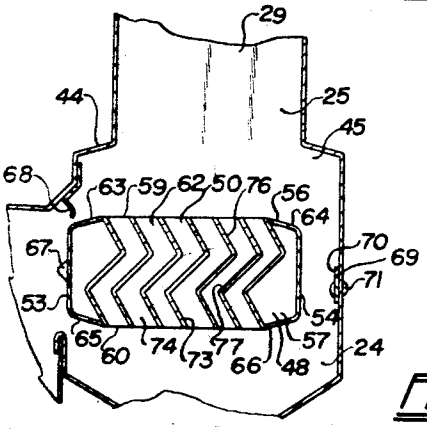

Fig. 4.

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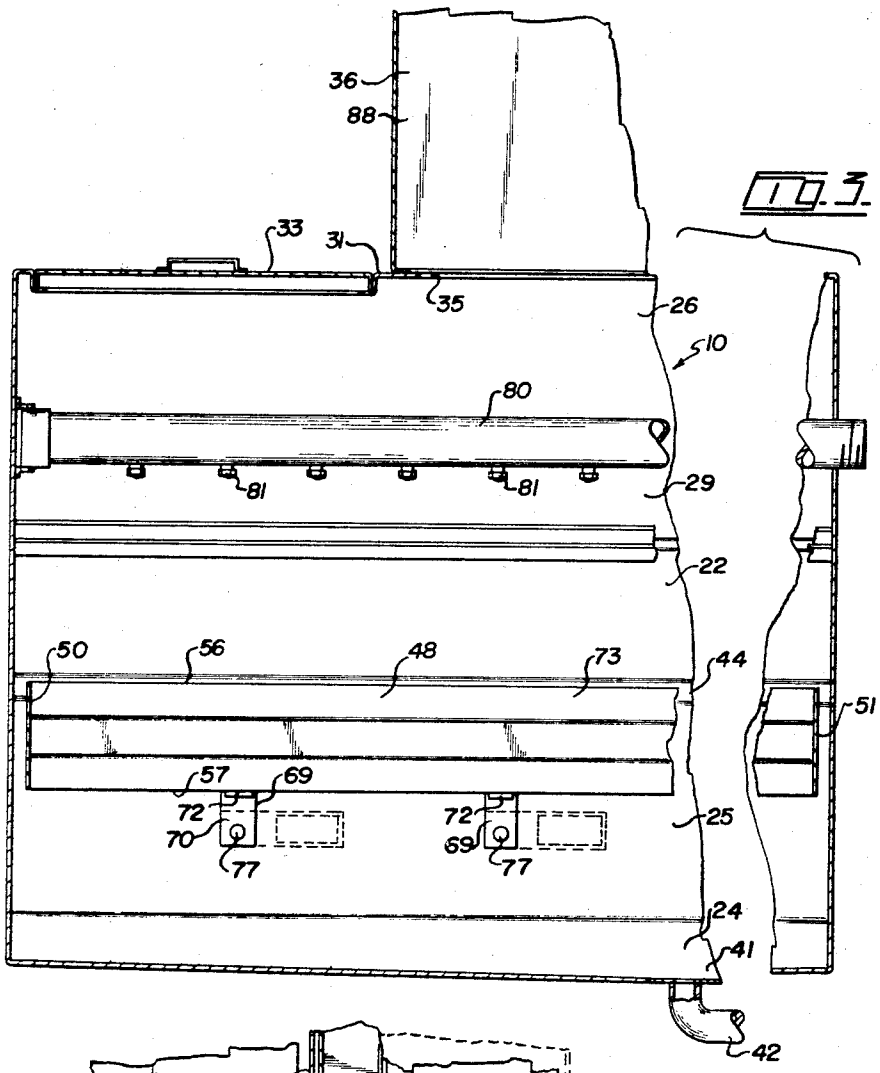

FIG. 3

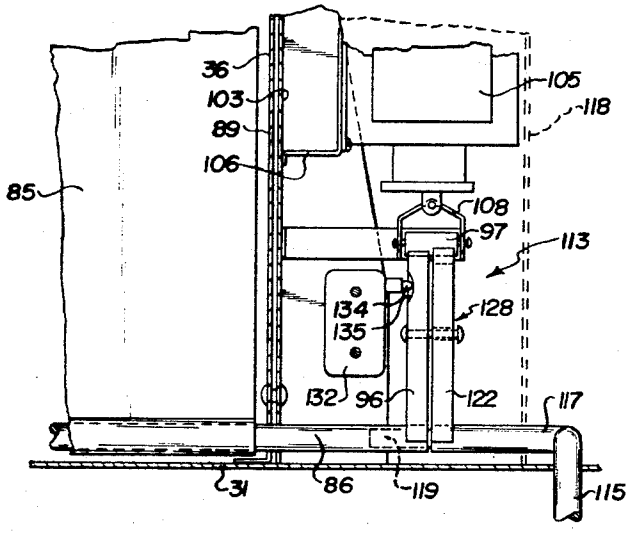

FIG. 7

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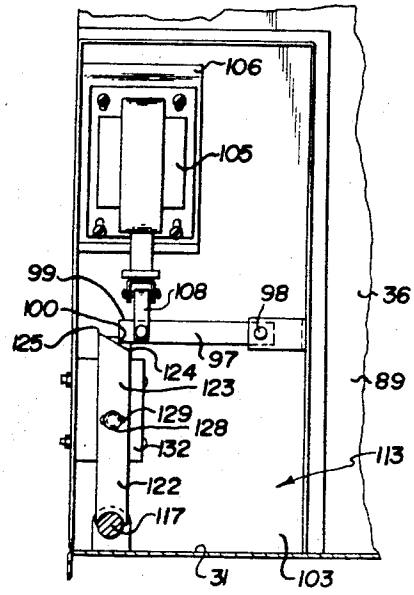

Fig. 6

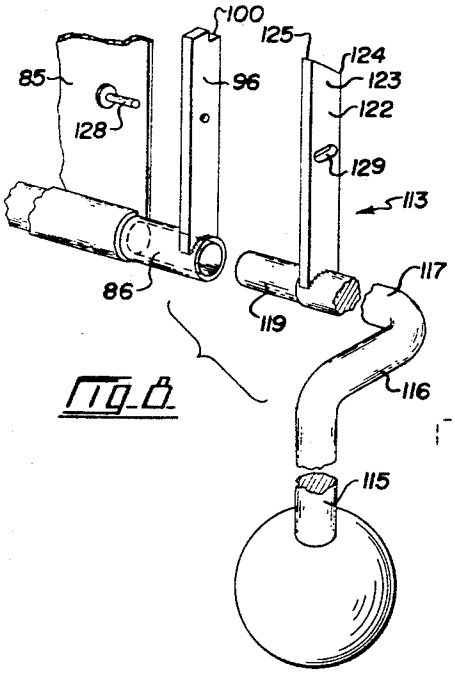

Fig. 8

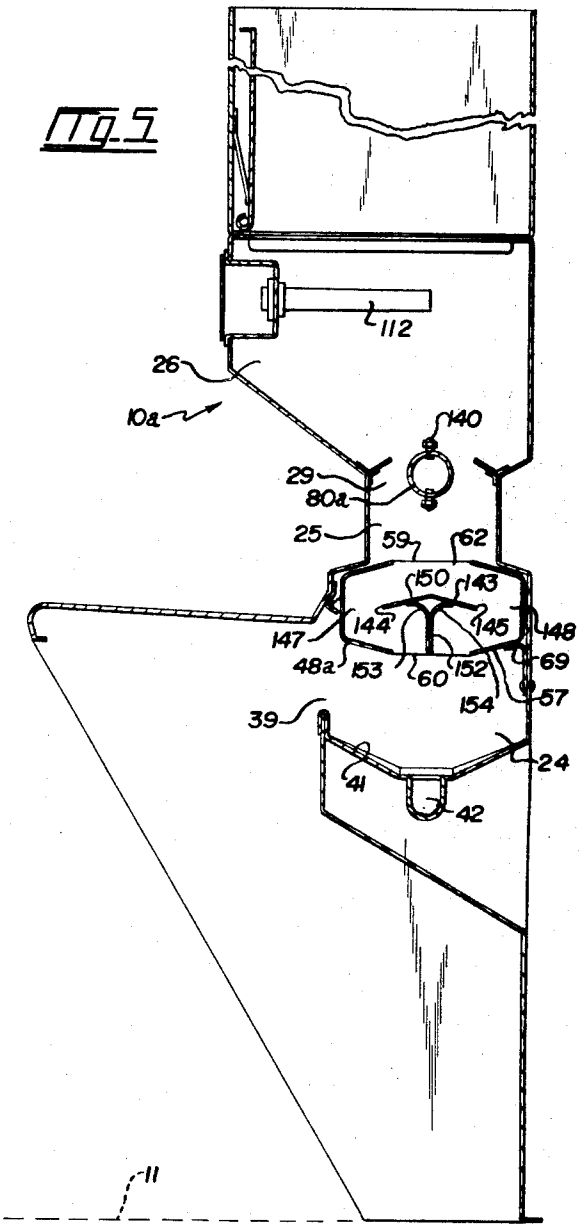

Fig. 5

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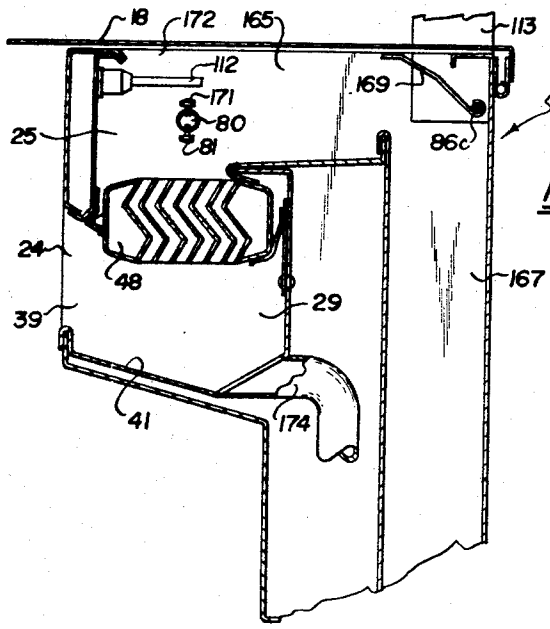

Fig. 10.

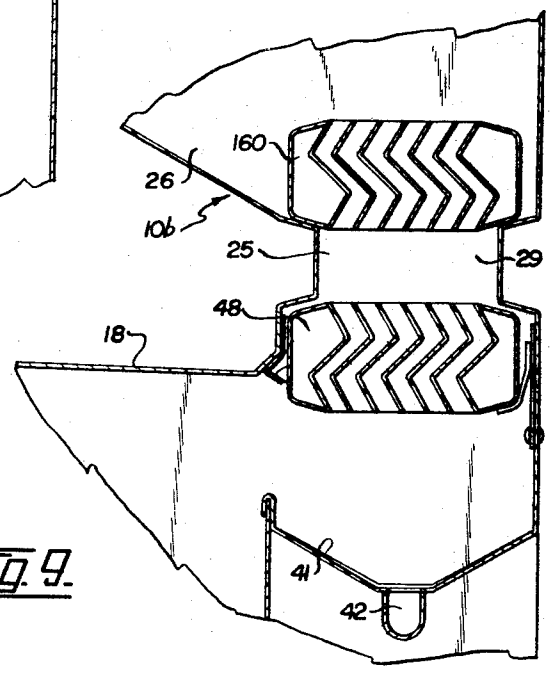

Fig. 9.

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GREASE EXTRACTING VENTILATING APPARATUS

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U.S. Cl. 98—115 12 Claims
Int. Cl. B01d *45/00;* F23j *11/00*

ABSTRACT OF THE DISCLOSURE

Ventilating apparatus for handling grease-laden air and having a main duct with a cartridge removably mounted therein and quickly and easily removable therefrom. The cartridge has a passage therethrough through which all the grease-laden air travelling along the duct passes. Baffle means in the cartridge passage divide the latter into a plurality of zigzag channels arranged to change the direction of the air flow in the channels to cause grease to be deposited in the cartridge. Spray means in the duct operate to wash down said duct and the cartridge, and means for automatically and manually operating a damper in the main duct above the cartridge close off said duct in case of fire.

This invention relates to apparatus particularly for ventilating areas having grease-laden air therein, such as areas over cooking stoves and other appliances using hot oils and fats.

There are many devices on the market for extracting grease from air being ventilated, but these are relatively cumbersome and expensive to construct and many impede the flow of air or lose their efficiency as grease and lint accumulate therein, and although they include spraying apparatus for washing out the grease, these cannot get all of the grease out and it is quite difficult, if not impossible, to clean the interior of the ventilating ducts by hand. The prior ventilating devices also include damper means for shutting off the duct when the temperature therein rises above a predetermined level or, in other words, when fire develops in the duct. However, damper closing mechanisms are both automatically and manually operable, and the operating means of the prior art are quite complicated and very expensive. The dampers for closing off the prior devices to prevent the flow of air therethrough when this is necessary, are quite long and cumbersome and, therefore, comparatively difficult to operate and clean.

The present ventilating apparatus is by comparison very simple in construction, and is designed to extract grease from air travelling therethrough by means of baffles so arranged that there is a minimum slowing down of the moving air. This apparatus also includes a cartridge removably mounted in the ventilating duct with baffle means therein to cause grease travelling through the cartridge to be deposited therein. The cartridge can easily be inserted into the duct and removed therefrom through the duct air entrance. The apparatus includes spray means for cleaning out the baffle cartridge, but a big advantage of this equipment is that the cartridge can be quickly and easily removed from the duct so that it can be washed periodically to remove all the grease therein in a very simple manner. When the cartridge is removed, the interior walls of the duct can easily be inspected and hand cleaned. Another feature of this apparatus is that it includes means for both automatically and manually operating a damper to close off the duct in case of fire, said means being very simple, positive in action, and easily operated. Other advantages of this apparatus over the prior art is that it can include a timing system to operate the spray apparatus regularly at desired times for cleaning purposes, the manual operating mechanism is remote from the fire area so that it can easily be operated; no hinged access doors and protruding hardware are required over the cooking devices being ventilated, making this apparatus sanitary and easier to keep clean than the prior devices; the simplification in design of the controls and the damper system make it possible to manufacture the apparatus in a very economical manner; and if desired, the automatic wash down system can be dispensed with because of the fact that the baffle system is in the removable cartridge and therefore can easily be washed. The damper arrangement of this apparatus is such that the damper is quite small and, therefore, easy to operate.

Several embodiments of the present invention are illustrated in the accompanying drawings, in which,

FIGURE 1 is a reduced isometric view of ventilating apparatus according to the present invention,

FIGURE 2 is a vertical section taken on the line 2—2 of FIGURE 1, illustrating the preferred form of the invention,

FIGURE 3 is a vertical section taken on the line 3—3 of FIGURE 2,

FIGURE 4 is a fragmentary view similar to FIGURE 2, showing a baffle cartridge of the apparatus removed therefrom,

FIGURE 5 is a view similar to FIGURE 2, illustrating an alternative form of ventilating apparatus,

FIGURE 6 is an enlarged section taken on the line 6—6 of FIGURE 1, showing the damper operating mechanism of the apparatus in elevation,

FIGURE 7 is a front view of the apparatus shown in FIGURE 6, with the cover removed,

FIGURE 8 is an exploded perspective view of the apparatus damper and elements associated therewith,

FIGURE 9 is a fragmentary sectional view illustrating another alternative form of ventilating apparatus, and

FIGURE 10 is a sectional view of ventilating apparatus which is a variation of that illustrated in FIGURE 2.

Referring to FIGURE 1 of the drawings, **10** is grease extracting ventilating apparatus according to the present invention mounted in operative position over a stove **11**. The apparatus may be used in association with any cooking appliance, and in the illustrated example, stove **11** includes a frying plate **13** and a deep fry well **14**. Apparatus **10** is mounted above and at the back of stove **11**, and has a shelf **18** spaced above and projecting forwardly over the top of the stove.

Apparatus **10** is made up mainly of a casing **22** that is as wide as stove **11**. Casing **22** includes a lower section **24**, an intermediate section **25** and an upper section or plenum chamber **26**, see FIGURE 2. These sections open into each other to form a main duct **29** extending from the bottom to the top of the casing. Upper section **26** has a top **31** which may be solid, or as preferred, said top may include removable covers **32** and **33**, as shown in FIGURE 1. Top **31** has an opening **35** therein centrally thereof, and a discharge duct **36** covers this opening and extends upwardly therefrom. The discharge duct is adapted to be connected to a ventilating pipe not shown, which extends to the atmosphere outside the building in which the apparatus is located. Said main and discharge ducts and the ventilating pipe actually form a ventilating duct extending from stove **11** to the outside atmosphere.

The lower section **24** of casing **22** is formed with a slot or entrance **39** extending the width of the casing and opening into duct **29**. This entrance is located immediately below shelf **18**.

A trough **41** is formed at the bottom of section **24** of the casing below entrance **39**, said trough extending from the front to the back of the section. A drain pipe **42** extends from the bottom of trough **41**, and when the apparatus is in use, this pipe is connected to a suitable drain.

The intermediate section **25** is narrower from the front to the back of the apparatus than lower section **24**, see FIGURE 2, and is connected to the latter by downwardly inclined shoulders **44** and **45**. A baffle cartridge **48** is removably mounted in duct **29** near the top of lower section **24**. This cartridge has end walls **50** and **51**, front and back walls **53** and **54**, a top **56** and a bottom **57**. Top **56** and bottom **57** are formed with openings **59** and **60** respectively therein, said openings extending the width of the cartridge which, in turn, extends the width of duct **29**. Cartridge **48** is hollow so that it forms a passage **62** extending between openings **59** and **60** and opening into duct **29** above and below the cartridge. Top **56** is inclined upwardly from front and back walls **53** and **54** to opening **59**, as indicated at **63** and **64** in FIGURE 2. Bottom **57** is inclined downwardly from said front and back walls to opening **60**, as indicated at **65** and **66**.

Cartridge **48** is removably retained in duct **29** in any desired manner. In this example, front wall **53** of the cartridge is formed with a rib or lug **67** projecting outwardly therefrom adapted to fit over an angle bracket **68** mounted on the front wall of lower section **24** immediately above entrance **39**. One or more spring clips **69** are provided for removably holding the cartridge in place. Each clip **69** includes a back **70** swingably mounted on a pin **71** projecting from the back wall of casing **22** in lower section **24**. A spring finger **72** is connected to the upper end of each clip back **70** and extends downwardly and outwardly therefrom beneath the bottom **57** of cartridge **48**, as clearly seen in FIGURES 2 and 3. When it is desired to release the cartridge, clips **69** are swung laterally on pins **71** into the positions shown in broken lines in FIGURE 3, at which time fingers **72** clear the cartridge so that the latter can be pulled downwardly and withdraw through duct entrance **39**, see FIGURE 4.

In order to replace the cartridge it is moved through duct entrance **39** into the lower end of duct **29** and then lifted upwardly until lug **67** is positioned above the level of bracket **68**. When clips **69** are swung upwardly, the upper ends of backs **70** thereof move between the cartridge and the adjacent duct wall to shift said cartridge towards the front wall of the duct thereby positioning lug **67** on top of bracket **68**.

A plurality of laterally spaced, generally vertical zigzag baffles **73** are mounted in passage **62** of cartridge **48**, dividing the latter into a plurality of zigzag channels **74**. The zigzags of baffles **73** are of such magnitude that portions of each baffle overlap portions of each adjacent baffle so that no air can travel straight through cartridge passage **62**. For example, the portion **76** of one of the baffles overlaps the portion **77** of the adjacent baffle in FIGURE 2. As a result of this arrangement, air travelling through any of the channels **74** in the cartridge cannot flow straight from opening **60** to opening **59** in the bottom and top of the cartridge and must make at least one right angle turn in each channel. In the illustrated example, the air must make two substantially right angle turns in opposite directions while travelling through any one of channels **74**.

One of the advantages of apparatus **10** is that grease-laden air travelling through entrance **39** has to make substantially a right angle turn to enter passage **62** of cartridge **48**. As the air travels through channels **74**, it must make two more right angle turns in the channels and then another fairly sharp angular turn to travel upwardly through intermediate section **25** of duct **29**. Broken line **78** in FIGURE 2 illustrates the path the grease-laden air must follow during its journey into and upwardly through duct **29**. Although channels **74** are zigzagged, the flow of air through duct **29** is not materially reduced by the baffles in the cartridge because of the fact that there are a plurality of channels **74**.

It is desirable to provide spray means in duct **29** for cleaning purposes and for preventing fire from starting in the duct or for putting out any fire that might get started.

For this purpose, a spray tube **80** extends across duct **29** in upper section **26** above intermediate section **25** and cartridge **48**. This tube extends completely across the apparatus and is preferably removably mounted therein. The tube is connected to a fluid source, preferably a water source, not shown, when the apparatus is in use. The tube, may have a plurality of perforations therein for directing fluid into the main duct, but it is preferable to provide a plurality of nozzles **81** in the tube so that the liquid is sprayed throughout the duct. These nozzles are directed generally downwardly so that they direct water against the side walls of upper section **26**, intermediate section **25** and through this section on to top **56** of cartridge **48**, on to baffles **73**, and through channels **24**. This water washes grease off the surface with which it comes into contact, and the dirty water flow into trough **41** and thence out of the apparatus through drain pipe **42**.

As previously stated, discharge duct **36** projects upwardly from and communicates with main duct **29**. A damper **85** is mounted in duct **36** so that it can swing to a position completely to close off said duct. As duct **36** is much smaller in cross section than duct **29**, the damper is relatively small. In this example, one edge of damper **85** is fixedly secured to a tube **86** which is journalled in side walls **88** and **89** of duct **36** near and at the bottom of front wall **90** thereof. By referring to FIGURE 2, it will be seen that damper **85** is secured to the inner surface of tube **86** so that it will fall under its own weight completely to cover opening **35** and thereby shut off the discharge duct. Damper **85** is normally retained in a vertical position as shown in FIGURE 2, at which time a leaf spring **92** which is secured to the damper bears against the inner surface of wall **90** so that when the damper is released, said spring will urge it towards the closed position. The damper will normally close by itself, but the spring is provided to make sure that the damper closes when this is necessary.

Damper **85** is normally retained in its open position, but it is desirable to have it close automatically in case the temperature in duct **29** rises to the point where there is danger of fire, and it should be closable manually when desired. The mechanism for controlling the damper is illustrated in FIGURES 6 to 8.

Tube **86** projects outwardly beyond duct wall **89**, and has a vertical arm or latch **96** fixed thereto and normally projecting upwardly therefrom. This arm or latch is aligned with damper **85** so that when the latter is in its horizontal closed position, the arm or latch is in a horizontal position. A substantially horizontal dog **97** is pivotally mounted at one end at **98**, and has its opposite end **99** normally resting in a notch **100** formed at the upper end of latch **96** at one side thereof, see FIGURE 6. A vertical mounting plate **103** is mounted on duct side wall **89** near tube **86**, and a solenoid **105** is supported by bracket **106** which, in turn, is mounted on plate **103**, see FIGURES 6 and 7. The core of this solenoid is connected by a link **108** to dog **97** near the end **99** thereof. Solenoid **105** is normally de-energized, at which time dog **97** rests in notch **100** of latch **96**. This retains the latch and, consequently, damper **85** in their vertical positions. When the solenoid is energized, dog **97** is swung upwardly to release latch **96** so that spring **92** and the weight of damper **85** cause the damper to swing to its closed position.

In order to close the damper when the temperature in main duct **29** rises above a predetermined point, a thermoswitch **112** is mounted in duct **29** near the upper end thereof. This switch is electrically connected to solenoid **105** and to a suitable source of electrical power, not shown, so that when the temperature in the duct rises to the predetermined point, the solenoid is energized to cause damper **85** to close.

Manual operating means generally designated by the numeral **113** has been provided for the damper. This operating means includes a handle **115** hanging downwardly in front of upper section **26** of the apparatus from a horizontal and inwardly-extending section **116**. This section

116 is fixedly connected to a shaft 117 extending into a housing 118, removed in FIGURES 6 and 7, said shaft being axially aligned with tube 86, see FIGURES 7 and 8. Shaft 117 has a reduced end 119 which fits into tube 86 and is rotatable relative thereto. A second arm or latch 122 is fixedly secured to shaft 117 and extends upwardly beside latch 96. Latch 122 has a bevelled upper end 123 having a low corner 124 below the level of notch 100 in latch 96, and an upper corner 125 which is above the bottom of said notch. A pin 128 is fixedly secured to latch 96 and extends into a slot 129 in latch 122.

When handle 115 is swung outwardly relative to the apparatus, shaft 117 rotates relative to tube 86, and latch 122 is swung inwardly until corner 125 engages end 99 of dog 97 and lifts said dog out of notch 100. Latch 96 remains stationary during this movement owing to the fact that pin 128 extends into slot 129 of latch 122. Further movement of the latter latch causes latch 96 to move with it. At the same time, since dog 97 has released latch 96, spring 92 and the weight of damper 85 causes the damper to swing to its closed position. When handle 115 is swung back towards the apparatus, latches 96 and 122 are swung back to their vertical positions until dog 97 drops into latch notch 100, and this action moves damper 85 back to its open position.

An electrically driven exhaust fan 130, diagrammatically illustrated in FIGURE 1, is mounted in discharge duct 36 to draw air through duct 29. When damper 85 is closed, it is desirable to shut off the exhaust fan. This is done automatically when the damper is closed by means of a microswitch 132 mounted on a support 133 projecting outwardly from mounting plate 103. The operating plunger 134 of this switch normally projects into a notch 135 formed in the side of adjacent latch 96 and bears against the latter. With this arrangement, when the latch is in its normal position, switch 132 is closed. This switch is in circuit with the motor of exhaust fan 130 so that when latch 96 is released to allow damper 85 to close and said latch moves away from plunger 134 to permit switch 132 to open, the exhaust fan stops operating.

When apparatus 10 is in operation, the exhaust fan draws grease-laden air from above stove 11 through entrance 39 into duct 29. This air passes upwardly through zigzag channels 74 into zigzag and through discharge duct 36. It will be noted from line 77 in FIGURE 2 that the grease-laden air has to make a sharp turn after passing through entrance 39 in order to enter channels 74. As the grease is heavier than the air, it does not so readily make this sharp turn so that considerable grease is separated from the air at the first turn, said grease dropping down into trough 41. The air also makes two substantially right angle turns in channels 74 so that more grease is separated therefrom and deposited on baffles 73, running downwardly along the latter and dropping into trough 41. The air also makes a turn immediately above channels 74. Thus, as the air travels through duct 29 and cartridge 48, a very large percentage of grease is removed therefrom without materially affecting the velocity of the air. When it is desired to wash out the apparatus, water or other cleaning fluid is directed into tube 80, and it sprays out through nozzles 81 down through upper section 26, intermediate section 25, over baffles 73, and through channels 74 washing down the walls of the main duct and the baffles in the cartridge. It will be noted that the top sections 63 and 64 of the cartridge project into duct 29 at intermediate section 25 so that some water from tube 80 is caught by these top sections and directed around the outer surface of cartridge 48 to keep said outer surface clean. Ventilating equipment such as this is normally used in kitchens where a great deal of cooking is done, such as in restaurant kitchens. It is normal practice to periodically operate the spraying system to clean out the main duct, such as, for example, once a day. This can be done manually, or a valve controlling the flow of water to tube 80 can be controlled by a time clock system so as automatically to start the clean-out operation. One of the advantages of this apparatus is that cartridge 48 can be very quickly and easily removed for cleaning and inspection purposes. It is removed from the apparatus in the manner described above, and it can be placed in a suitable container or sink and easily washed with water and soap or other cleaner.

If a fire starts around the cooking equipment 11, the temperature in duct 29 rises, and thermoswitch 112 energizes solenoid 105 to cause damper 85 to close and to shut off the exhaust fan before the fire reaches the duct. This stops the movement of air through the duct so that it is relatively easy to contain the fire at its starting point. An operating switch is placed in circuit with solenoid 105 in order to control a valve which is opened when solenoid 105 is energized in order to cause the spraying apparatus automatically to operate under these circumstances.

Damper 85 can be closed manually by pulling handle 115 outwardly. This is done when it is desired at any time to close the damper, such as when a fire occurs somewhere near the apparatus and it is necessary to stop the draft created by the flow of air through the apparatus. Furthermore, the damper can be closed should the automatic system fail when there is a fire in the duct.

FIGURE 5 illustrates apparatus 10*a* which is slightly different from apparatus 10. The difference is in the baffle arrangement within cartridge 48*a*, and spray tube 80*a* has been moved from upper duct section 26 to intermediate section 25, although this does not have to be done. If the tube is moved downwardly as shown, it is preferable to provide it with a plurality of additional nozzles 140 directed upwardly towards section 26.

Cartridge 48*a* has passage 62 extending therethrough from top opening 59 to bottom opening 60. A transverse baffle 143 is mounted in the cartridge and extends across passage 62 between the openings 59 and 60 thereof, side edges 144 and 145 of this baffle being spaced inwardly from the back and front walls of the cartridge so as to divide passage 62 into channels 147 and 148. Baffle 143 is inclined downwardly towards each of its opposite edges 144 and 145, as indicated at 150. The baffle arrangement is improved by a vertical baffle 152 connected to and depending from transverse baffle 143 substantially midway between the side edges thereof and extending towards bottom opening 60. Baffle 152 is preferably formed with deflectors 153 and 154 at its upper end which respectively curve towards edges 144 and 145 of baffle 143.

In this example, cartridge 48*a* is retained in position within duct 29 in the same manner as cartridge 48 by spring clips 69.

Apparatus 10*a* functions substantially in the same manner as apparatus 10. The main difference is that when the grease-laden air travels through entrance 39 in the lower end of duct 29, it makes a sharp turn upwardly, and vertical baffle 152 divides this air into two streams to travel upwardly through zigzag channels 147 and 148 around the edges of horizontal baffle 143. The air makes three sharp turns as it travels towards the edges of the horizontal baffle, around said edges, back towards opening 59, and up through said opening.

When the apparatus is automatically cleaned, water or other liquid is directed into tube 80*a*, and is sprayed downwardly and upwardly by nozzles 81 and 140. The downwardly travelling water washes cartridge 48*a* and the baffles therein, and is caught in trough 41. Cartridge 48*a* can be quickly and easily removed when it is desired to wash it separately from the rest of the apparatus.

FIGURE 9 illustrates apparatus 10*b* which is another embodiment of the invention. This is the same as apparatus 10, with the exception that a second cartridge 160 is mounted at the bottom of upper section or plenum chamber 26 immediately above intermediate section 25. Cartridge 160 completely covers the upper end of section 25 so that all air moving upwardly through main duct 29 passes through said cartridge. Access is gained to cartridge 160 by removing one of the covers 32 or 33. Cartridge 160 has the same baffle and passage arrange-

ment as lower cartridge **48**, although, if desired, it may have the same baffle arrangement as cartridge **48***a*.

Apparatus **10***b* functions in the same manner as the previously-described forms of the invention, the only difference being that the grease-laden air entering duct **29** passes successively through cartridges **48** and **160**. This arrangement is used where there is an excessive amount of grease in the air being vented.

FIGURE 10 illustrates ventilating apparatus **10***c* which is another alternative of the invention.

Apparatus **10***c* has a cartridge **48***c* which is the same as cartridge **48** mounted in the lower section **24** of duct **29**. The upper section **26** of the duct has been omitted so that the intermediate section **25** forms the upper end of main duct **29**. A discharge duct **165** is connected to the upper end of main duct **29** and extends laterally therefrom, and an outlet pipe **167** extends downwardly from the outer end of said discharge duct. Ducts **29** and **165** and outlet pipe **167** form a continuous duct extending from duct entrance **39** to atmosphere outside the building. An exhaust fan, not shown, for this apparatus would be located in pipe **167**.

A damper **169** is mounted on a tube **86***c* in discharge duct **165** and is positioned so that it can swing to a lower or horizontal position completely closing off the upper end of outlet pipe **167**. This damper is normally held in an inclined position, and is controlled by manual operating means **113** in the same manner as the dampers in the above-described forms of the invention. The thermoswitch **112** for the damper control mechanism is located in intermediate duct section **25** above cartridge **48**. Similarly, spray pipe **80** is located in said intermediate section **25** just above the cartridge. This pipe has downwardly-extending nozzles **81**, and has additional nozzles **171** projecting upwardly therefrom which are directed towards the wall **172** which constitutes the top of duct **29** and the upper wall of discharge duct **165**.

Although the illustrated cartridge **48***c* is the same as cartridge **48**, it will be understood that cartridge **48***a* can be used in this form of the invention.

Trough **41***c* located underneath cartridge **48***c* and below the level of entrance **39** has an outlet pipe **174** which extends to a suitable drain.

Apparatus **10***c* functions in the same manner as the others, the only difference being that the air that is drawn through main duct **29** travels horizontally through discharge duct **165** and downwardly through outlet pipe **167**. This apparatus is used in places where it is desirable not to have any part of the apparatus projecting upwardly above shelf **18**.

I claim:

1. Ventilating apparatus comprising a ventilating main duct having an entrance near one end and opening laterally therefrom and an outlet near an opposite end and through which grease-laden air will travel, said duct having a vertical section above said entrance, a cartridge removably mounted in and extending across substantially the entire cross sectional area of the vertical section of said duct, means for removably supporting the cartridge in the passage where it is accessible through said entrance and removable therethrough, said cartridge having a vertical passage therethrough of substantially the same cross sectional area as the duct and communicating at top and bottom ends thereof with the duct and through which all said grease-laden air flows, baffle means in the cartridge passage dividing said passage into a plurality of zigzag channels extending from the top to the bottom thereof and generally longitudinally of said duct and arranged to change the direction of said air flow in the channels and transversely of the duct to cause grease therein to be deposited in the cartridge and to flow downwardly through the bottom end of the cartridge passage, spray means extending across the duct above the cartridge and positioned to spray fluid on to the duct walls and into and through the zigzag channels of the cartridge, control means operable to direct fluid to said spray means, and a trough in the passage below the entrance thereof positioned to receive the grease and sprayed fluid from the cartridge.

2. Ventilating apparatus as claimed in claim **1** including a damper mounted in the duct above said spray means, means normally retaining said damper in an open position, operating means for releasing the damper retaining means to close the damper, and a thermostat in the duct operatively connected to said operating means and said control means to cause said operating means when the temperature in the duct reaches a predetermined point to close the damper and to spray fluid from the spray means.

3. Ventilating apparatus as claimed in claim **1** including a damper hingedly mounted at an edge thereof in the duct and adapted to extend upwardly from said edge along a wall of the duct, means normally retaining the damper in said position along the duct wall, and spring means between the damper and said duct wall normally compressed by the damper and adapted to start the latter swinging to a duct-closing position when the damper is released by said retaining means.

4. Ventilating apparatus as claimed in claim **1** in which said cartridge is hollow and the ends of the passage thereof are formed by aligned openings in a top and a bottom of the cartridge, and said baffle means comprises a transverse baffle extending across the passage between said openings and extending laterally between said top and bottom to force air entering through the bottom opening to travel laterally in the passage before reaching the top opening, side edges of said baffle being spaced from adjacent sides of the cartridge, said baffle and the top and bottom of the cartridge forming said zigzag channels at opposite sides of the baffle.

5. Ventilating apparatus as claimed in claim **1** in which said cartridge is hollow and the ends of the passage thereof are formed by aligned openings in a top and a bottom of the cartridge, and said baffle means comprises a transverse baffle extending across the passage between said openings and extending laterally between said top and bottom to force air entering through the bottom opening to travel laterally in the passage before reaching the top opening, side edges of said baffle being spaced from adjacent sides of the cartridge, and a vertical baffle connected to and depending from said transverse baffle substantially midway between the side edges thereof and extending towards said bottom opening, said transverse and vertical baffles, and the top and bottom of the cartridge forming said zigzag channels at opposite sides of the baffles.

6. Ventilating apparatus as claimed in claim **1** in which said cartridge is hollow and the ends of the passage thereof are formed by openings in a top and a bottom of the cartridge, and said baffle means comprises a plurality of laterally spaced, generally vertical zigzag baffles in said passage dividing the latter into said plurality of zigzag channels, the zigzags of said baffles being of such magnitude that portions of each baffle overlap portions of each adjacent baffle.

7. Ventilating apparatus as claimed in claim **1** including a damper hingedly mounted at a lower edge thereof in the duct and extending upwardly in an open position along a wall of the duct, said damper when free swinging under gravity to a substantially horizontal position closing the duct, a latch arm fixedly connected to the damper to swing therewith, a hinged dog positioned normally to engage said latch arm to retain the damper in said open position, means near said dog operable to disengage the dog from the latch arm to permit the damper to swing to the duct closing position, an electrically driven exhaust fan for drawing air through the main duct, and a switch for controlling the operation of the exhaust fan, said switch having an operating plunger engaged by the latch arm when the damper is in the open position to

keep the fan in operation, said plunger being released by the latch arm when the damper swings to the duct closing position to cause the switch to stop the fan.

8. Ventilating apparatus as claimed in claim 1 including a damper hingedly mounted at a lower edge thereof in the duct and extending upwardly in an open position along a wall of the duct, said damper when free swinging under gravity to a substantially horizontal position closing the duct, a latch arm fixedly connected to the damper to swing therewith, a hinged dog positioned normally to engage said latch arm to retain the damper in said open position, a solenoid connected to said dog operable to disengage the dog from the latch arm to cause the damper to swing to the duct closing position, and a thermostat in the main duct electrically connected to said solenoid, said thermostat being adapted to operate the solenoid to cause the damper to close when the temperature in the main duct reaches a predetermined point.

9. Ventilating apparatus comprising a ventilating main duct having an entrance near one end and opening laterally therefrom and an outlet near an opposite end and through which grease-laden air will travel, said duct having a vertical section above said entrance, a cartridge removably mounted in and extending across substantially the entire cross sectional area of the vertical section of said duct, means for removably supporting the cartridge in the passage where it is accessible through said entrance and removable therethrough, said cartridge being hollow and having an opening in the top and an opening in the bottom thereof and having a vertical passage therethrough extending from the top opening to the bottom opening and through which all said grease-laden air flows, said passage being of substantially the same cross sectional area as the duct, baffle means in said passage comprising a plurality of laterally-spaced, generally vertical zigzag baffles dividing the passage into a plurality of zigzag channels extending from the top opening to the bottom opening of the cartridge, the zigzags of said baffles being of such magnitude that portions of each baffle overlap portions of each adjacent baffle, said baffles changing the direction of said air flow in the channels to cause grease therein to be deposited in the cartridge and to flow downwardly through said bottom opening, a trough in the passage below the entrance thereof positioned to receive grease from the cartridge, spray means extending across the duct above the cartridge and positioned to spray fluid into said channels and on to the baffles in the cartridge, a damper mounted in the duct above said spray means, means normally retaining said damper in an open position, a thermostat in the duct, and operating means controlled by said thermostat to release the damper retaining means to close the damper when the temperature in the duct reaches a predetermined point.

10. Ventilating apparatus comprising a ventilating main duct having an entrance near one end and opening laterally therefrom and an outlet near an opposite end and through which grease-laden air will travel, said duct having a vertical section above said entrance, a cartridge removably mounted in and extending across substantially the entire cross sectional area of the vertical section of said duct, means for removably supporting the cartridge in the passage where it is accessible through said entrance and removable therethrough, said cartridge having a vertical passage therethrough of substantially the same cross sectional area as the duct and communicating at top and bottom ends thereof with the duct and through which all said grease-laden air flows, baffle means in the cartridge passage dividing said passage into a plurality of zigzag channels extending from the top to the bottom thereof and arranged to change the direction of said air flow in the channels to cause grease therein to be deposited in the cartridge and to flow downwardly through the bottom end of the cartridge passage, a trough in the passage below the entrance thereof positioned to receive the grease from the cartridge, a damper swingably mounted in the main duct to move to a position closing the duct, a first latch arm fixedly connected to the damper to swing therewith, a hinged dog positioned normally to engage said latch arm to retain the damper in an open position, a second latch arm mounted near the first latch arm normally not interfering with said dog and swingable to disengage the dog from the first latch arm to cause the damper to swing to the duct closing position, and a handle connected to said second arm and by means of which said second arm is swung to disengage the dog from the first arm.

11. Ventilating apparatus as claimed in claim 10 including means interconnecting the first and second latch arms while permitting limited relative movement therebetween.

12. Ventilating apparatus as claimed in claim 10 including a solenoid connected to said dog operable to disengage the dog from the latch arm to cause the damper to swing to the duct closing position, and a thermostat in the main duct electrically connected to said solenoid, said thermostat being adapted to operate the solenoid to cause the damper to close when the temperature in the main duct reaches a predetermined point.

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