

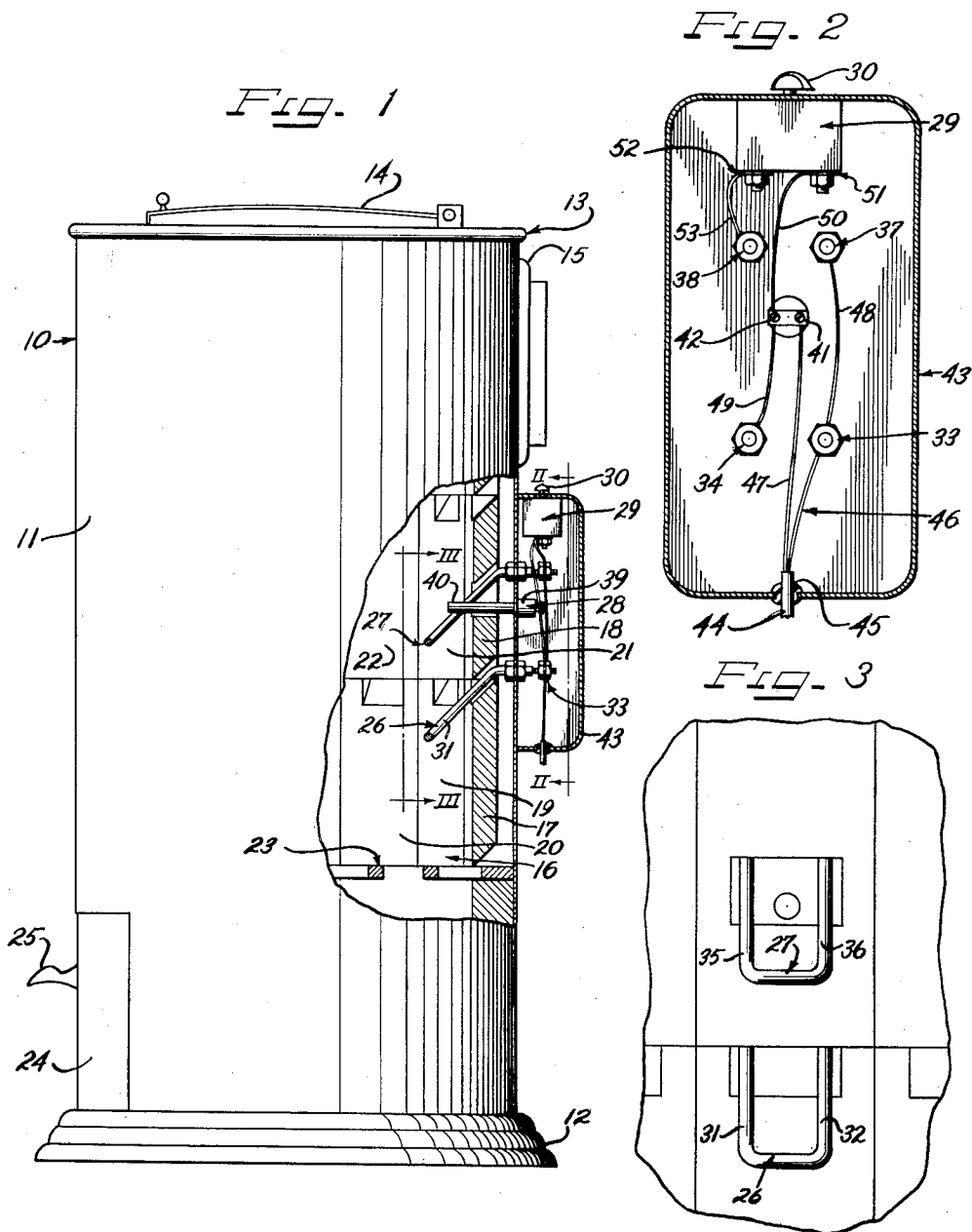
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ELECTRICALLY OPERATED INCINERATOR

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ELECTRICALLY OPERATED INCINERATOR

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This invention relates to an electrically operated incinerator and more particularly to an incinerator which has minimum power consumption and in which damage to heating elements is prevented.

Electrically operated incinerators have many advantages over gas fired or other types of incinerators in that there is no pilot light which might go out, there are no burners to become clogged with trash, refuse and the like and it is much simpler to supply electrical energy than it is to supply a gas or other fuel.

The electrically operated incinerators have, however, suffered from certain disadvantages heretofore and because of such disadvantages, they have not been extensively adopted. The most important of such disadvantages are the break-downs of heating elements and the relatively high power consumption heretofore encountered with electrically operated incinerators.

An object of this invention is to provide an electrically operated incinerator in which damage to and break-down of elements is obviated.

Another object of this invention is to provide an electrically operated incinerator having minimum power consumption.

A further object of this invention is to provide an electrically operated incinerator which is simple and economically manufacturable from a minimum number of parts and yet is efficient and reliable in operation.

According to an important feature of this invention, the electrical input to a resistance heating element is regulated in a manner such that coincidence between the electrical input and the heat from combustion of material in the incinerator is prevented for any extended period. It has been found that with this feature, break-down of the heating elements is minimized and the life of heating elements is greatly extended. Break-down of the resistive heating elements, and the relatively short life of such elements heretofore encountered, is apparently due to the combined effects of heat generated internally in the element by passage of the electric current there-through and the external heat generated by combustion of the material in the incinerator. Either source of heat, by itself, is not sufficient to cause break-down of the element.

The coincidence between the electrical input to the heater element and the heat from combustion of material in the incinerator may be minimized by employing timer means in a manner such that the electrical input is used only for a predetermined time period. However, the time required for ignition of the material in the incinerator will vary between comparatively wide limits and preferably, means are provided for disconnecting the electrical input to the heating element when the temperature at some point in the incinerator reaches a predetermined value indicative of combustion in the chamber. With this arrangement, there can be no coincidence between the external heat from combustion of the material and the internal heat from flow of electrical current through

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the element, and hence damage to and break-down of the elements is prevented.

It may be noted that there are a great many different types of electrical ignition systems used for gas burners and the like, but such systems are not generally applicable to incinerators because of the fact that special problems are involved in igniting material within incinerators. In particular, in conventional gas burners using electrical ignition elements, the flow of gas is such that the element is out of the path of flow after the burner ignites and hence the combined effects of external heat of combustion and internal heat from electrical current do not arise. Also, the ignition elements in gas burners do not contact wet or greasy material such as encountered in incinerators and because there is no necessity for a protective coating on such ignition elements, the elements can be readily made to withstand very high heats.

A further feature of the invention relates to the dehydration of the garbage or waste material in the incinerator before it is ignited. With normal garbage and waste products, it has been found highly desirable for proper ignition of the material, and proper combustion of the material after it is ignited, that the material be dried out or dehydrated. If a resistance element is supplied with an electrical input sufficient to heat the element to the ignition temperature of the material, the material immediately adjacent the element will be dried out and then heated to its ignition temperature to ignite. The remaining material will not be dry and will not burn immediately and if it burns at all, it will burn with very incomplete combustion and generate smoke, soot, etc.

By this invention, a resistance element is supplied with an electrical input which is insufficient to quickly heat the element to ignition temperature so that a substantial amount of dehydration will take place before ignition. After such substantial amount of dehydration, the material may be heated to ignition temperature. This may be accomplished through the same element used for dehydration, as by increasing the power input to the element, but such would necessitate either inefficient resistance control arrangements, or expensive transformer arrangements and most preferably, a separate element is used for ignition purposes.

To prevent break-down of the dehydrating and ignition elements, a temperature responsive device or thermostat may control the power input to both elements. Such thermostat may also serve the function of energizing the dehydration element when the temperature in the combustion chamber of the incinerator drops below a predetermined value.

According to a further feature of the invention, a timer may be connected in circuit with the ignition element to energize the same at predetermined times.

Still another feature of the invention is in a compact and simple manner of assembly of the resistance elements and associated controls in an incinerator.

An object of this invention, accordingly, is to provide an improved electrically operated incinerator.

Another object of this invention is to provide an improved electrically operated incinerator in which the electrical input to a resistance element or elements is controlled so as to prevent damage thereto.

A further object of this invention is to provide an improved electrically operated incinerator in which the material in the incinerator is dehydrated to a substantial extent before ignition thereof.

Still another object of this invention is to provide an improved electrically operated incinerator which is readily constructed and operated, efficient and reliable, and economically manufacturable from a minimum number of component parts.

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This invention contemplates other objects, features and advantages which will become more fully apparent from the following detailed description taken in conjunction with the accompanying drawing which illustrates a preferred embodiment and in which:

Figure 1 is a side elevational view of an incinerator constructed in accordance with the principles of this invention with a portion of the wall of the incinerator broken away to show the internal construction thereof;

Figure 2 is a sectional view taken substantially along lines II—II of Figure 1; and

Figure 3 is a sectional view taken substantially along lines III—III of Figure 1.

Reference numeral 10 generally designates an incinerator constructed in accordance with the principles of this invention. The incinerator 10 may comprise an upright cylindrical sheet metal casing 11 supported on a base 12. A top 13 is disposed on the casing 11 and has a hinged door 14 preferably of cast iron, and preferably insulated, which may be opened to supply garbage or waste material to the incinerator. A fitting 15 may be disposed on the casing 11 adjacent its upper end for connection of the interior of the incinerator to a chimney through a conventional stove pipe.

The incinerator 10 has a combustion chamber generally designated by reference numeral 16 which is lined by fire bricks such as bricks 17, 18, 19, 20, 21 and 22 illustrated in Figure 1. Below the combustion chamber 16 is a shaker grate structure generally designated by reference numeral 23 and below the grate 23 is an ash drawer 24 having a handle 25 for removal of the drawer to empty ashes collecting therein.

According to this invention, a pair of electrically operated resistance elements 26 and 27 project into the combustion chamber 16. The element 26 may be used to dehydrate material disclosed within the chamber 16 after which the material may be ignited by means of the element 27.

A temperature responsive device or thermostat 28 may respond to temperatures within the combustion chamber 16 and control the electrical input to the elements 26 and 27 so as to prevent coincidence for any extended period between the heat developed from combustion of material within the chamber 16 and the heat developed by the flow of electrical current through the elements.

The thermostat 28 may also serve to energize the dehydration element 26 when the temperature within the combustion chamber 16 drops below a predetermined value, to thus insure proper dehydration of the material.

The ignition element 27 may be energized at predetermined times through a timer 29 having a control knob 30.

The dehydration element 26 and the ignition element 27 may each have a generally U-shaped configuration, as illustrated in Figure 3. The dehydration element 26 may have legs 31 and 32 extending angularly upwardly through a channel between fire bricks 17 and 18 with the terminal ends of the legs 31 and 32 projecting horizontally through openings in the wall of the casing 11, such terminal ends being supported from the casing wall through suitable nuts as illustrated. The major portion of the element 26 may be provided with an insulating coating, but the extremities of the legs 31 and 32 may be provided with terminals 33 and 34, for connection of electrical wires thereto.

The ignition element 27, similar to the dehydration element 26, may have a pair of legs 35 and 36 projecting angularly upwardly through a suitable opening in the fire brick 18 with the terminal end portions of the legs 35 and 36 projecting through openings in the wall of the casing 11 and secured thereto by suitable nuts or the like. The major portion of the ignition element 27 may be insulated but the extremities of the legs 35 and 36 may be provided with terminals 37 and 38 for connection of wires thereto.

The thermostat 28 may comprise a contact housing

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39 supported on the outside of the casing 11 and a rod 40 projecting inwardly through the wall of the casing 11 and between the legs 35 and 36 of the ignition element 27, the closing and opening of contacts within the contact housing 39 being controlled by the temperature of the rod 40. The contact housing 39 may carry a pair of terminals 41 and 42 for connection of electrical wires thereto.

To support the timer 29 and enclose the terminals of the ignition elements and thermostat, a generally rectangular sheet metal housing 43 may be supported on the outer surface of the casing 11, the timer 29 being supported from the upper wall of the housing 43.

To supply electrical power to the incinerator, a conventional two-wire line cord 44, which may be connected to a 60 cycle 110–120 volt supply, may have an end extending upwardly through insulating bushing 45 in the lower wall of the housing 43. The supply line 44 may have one conductor 46 connected to the terminal 33 of the dehydration element 26 and a second conductor 47 connected to the terminal 41 of the thermostat 28. The terminal 33 of the dehydration element 26 may be connected directly to the terminal 37 of the ignition element 27 through a wire 48. The terminal 42 of the thermostat 28 may be connected through a wire 49 to the terminal 34 of the dehydration element 26 and also through a wire 50 to a terminal 51 of the timer 29. The timer 29 may have a second terminal 52 connected through a wire 53 to the terminal 38 of the ignition element 27.

In operation, the contacts of the thermostat 28 may be initially closed (assuming that the incinerator is cool) to complete a circuit between the terminals 41 and 42 and energize the dehydration element 26. After a length of time sufficient for dehydration of the material in the incinerator, the contacts of the timer 29 may be closed to complete a circuit between the terminals 51 and 52 and energize the ignition element 27. The element 27 will, of course, heat up to an ignition temperature to ignite the material in the combustion chamber 16. After sufficient heat is developed from the combustion of the material, the contacts of the thermostat 28 will open to de-energize both the ignition element 27 and the dehydration element 26, so as to prevent concurrent application for any extended period of both heat from combustion and heat from electrical current flow, and thus prevent damage to and break-down of the resistance elements 26 and 27. After the material within the combustion chamber 16 is burned up, a new load of material may be disposed in the combustion chamber 16 and the timer may be reset. If the new load is put into the incinerator during or immediately after the burning of the previous load, there will be sufficient heat within the chamber 16 so that energization of the dehydration element 26 is not necessary and such element will not be energized until the temperature drops below a predetermined value at which the contacts of the thermostat 28 are set to close. Accordingly, the dehydration element 26 is operated only when it is needed, so as to minimize the power consumption of the incinerator.

In general, cellulose-base materials will be the most readily ignited of the materials contained in normal garbage or waste products to be burned. Such materials will ignite at from 300° to 400° F. However, the thermostat need not be set to open its contacts at a temperature equal to the ignition temperature because with spacing between the thermostat and the ignition element, the thermostat may never reach the ignition temperature even with the ignition element operated above the ignition temperature unless, of course, combustion takes place. For example, the ignition element may reach a temperature of 400° and the thermostat may never go above 225° without combustion. Hence a temperature of 250° indicates combustion and the thermostat may be set to open at 250°.

Since dehydration of the material will be the most effective at temperatures above the boiling point of water

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(212° F. at sea level pressure), the thermostat may be set to close at a temperature approximately equal thereto. Preferably, for ordinary waste products, the thermostat may be set to open at from 200° to 300° F. and may be set to close at from 150° to 250° F.

The dehydration element should reach a temperature of from 210° to 300° F. with normal line voltage and with no material in the combustion chamber. It may be operated at a power input sufficient to ultimately reach a temperature higher than the ignition temperature of the material so long as it takes a substantial length of time to reach such temperature with a normal load of material, so that a substantial amount of dehydration of the material can take place.

The ignition element should be operated under such conditions that it will reach a temperature substantially in excess of the ignition temperature of the material to be burned. For example, a temperature of 400° F. might be suitable for ordinary garbage. The temperature reached by the ignition elements is, of course, determined by the applied voltage, the resistance of the elements, the surface area of the elements, the heat transmission characteristics of the material of the elements, and the character and temperature of the medium surrounding the elements. Such temperatures may be calculated, or may be readily determined by simple preliminary tests, as will be readily appreciated by those skilled in the art.

It will be apparent, accordingly, that this invention provides an electrically operated incinerator in which damage to heating elements is obviated. The complete combustion of material within the incinerator is insured because of the provision of the dehydration element and the incinerator has minimum power consumption because both the dehydration element and the ignition element are operated only when needed. Also, the dehydration element is operated as a comparatively low temperature at which a maximum efficiency is obtained, that is, the amount of dehydration of the material relative to the power input to the element is at a maximum. It may further be noted that the heating elements with associated thermostat and timer form a very compact unit which may be readily assembled and mounted on the incinerator.

It will be understood, of course, that modifications and variations may be effected without departing from the spirit and scope of the novel concepts of the present invention.

I claim as my invention:

1. In an incinerator, a sheet metal casing, a firebrick

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lining in said casing defining a combustion chamber, a pair of generally U-shaped resistance elements in vertically spaced relation in said chamber having legs extending through said lining and the wall of said casing, means securing said legs to said walls, a thermostat mounted on the outside of the wall of said casing and having an element projecting inwardly through said wall and said lining between the legs of the upper one of said resistance elements, a housing on the outside of the wall of said casing enclosing said thermostat and the terminal ends of the legs of said resistance elements, and a timer carried within said housing and electrically connected to at least one of said elements for controlling energization of the same.

2. In an incinerator having a combustion chamber, a first resistance element in said chamber for dehydrating material therewithin, a second resistance element in said chamber for igniting material therewithin, and thermostat means for de-energizing both of said elements when the temperature in said chamber exceeds a first predetermined temperature in excess of 225° F. and for energizing said first element when the temperature in said chamber is below a second predetermined temperature less than said first predetermined temperature.

3. In an incinerator or the like having a combustion chamber, a first resistance element for dehydrating material in said chamber, a second resistance element for igniting material in said chamber, means for connecting said elements to a supply line to heat said first element to a temperature of 210° to 350° F. and said second element to a temperature greater than 300° F., and thermostat means for de-energizing both of said elements when the temperature in said chamber exceeds a first predetermined temperature in excess of 225° F. and for energizing said first element when the temperature in said chamber is below a second predetermined temperature less than said first predetermined temperature.

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