

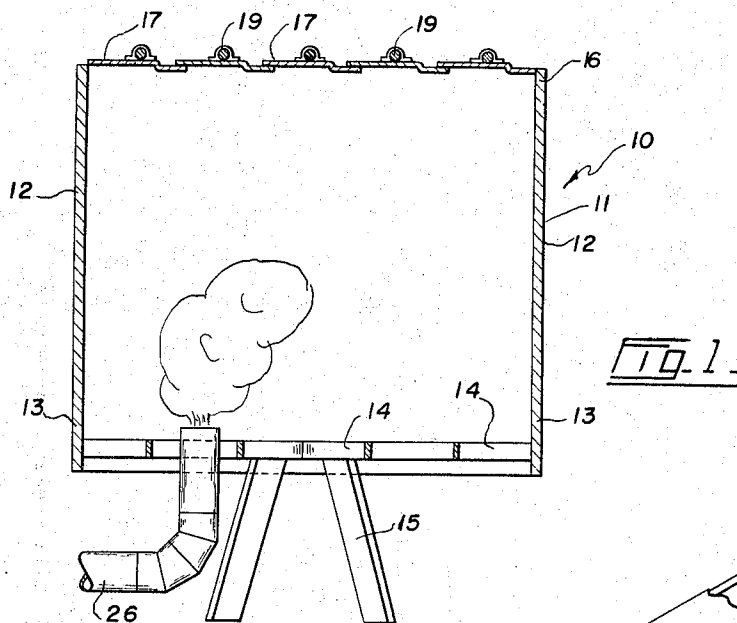
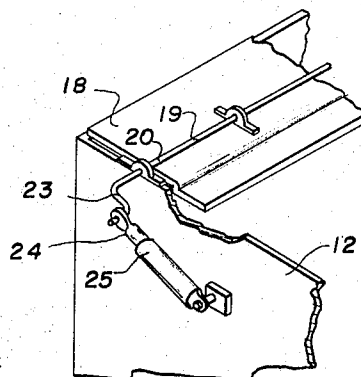
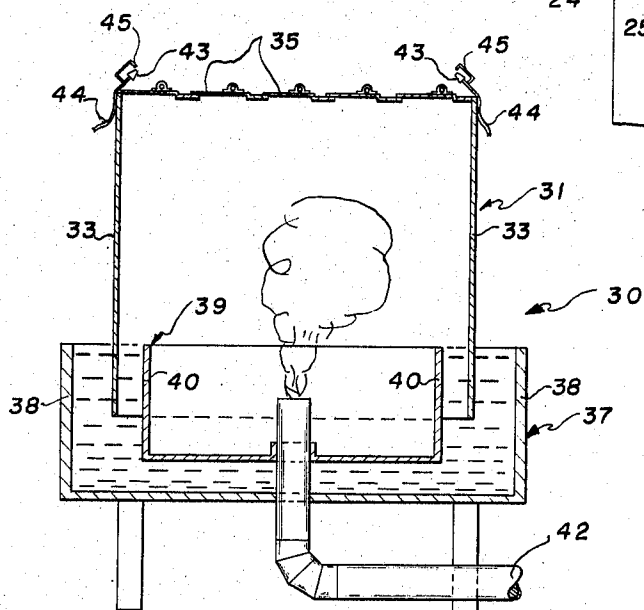
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APPARATUS FOR DISCHARGING GASES INTO THE ATMOSPHERE

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3,362,318 APPARATUS FOR DISCHARGING GASES INTO THE ATMOSPHERE

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ABSTRACT OF THE DISCLOSURE

Apparatus for discharging gases into the atmosphere having a gas-receiving tank of uniform dimensions, the whole top of which is openable and closable so as to permit gases under pressure therein to escape in the form of a cloud of uniform dimensions. The top of the tank includes heating means for heating the gases as they are ejected.

This invention relates to an apparatus whereby gases and the like may be discharged into the atmosphere in a manner in which they may rise to relatively great heights.

The discharge of gases from chimneys and the like is generally in the form of a narrow stream of substantially the same diameter as the chimney from which they issue. The gases are normally at a temperature in excess of that of the environmental air so that they are lighter than the latter, and therefore will continue to rise while the temperature differential exists. The height to which they may rise is therefore controlled by the heat differential between the rising gases and the environmental air. Where the interface between the rising gases and the environmental air is relatively large in proportion to the volume of the rising gases, the rate of heat loss by admixture of colder air, will of course be greater than in those cases where the area of the interface to the total volume of gas is proportionately less.

It is therefore reasonable to assume that gas rising as a substantially spherical cloud or mass would tend to cool much less rapidly than would a similar volume of gas in an elongated cylindrical form much in the form it would assume when issuing from a chimney.

It is therefore the object of this invention to provide a means whereby the gases, instead of being discharged into the atmosphere as a continuous stream of relatively small cross sectional area, may be discharged in consecutive clouds or masses of substantially uniform dimensions without in any way impeding the flow of the gases from their source.

It is another object of this invention to provide a means whereby such gases may be heated as they are discharged into the atmosphere so as to decrease their density or weight relative to the density of the environmental air.

The present invention comprises a chamber of substantially uniform diameter having a substantially vertical side wall and an open bottom. The top of the chamber is provided with a cover movable between open and closed positions so as to permit consecutive filling of the chamber with the gas and discharge of the gases therefrom as a single cloud. There is also provided means to heat the gases as they emerge from the chamber.

One embodiment of the invention also provides for vertical movement of the chamber and means at the chamber's bottom as the latter is moved to eject the gases therefrom.

In the specification and claims following, the word "gases" shall be deemed to include smoke and other gaseous mixtures containing and carrying solids in suspension, the latter being usually termed aerosols.

In the drawings which illustrate the embodiments of the invention,

FIGURE 1 is a central vertical section of one embodiment of the invention,

FIGURE 2 is a central vertical section of another embodiment of the invention, and

FIGURE 3 is an isometric view with a portion of a cover common to both embodiments as illustrated in FIGURES 1 and 2.

Referring to FIGURE 1 of the drawings, there is illustrated one embodiment 10 of the apparatus which is devised for the discharge of heated gases into the atmosphere.

Apparatus 10 comprises an open bottom tank 11 having substantially vertical side walls 12, across the lower ends 13 of which are secured spaced horizontal supporting beams 14. These beams rest upon a base structure 15 so that the lower end of the tank is open to the atmosphere.

At the upper end 16 of the tank are secured a plurality of rotatable flap elements or doors 17.

These doors are clearly illustrated in FIGURE 3 of the drawings, and are of elongated rectangular structure from the end 18 of which extend centrally located pintles 19, the latter being journaled for rotation in brackets 20 secured to the side walls 12. The flap elements 17 which extend parallel to each other are of a width that each will overlap the other when they are rotated on their pintles, thereby closing the top of the tank.

It is to be understood, of course, that to effect an air tight closure at the top of the tank, suitable sealing means be employed at the overlapping edges of the flap elements and the tank, whereby this latter feature may be achieved. One of the pintles 19 of each of the flap elements is formed as a crank 23 to which is operatively connected a piston 24 of a hydraulically operated piston cylinder assembly 25, the latter when connected to a suitable source of power, not shown, being sufficient to operate or rotate the flap element with which it is associated between a horizontal and a vertical position.

It will be seen that when the flap elements are arranged in their horizontal position, they effectively seal the tank. However, when they are rotated to a vertically extended position, the top of the tank is effectively opened. The heated gases which may originate from a furnace or the like are led by a conduit 26 which extends through the structure 15 into the lower part of the tank. When the flap elements 17 are arranged in their horizontally extended position so as to close the top of the tank, the heated gases will of course gradually fill the tank and when the latter is filled, said flap elements may be operated to a vertical position by the piston and cylinder assembly 25 so as to permit the gases to escape from the tank as a single mass.

It is to be understood, of course, that the tank is formed having substantially uniform dimensions so that the gases emanate as a single cloud or mass of substantially uniform dimensions so that the area of interface between the gas mass and the environmental air is proportionately small relative to the volume of gas to be discharged.

After the gas has emerged from the tank, the flap elements may of course again be closed so as to again fill the tank with gas and the procedure as outlined above repeated.

It is to be appreciated that the tank 11 may be cylindrical or cubical in shape and the flap elements 17 need not overlap each other to effect a seal. The flap elements need not overlap each other, but may be arranged in any suitable fashion whereby they effectively close the top of the tank when moved to a horizontal position and, when moved in a vertical position, provide a substantially unobstructed passage for the gas.

FIGURE 2 illustrates another embodiment 30 of the apparatus. Apparatus 30 comprises a tank 31 having the

same construction and form as has tank 11, having vertical side walls 33, is open at its bottom, and is closable at its top in the same manner as tank 11, there being provided flap elements 35 identical in construction and operation to flap elements 17 of tank 11.

Tank 31, however, unlike tank 11, is not supported on a fixed base, but is buoyantly supported in the manner of a gasometer, on a body of liquid. Apparatus 30 therefore includes a second liquid receiving tank 37 open at its top and of greater cross sectional dimension than 31. This tank 37 has vertical outer side walls 38 and has a centrally located piston-like central section 39, the side walls 40 of which are substantially vertical and spaced inwardly from the outer side walls 38. The space between the side walls 38 and 40 is filled with water and thereby forms a well into which the side wall 33 of tank 31 may extend.

This central section 39 is shaped so that it has the same but a little smaller cross sectional configuration as tank 31 so that it has a slidable fit within the latter. Gases to be discharged into the air are led into the tank 31 by means of a conduit 42 which is extended upwardly through the central section 39.

Embodiment 30 of the apparatus, although it may be employed in those cases where the thermal differential between the environmental air and the heated gases is great, is particularly designed for a discharge of gases wherein the thermal differential between the latter and the environmental air is not so pronounced. In this latter case, the gases due to the relatively small thermal differential, will not have the desired lift to enable the cloud mass to rise to a sufficient dispersing elevation before said gases cool to the temperature of the environmental air.

In the operation of embodiment 30, the flap elements 35 are opened and the tank 31 allowed to settle by gravity into the water in the well. The flap elements are then closed to effectively seal the top of the tank 31 and, the gases to be discharged, permitted to flow through the conduit into the closed tank 31. It will be appreciated that as the tank 31 is gradually filled with gases, its buoyancy increases causing it to move upwardly out of the well. When the tank 31 has been filled with gases and has lifted to a predetermined height, the flap elements are quickly moved from their horizontal to a vertical position, permitting the gases to suddenly escape. The moving of the flap elements 35 to an open position, normally robs the tank 31 of its buoyancy permitting it to return, by gravity, to the well and, the filling operation as hereinbefore described, repeated.

In order to increase the thermal differential between the gases to be released and the environmental air, there is secured to the side walls 33 of the tank 31, a plurality of nozzle elements 43 which are connected via flexible conduits 44 to a source of pressurized liquid or gaseous hydrocarbon fuel. These nozzle elements are so arranged as to direct the fuel over the top of the tank as the gases to be discharged emerge therefrom. Ignitors 45 of a type standard in the industry are arranged adjacent the nozzle elements 43 so as to ignite the fuel discharged therefrom, the resultant flame heating the gases being

discharged into the atmosphere thereby raising or increasing the thermal differential.

In both embodiments 10 and 30 of the apparatus, it is to be appreciated, of course, that the piston and cylinder assemblies which operate both flap elements 17 and 35 are so arranged that the flap elements are moved from their closed or horizontal position to a vertical position very quickly so that the gases released emerge in a mass of substantially uniform dimensions, as hereinbefore noted. The return of the flap elements to their horizontal or closed position must also be performed with great rapidity so as to eliminate the gaseous tail which might otherwise extend below the single cloud mass and which therefore would tend to coll much more rapidly than the gases in the mass, and therefore might not probably rise to the desired elevation.

What I claim as my invention is:

1. Apparatus for discharging heated, lighter-than-air gases into the atmosphere comprising a liquid filled well, negatively buoyant tank means of uniform dimension having substantially vertical side walls and being open at its top and bottom fitting in the well for vertical movement, a plurality of flap elements pivotally mounted on the tank means and extending across the top thereof movable between horizontal and vertical positions, said flap elements being arranged in a horizontal position to sealably close the top of the tank means, means when the top of the tank means is closed for feeding heated, lighter-than-air gases at greater than atmospheric pressure into said tank means through the bottom thereof, said gases thereby displacing the liquid in the tank means and causing the latter to rise in the well, and means connected to the flap elements operable after a predetermined volume of gases to be discharged have been fed into the tank means to quickly move the flap elements to their vertical position so as to open the top of the tank means thereby permitting the tank means to sink in the well so that said gases will be ejected therefrom as a single, uniformly dimensioned cloud.

2. Apparatus as claimed in claim 1 including heating means at the top of the tank means for heating said gases as they are ejected.

3. Apparatus as claimed in claim 2 in which the heating means comprises a plurality of discharge nozzles secured to the tank means being adapted when connected to a source of carbonaceous fuel to direct said fuel over the top of the tank means when the flaps are moved from their vertical to their horizontal positions, and ignition means at the nozzles for igniting fuel.

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