

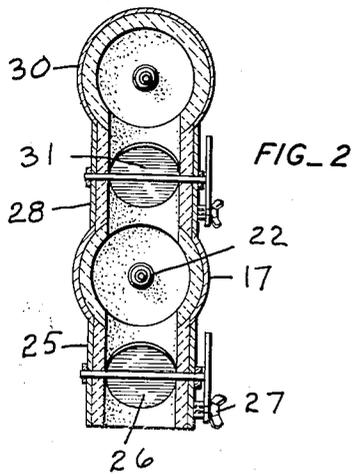
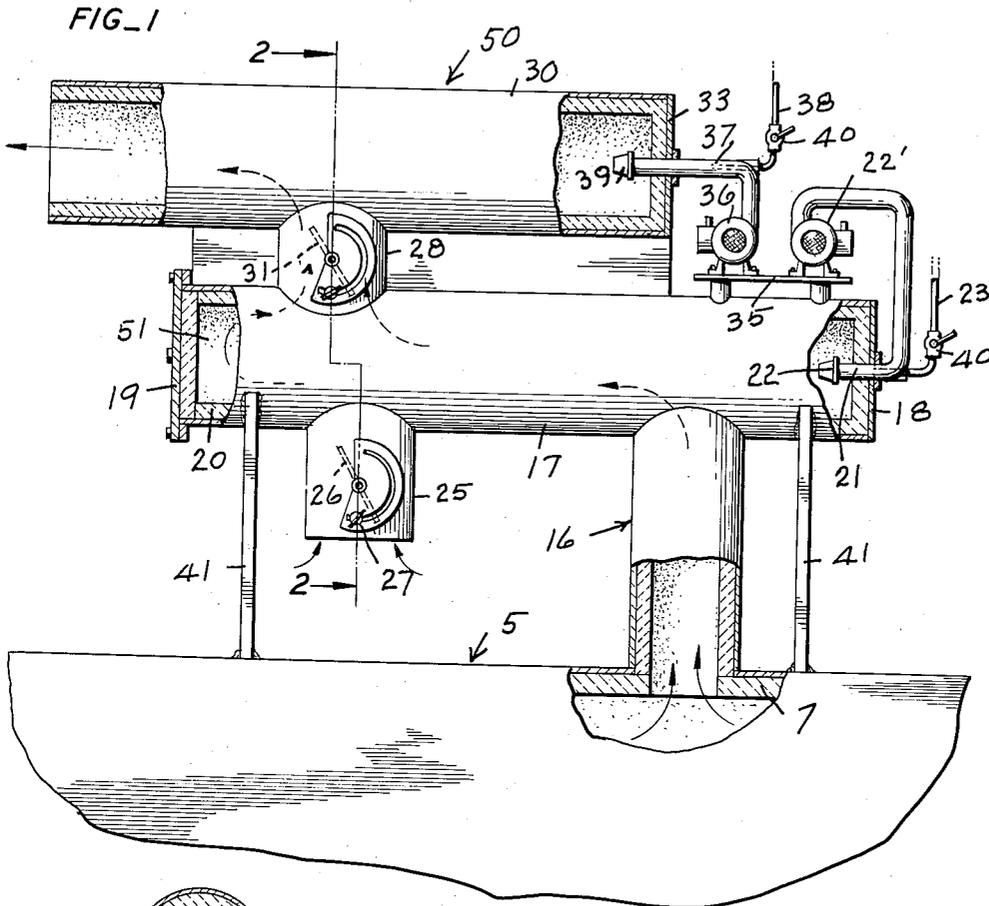
Dec. 20, 1960

J. KOCEE
TRASH BURNER

2,965,051

Filed April 20, 1959

3 Sheets-Sheet 1



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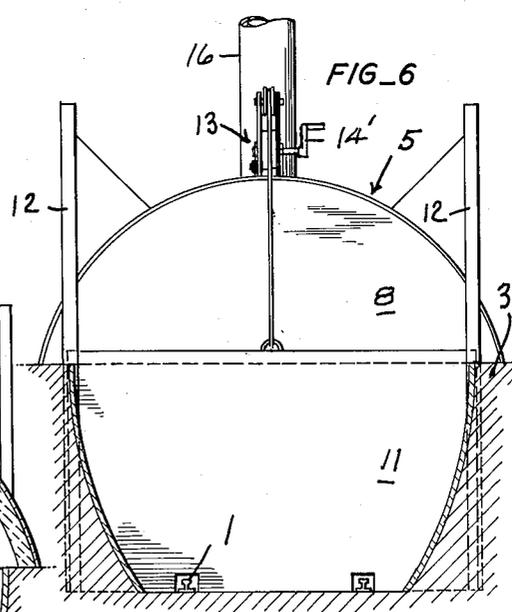
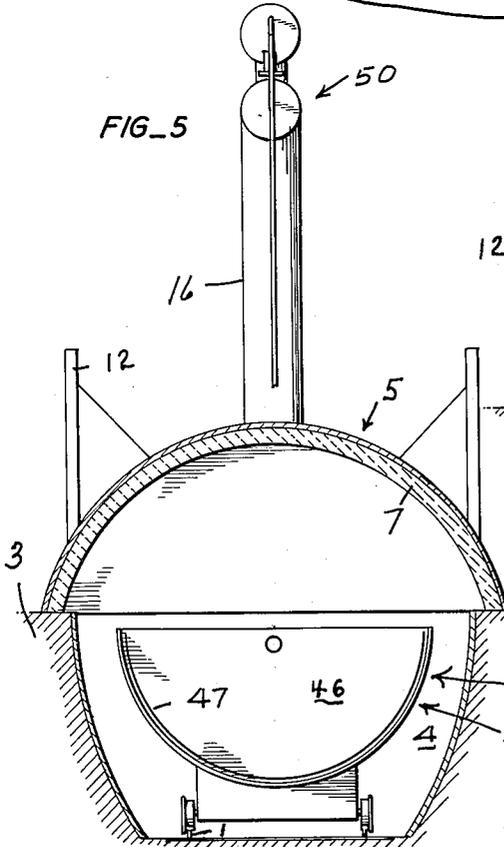
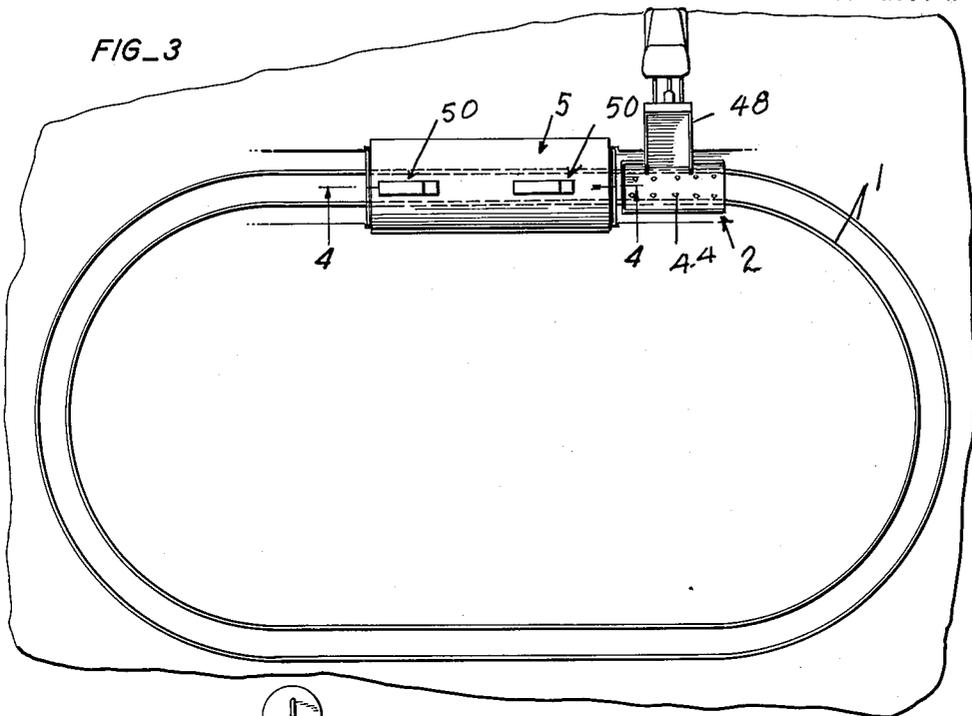
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3 Sheets-Sheet 2



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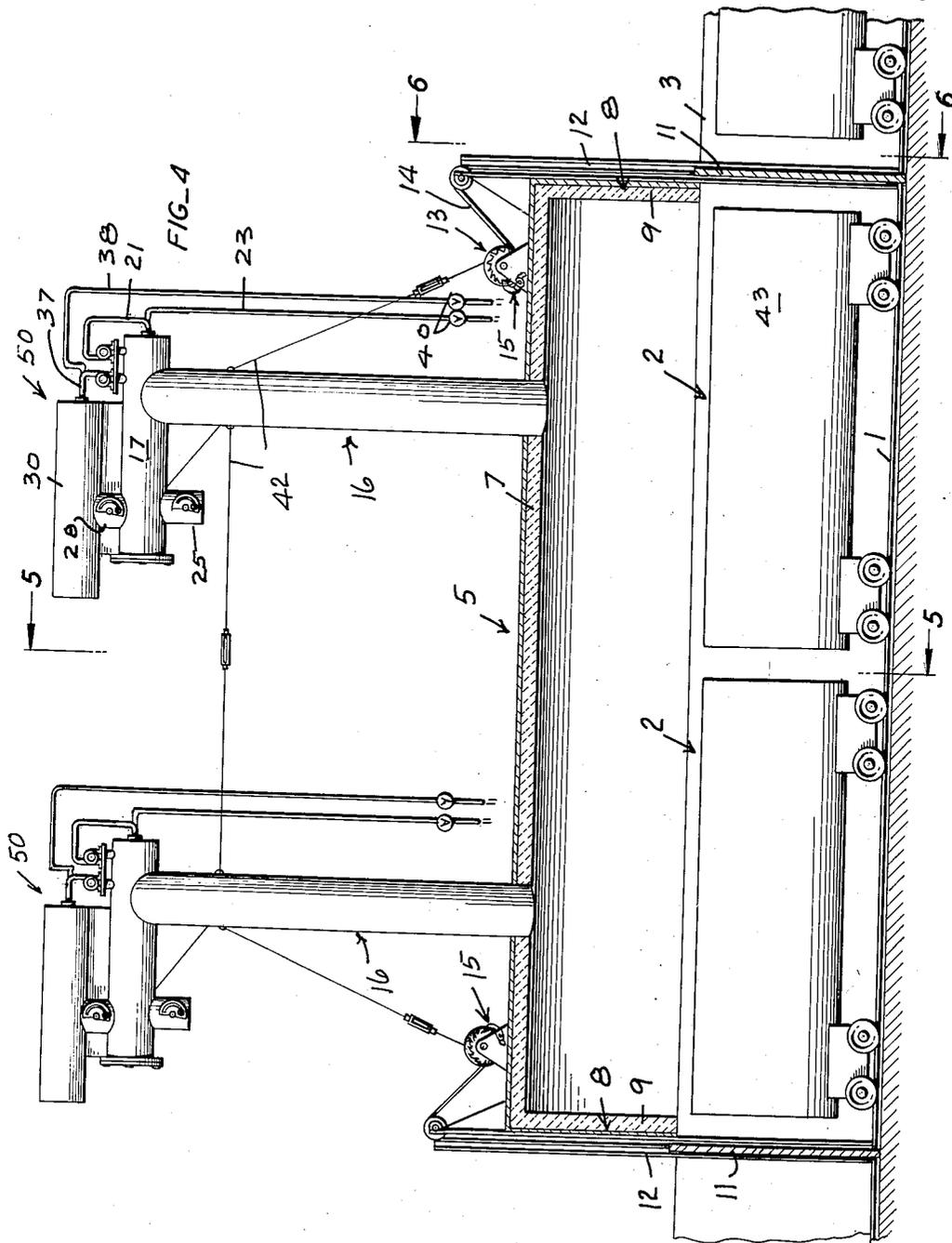
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3 Sheets-Sheet 3



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TRASH BURNER

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7 Claims. (Cl. 110—18)

This invention relates to a trash burner and has for one of its objects the provision of an improved trash burner that is adapted to efficiently burn trash of all kinds without discharging into the atmosphere the objectionable products of combustion that create "smog" conditions.

The present invention is concerned with disposing of refuse and trash from establishments in municipalities that must rely upon disposing of very large and continuously accumulating burnable trash.

Many attempts have been made heretofore at disposing of the trash collected from municipalities. Many of such efforts have been directed toward covering the trash with dirt in order to avoid creating the objectionable smoke. In many places ordinances prohibit open air burning or burning of any kind that will produce objectionable smoke. The system that solves the problem, by covering the trash with earth, has been found to have its limits, for the reason that the facilities for burying or covering the trash soon come to an end. Furthermore, where the trash includes paper and other loose material, it provides a breeding ground for rodents and vermin, with obvious bad results and unsanitary conditions.

The mere burning of trash and refuse is insufficient to solve the problem of disposal thereof. Such burning must not only be substantially free from the distribution of undesirable products of combustion into the atmosphere, but it must be sufficiently economical to be practical, and it must be of a type that is able to burn large quantities of refuse of any kind within a relatively small area by equipment that is capable of being used for long periods of time without causing trouble.

It is one of the principal objects of this invention to provide means for burning large quantities of trash and refuse, without objectionable distribution of the products of combustion into the atmosphere, and which means are economical to operate, and that enable the ready recovery of salvageable metals after the flammable material has been burned.

Other objects and advantages will appear in the description and in the drawings.

In the drawings,

Fig. 1 is a part sectional and part elevational view of the burner hereinafter to be described.

Fig. 2 is a cross sectional view taken along line 2—2 of Fig. 1.

Fig. 3 is a plan view illustrating a system in which the burner of Fig. 1 is used, and said view is also illustrative of certain steps in the method provided.

Fig. 4 is an enlarged cross sectional view taken along line 4—4 of Fig. 3.

Fig. 5 is a cross sectional view taken along line 5—5 of Fig. 4.

Fig. 6 is a cross sectional view taken along line 6—6 of Fig. 4.

In detail, referring to Fig. 3, a preferred system includes a track, preferably an endless track 1 (Fig. 1),

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adapted to support any desired number of wheel supported vehicles 2 (Figs. 1, 4, 5) thereon. The track may comprise a pair of endless metal rails supported on the ground, or supported on the ground by conventional ties 5 (not shown) or the rails may be supported on or partially imbedded in concrete. In other words, any suitable support for holding the rails stationary relative to each other, when in use, would be adequate.

At a point around track 1, the earth may be banked up at opposite sides of the track, as at 3 (Figs. 1, 5), to form the sides of a tunnel 4 (Fig. 5), and a metal cover 5 at said point extends over the said tunnel.

This cover 5 may be generally semi-cylindrical in vertical cross sectional contour, with the convex side directed upwardly, and may be of metal, lined with fire brick 7 or any other suitable heat insulated material to enable it to withstand substantially continuous heat within tunnel 4, and therebelow, for a long period of time without substantial deterioration.

The said cover has opposed generally semi-circular end walls 8 that may terminate at their lower edges substantially even with the lower edges of the main cover. These end walls may also be of metal and lined with fire brick 9, or they may include any other suitable heat resistant structure.

The use of the words "semi-cylindrical" and "semi-circular" as above used, are not intended to be restrictive to such precise limits, since actually the cylindrical top or cover, as shown in Figs. 5, 6, may be less than semi-cylindrical, and the end walls are less than semi-circular.

Adjacent to opposite ends of the tunnel, are vertically movable doors 11 that are held in oppositely opening channels 12 that, in turn, may be secured to the ends of the cover. Winches or drums 13 have cables 14 respectively connecting them with the doors for actuation of the drums to raise or lower the doors. A crank 14 (Fig. 6), or any other suitable means, may be connected with the shaft of each drum 13 for actuation for raising the doors 11 independently of each other, and conventional pawl and ratchet means, generally designated 15 may be provided for releasably holding the doors elevated, in which last position the ends of the tunnel are open, and the doors are alongside the end walls of the cover.

Cover 5 is provided with one or more vertically extending stacks or flues, 16. In any event, where more than one stack is used, each stack is the same, and adjacent stacks are spaced apart a distance substantially equal to the center to center distance between an adjacent or connected pair of vehicles 2, so that each vehicle of adjacent pairs thereof will be below a stack and below the cover.

Where several vehicles may be under the cover at the same time the burning of trash may be more efficiently handled, since the burning may be substantially continuous inasmuch as one vehicle may have the trash therein partially consumed while another is loading, and at times both vehicles will have their contents in the burning step in different stages of completion while others are loading. Where only a single car is used, subsequent loads must wait until the load therein is consumed.

The fact that more than one vehicle may be under the cover, would not preclude as efficient burning of its contents, as though several were below the hood, and below the different stacks.

Extending horizontally over the upper end of each stack is a horizontally extending tubular horizontally elongated chamber 17 (Fig. 1) that is closed at its ends by opposed heads 18, 19. This chamber may be called a "lower" chamber, and it is preferably of metal, and lined with fire brick 20.

The stack or flue 16 opens into the lower side of said tubular lower chamber 17 at a point adjacent to but

spaced a relatively short distance from the end wall 18. The length of chamber 17 between the stack 16 and end wall 19 is preferably much greater than the distance between stack 16 and wall 18.

Centrally extending through end wall or head 18 of chamber 17 is a horizontally extending fuel pipe 21 that has a horizontally directed burner head 22 thereon within chamber 17 close to wall 18, and which burner head is directed toward end wall 19. This head is preferably coaxial with the chamber.

Outside chamber 17 fuel pipe 21 is connected with the exhaust of a conventional electrically actuated blower 22'. A gas line 23 connected with a source of gas (not shown) opens into the pipe 21 coaxial with the burner head 22.

Adjacent to the end of chamber 17 that is next to the end wall 19, a relatively large diameter, vertical air control pipe 25 opens into the bottom of chamber 17. This pipe 25 carries a butterfly damper 26 therein that may be secured in any angular position within the pipe 25 from a position in which the pipe is fully open to one in which the pipe is fully closed by the damper. A lock nut 27 is provided to lock the damper in any adjusted position. The lower end of pipe 25 is open to the atmosphere.

Almost directly over pipe 25, but slightly closer to end wall 19 than is pipe 25, is a vertical duct 28 that is as large in diameter as pipe 25, and, as seen in Fig. 2, both ducts 28 and 25 are almost equal in their diameters to the diameter of chamber 17.

The upper end of duct 28 opens at its upper end into the lower side of an upper chamber 30, and it opens at its lower end into the upper side of chamber 17.

A butterfly damper 31 within duct 28 controls the passage of gas through the duct in the same manner as damper 26 controls the flow of air through pipe 25, and similar means is provided for locking damper 31 in its adjusted position.

The upper chamber 30 is also preferably lined with fire brick, or other suitable refractory material, as is duct 28, and the duct 28 opens into said chamber at a point about midway between its ends. Also chamber 30 is substantially parallel with chamber 17.

End wall 33 closes the end of chamber 30 at a point that is about over the stack 16, thus there is a space over chamber 17 adjacent to end wall 33 for a horizontal shelf 35 that is adapted to be supported on and over the end of chamber 17, and which shelf, in turn, supports blowers 22' and a second blower 36 thereon.

A fuel line 37 is connected with the discharge outlet of blower 36 which pipe is the same as pipe 21 except that it extends into and through end wall 33 on chamber 30. This end wall is lined with fire brick, or the like, the same as end wall 18 of chamber 17. A gas line 38 extends into the pipe 37 coaxial with a burner head 39 that is on the terminating end of pipe 37 within chamber 30 and adjacent to wall 33. The end of chamber 30 opposite to wall 33 is open.

Valves 40 in gas lines 23 and 38 control the flow of gas to burner heads 22, 39, and it may be noted that the head 19 of chamber 17 is readily removable.

Supports 41 are adapted to support the chamber 17 above and on the cover 5, and where found desirable, the stacks 16 may be relatively high, as seen in Fig. 4, with guy wires 42 bracing them on the cover.

The body 43 of each of the vehicles 2 may be mounted on trucks that, in turn, are supported on the rails of track 1. This body may merely be semi-cylindrical, and of metal, which, in turn may have suitable draft openings 44 (Fig. 3) therein, if desired, to promote combustion by admitting air to below the contents of each body. The concave side of the body is directed upwardly, and each body may be provided with end walls 46, one or both of which may be removably held between a pair of parallel, spaced, opposed, guide strips 47 to facilitate the

removal of ashes and other unburned material from the body.

In operation, any number of cars or vehicles 2 may be in a row or spaced along track 1 for loading in any suitable manner, as from dump trucks 48. If desired, these trucks 48 may be supported on an elevated ramp on a bank adjacent to the tunnel 4, or the cars can be loaded at any point around the track.

After the cars are loaded they are moved below the cover 5 and the contents are ignited. The end gates 11 may be held in slightly elevated position, if found necessary, in order to provide an adequate supply of air, and the smoke consumers, generally designated 50, may be fired by turning on the gas and blowers and igniting the gas. This, of course, creates a forced draft in the stack 16 due to the relatively high velocity of the gas-air mixture passing over the open upper end of stack 16 within the lower chamber 17.

The air entering pipe 25 at the point where the ignited gas-air mixture from burner 22 fills the lower chamber provides a full area of intense heat within the chamber 17 and provides air to promote the burning of the products of combustion, and the eddy chamber 51 between the end wall 19 and the opening of pipe 25 into chamber 17 will collect solids that may pass into the chamber 17 but that may not be wholly consumed.

When any products of combustion that may not be consumed pass into the upper chamber 30, through duct 28, the velocity thereof is reduced, which is desirable.

At the point where the duct 28 opens into the upper chamber 30, the ignited air-gas mixture from burner 39 fills the upper chamber and is of relatively slow velocity, hence the burning or consumption of such products of combustion as may enter the upper chamber is completed, and substantially no visible smoke or carbon monoxide is ejected into the atmosphere from the upper chamber.

It has been found that in the burning of rubber tires and other materials that create a dense black smoke, such materials can be burned in the present system free from noticeable smoke.

The present invention enables the rapid, continuous and effective burning of large quantities of trash and refuse in an economical manner, and the endless track with its cars outside the burner, provides means for dumping the refuse from the trucks during the rush hours in receptacles that may be successively moved through the burning unit. During slack hours it may be that only one of the several smoke consumers may be operating.

Pipe 25 and duct 28, having dampers therein, enable an exact control of combustion and velocity of the products of combustion through each smoke consumer so as to insure a positive and complete consumption of the smoke according to the materials being burned, and other conditions.

After the burnable contents of each car or vehicle 2 has been completed, the car may be rolled out from below cover 5 and the salvageable metal may be removed therefrom. The track 2 may be of sufficient length to permit substantial cooling of the cars and salvageable metal before the car is re-loaded.

While the exact positions of the pipes and valves in Fig. 4 may be slightly different than in Fig. 1 and stacks 16 in Fig. 4 may be indicated as being longer than in Fig. 1, the elements and manner of operation are the same.

I claim:

1. In a trash burner having a cover, a pair of horizontally elongated tubes one positioned above the other to provide an upper combustion chamber and a lower combustion chamber, said lower combustion chamber having end walls closing its opposite ends, a smoke stack connecting one end portion of said lower chamber with said cover and communicating between the area below said cover and the interior of said one end portion, a

duct connecting said tubes and communicating between the interior of said lower tube at the end portion thereof that is opposite to said first mentioned end portion and with the interior of said upper tube at a point spaced between the ends of said upper tube, a pair of gas burners respectively at one of the ends of said upper tube and said lower tube directed axially thereof toward the opposite ends of said tubes, said upper tube being open at the end thereof opposite to the burner.

2. In a trash burner having a cover, a pair of horizontally elongated tubes one positioned above the other to provide an upper combustion chamber and a lower combustion chamber, said lower combustion chamber having end walls closing its opposite ends, a smoke stack connecting one end portion of said lower chamber with said cover and communicating between the area below said cover and the interior of said one end portion, a duct connecting said tubes and communicating between the interior of said lower tube at the end portion thereof that is opposite to said first mentioned end portion and with the interior of said upper tube at a point spaced between the ends of said upper tube, a pair of gas burners respectively at one of the ends of said upper tube and said lower tube directed axially thereof toward the opposite ends of said tubes, said upper tube being open at the end thereof opposite to the burner, a damper in said duct for regulating the volume of gas adapted to pass therethrough from said lower chamber into said upper chamber.

3. In a trash burner having a cover, a pair of horizontally elongated tubes one positioned above the other to provide an upper combustion chamber and a lower combustion chamber, said lower combustion chamber having end walls closing its opposite ends, a smoke stack connecting one end portion of said lower chamber with said cover and communicating between the area below said cover and the interior of said one end portion, a duct connecting said tubes and communicating between the interior of said lower tube at the end portion thereof that is opposite to said first mentioned end portion and with the interior of said upper tube at a point spaced between the ends of said upper tube, a pair of gas burners respectively at one of the ends of said upper tube and said lower tube directed axially thereof toward the opposite ends of said tubes, said upper tube being open at the end thereof opposite to the burner, an air inlet opening into the end portion of said lower tube that is opposite to the end portion into which said stack opens, and a damper in said inlet for regulating the flow of air into said lower chamber through said inlet.

4. A smoke consumer for trash burners and the like comprising; an upper horizontally elongated tube open at one end thereof and having an end wall closing the opposite end, a gas burner extending through said end wall and into said tube at said opposite end and directed axially of said upper tube in a direction away from said end wall, a lower horizontally elongated tube below said upper tube having an inner end wall closing one end thereof and an outer end wall closing the opposite end thereof, a gas burner extending through said inner end wall and into said tube adjacent to said inner end wall and directed axially of said lower tube in a direction away from said inner end wall, a vertical duct connecting said upper tube and said lower tube, said duct having a lower open end communicating with the inside of said lower tube at a point spaced between said inner end wall and said outer end wall but closer to said outer end wall than to

said inner end wall, said duct having an open upper end communicating with the inside of said upper tube at a point spaced a substantial distance from the open end of said upper tube, an air inlet in the underside of said lower tube opening into said lower tube at a point remote from said inner end wall and spaced a substantial distance from said outer end wall, and a vertical smoke stack opening into said lower tube at a point spaced between said inlet and said inner end wall.

5. A smoke consumer for trash burners and the like comprising; an upper and a lower horizontally elongated tube in substantially parallel relation with the upper tube overlying the lower tube, said tubes having corresponding inner ends at one of their ends, and the upper tube having an open outer end opposite its inner end and the lower tube having a closed outer end opposite to its inner end, gas burners within said inner ends of said tubes directed axially thereof toward their outer ends, a smoke stack opening into the underside of said lower tube adjacent to its inner end, a vertical duct communicating between said tubes at points intermediate their inner and outer ends.

6. A smoke consumer for trash burners and the like comprising; an upper and a lower horizontally elongated tube in substantially parallel relation with the upper tube overlying the lower tube, said tubes having corresponding inner ends at one of their ends, and the upper tube having an open outer end opposite its inner end and the lower tube having a closed outer end opposite to its inner end, gas burners within said inner ends of said tubes directed axially thereof toward their outer ends, a smoke stack opening into the underside of said lower tube adjacent to its inner end, a vertical duct communicating between said tubes at points intermediate their inner and outer ends, an air inlet communicating with said lower tube at a point approximately below said duct.

7. A smoke consumer for trash burners and the like comprising; an upper and a lower horizontally elongated tube in substantially parallel relation with the upper tube overlying the lower tube, said tubes having corresponding inner ends at one of their ends, and the upper tube having an open outer end opposite its inner end and the lower tube having a closed outer end opposite to its inner end, gas burners within said inner ends of said tubes directed axially thereof toward their outer ends, a smoke stack opening into the underside of said lower tube adjacent to its inner end, a vertical duct communicating between said tubes at points intermediate their inner and outer ends, an air inlet communicating with said lower tube at a point approximately below said duct, dampers respectively in said duct and in said inlet for controlling the flow of gas and air therethrough.

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