April 11, 1961 R. F. SMITH 2,978,999

INCINERATOR WITH COMPACTER

Filed June 25, 1959 3 Sheets-Sheet 1

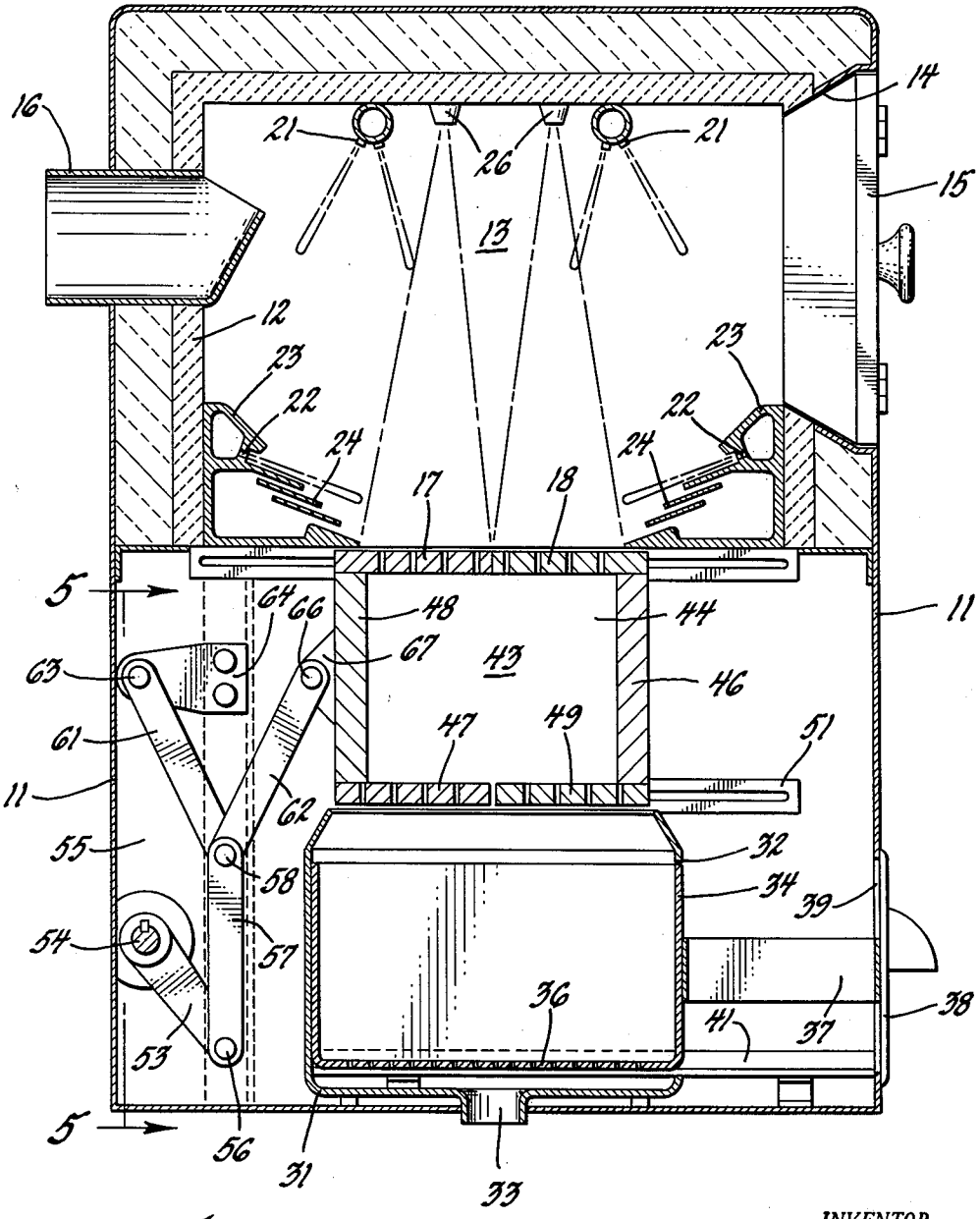


Fig. 1

INVENTOR.
Robert F. Smith
BY
Edwin L. Dybvig
HIS ATTORNEY

April 11, 1961 R. F. SMITH 2,978,999

INCINERATOR WITH COMPACTER

Filed June 25, 1959 3 Sheets-Sheet 2

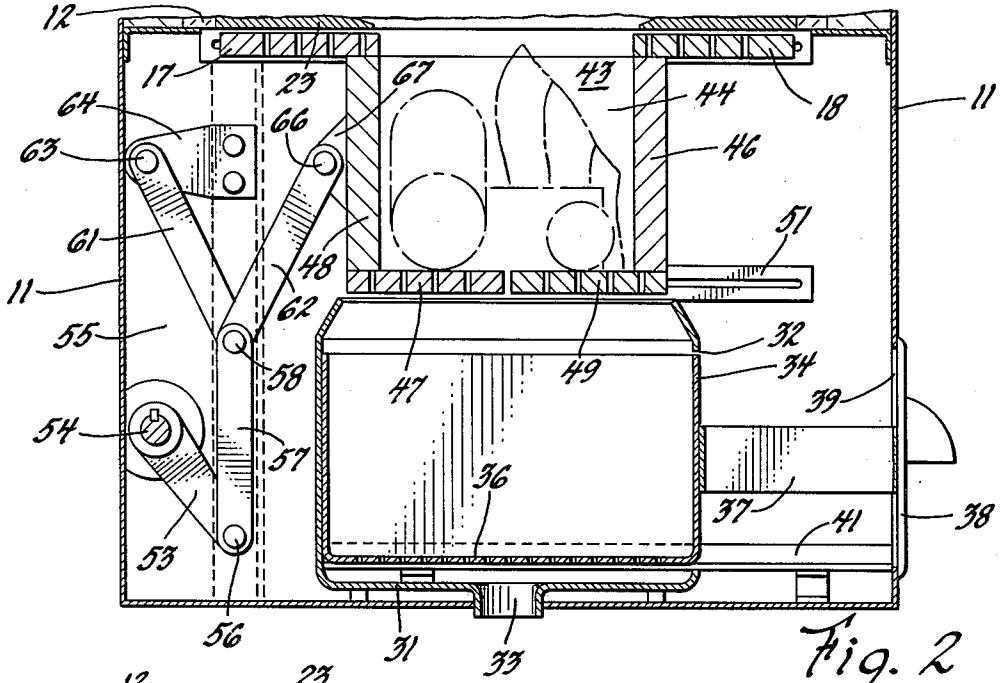


Fig. 2

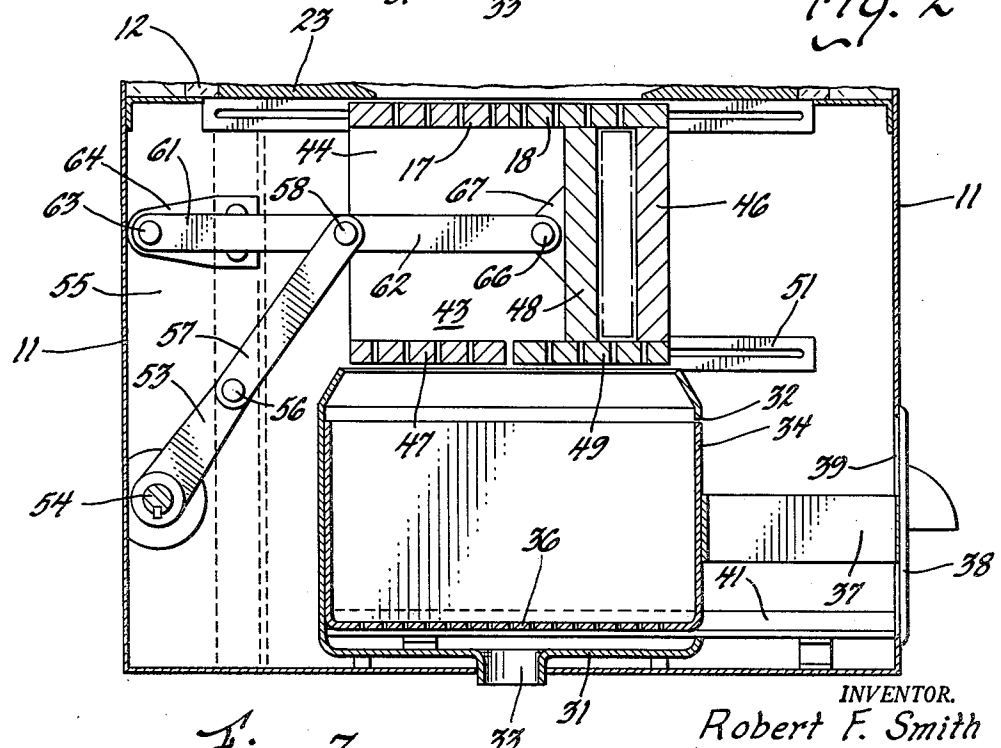


Fig. 3

INVENTOR.
Robert F. Smith
BY
Edwin S. Dybvig
HIS ATTORNEY

April 11, 1961 R. F. SMITH 2,978,999

INCINERATOR WITH COMPACTER

Filed June 25, 1959 3 Sheets-Sheet 3

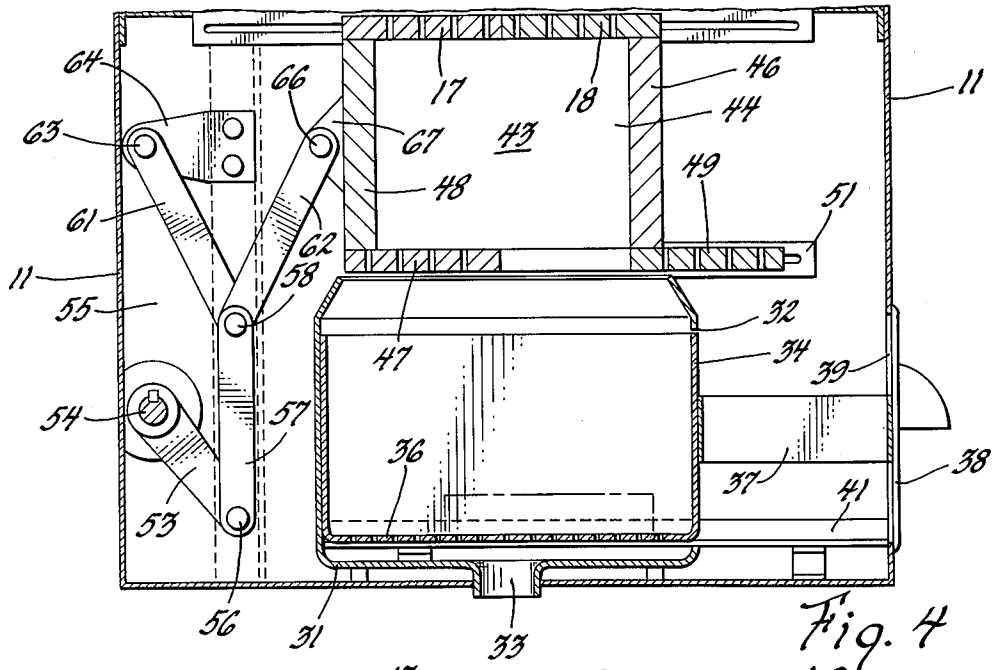


Fig. 4

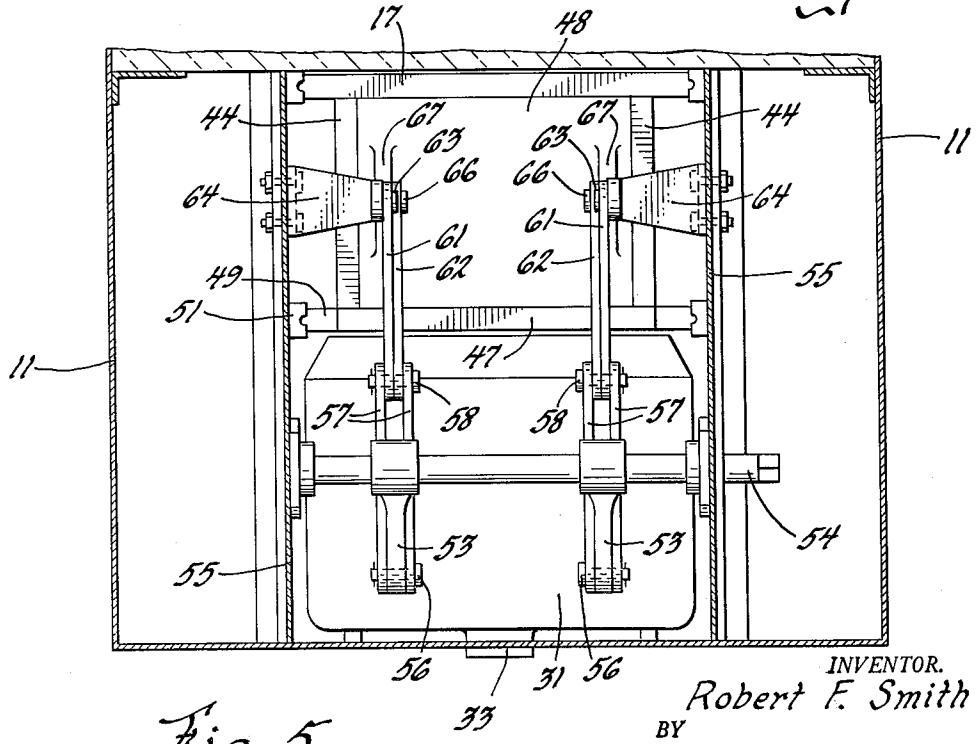


Fig. 5

INVENTOR.
Robert F. Smith
BY
Edwin S. Dybvig
HIS ATTORNEY

United States Patent Office 2,978,999 Patented Apr. 11, 1961

2,978,999

INCINERATOR WITH COMPACTER

Robert F. Smith, Grosse Pointe Woods, Mich., assignor to General Motors Corporation, Detroit, Mich., a corporation of Delaware

Filed June 25, 1959, Ser. No. 822,882

4 Claims. (Cl. 110—18)

This invention relates to a waste burner or refuse incinerator having a compacter or compacting compartment incorporated therein.

I am aware of the fact that incinerating apparatuses for substantially consuming and disposing of refuse, such as waste materials and garbage or the like are available on the market. However, these incinerators are not entirely satisfactory and therefore their sale has been somewhat curtailed or retarded. For example, when a composite batch of refuse including combustible cardboards, paper cartons, paper wrappings, garbage, miscellaneous rubbish and noncombustible broken glass articles, metal foil cups, plates, fruit or vegetable cans is placed in an incinerator, the combustible materials together with the garbage will be burned or consumed in the incinerator but the noncombustible articles are not burned or decomposed therein. It is impractical and prohibitive to attempt to flush these noncombustible articles out of an incinerator through a drain associated therewith, and they thereby create a problem in the use of incinerating apparatuses. Unless such noncombustible articles are separated from combustible materials prior to placing refuse in an incinerating chamber, the residue of combustion, glass, metal foil and cans have to be individually picked out of the chamber, after an incinerating operation, and this is an objectionable, tedious and dirty task. The residue, glass, metal foil and cans are bulky and in either event ordinarily constitute the greater part of contents of a trash receptacle to be emptied by a trash collector and removed from a residence. I therefore contemplate the provision of a more practical incinerator or incinerating apparatus which will increase their utility and popularity by eliminating the necessity of removing noncombustible articles from the refuse prior to burning same therein and will also prevent the bulkiness of noncombustible articles from forming the major accumulative portion of the content of a trash receptacle.

An object of my invention is to provide a method of and apparatus for processing waste or a composite refuse wherein combustible materials thereof are burned in the presence of noncombustible articles in a first zone or chamber of an incinerator, and the noncombustible residue or articles are thereafter dumped out of the first zone or chamber into a second zone or compartment in the incinerator and reduced to a compacted mass therein to thereby facilitate disposal of the residue from the apparatus.

Another object of my invention is to provide a combined incinerator-compacter which thoroughly disposes of combustible portions of a batch of refuse and crushes and compresses noncombustible portions thereof therein to expedite removal of residue of combustion therefrom in a compact convenient form.

A further object of my invention is to provide an incinerator having an incinerating chamber, means for cleansing products of combustion of refuse burned therein with a compacter for receiving residue or noncombustible

articles of the refuse from the chamber and compacting same into a compacted mass which is dumped from the compacter into a removable receptacle in the incinerator for disposal.

In carrying out the foregoing objects, it is a still further and more specific object of my invention to provide a compacter compartment in an incinerator intermediate an incinerating chamber and a detachable or removable receptacle therein which compartment comprises, in addition to a bottom dumping grate-like door or doors, a fixed wall portion, a movable wall portion and means for moving the movable wall portion of the compartment toward the fixed wall portion thereof to crush and compress noncombustible articles received thereby from the chamber into a compacted mass that is released therefrom into the removable receptacle by opening the dumping door.

Further objects and advantages of the present invention will be apparent from the following description, reference being had to the accompanying drawings wherein a preferred embodiment of the present invention is clearly shown.

In the drawings:

Figure 1 is a vertical sectional view of an incinerator having the present invention incorporated therein;

Figure 2 is a fragmentary sectional view of the incinerator showing grate-like doors of the incinerating chamber thereof opened with noncombustible articles dumped therefrom into a compacting compartment;

Figure 3 is a view similar to Figure 2 showing noncombustible articles compacted into a mass in the compacting compartment;

Figure 4 is a view similar to Figures 2 and 3 showing the door of the compacting compartment opened with the compacted mass released to a receptacle removably disposed in the incinerator; and

Figure 5 is a sectional view taken on the line 5—5 of Figure 1 showing a leverage mechanism for operating the compacting apparatus in the incinerator.

Referring to the drawings, I show in Figure 1 thereof a waste burner or incinerator cabinet-like structure having outer supporting walls **11** and inner refractory walls **12** with any suitable or desirable insulating material disposed therebetween to provide an incinerating zone or chamber **13** in the top portion of the box-like cabinet structure. Chamber **13** has a waste material inlet or receiving opening **14** normally closed by a door **15** hingedly or otherwise suitably mounted on the incinerator structure for movement relative thereto. A shielded or baffled flue or pipe **16** communicates with the interior of chamber **13** and extends out of the structure for discharge of gaseous and the like products of combustion. the bottom of incinerating chamber **13** is normally closed by biparting grate-like doors **17** and **18** which are mounted in the structure upon grooves or the like **19** provided in suitable stationary track members for sliding movement relative to walls **12** away from one another to open the bottom of chamber **13**. Any desirable or conventional linkage means (not shown) may be connected to the doors **17** and **18** with an actuating member extended to the exterior of the incinerator structure for operating these doors into open and closed positions. A plurality of gas outlet jets **21** are located at the top of chamber **13**, and another plurality of gas outlet jets **22** are provided in a combined gas and air discharge manifold **23** located in the lower portion of chamber **13**. Gas egressing from jets **21** and **22** may be ignited in any suitable or conventional manner prior to a combustion operation within chamber **13**. Combustion in chamber **13** is aided by air admitted thereto through vane-like air outlets **24** provided in manifold **23**. Air ambient the incinerator structure may circulate into manifold **23** by

natural draft, or the air may be forced into chamber 13 by a suitable or conventional blower or the like as is conventional in the art. Jets 21 and 22 are preferably arranged to substantially surround waste material placed in chamber 13 to be incinerated by burning gas emitted from the jets and illustrated by the dot-dash lines. Suitable spray jets 26 located at the top of chamber 13 are connected to a source of water supply, preferably under pressure, and are utilized for flushing out or cleansing the incinerator in a manner and for a purpose to be hereinafter described. A shroud or cup-like housing 31, provided with a side opening 32 and a drain outlet opening 33, is mounted in the lower portion of the incinerator structure and supported therein in any suitable or desirable manner. The opening 32 receives a receptacle 34 having a perforated or screen-like bottom wall 36, an integral extension 37 and a handle-like cover 38 which cover closes an opening 39 in a side wall 11 of the incinerator structure. Receptacle 34 is detachably mounted in the structure upon suitable guides or tracks, such as angle iron elements 41, for sliding movement relative thereto so as to be removable therefrom.

In accordance with the objects of this invention, I provide the incinerator structure or incinerating apparatus with a noncombustible article compacter or compacting zone or compartment 43 below chamber 13 and intermediate this chamber and receptacle 34. The compactor compartment 43 comprises a plurality of stationary upright impervious integral wall portions 44 and 46, a stationary perforated or grate-like partial bottom wall 47 and a movable wall portion 48. Wall portions 46 and 48 of compartment 43 form a fixed compacter member and a shiftable compacter member respectively. A grate-like door 49, slidably mounted on suitable tracks or guides 51, cooperates with wall 47 to complete the bottom of compartment 43 and the grate-like doors 17 and 18 of chamber 13 form the top of this compartment. Any suitable or conventional means or mechanism may be provided to shift and guide the movable compacter member 48 along the interior of compartment 43 toward the fixed compacter member 46. I provide a force multiplying leverage mechanism for this purpose which may be manually or power actuated as desired. A pair of spaced apart crank arms 53 keyed to or fixedly mounted on a drive shaft or stud 54, rotably anchored to angle iron reinforced subwalls 55 (see Figure 5) in the incinerator structure, have their other end shiftably secured, by pins 56, to one end of parallel arms 57. Crank arms 53 are thereby rotatable with drive shaft 54 which has one for the reception of a crank or for connecting an electric motor thereto. The other or upper end of arms 57 are pivotally connected, by pins or studs 58, to one end of each of two sets of pairs of levers 61 and 62. Levers 61 have their upper end pivotally mounted by pins or studs 63 secured to one end of bracket supports 64 bolted or otherwise stationarily fixed to the reinforced subwalls 55 of the incinerator structure. The upper end of levers 62 are pivotally attached by pins or studs 66 to spaced apart bosses 67 formed on and projecting outward from the shiftable compacter wall member 48.

Rotation of shaft 54, either manually or by a suitable electric motor, swings arms 53 in a counterclockwise direction, as viewed in Figure 1 of the drawings, and their swinging applies upward force to arms 57. Arms 57 push upwardly on the connector pins or studs 58 of levers 61 and 62 and by virtue of levers 61 being stationarily anchored upon pins or studs 63 for pivotal movement thereabout the force of rotation of arms 53 reacts against levers 61 and is transmitted, through arms 57, to levers 62. This force is applied to pins or studs 66 and bosses 67 for shifting the shiftable compacter member 48 along the interior of compartment 43 toward the stationary wall portion thereof or fixed compacter member 46. Compacter 48 is guided, during its travel toward member 46, by the side walls 44, partial bottom wall 47 and door 49 of compacting compartment 43. Having set forth the essential elements of my improved waste burner or combined incinerator-compacter, I will now proceed to describe the use or operation thereof.

A batch of composite refuse is, after opening door 15, inserted into incinerating zone or chamber 13 of the incinerator structure and supported therein upon the closed grate-like bottom doors 17 and 18 thereof. This batch of refuse may include combustible materials, such as papers, paper cartons, paper wrappings, garbage and noncombustible articles comingled therewith, such as broken glass jars, metal foil cups or plates and fruit or fruit juice cans and vegetable or vegetable juice cans. Door 15 is then closed and a suitable inflammable gas is directed out of the jets 21 and 22. The gas is ignited in any suitable manner, such, for example, as by a pilot flame concealed from the water spray jets 26, and air is directed into zone or chamber 13 through the outlets 24 of manifold 23. Flames issuing from the jets 21 and 22 cause burning and decomposition of combustible materials of the composite batch of waste or refuse within the incinerating chamber or zone 13 in the presence of noncombustible articles included in the refuse and trapped or retained in the chamber or zone. Gaseous products of combustion leave chamber 13 by way of pipe or flue 16 to a chimney. The residue of burned combustible materials and the broken glass, metal foil or cans remain trapped in chamber 13 after the combustion operation is completed and are supported therein on the grate doors 17 and 18. The supply of gas to jets 21 and 22 is cut off and the temperature of incinerating chamber or zone 13 is permitted to reduce to normal. Grate-like doors 17 and 18 are then slid open to release or dump residue, glass and metal items of the noncombustible constituent of the batch of refuse contained in chamber 13 into compacter zone or compartment 43 to be supported in loose or bulk-like form on the stationary partial bottom wall 47 and grate-like door 49 thereof (see Figure 2). Thereafter water is sprayed, by spray jets 26, into chamber 13 to flush ashes and other residue production of combustion therefrom and this water flows over the noncombustible items dumped into compartment 43 to wash them and flush the residue particles out of the compartment through shaker grate door 49. The residue particles and water flow into receptacle 34 and out of same through its screen-like or perforated bottom 36 to drain 33 so as to be directed to a sewer main. After a predetermined interval of time, to insure flushing of ashes and other residue particles out of the incinerator, water directed through the spray jets 26 is shut off. Shaft 54 of the compacting or leverage mechanism is now rotated, in any suitable manner as hereinbefore described, and the arms 53 and 57 act against levers 61 and, therefore, upon levers 62 to effect a forceful pushing of compacter member 48 along the interior of compartment or zone 43 toward fixed compacter member 46. Movement of member 48 along compartment 43 picks up residue, broken glass, metal foil and cans and pushes these articles in advance thereof toward member 46 to crush and compress them thereagainst into a compacted mass (see Figure 3). Rotation of shaft 54 in a clockwise or opposite direction returns compacter or wall portion 48 of compartment 43 to its normal position shown in Figure 1 of the drawings. Shaker grate door 49 is thereafter slid open for release of the compacted mass from compacter compartment or zone 43 whereupon this mass falls into receptacle 34 (see Figure 4). Compacted masses of noncombustible articles may be permitted to accumulate in receptacle 34 until it is about filled or this detachable receptacle may be removed from the incinerator structure after each combustion operation so as to empty individual compacted masses therefrom into a trash receptacle or bin to be collected by a trash collector. Receptacle 34 is replaced into the incinerator structure, and grate-like

doors 17, 18 and 49 are returned to their normal closed position to ready the incinerator for another combustion, dumping, flushing and compacting operation. While I have disclosed the basic principle of my invention as being more or less manually operable, it is to be understood that controls, such as electrically operated means or devices, may be incorporated in the combined incinerator-compacter and coordinated with one another to automatically and progressively carry out the combustion, dumping, flushing and compacting cycles thereof in succession.

It should, from the foregoing, be apparent that I have provided an improved method of and apparatus for incinerating batches of composite refuse. My improved apparatus effectively and thoroughly burns combustible materials of refuse and crushes and compresses residue and noncombustible articles thereof into a compact mass for ridding an incinerator of such and conditions it for a subsequent combustion or incinerating operation with a minimum of effort. By my invention, there is no necessity of separating combustible and noncombustible portions of a batch of refuse from one another prior to placing the composite batch thereof into the incinerator. My invention also eliminates hand picking of a plurality of noncombustible articles out of the incinerating chamber or zone of an incinerator after use thereof and, furthermore, prevents a trash collector's bin or receptacle from becoming substantially filled with disposed of broken glass jars, dishes and tin can containers.

While the embodiment of the present invention as herein disclosed, constitutes a preferred form, it is to be understood that other forms might be adopted.

What is claimed is as follows:

1. In combination, an incinerator provided with an incinerating chamber and a compacter compartment therebelow having an outlet opening, a first door at the bottom of said incinerating chamber, a second door for said outlet opening in the compacter compartment, said incinerating chamber receiving a composite refuse including combustible materials and noncombustible articles, means for burning the combustible materials of the refuse in said incinerating chamber while retaining noncombustible articles thereof on said first door, said first door being movable to open the bottom of said incinerating chamber and dump said noncombustible articles therefrom while said second door is closed into said compacter compartment, whereby to trap and hold the articles in loose fashion therein, said compacter compartment comprising in addition to said second door a fixed wall portion and a movable wall portion, means for shifting said movable wall portion of the compacter compartment toward said fixed wall portion thereof to crush and compress said loose noncombustible articles trapped therein into a compacted mass, and said second door being movable relative to said compacter compartment for releasing said compacted mass as a unit therefrom.

2. The method of disposing of composite refuse including combustible materials and noncombustible articles which consists in, holding the materials and articles in a first zone of an incinerator-compacter and burning the combustible materials in the presence of the noncombustible articles while in said zone, dumping the noncombustible articles out of the first zone into a second zone of the incinerator-compacter, and trapping the articles in loose fashion therein, circulating water through said first and said second zones to flush products of combustion therefrom and from the loose trapped noncombustible articles in said second zone, applying force to the trapped flushed loose noncombustible articles in said second zone to crush them, continuing the application of force to the crushed articles while trapped in said second zone to compress them therein into a compacted mass, and thereafter opening said second zone to release the compacted mass as a unit therefrom into a removable receptacle in the incinerator-compacter for removal therefrom.

3. In combination, an incinerator provided with an incinerating chamber, a compacter compartment therebelow and a drain, a first door at the bottom of said incinerating chamber, a grate-like door at the bottom of said compacter compartment, said incinerating chamber receiving a composite refuse including combustible materials and noncombustible articles, means for burning the combustible materials of the refuse in said chamber while retaining noncombustible articles admixed therewith, said first door being movable to open the bottom of said incinerating chamber and dump said noncombustible articles therefrom into said compacter compartment whereby to trap and hold the articles in loose fashion therein, means for directing water through said compacter compartment over the loose noncombustible articles trapped therein to flush products of combustion therefrom into said drain, said compacter compartment comprising in addition to said grate-like door a fixed wall portion and a movable wall portion, means for shifting said movable wall portion of said compartment toward said fixed wall portion thereof to crush and compress said loose flushed noncombustible articles trapped therein into a compacted mass, and said grate-like door being movable relative to said compacter compartment for releasing said compacted mass as a unit therefrom.

4. In combination, an incinerator provided with an incinerating chamber, a compacter compartment therebelow, a reticulated receptacle removably located beneath said compartment and a drain for the incinerator, a first door at the bottom of said incinerating chamber, a grate-like door at the bottom of said compacter compartment, said incinerating chamber receiving a composite refuse including combustible materials and noncombustible articles, means for burning the combustible materials of the refuse in said chamber while retaining noncombustible articles admixed therewith, said first door being movable to open the bottom of said incinerating chamber and dump said noncombustible articles therefrom into said compacter compartment, means for directing water through said incinerating chamber into said compacter compartment over the noncombustible articles dumped therein and through said reticulated receptacle to flush products of combustion therefrom into said drain, said compacter compartment comprising in addition to said grate-like door a fixed wall portion and a movable wall portion, means for shifting said movable wall portion of said compartment toward said fixed wall portion thereof to crush and compress said noncombustible articles therein into a compacted mass, said grate-like door being movable relative to said compacter compartment for releasing said compacted mass therefrom into said receptacle, and said receptacle being removable from said incinerator for disposal of the compacted mass received therein.

References Cited in the file of this patent

UNITED STATES PATENTS

250,979	Russell	Dec. 13, 1881
1,973,697	Bailey	Sept. 18, 1934
2,693,775	Berry	Nov. 9, 1954
2,877,723	Decker	Mar. 17, 1959
2,883,947	Corey	Apr. 28, 1959
2,907,530	Pyles	Oct. 6, 1959