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R. B. ESTES ET AL
GAS AND SOLID SEPARATOR
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2,092,305

FIG. 1.

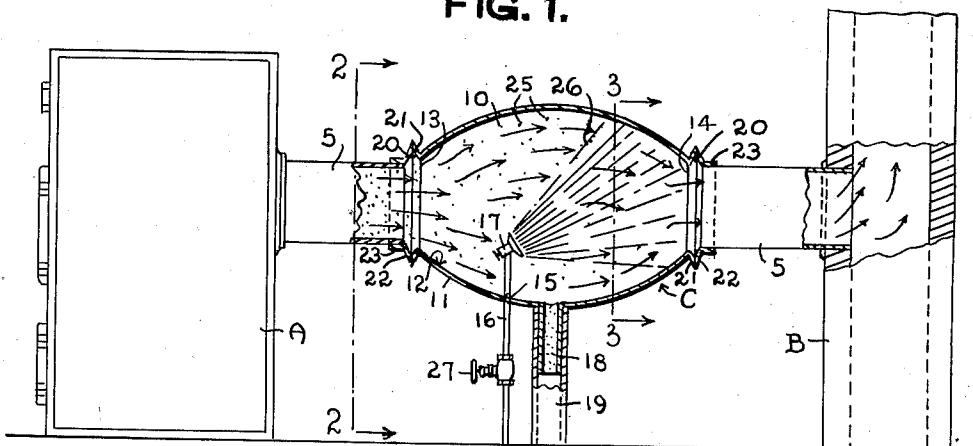


FIG. 2.

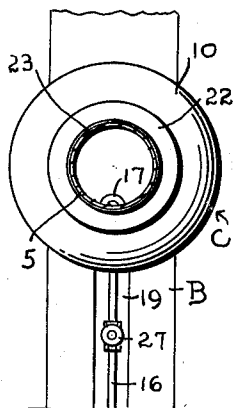


FIG. 4.

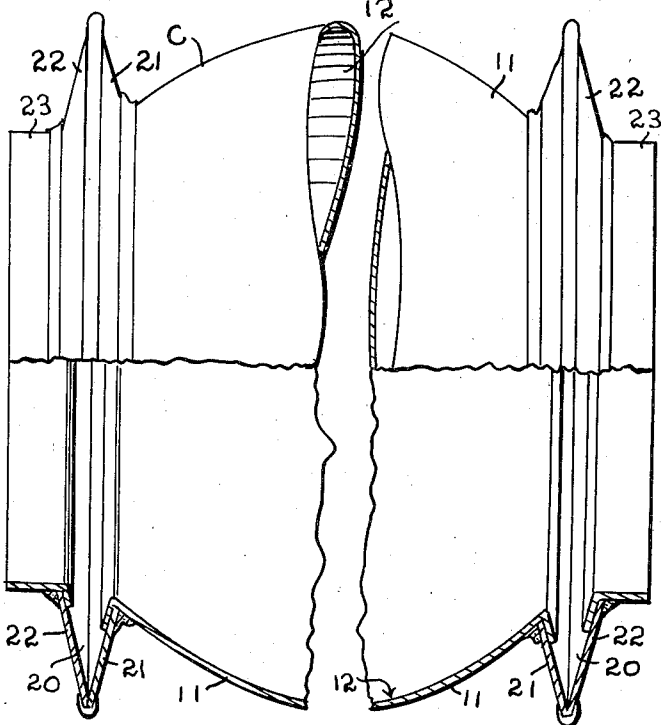
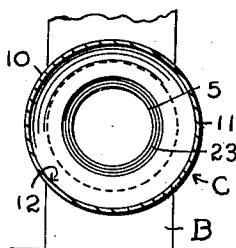


FIG. 3.



INVENTORS,
Rufus B. Estes
Christ Anagnost
BY *Lancaster, Allwing & Rommel*
ATTORNEYS.

UNITED STATES PATENT OFFICE

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GAS AND SOLID SEPARATOR

Rufus B. Estes and Christ Anagnost, Knoxville, Tenn., assignors, by direct and mesne assignments, to National Smoke Eliminator Incorporated, Knox County, Tenn.

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4 Claims. (Cl. 183—21)

This invention relates to apparatus for separating gases and solids, and more particularly to an apparatus adapted to wash the solid products of combustion from the gaseous products thereof.

5 The principal object of the invention is to provide an apparatus which may be interposed in the flue, leading from the combustion chamber of a furnace or boiler or from the fire box of a stationary engine or the like, to the chimney, smoke stack or the like, and which apparatus will efficiently wash, as by a spray of water, the solid products of combustion, such as soot and fine ash, from the gaseous products flowing through the flue, yet the wash water will not find its way
10 into the flue, combustion chamber, fire box, chimney or smoke stack.

Another object is to provide an apparatus, for the purpose mentioned, which has a novel shape, whereby the products of combustion will take such a path that they will be efficiently treated by the solid products of combustion removing means.

Still another object is to provide an apparatus, as set out, employing a liquid as a solid products removing means, wherein liquid traps are provided, which traps have other functions.

Yet another object is to provide such an apparatus, which may be easily installed and will not be apt to get out of order, nor be warped or cracked by the heat of the hot products of combustion.

Other objects and advantages of the invention will be apparent during the course of the following detailed description, taken in connection with the accompanying drawing, forming a part of this specification, and in which drawing:—

Figure 1 is a view, partly in vertical section, of the novel apparatus, associated with a device, having a combustion compartment, and a means for exit of the products of combustion.

Figures 2 and 3 are sections upon substantially their respective lines of Figure 1.

Figure 4 is, in part, an enlarged fragmentary vertical section and, in part, an elevation of the novel apparatus.

45 In the drawing, wherein for the purpose of illustration, is shown a preferred embodiment of the invention and wherein similar reference characters designate corresponding parts throughout the several views, the letter A may designate generally a conventional device which produces products of combustion, B, conventional exit means for said products of combustion, and the letter C, the novel apparatus.

50 The device A is shown, by way of example, as a furnace from which the gaseous products of combustion pass off, carrying with them soot and fine ash, through the flue pipe 5, which is shown, by way of example, as substantially horizontal, but which may incline upwardly and empties into the exit means B, which is shown as a conventional chimney.

5 As for the novel apparatus C, the same includes a hollow, main body portion 10, which is preferably elliptical in longitudinal cross section, as shown in Figure 1, and substantially circular in transverse cross section, as shown in Figure 3; the walls 11 of the main body portion 10 defining an elongated chamber 12. It is preferred that this main body portion 10 be open at its opposite ends, as shown in Figures 1 and 4, to provide a gaseous and solids products of combustion intake opening 13 and a gaseous products of combustion exit or outlet opening 14, these openings 13 and 14, being of less diameter, of course, than the general height of the chamber 12. For example, the openings 13 and 14 may be approximately 8½ inches while the greatest height of the chamber 12 may be about 17 inches.

15 The main body portion 10 is perforated at any convenient point, for example at 15, so that a suitable conduit, such as a small-bore pipe 16, may extend from a source of liquid supply (not shown) through the wall 11 to the chamber 12. Preferably, the end of this pipe 16 within the chamber, is positioned so that a nozzle or spray head 17 may be coupled thereto and occupy a position below the longitudinal axis of the chamber 12 and intermediate the intake opening 13 and transverse axis of the chamber 12, substantially as shown in Figures 1 and 2. The nozzle 17 is so adjusted that it will direct a spray of suitable liquid, such as water, away from the intake opening 13 and upwardly and outwardly against the inside surface of the wall 11 inwardly of the outlet opening 14. Any suitable means may be employed to provide a tight fit between the pipe 16 and wall 11.

25 The main body portion 10 is perforated at any convenient point, for example at 15, so that a suitable conduit, such as a small-bore pipe 16, may extend from a source of liquid supply (not shown) through the wall 11 to the chamber 12. Preferably, the end of this pipe 16 within the chamber, is positioned so that a nozzle or spray head 17 may be coupled thereto and occupy a position below the longitudinal axis of the chamber 12 and intermediate the intake opening 13 and transverse axis of the chamber 12, substantially as shown in Figures 1 and 2. The nozzle 17 is so adjusted that it will direct a spray of suitable liquid, such as water, away from the intake opening 13 and upwardly and outwardly against the inside surface of the wall 11 inwardly of the outlet opening 14. Any suitable means may be employed to provide a tight fit between the pipe 16 and wall 11.

30 In the example shown, the apparatus C is disposed substantially horizontal, but it will be apparent that the shape of the same is such that a sump is provided, no matter if the apparatus is disposed on a slant. At the bottom of the sump, the main body portion 10 may be provided with a liquid outlet nipple or pipe 18. This may be inserted into any suitable conduit, such as the pipe 19, to carry off the soot and ash laden liquid. In the example shown, the apparatus C may be said to be supported, in part, upon the upper edge of this pipe 19.

35 Now as for the means to trap the cleansing liquid

uid discharged into the chamber 12, so that none of it will possibly flow into the flue 5 and, consequently, into the combustion chamber or chimney. Since it is proposed to provide such means at both open ends 13 and 14 of the main body portion 10, but one will be described, for they are substantially alike, and similar reference characters will be employed for corresponding portions of both. The means includes an annular trough 20, preferably having a substantially V-shape in cross section, as shown in Figures 1 and 4. That is, the trough 20 has inclined walls 21 and 22; the wall 21 joining the wall 11 of the main body portion 10 at the intake opening 13 or outlet opening 14, as the case may be. It is essential that the opposite wall 22 be somewhat higher than the wall 21, as clearly shown in Figure 4, whereby liquid finding its way into the trough 20 will flow over the top of the wall 21 and not over the top of the higher wall 22, even if the apparatus C be tilted. As an example, the wall 22 may be of a length so that its top edge will define a circle having a diameter of substantially 8 inches while the top edge of the wall 21 will define a circle having a diameter of substantially $8\frac{1}{2}$ inches.

Preferably, the walls 21 and 22 are of separate lengths of relatively thin sheet metal, suitably joined together and to the main body portion 10 as by solder or welding. The wall 22 is joined to an outwardly-extending collar 23, which may be soldered to the top of the wall 22.

The walls 21 and 22 not only form a trough to catch liquid spray which may be carried by the draft or splashed and which would otherwise find its way into the flue 5, but they also provide for an efficient radiation of the heat from the products of combustion because of their relatively large area so that there is no great expansion and contraction of the walls of the main body portion 10, which, in devices of this kind, causes leaks and cracks to develop in their walls and particularly where the liquid carrying pipes enter the chambers.

Because of the elliptical formation of the main body portion 10, the gaseous and solids products of combustion, designated as 25 enter the chamber 12 and the gases have an opportunity to at once expand, so that the solids products are carried away from each other and can be more efficiently acted upon by the spray 26, the force of which may be regulated by the valve 27 in the pipe 16. Not only does the direct spray act upon the products of combustion, but the splash of the spray against the wall 11 also tends to further cleanse the gaseous products from the solids they carry.

In installing the novel apparatus C, a portion of the flue pipe 5 may be removed and the apparatus joined thereto after a suitable source of cleansing liquid is provided, piped to the apparatus, and a suitable drain pipe for the waste liquid, carrying the solids products of combustion. Even if the flue 5 be short and the apparatus C be placed closely adjacent A, it will not cause the walls of C to crack or expand to any extent.

Various changes may be made to the form of the invention herein shown and described, without departing from the spirit of the invention or the scope of the claims.

70 What is claimed is:

1. In a gas and solids separator adapted to separate (by liquid means) the solids, carried in a stream of gas flowing thereinto, from said gas, an elongated hollow body portion, defining a chamber, having a gas and solids intake opening

and a gas outlet opening spaced therefrom, means for separating said solids from said gas by liquid within said hollow body portion including a conduit for said liquor opening into said chamber and provided with a discharge mouth within said chamber, and liquid trapping means disposed inwardly of one of said openings, including a trough, substantially V-shaped in cross section, and disposed with its mouth facing the longitudinal axis of said hollow body portion, the wall of said trough disposed nearest said first named means being of less height than the opposite wall of said trough.

2. In a gas and solids separator adapted to separate (by liquid means) the solids, carried in a stream of gas flowing thereinto, from said gas, a hollow body portion having a gas and solids intake opening, a gas outlet opening spaced therefrom, a sump portion and a liquid and solids outlet opening at the bottom of said sump portion, means for discharging liquid into the path of said gas and solids within said hollow body portion, and liquid trapping means disposed inwardly of one of said openings including a trough, substantially V-shaped in cross section and disposed with its mouth facing the longitudinal axis of said hollow body portion, the wall of said trough disposed nearest said sump portion being of less height than the opposite wall of said trough.

3. In combination with a liquid, a soot remover adapted to be placed near a generator of hot, soot-containing products of combustion and to remove the soot from said hot products of combustion, including a hollow body portion defining a chamber, means at one end of said hollow body portion to admit said hot products of combustion into said chamber, including a ring member, means at the other end of said hollow body portion through which said soot-free products of combustion flow, means for removing soot from said hot products of combustion, including a conduit for said liquid leading into said chamber and having a discharge mouth, and combined liquid-trapping means and heat exchange means disposed between said ring member and said hollow body portion, including a trough of sheet metal, substantially V-shaped in cross section, with the apex of said V outwardly and one wall of said trough being of less height than the opposite wall thereof.

4. In a soot remover, adapted to be placed near a generator of hot, soot-containing products of combustion and to remove the soot from said hot products of combustion, a hollow body portion defining a chamber, means at one end of said hollow body portion to admit said hot products of combustion into said chamber, including a ring member, means at the other end of said hollow body portion through which said soot-free products of combustion flow, means for removing soot from said hot products of combustion while in said chamber, including a liquid, combined means for trapping said liquid and for radiating heat away from said hot products of combustion, including a trough substantially V-shaped in cross section disposed between said ring member and said hollow body portion, the walls of said trough converging outwardly and the wall of said trough nearest said ring member being of greater height than the opposite wall of said trough.

RUFUS B. ESTES.

CHRIST ANAGNOST.