

[72] Inventors **Stuart C. Wyant**
809 Clay St.;
Robert R. Fredinburg, 438 Euclid, both of
Ashland, Oreg. 97520

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[54] **TIMED MOTORIZED FLUE CLEANING APPARATUS**
9 Claims, 4 Drawing Figs.

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[56]

References Cited

UNITED STATES PATENTS

430,257	6/1890	Taylor	239/550 X
3,121,235	2/1964	Gellmann	239/550 X
3,242,652	3/1966	Malenchini	169/19 X
1,373,160	3/1921	Barravecchia	169/16 X

FOREIGN PATENTS

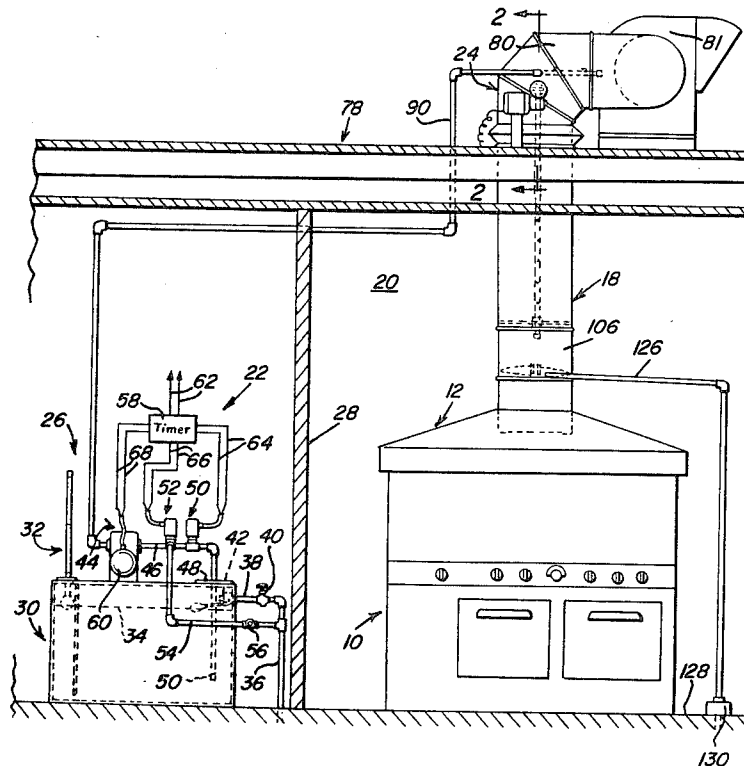
630,767	12/1927	France	239/208
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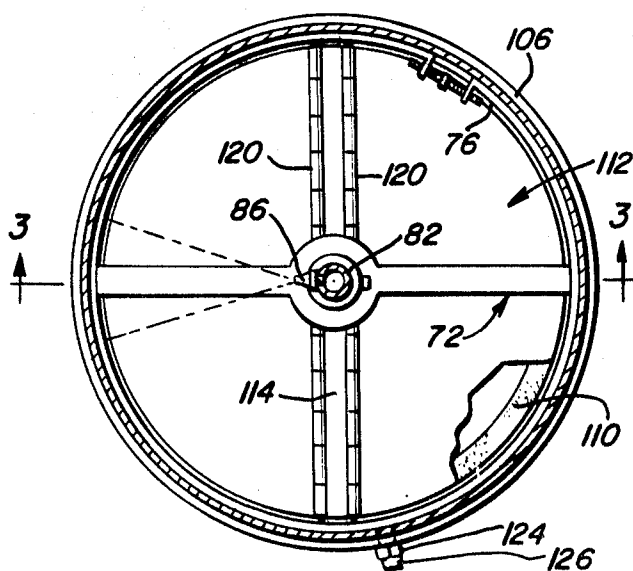
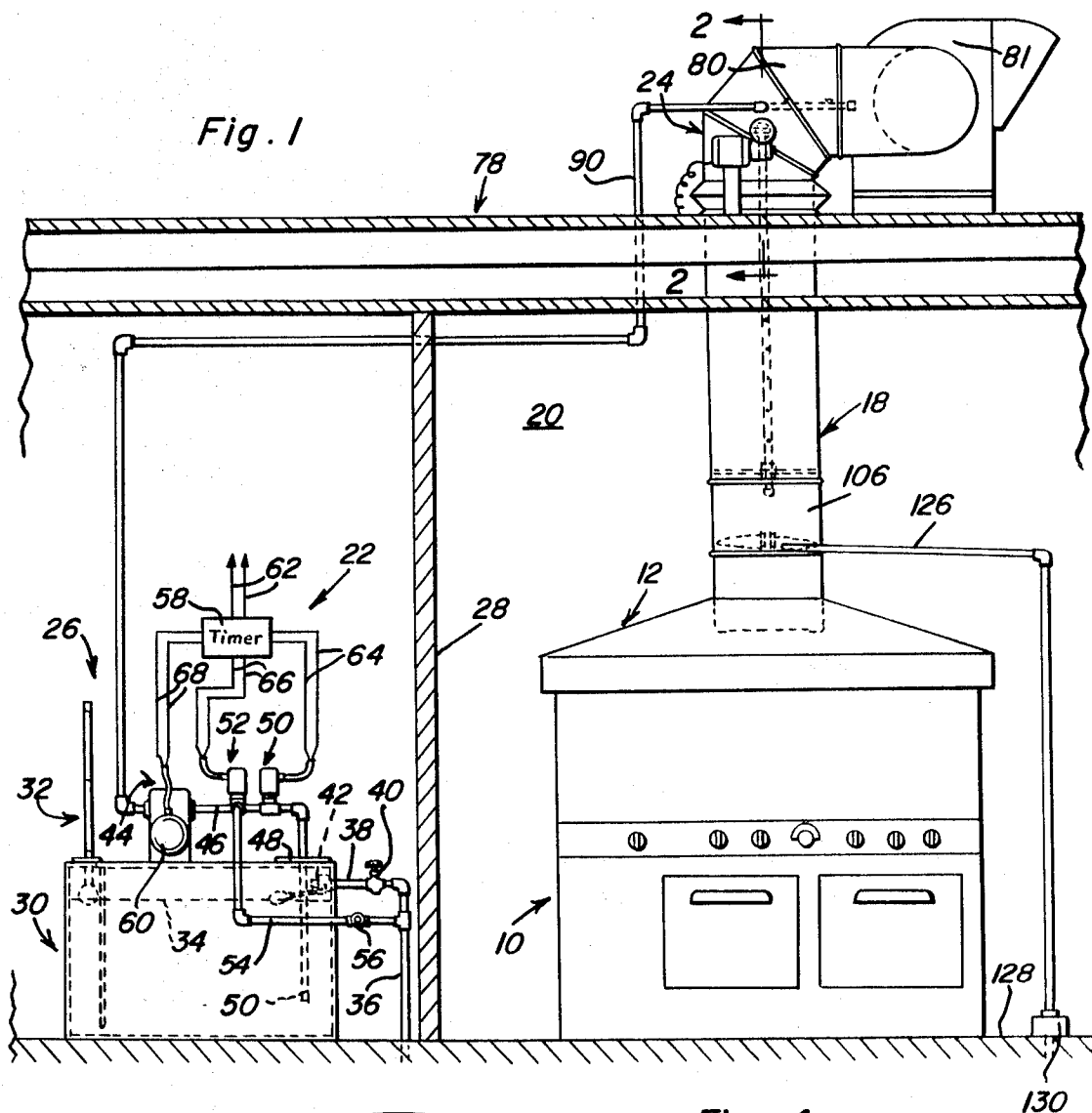
Primary Examiner—M. Henson Wood, Jr.

Assistant Examiner—Michael Y. Mar

Attorneys—Clarence A. O'Brien and Harvey B. Jacobson

ABSTRACT: An assembly including structure for applying cleaning liquid and then flushing liquid to the internal surfaces of at least one upstanding section of a flue line and for collecting and ducting away the liquids flowing downwardly the internal surfaces of the upstanding section by gravity.





Stuart C. Wyant
Robert R. Fredinburg
 INVENTORS.

BY *Clarence A. O'Brien*
and Harvey B. Jacobson
 Attorneys

Fig. 2

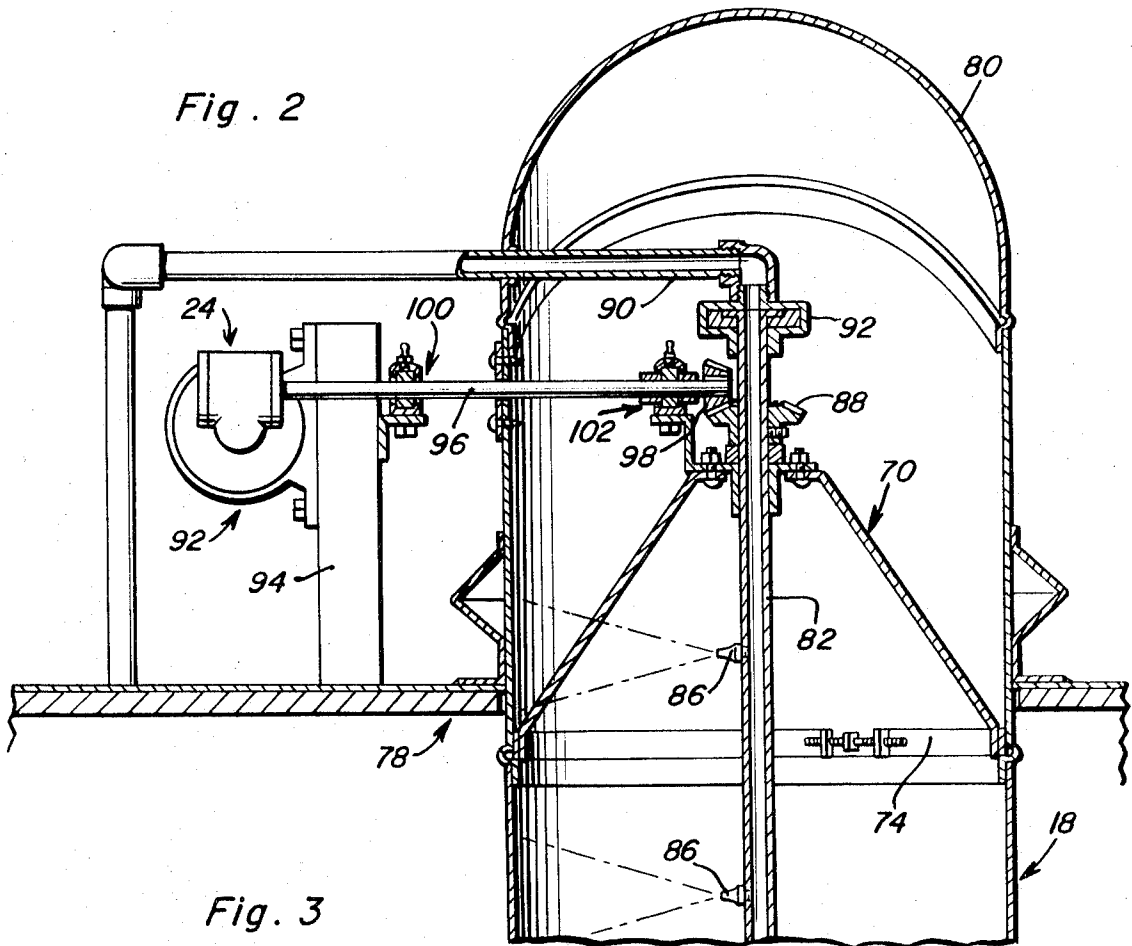
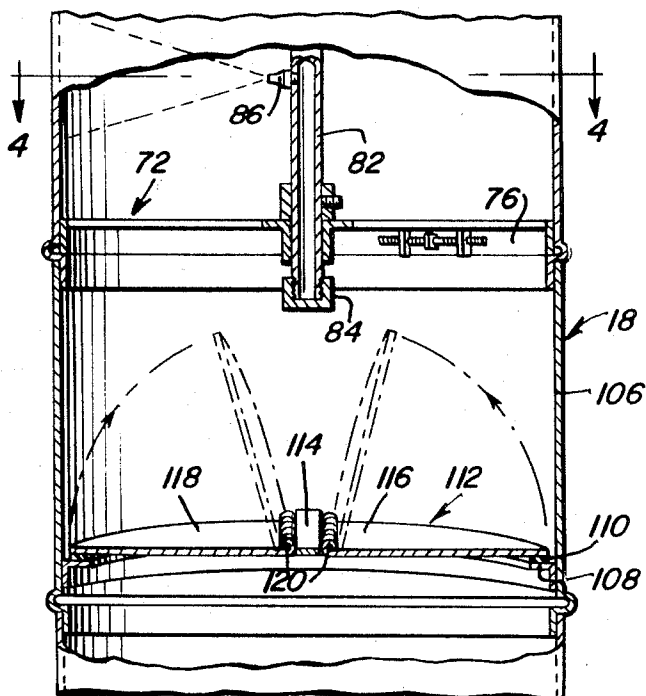


Fig. 3



Stuart C. Wyant
Robert R. Fredinburg
INVENTORS.

BY *Clarence A. O'Brien*
and Harvey B. Jacobson
Attorneys

TIMED MOTORIZED FLUE CLEANING APPARATUS

The flue cleaning apparatus of the instant invention is designed to clean flues in restaurants and other commercial establishments where grease is a problem and may be a fire hazard in and to exhaust systems.

The system is designed to be fully automatic, with automatic timing switches and devices and may be adjusted by the individual operator so that the system goes into operation when cooking or other normal operations cease.

In order to initiate operation of the flue cleaning apparatus, the associated exhaust system is closed, which of course requires that the exhaust fan or fans be shut off. A very important portion of the flue cleaning apparatus is the flue closing and liquid collecting "butterfly" valve which is installed near the bottom of the section of flue line with which the cleaning apparatus is operatively associated. The "butterfly" valve is constructed so as to be gravity urged toward the closed position and automatically swingable to the open position upon the actuation of the associated exhaust fan or fans. The "butterfly" valve is automatically swung from the closed position to the open position in response to air being forced through the associated flue.

The main object of this invention is to provide a flue cleaning apparatus which will be capable of thoroughly cleaning the internal surfaces of a flue line operatively associated with a range hood or any other areas from which dirt or grease laden vapors are to be exhausted.

Another object of this invention, in accordance with the immediately preceding object, is to provide a flue cleaning apparatus which will be capable of sequentially spraying cleaning liquids and flushing or rinsing liquids on the internal surfaces of an associated flue line.

Still another object of this invention, in accordance with the preceding objects is to provide a flue cleaning apparatus which will be operative to entrap, collect and duct away cleaning and rinsing liquids which tend to flow downwardly along the internal surfaces of an associated flue line.

Still another object of this invention is to provide a flue cleaning apparatus including control means for fully automatic operation of the cleaning apparatus and which may be set to automatically clean the associated flue during periods of nonuse of the flue.

A final object of this invention to be specifically enumerated herein is to provide a flue cleaning apparatus in accordance with the preceding object and which will conform to conventional forms of manufacture, be of simple construction and easy to use so as to provide a device that will be economically feasible, long lasting and relatively trouble-free in operation.

These together with other objects and advantages which will become subsequently apparent reside in the details of construction and operation as more fully hereinafter described and claimed, reference being had to the accompanying drawings forming a part hereof, wherein like numerals refer to like parts throughout, and in which:

FIG. 1 is an elevational view of a conventional form of cooking range having a range hood and flue line operatively associated therewith and with the flue cleaning apparatus of the instant invention disposed in operative association with the flue;

FIG. 2 is an enlarged fragmentary vertical sectional view taken substantially upon the plane indicated by section line 2-2 of FIG. 1;

FIG. 3 is a fragmentary vertical sectional view taken substantially upon the plane indicated by section line 3-3 of FIG. 4; and

FIG. 4 is a horizontal sectional view taken substantially upon the plane indicated by section line 4-4 of FIG. 3.

Referring now more specifically to the drawings the numeral 10 generally designates a conventional form of commercial cooking range including an overhead hood assembly referred to in general by the reference numeral 12. The hood

assembly 12 includes an upper central outlet 14 opening into the lower end of an upstanding flue line referred to in general by the reference numeral 18.

The range 10 is disposed within a room 20 which may be considered a kitchen and the flue cleaning apparatus of the instant invention is referred to in general by the reference numeral 22. The apparatus 22 includes a flue line mounted portion referred to in general by the reference numeral 24 and a control and supply portion referred to in general by the reference numeral 26.

The room or kitchen 20 is defined at least in part by a wall 28 and the control and supply portion 26 is disposed on the side wall 28 remote from the range 10. Also, it may be seen from FIG. 1 of the drawings that the control and supply portion 26 includes a large floor mounted reservoir or tank referred to in general by the reference numeral 30 including a float assembly referred to in general by the reference numeral 32 which is operative to indicate the level 34 of liquid within the tank 30.

A fresh waterline 36 is provided and includes a branch 38 which is valved as at 40 and opens into the interior of the tank 30 through a float controlled valve assembly 42 for maintaining the level 34 as illustrated in FIG. 1 of the drawings whenever the valve 40 is opened.

A motorized pump assembly referred to in general by the reference numeral 44 is mounted on the top of the tank 30 and includes an inlet line 46 whose inlet end extends downwardly through a removable cover 48 for the tank 30 and terminates as at 50 adjacent the bottom of the tank 30. The inlet line 46 has a solenoid actuated valve assembly 50 disposed therein and a second solenoid actuated valve assembly referred to in general by the reference numeral 52 is also provided and disposed in the inlet line 46 downstream from the valve assembly 50. The valve assembly 52 is similar to the valve assembly 50 except that a second branch 54 of the waterline 36 which is valved as at 56 opens into the valve assembly 52. Thus, the valve assembly 50 is operative to control the flow of liquid from within the tank 30 to the motorized pump 44 and the valve assembly 52 is operative to control the flow of water from the waterline 36 to the motorized pump 44. Of course, when the valve assembly 50 is opened and the valve assembly 52 is closed, liquid from within the tank 30 is passed through both the valve assembly 50 and the valve assembly 52 to the motorized pump 44.

The control and supply portion 26 of the flue cleaning apparatus 22 further includes any suitable type of timer mechanism 58 for controlling operation of the valve assembly 50, the valve assembly 52 and the motor 60 of the motorized pump assembly 44. The timer 58 is electrically connected to any suitable source (not shown) by means of conductors 62 and the timer 58 is electrically connected to the valve assembly 50 by means of conductors 64, to the valve assembly 52 by means of conductors 66 and to the electric motor 60 by means of electrical conductors 68.

The flue mounted portion 24 of the flue cleaning apparatus includes upper and lower support spider assemblies referred to in general by the reference numerals 70 and 72 including expandible mounting rings 74 and 76, respectively, secured in upper and lower portions of the flue line 18. The upper end of the flue line 18 projects through a roof structure referred to in general by the reference numeral 78 and includes a horizontally directed terminal end portion 80 opening into the inlet of a blower assembly 81.

An upstanding tubular manifold line 82 is journaled from their support spider assemblies 70 and 72 and is capped at its lower end as at 84. The manifold line 82 includes a plurality of longitudinally spaced nozzles 86 and the upper end of the manifold line 82 has a bevel gear 88 mounted thereon and is coupled to the outlet end portion of a supply line 90 by means of any suitable rotatable coupling 92. The inlet end of the supply line 90 is connected to the outlet of the motorized pump 44 and a gear head drive motor referred to in general by the reference numeral 92 is mounted on a support 94 carried

by the roof structure 78 and includes a journaled output shaft 96 having a bevel gear 98 mounted on its outer end and meshed with the bevel gear 88. The shaft 96 is journaled exteriorly of the gear head motor 92 by a bearing assembly referred to in general by the reference numeral 100 supported from the support 94 and a bearing assembly referred to in general by the reference numeral 102 supported from the support spider assembly 70.

The flue mounted portion 24 of the flue cleaning apparatus 22 also includes a flue section 106 disposed in the flue line 18 and which has a slightly inclined annular flange 108 mounted therein including an annular seal member 110 mounted on its upper surface. A butterfly valve assembly referred to in general by the reference numeral 112 including a diametric center support portion 114 supported from diametrically opposite portions of the flange 108 and a pair of opposite side semicircular wing members 116 and 118 pivotally supported from the diametric member 114 by hinge assemblies 120 is provided and supported within the section 106 from the annular flange 108.

In FIG. 3 of the drawings, the full open positions of the wing members 116 and 118 are illustrated in phantom lines and thus it may be seen that the wing members 116 and 118 are free to swing toward their closed positions illustrated in solid lines in FIG. 3 of the drawings by gravity. However, operation of the blower assembly 81 will cause sufficient air to be drawn upwardly into the lower end of the flue line 106 to swing the wing members 116 and 118 from the closed position thereof illustrated in solid lines in FIG. 3 of the drawings to the phantom line position thereof whenever the blower assembly is actuated.

With attention now invited more specifically to FIGS. 1 and 4 of the drawings, it may be seen that a tubular fitting 124 opens through the sidewall of the section 106 adjacent the lowest peripheral portion of the abutment flange 108 with the tubular fitting 104 horizontally registered with the upper surface of the abutment flange 108. Thus, any liquids falling downwardly through the flue line 18 when the wing members 116 and 118 are closed results in such liquids draining toward the tubular fitting 124 and through the latter into the inlet end of the drain line 126 which is operatively coupled to the tubular fitting 124. The outlet end of the drain line 126 opens downwardly through the floor 128 through a foot valve 130.

Assuming that the timer 58 is set to automatically actuate the flue cleaning apparatus 22 during periods when the range 10 is not in use, the wing members 116 and 118 of the butterfly valve assembly 112 will be in the closed positions illustrated in solid lines in FIG. 3 of the drawings. As the flue cleaning apparatus 22 is actuated, the motor 60 drives the motorized pump 44 which is supplied with cleaning liquid from the interior of the tank 30 through the inlet line 46 and the valve assemblies 50 and 52. The pump cleaning fluid is then forced through the supply line 90 and down into the top of the manifold line 82 and outwardly through the nozzles 86. Of course, the timer 58, by this time, has automatically actuated the gear head motor 92 so that the manifold line 82 is rotated thereby enabling nozzles 86 to spray cleaning fluid onto all of the internal surfaces of the adjacent portions of the flue line 18. After the cleaning fluid has been sprayed on the internal surfaces of the flue line 18 for a predetermined time controlled by the timer 58, the valve assembly 50 is deactivated and the valve assembly 52 is actuated so as to open the branch 54 to the inlet line 46 and thereby enable fresh water to be pumped through the supply line 90 and into the manifold line 82 whereupon the fresh water will be sprayed from the nozzles 86 onto the internal surfaces of the flue line 18 so as to flush the latter. As the cleaning liquid and water sprayed from the nozzles 86 falls downwardly along the internal surfaces of the flue line 18, they are caught by the closed "butterfly" valve assembly 112 and drained to the low side of the annular flange 108 and outwardly of the tubular fitting 124.

As soon as the flue cleaning apparatus 22 has been actuated a sufficient time to flush all traces of the cleaning liquid from

the internal surfaces of the flue line 18, the timer 58 will automatically terminate operation of the motor 60, the gear head motor 92, and close the valve assembly 52. In this manner, the internal surfaces of the flue line 118 will be thoroughly cleansed and the flue line 18 will be ready for operation whenever the range 10 is to be next used. Of course, the blower assembly 81 may be readily operatively connected to the timer 58, if desired.

Although the gear head motor 92 has been provided to provide a means whereby the manifold line 82 may be rotated during operation of the flue cleaning apparatus 22, it is proposed that the gear head motor 92 could be eliminated merely by inclining the nozzles 86 so that they open generally tangentially of the manifold line 82. By this construction, the jet thrust of the nozzles 86 could be utilized to provide motive force for turning the manifold line 82 in lieu of the gear head motor 92.

The foregoing is considered as illustrative only of the principles of the invention. Further, since numerous modifications and changes will readily occur to those skilled in the art, it is not desired to limit the invention to the exact construction and operation shown and described and accordingly all suitable modifications and equivalents may be resorted to falling within the scope of the invention.

We claim:

1. In combination, an upstanding tubular flue line section, means in said section operative to spray cleaning liquid on the internal surfaces of said section about substantially the entire inner periphery of at least one upper zone of said upstanding section, means in a lower zone of said section operative to collect and drain away liquid flowing downwardly along the inner surfaces of said lower zone throughout substantially the entire inner periphery of said lower zone, the last-mentioned means comprising gas barrier means mounted in said lower zone shiftable between an inoperative position allowing the passage of flue gases there past and an operative position defining a transverse barrier in said lower zone to the upward passage of flue gases and the downward passage of liquids therepast, a drain opening formed through one wall portion of the lower zone of said flue section, said transverse barrier, when in the operative position, also including means operative to collect any liquids flowing downwardly along the adjacent inner surface portions of said section and to divert the collected liquids to said drain opening for discharge therethrough.

2. In combination, an upstanding tubular flue line section, means in said section operative to spray cleaning liquid on the internal surfaces of said section, means in a lower portion of said section operative to collect and drain away liquid flowing downwardly along said inner surfaces toward the second mentioned means, said means in said lower portion comprising flap valve means shiftable between open and closed position closing the lower end of said upstanding section and gravity urged toward said closed position.

3. The combination of claim 2 wherein said flap valve means includes an annular flange disposed in said lower portion inclined at least slightly relative to a horizontal plane so as to have one peripheral portion lower than all other peripheral portions of said flange, a pair of semicircular wing members pivotally supported along their base marginal edge portions for oscillation about an axis extending generally diametrically of said annular flange and including generally semicircular edge portions which overlie said flange when said wing members are generally horizontally disposed, said wing members being swingable from substantially horizontally disposed positions toward upstanding but at least slightly upwardly divergent open position.

4. The combination of claim 3 wherein said flap valve means includes seal means disposed between the semicircular marginal edge portions of said wing members and said annular flange.

5. The combination of claim 2 wherein said flap valve means includes an annular flange disposed in said lower portion inclined at least slightly relative to a horizontal plane so as

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to have one peripheral portion lower than all other peripheral portions of said flange, a pair of semicircular wing members pivotally supported along their base marginal edge portions for oscillation about an axes extending generally diametrically of said annular flange and including generally semicircular edge portions which overlie said flange when said wing members are generally horizontally disposed, said wing members being swingable from substantially horizontally disposed positions toward upstanding but at least slightly upwardly divergent open position, and a tubular drain fitting opening through said lower portion of said flue line in general horizontal registry with and adjacent the lower portion of said annular flange.

6. The combination of claim 5 wherein said upstanding tubular flue line section includes a blower assembly for pumping air through said flow line section, said blower assembly being of sufficient power to cause said wing members to automatically swing from the closed positions thereof to the open positions thereof upon operation of said blower means.

7. In combination, an upstanding tubular flue line section, means in said section operative to spray cleaning liquid on the internal surfaces of said section, means in a lower portion of said section operative to collect and drain away liquid flowing downwardly along said inner surfaces toward the second mentioned means, said means operative to spray cleaning liquid on the internal surfaces of said section comprising an upstanding tubular manifold line journaled for rotation in said flue line section whereby the entire inner surfaces of said tubular member may be cleaned, means supplying the interior of said manifold line with cleaning liquid under pressure, said manifold line including outlet nozzles communicating with the interior of said manifold and opening outwardly therefrom, said nozzles being spaced longitudinally of said manifold line and positioned therealong for spraying at least the adjacent inner surface portion of said flue line.

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8. In combination, an upstanding tubular flue line section, means in said section operative to spray cleaning liquid on the internal surfaces of said section, means in a lower portion of said section operative to collect and drain away liquid flowing downwardly along said inner surfaces toward the second mentioned means, said means operative to spray cleaning liquid on the internal surfaces of said section comprising an upstanding tubular manifold line journaled in said flue line section, means supplying the interior of said manifold line with cleaning liquid under pressure, said manifold line including outlet nozzles communicated with the interior of said manifold and opening outwardly therefrom, said nozzles being spaced longitudinally of said manifold line and positioned therealong for spraying at least the adjacent inner surface portion of said flue line, means drivingly connected to said manifold line for rotating the latter within said flue line section.

9. In combination, an upstanding tubular flue line section, means in said section operative to spray cleaning liquid on the internal surfaces of said section, means in a lower portion of said section operative to collect and drain away liquid flowing downwardly along said inner surfaces toward the second mentioned means, the first mentioned means including means operative to spray a rinsing liquid on said surfaces subsequent to said cleaning liquid being sprayed on said surfaces, said first mentioned means including timed control means operative to automatically initiate operation of said means to spray cleaning liquid on the internal surfaces of said section, thereafter terminate operation of the last mentioned means for spraying cleaning liquid on the internal surfaces of said section and initiate operation of the last mentioned means to spray rinsing liquid on the internal surfaces of said section subsequent to termination of operation of the last mentioned means to spray rinsing liquid on the internal surfaces of said flue line section.

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