

Fig. 1

INVENTOR.
Clifford A. Scogin
BY *John A. Hamilton*
Attorney.

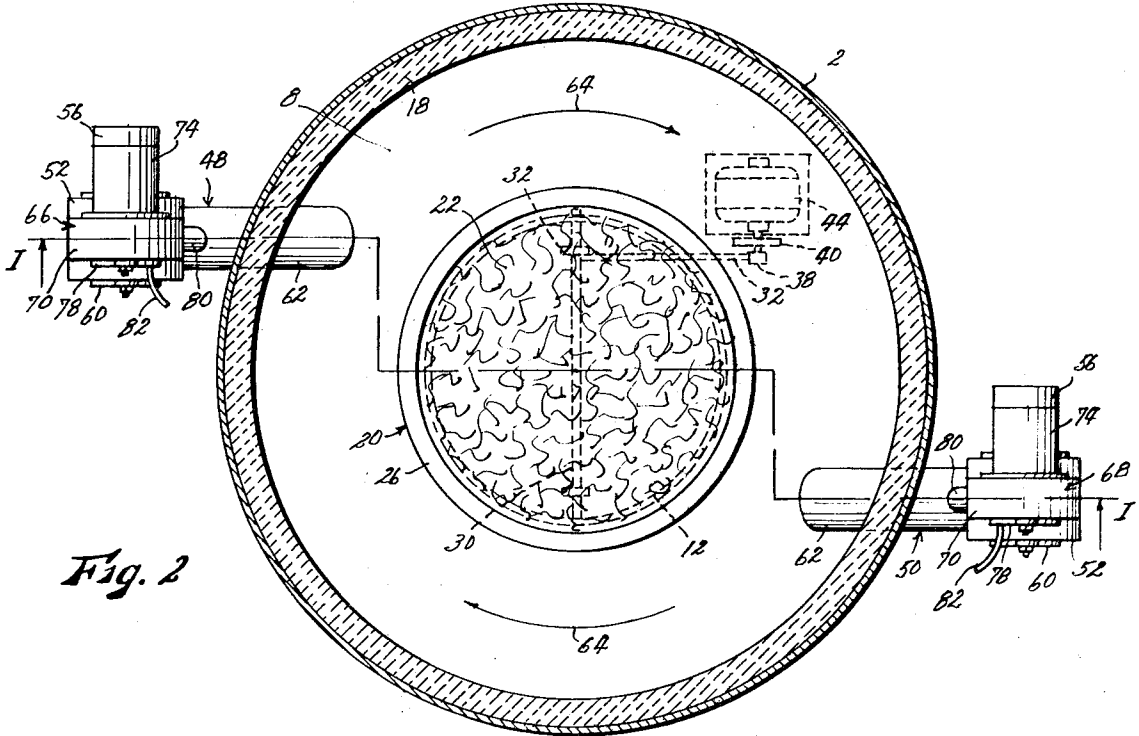


Fig. 2

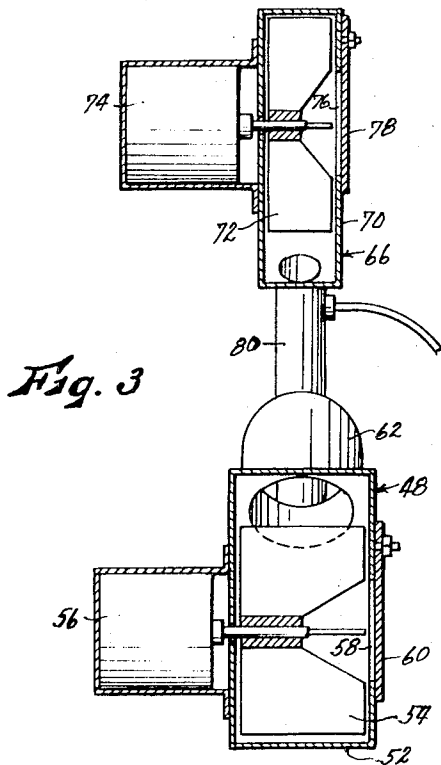


Fig. 3

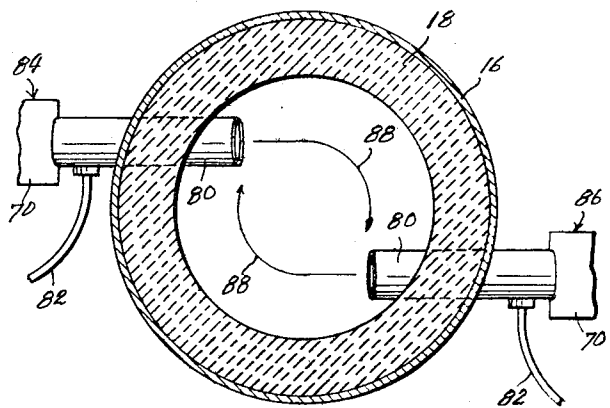


Fig. 4

INVENTOR.
Clifford A. Scogin
BY
John A. Hamilton
Attorney.

INCINERATOR

This invention relates to new and useful improvements in incinerators, and has particular reference to incinerators for the disposal of heavy refuse ordinarily quite difficult to burn efficiently, or the burning of which is accompanied by the emission of large quantities of smoke, or disagreeable odors, or both.

The primary object of the present invention is the provision of an incinerator which will burn such heavy refuse, both rapidly, and also with great efficiency, to the end that very little smoke or odor is emitted. The present incinerator will burn garbage, or even rubber tires, with virtually no smoke or odor ever leaving the stack.

General features of the invention contributing to the accomplishment of this object are the provision of means whereby the refuse, disposed in a pile, is burned first at the surface of the pile, then gradually inwardly from said surface, the provision of means for creating a whirling vortex pattern of air and flames in the burning chamber, thereby producing more efficient combustion and retaining the gaseous products of combustion for a longer time to permit further combustion thereof, the provision of means for constantly altering the position of the refuse pile relative to the currents of air and flame to provide better access for said currents to all parts of the pile, and the provision of an after-burner in the stack for completing the combustion of the gases rising therethrough, said gases commonly still containing smoke and organic matter producing disagreeable odors.

Other objects re simplicity and economy of construction, and efficiency and dependability of operation.

With these objects in view, as well as other objects which will appear in the course of the specification, reference will be had to the accompanying drawing, wherein:

FIG. 1 is a partially schematic vertical sectional view, taken generally on line I—I of FIG. 2, of an incinerator embodying the present invention, with the stack partially broken away and foreshortened, and with parts left in the elevation;

FIG. 2 is a sectional view taken on line II—II of FIG. 1,

FIG. 3 is an enlarged sectional view taken on line III—III of FIG. 1, and

FIG. 4 is an enlarged, fragmentary sectional view taken on line IV—IV of FIG. 1.

Like reference numerals apply to similar parts throughout the several views, and the numeral 2 applies to the body or housing of the incinerator which is formed of sheet metal and is cylindrical in form with its axis disposed vertically. It is provided with a horizontal bottom wall 4 and a horizontal partition wall 6 spaced above wall 4 and forming the floor of the combustion chamber 8 thereabove. The space between walls 4 and 6 constitutes a motor chamber 10, as will appear. Wall 6 has an aperture 12 formed centrally therein. Body 2 is provided with a conical top wall 4, and a cylindrical stack 16 rising vertically from the middle thereof. Said stack may be of any desired height. Floor 6, combustion chamber 8, top wall 14 and stack 16 are all provided with a lining 18 of refractory material such as firebrick.

A circular platform 20 for holding a pile of refuse 22 is disposed generally horizontal in chamber 8 just above and in overlying relationship to aperture 12 of floor 6. Said platform may consist of a sheet metal base 24 having a covering of refractory material providing a low, upstanding wall 26 around its peripheral edge to better retain refuse on said platform. Platform 20 is of smaller diameter than body 2 whereby to form an annular well 28 therebetween, as best shown in FIG. 1.

Platform base 24 is supported for tilting or rocking movement on a horizontal shaft 30 mounted in and extending diametrically across aperture 12 of floor 6. An arm 32 is affixed to said platform base and extends downwardly through said aperture into chamber 10. A link 34 is pivoted at one end to the lower end of said arm, as at 36, and the opposite end of said link is pivoted, as at 38, to a disc 40 mounted on the drive shaft 42 of an electric motor 44, eccentrically of said shaft. Said motor is mounted on bottom wall 4 within chamber 10.

Said motor shaft is of such speed that as long as the motor is operative, platform 20 is rocked oscillatably at a slow speed, perhaps 20 or 30 oscillations per minute. Access to platform 20, for the placement of refuse thereon, may be had through a door 46 in the sidewall of body 2 bounding combustion chamber 8.

A pair of air blowers 48 and 50 are disposed at the sides of body 2, above the level of platform 20. Each of said blowers includes a housing 52 in which is mounted a rotatable air impeller wheel 54 driven by an electric motor 56 and having an air inlet opening 58 controlled by an adjustable damper 60. Air drawn by impeller wheel 54 through opening 58 is delivered from housing 52 through a tube 62 which extends into combustion chamber 8 through a wall thereof, and which is open at its inner end. Within chamber 8, tubes 62 are inclined downwardly to be aimed at the pile of refuse carried by platform 20, as best shown in FIG. 1. In a horizontal plane, as best shown in FIG. 2, tubes 62 are disposed in generally opposed relation at opposite sides of chamber 8, and are directed generally tangentially to platform 20, in the same angular relationship (clockwise as shown) thereto. Thus air delivered to chamber 8 by said tubes is caused to enter into a clockwise whirling or vortex pattern in aid chamber, as indicated by arrows 64 in FIG. 2.

A pair of burners 66 and 68 are associated respectively with blowers 48 and 50. Each of said burners includes a housing 70 carrying an air impeller wheel 72 driven by a motor 74, an air inlet opening 76 and an adjustable damper 78, in the same manner as blowers 48 and 50, and operable to deliver air through blast tube 80 is interconnected with housing 70. Blast tube 80 is of smaller diameter than its associated air delivery tube 62, and extends coaxially into said tube, the discharge ends of tubes 62 and 80 being generally coextensive, as shown in FIG. 1. A burner for gas or other fuel, is disposed within the entry end portion of tube 80, but is standard and is not here shown. Said burner is supplied with fuel through a suitable conduit 82. It will be understood that, generally speaking, the burner blowers 72 supply sufficient primary and secondary air supplies for the full combustion of the gas or other fuel, while blowers 48 and 50 supply air for the combustion of the refuse 22.

A second pair of burners 84 and 86 are disposed in the lower portion of stack 16, just above chamber 8. These burners are similar in all essential respects to burners 66 and 68, corresponding parts being indicated by corresponding numerals, except that blast tubes 80 thereof are directed slightly upwardly within the stack, as indicated in FIG. 1. In a horizontal plane, as shown in FIG. 4, they are directed tangentially, in a manner similar to the blast tubes of burners 66 and 68, to set up a whirling vortex pattern of flame as indicated by arrows 88 in FIG. 4.

Not shown are mounting members for supporting blowers 48 and 50, and burners 66, 68, 84, and 86, firmly and rigidly in position. Such mounting members are, however, standard and well understood in the art.

In operation, with all of the burners and blowers operative and with motor 44 operating to rock platform 20, it will be seen first that flame and air from burners 66 and 68 and blowers 48 and 50 impinge directly against the surface of the pile of refuse carried on platform 20, tending to heat and cause combustion of the surface refuse. Perhaps the first and most important difference of operation, of the present incinerator from prior devices results from this fact, in that the refuse is burned first at the surface of the pile, and then gradually inwardly from said surface rather than from the bottom of a pile upwardly, as in incinerators wherein the refuse is simply thrown or piled on a bed of fire. In the latter method the refuse, particularly if it is heavy or wet and therefore generally difficult to ignite, tends in large measure to stifle or muffle the fire, and must be substantially heated and/or dried throughout the pile before effective combustion thereof can begin. In the present incinerator, the application of the flame and air directly to the surface of the pile permits extremely

rapid and efficient heating and burning of the surface refuse with no necessity that the interior of the pile be heated and/or dried at all.

Secondly, it will be seen that the tangential disposition of blowers 48 and 50 and burners 66 and 68 creates a clockwise whirling or vortex pattern of air and flame in chamber 8, as indicated by arrows 64 in FIG. 2. This vortex action has several interrelated beneficial effects. It provides for rapid and thorough distribution of the heat and flame, as well as air to support combustion of the refuse, to all areas of the surface of the pile of refuse, so that combustion of the refuse tends to occur evenly over the entire area. The rapidly moving currents of the vortex also tend to separate or "peel off" refuse from the pile as soon as it has been completely or nearly completely burned and therefore becomes sufficiently light in weight to be entrained in the air currents. The pile is thus prevented from acquiring a coating or "skin" of ash or partly burned matter which could insulate the interior of the pile from the flames and heat to some degree, and thereby slow the process. The vortex action, together with the downward inclination of the burners and blowers producing it, also retains the gaseous products of combustion within chamber 8 for a much longer period of time than they would otherwise be, for example, if air were supplied to said chamber by a simple gravity-induced draft. This gives ample time to complete the combustion of material separated from the pile by the "peeling" action of the vortex currents, if it is not already completely burned, before it proceeds upwardly through stack 16. Also, any heavier bits of matter which may be incombustible are forced outwardly to the peripheral zone of chamber 8 by centrifugal force resulting from the vortex action, and settle into well 28, from which they may be periodically removed by any suitable means not shown. Fairly satisfactory results have been obtained without the use of blowers 48 and 50, combustion air for the refuse being admitted to chamber 8 solely through atmospheric openings formed in body 2 at the lower portion of said chamber. However, the efficient combustion of heavy refuse such as garbage and rubber requires extremely large quantities of air which are better supplied by the blowers. Said blowers also have the advantages of applying the air directly to the refuse pile for better combustion and of providing a far better vortex action than could be generated by burners 66 and 68 alone, thereby providing a better "peeling action" on the refuse pile, increasing the retention time of the gases in chamber 8 and improving the centrifugal disposition of heavy ash and the like.

Thirdly, the rocking of platform 20 by motor 44 has been found to improve the "peeling action" of the vortex on the refuse pile in that while some peeling action occurs anyway, as a result of the speed of the vortex action, it is more efficient if the direction of the vortex currents, with respect to any point on the surface of the pile, is being constantly changed. The same effect could be obtained by moving burners 66 and 68, and blowers 48 and 50, with respect to the refuse pile, instead of moving the pile itself, as shown, but the latter means has been found far more simple and practical.

Fourthly, despite the burning efficiency within chamber 8, as already discussed, heavy refuse such as garbage, rubber, or the like will still produce a heavy smoke, or fumes containing organic matter having a disagreeable odor. These components, while combustible, require for their combustion a higher temperature than it is practical to produce within chamber 8, and are the principal reasons that many prior incinerators have been classed as public nuisances. In the present apparatus, these components are burned by heat produced by burners 84-86 in the lower end portion of stack 16. These burners, which in a sense constitute an "afterburner" operating in the restricted confines of the stack, produce a zone of extremely intense, white-hot heat easily capable of igniting and burning the objectionable carbons and other objectionable organic matter in the stack gases, although this combustion may still require some time. To provide the desired retention time of said gases in the stack, said burners

are arranged tangentially as shown in FIG. 4 to create the vortex action indicated by arrows 88, thus continuing and reinforcing the clockwise vortex action first generated in chamber 8. The stack vortex which also of course creates extreme turbulence leading to better combustion, tends to continue to the top of the stack, thus tending to slow the passage of gases therethrough. As shown, the blast tubes 80 of burners 84 and 86 are preferably angled slightly upwardly at their inner ends. This tends to reduce the retention time of the gases in the stack in some small degree, contrary to the considerations just discussed rendering a longer retention time desirable, but has the desirable function of providing a forced stack draft which is of assistance in starting the incinerator when all of the parts are initially cold. The reduction of retention time in the stack can be compensated for by increasing the height of the stack.

While I have shown and described a specific embodiment of my invention, it will be readily apparent that many minor changes of structure and operation could be made without departing from the spirit of the invention.

What I claim as new and desire to protect by Letters Patent is:

1. An incinerator comprising:

- a. a body member defining a combustion chamber with an atmospheric stack rising from said chamber,
- b. a platform for carrying a pile of refuse disposed in the lower portion of said combustion chamber,
- c. means whereby air is delivered to said combustion chamber, and
- d. burners mounted in the wall of said combustion chamber and operable to direct flames toward the surface of said pile of refuse, said burners being arranged to direct flames generally tangentially to said platform, considered in a horizontal plane, whereby to create a horizontally whirling vortex of flames and air with said combustion chamber, said burners also being positioned well above the level of said platform, and vertically angled to direct their flame downwardly toward the pile of refuse carried by said platform.

2. An incinerator comprising:

- a. a body member defining a combustion chamber having a floor and an atmospheric stack, rising from said chamber,
- b. a platform for carrying a pile of refuse to be burned disposed in the lower portion of said combustion chamber, said platform being disposed above the floor of said combustion chamber, of smaller horizontal dimensions than said chamber, and disposed centrally of said chamber, whereby to form an upwardly opening well between the edges of said platform and the interior walls of said combustion chamber,
- c. means whereby air is delivered to said combustion chamber, and
- d. a plurality of burners mounted in the wall of said body member and operable to direct flames into said combustion chamber generally tangentially to said platform, considered in a horizontal plane, whereby to create a horizontally whirling vortex of flames and air within said combustion chamber.

3. An incinerator comprising:

- a. a body member defining a combustion chamber with an atmospheric stack rising from said chamber,
- b. a platform for carrying a pile of refuse to be burned disposed in the lower portion of said combustion chamber, said platform being movably mounted in said body member,
- c. means carried by said body member and operable to move said platform continuously in a small pattern of movement within a whirling vortex of flames and air within said combustion chamber,
- d. means whereby air is delivered to said combustion chamber, and
- e. burners mounted in the wall of said combustion chamber and operable to direct flames toward the surface of said pile of refuse generally tangentially to said platform, con-

sidered in a horizontal plane, whereby to create a horizontally whirling vortex of flames and air within said combustion chamber.

4. An incinerator as recited in claim 3 wherein said platform is mounted in said body member for tilting motion on a horizontal axis, and with the addition of power means operable to rock said platform oscillatably.

* * * * *

10

15

20

25

30

35

40

45

50

55

60

65

70

75