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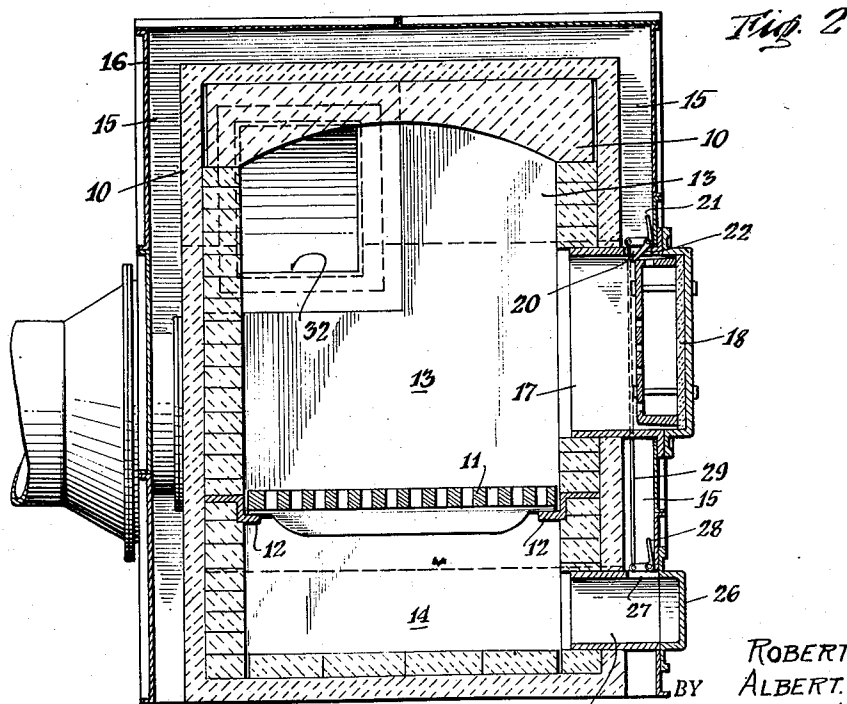
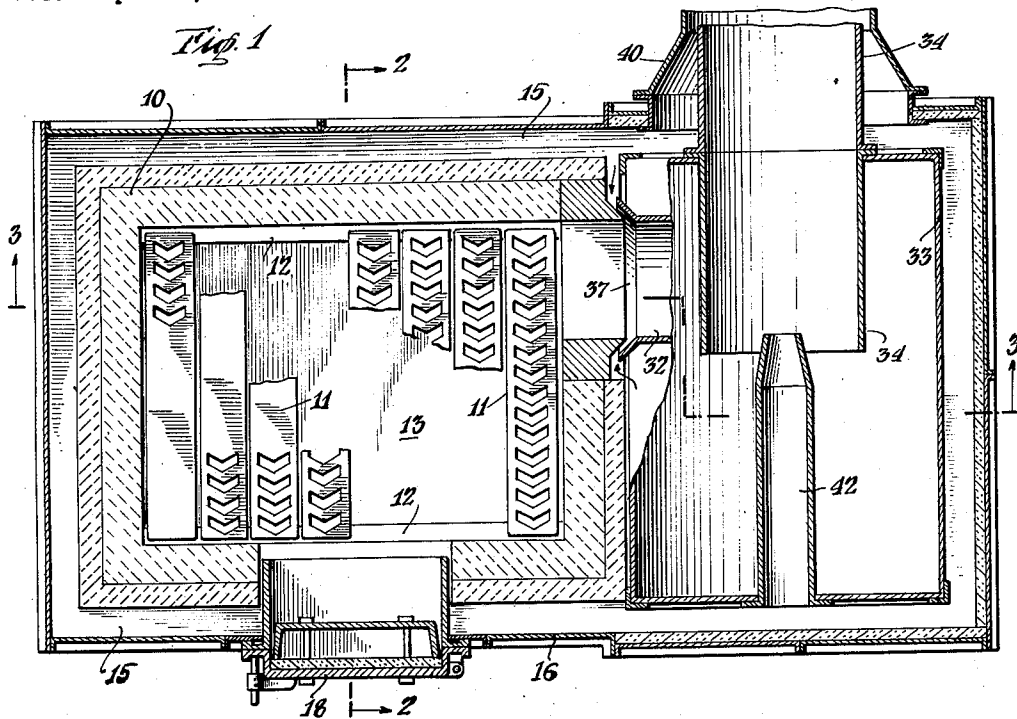
R. G. GREGG ET AL

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INCINERATOR WITH SPARK ARRESTER AND COOLING MEANS

Filed Sept. 22, 1944

3 Sheets-Sheet 1



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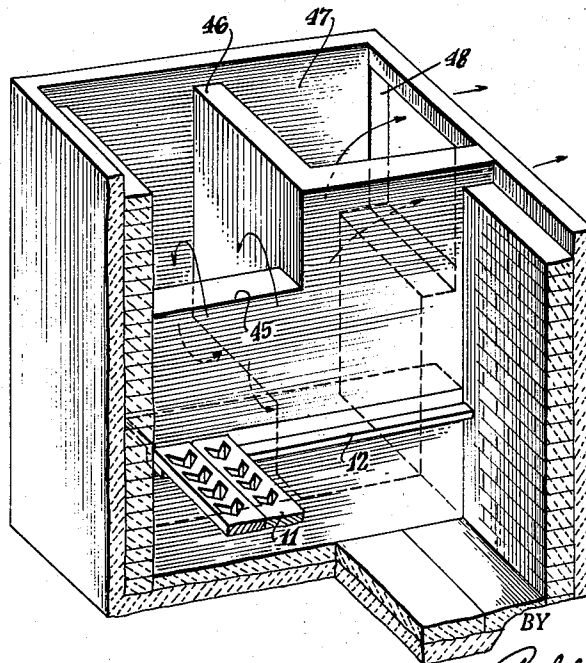
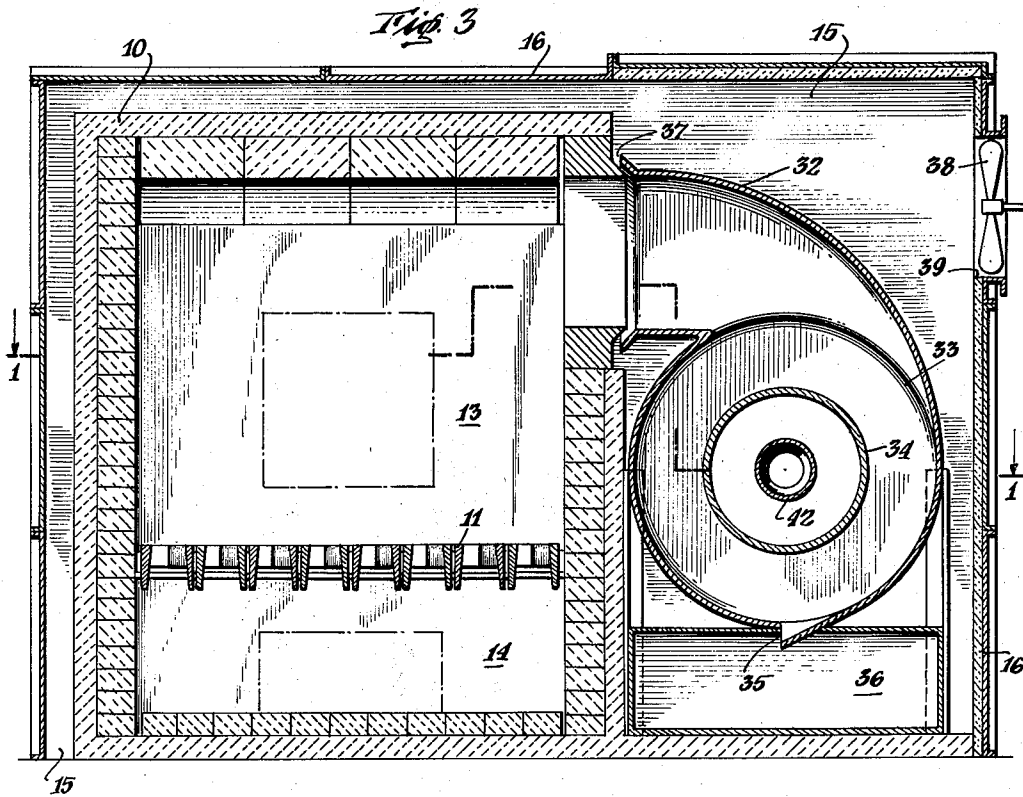
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INCINERATOR WITH SPARK ARRESTER AND COOLING MEANS

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3 Sheets-Sheet 2



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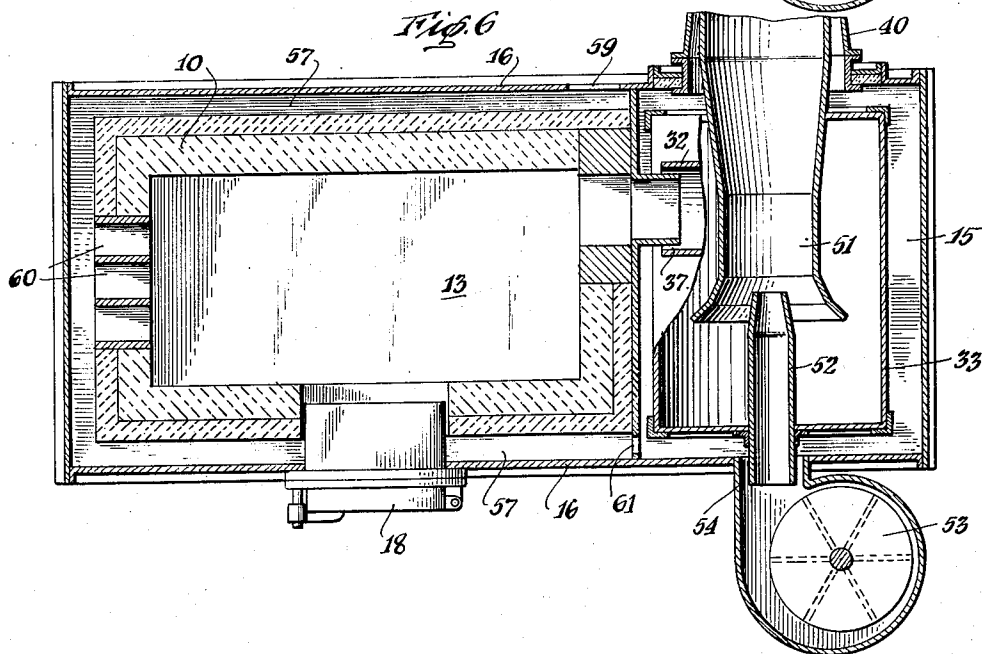
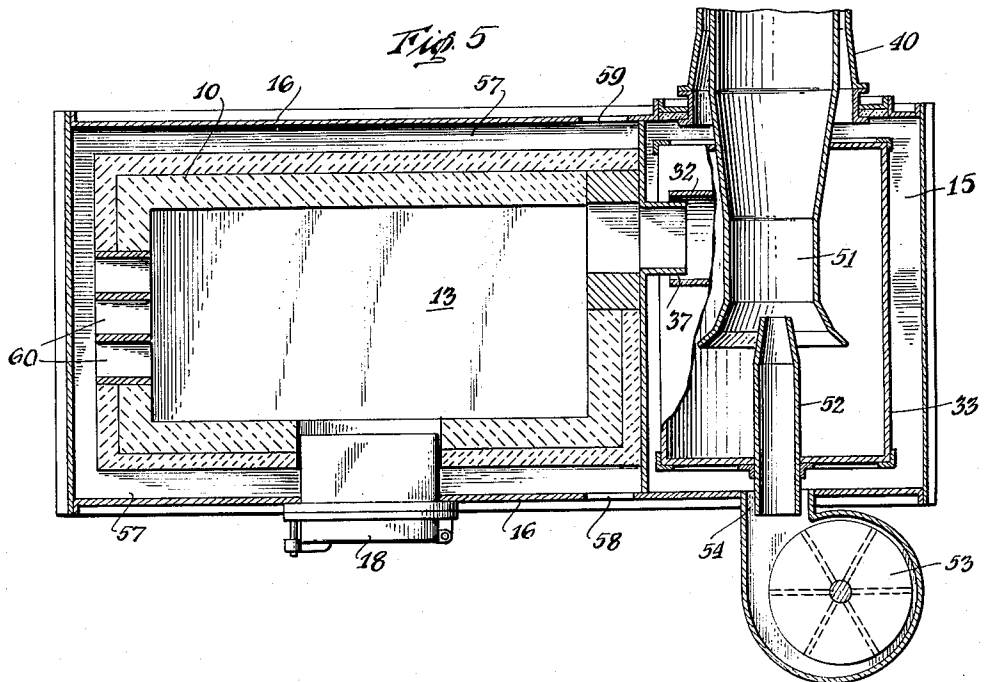
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INCINERATOR WITH SPARK ARRESTER AND COOLING MEANS

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3 Sheets-Sheet 3



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2,515,869

INCINERATOR WITH SPARK ARRESTER
AND COOLING MEANSRobert G. Gregg, New York, N. Y., and Albert E.
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18 Claims. (Cl. 110-18)

1

The invention relates to an incinerator for disposing of waste of many sorts, and particularly the waste in industrial establishments. The incinerator to be described herein is so constructed that the danger of sparks being expelled from the chimney or stack has been eliminated. The construction also makes provision for proper draft and the prevention of the draft causing flame from being projected through the firing door when firing the incinerator with waste.

It is an object of the invention to construct an incinerator having new and novel spark arresting or collecting means in association with the furnace.

Another object of the invention is to construct an incinerator with forced draft with means for cutting off draft to the furnace upon opening of the door for the firing of the furnace with waste.

Another object is to construct an incinerator having new and novel spark collecting means.

A still further object is to construct an incinerator having spark arresting or collecting means which also provides a cooling film of air for the flue passage to the spark collector.

A still further object is to construct an incinerator having spark collecting means enclosed in a cooling chamber and having induced draft for the furnace.

Another object of the invention is to construct an incinerator furnace and spark collecting means with a cooling chamber for both parts of the incinerator, all associated together in a new and novel combination.

Other objects of the invention will be more apparent from the following description taken in connection with the accompanying drawings illustrating preferred embodiments of the invention in which

Figure 1 is a horizontal section through the furnace and spark collecting means.

Figure 2 is a cross section through the furnace taken on line 2-2 of Figure 1 showing the firing door and the ash pit door with valve mechanism controlling the draft to the furnace both above and below the grate.

Figure 3 is a vertical section through the furnace and the spark collecting means.

Figure 4 is a partial sectional view and in perspective of another construction of furnace having an elongated flue passage.

Figure 5 is a view of another form of furnace with induced draft therefor.

Figure 6 shows a modification of the induced draft furnace of Figure 5.

2

The incinerator includes a furnace 10 having a grate 11 supported in any suitable manner such as upon saddle bars 12. The grate divides the furnace into an upper fire box 13 and a lower ash pit 14. A cooling chamber 15 may be provided which surrounds the furnace and is formed by a wall 16.

A firing passage 17 leads into the fire box and a fire door 18 closes this passage. A draft opening 20 connects the cooling chamber 15 with the firing passage 17 which draft opening is closed by a valve 21 connected with the door 18 in some suitable fashion such as by the lever 22 so that whenever the door is closed the valve is open and upon opening of the door, for throwing waste into the furnace, the valve 21 closes and cuts off the draft to the furnace.

The ash pit 14 has an ash passage 25 which is closed by an ash door 26. A draft opening 27 connects the cooling chamber 15 with the ash passage. A valve 28 controls the draft opening 27 and is connected by means of a connecting link or rod 29 to the firing passage draft valve 21 so that the former valve also is opened when the firing door 18 is closed but closes the draft opening 27 when the firing door is opened. It is to be understood that either draft opening may be provided without the other but preferably both draft openings are utilized.

The hot gases from the furnace pass out through a flue connection 32 to spark arresting or collecting means adjacent to the furnace. This means includes a spark arresting or collecting chamber 33 which is preferably cylindrical and disposed horizontally adjacent to the furnace. A stack connection 34 is connected with the spark collecting chamber centrally thereof and enters at one end of the chamber but terminates at a point spaced from the other end. The flue connection 32 joins the periphery of the spark collecting chamber at the stack connection end and so that the hot gases are directed circularly of the chamber and of the stack connection. The spark collecting chamber has at least one spark opening 35 in the wall thereof and in the form particularly illustrated in which the spark collecting chamber is disposed horizontally, the opening or openings are preferably provided at the bottom of the chamber. The opening 35 leads to a cinder or spark receiving chamber 36.

The hot gases from the firing box subject the spark collecting means as well as the flue connection to the high temperatures of these gases. In order to cool the spark collecting means it

3

also has a cooling chamber surrounding the same which in the construction of Figures 1 through 3 is the same chamber 15 which surrounds the furnace. In addition an air inlet 37 is provided around the periphery of the flue connection 32 so that air may enter the flue at this point from the cooling chamber and form a cooling film or blanket of air around the inner surface of the flue connection and spark collecting chamber. Means is provided to blow air into the cooling chamber 15 and any suitable means may be utilized for this purpose, such as a fan 38, shown mounted in an air inlet 39 into the cooling chamber. The air which cools the furnace and spark chamber may flow to atmosphere through the outlet 40 surrounding the stack connection and cools this connection.

Means may be provided for creating a more effective draft to the stack and to lower the pressure above the grate in the furnace. The means illustrated includes nozzle or pipe 42 which projects into the end of the stack connection 34. Air under pressure is supplied to the nozzle in any desired manner, that particularly illustrated being by simply connecting the pipe or nozzle with the cooling chamber 15 so that the air pressure in this chamber blows through the nozzle to create a draft in the stack connection. The stack connection at the nozzle may be of any desirable construction. The air being blown from the nozzle into the stack connection not only aids the draft but also cools the stack connection.

In operation, waste material to be burned is thrown into the fire box through the firing passage 17. Upon opening the firing door 18, the valves 21 and 28 are closed so that air pressure from the cooling chamber 15 does not pass to the furnace either into the ash pit 14 or into the fire box 13. Waste material may therefore be safely thrown into the furnace. When the firing door 18 is closed, the valves automatically open and draft is supplied to the fire from the cooling chamber 15 both above and below the grate.

The hot gases from the burning waste material pass out through the flue passage 32 and are directed circularly around the outer periphery of the stack connection 34 and around the inner periphery of the spark arresting or collecting chamber 33. The swirling gases propel all solid matter including hot or flaming cinders and sparks to the periphery of the chamber by centrifugal action. The solid matter including sparks are expelled through the opening 35 into the receiving chamber 36. The gases then pass around the end of the stack connection 34 and through the same to the stack and to atmosphere. In order to provide a more effective draft, cool the stack connection and reduce the pressure in the fire box, the air nozzle 42 projects a stream of air into the stack connection.

Another form of furnace is illustrated in Figure 4 which is provided with a grate 11 dividing the furnace into an ash pit and fire box as previously described. In the construction of furnace of Figure 4, however, the gases pass out of the furnace through a flue passage 45 and then pass downwardly under a wall 46 and upwardly through a passage 47 and out a stack opening 43 to the stack. This reverse direction flow of the hot gases deposits the cinders and sparks in the bottom of the pit formed by the down flow and up flow sections of the flue passage.

An induced draft system is shown in Figure 5 with parts corresponding to the construction of Figures 1 through 3 correspondingly numbered.

4

The spark collecting chamber 33 has a stack connection 51 in the form of a Venturi tube. A nozzle 52 projects thereinto and is supplied with air from the fan 53 to create a draft into the stack connection, whereby a pressure approximately equal to atmosphere or less is created in the fire box of the furnace. This stream of air from the nozzle also cools the stack connection.

Air is blown through the cooling chamber 15 surrounding the spark collecting chamber which air may be supplied from any source, the simpler arrangement being to supply this air from the fan 53. The connection between the cooling chamber and the fan 53 may be made in any desired way, that illustrated being through an opening 54 surrounding the remote end of the tube forming the nozzle 52. Some of the air from the fan passes through the opening 54, passes through the cooling chamber 15 and is expelled through the outlet 40 surrounding the stack connection. The cooling chamber also has a connection or air inlet 37 for providing a cool film or blanket of air around the flue connection 32 into the spark collecting chamber.

The furnace also has a cooling chamber 57 which, in Figure 5, is separate from the cooling chamber 15. This furnace cooling chamber has an air inlet from atmosphere and an outlet into the furnace. Two such air inlets 58 and 59 are shown at the ends of the cooling chamber. The furnace has air passages 60 leading to the cooling chamber which may be either to the fire box above the grate or to the ash pit below the grate, although preferably such passages are provided both above and below the grate. The air passages are located remotely from the air inlets 58 and 59. The induced draft created by the nozzle 52 and Venturi tube 51 draws air through the inlet openings 58 and 59, which air passes through the cooling chamber 57 to cool the furnace wall and into the furnace through the passages 60. With such induced draft the pressure in the fire box is less than atmospheric and hence the fire door may be opened for the loading of refuse therein without fire blowing out of the firing passage.

Figure 6 shows a modification of the construction of Figure 5 in that an opening or connection 61 is provided between the cooling chamber 15 and the cooling chamber 57. The inlet 58 of Figure 5 is closed in the construction of Figure 6. With this construction air under pressure is supplied to the cooling chamber 57 from the fan 53 by the connection 61 with the cooling chamber 15. Some of the air from the fan and cooling chamber 15 therefore passes through the opening 61 into the cooling chamber 57. Some of this air passes through the passages 60 into the furnace and another portion of the air continues around the furnace and passes to atmosphere through the opening 59. With this construction, air pressure may be provided within the furnace to increase the draft and yet the pressure within the furnace is about atmospheric pressure or less.

This invention provides an improvement in an incinerator. It is understood that various modifications in structure, as well as changes in mode of operation, assembly, and manner of use, may and often do occur to those skilled in the art, especially after benefitting from the teachings of an invention. This disclosure illustrates the preferred means of embodying the invention in useful form.

What is claimed is:

1. An incinerator comprising a fire box hav-

ing one or more passages into the fire box including a fire passage, a door for each passage, wall means forming a spark collecting chamber adjacent the fire box having at least one spark expelling opening in the wall thereof, a stack connection within the spark collecting chamber extending from one end and terminating at a point spaced from the other end, a flue connection from the fire box into the spark collecting chamber at the stack connection end thereof and directed tangentially thereof, and an air inlet around the periphery of the flue connection.

2. An incinerator comprising a fire box having one or more passages into the fire box including a fire passage, a door for each passage, wall means forming a spark collecting chamber adjacent the fire box having at least one spark expelling opening in the wall thereof, a stack connection within the spark collecting chamber extending from one end and terminating at a point spaced from the other end, a flue connection from the fire box into the spark collecting chamber at the stack connection end thereof and directed tangentially thereof, wall means forming a cooling chamber surrounding the spark collecting chamber, and means connected with the cooling chamber and projected into the end of the stack connection for creating a draft into the stack connection and withdrawing air from the cooling chamber.

3. An incinerator comprising a fire box having one or more passages into the fire box including a fire passage, a door for each passage, wall means forming a spark collecting chamber adjacent the fire box having at least one spark expelling opening in the wall and at the bottom thereof, a stack connection within the spark collecting chamber extending from one end and terminating at a point spaced from the other end, a flue connection from the fire box into the spark collecting chamber at the stack connection end thereof and directed tangentially thereof, wall means forming a cooling chamber surrounding the fire box and spark collecting chamber, and means connected with the cooling chamber and extending into the end of the stack connection for creating a draft into the stack connection and withdrawing air from the cooling chamber.

4. An incinerator comprising a fire box having one or more passages into the fire box including a fire passage, a door for each passage, wall means forming a spark collecting chamber adjacent the fire box having at least one spark expelling opening in the wall thereof, a stack connection within the spark collecting chamber extending from one end and terminating at a point spaced from the other end, a flue connection from the fire box into the spark collecting chamber at the stack connection end thereof and directed peripherally thereof, wall means forming a cooling chamber surrounding the spark collecting chamber, an air inlet around the periphery of the flue connection and connected with the cooling chamber, and means connected with the cooling chamber and creating a draft into the stack connection and removing air from the cooling chamber.

5. An incinerator comprising a fire box having one or more passages into the fire box including a fire passage, a door for each passage, wall means forming a spark collecting chamber adjacent the fire box having at least one spark expelling opening in the wall thereof, a stack connection within the spark collecting chamber ex-

tending from one end and terminating at a point spaced from the other end, a flue connection from the fire box into the spark collecting chamber at the stack connection end thereof and directed tangentially thereof, wall means forming a cooling chamber surrounding the spark collecting chamber, and means connected with the cooling chamber and projecting into the stack connection for creating a draft of air into the stack connection and through the cooling chamber.

6. An incinerator comprising a fire box having a grate, a firing passage into the fire box above the grate, an ash passage into the fire box under the grate, doors for each passage, wall means forming a cooling chamber surrounding the fire box, an air inlet into the chamber, the cooling chamber having an opening into each passage, a valve for each opening connected with the firing passage door to close the valves upon opening of the door, wall means forming a spark collecting chamber having at least one spark expelling opening in the wall thereof, a stack connection within the spark collecting chamber extending from one end and terminating at a point spaced from the other end, a flue passage from the fire box into the spark collecting chamber at the stack connection end thereof and directed tangentially thereof, and means creating a draft into the stack connection and circulation of air in the cooling chamber.

7. An incinerator comprising a fire box having a grate, a firing passage into the fire box above the grate, an ash passage into the fire box under the grate, doors for each passage, wall means forming a cooling chamber surrounding the fire box, an air inlet into the chamber, the cooling chamber having an opening into each passage, a valve for each opening connected with the firing passage door to close the valves upon opening of the door, wall means forming a horizontally positioned spark collecting chamber adjacent the fire box and having at least one spark expelling opening in the wall thereof at the bottom, a stack connection within the spark collecting chamber extending from one end and terminating at a point spaced from the other end, a flue passage from the fire box into the spark collecting chamber at the stack connection end thereof and directed tangentially thereof, and means providing an air connection extending into the stack connection to create a draft thereinto.

8. An incinerator comprising a fire box having a grate, a firing passage into the fire box above the grate, an ash passage into the fire box under the grate, doors for each passage, wall means forming a cooling chamber surrounding the fire box, an air inlet into the chamber, the cooling chamber having an opening into each passage, a valve for each opening connected with the firing passage door to close the valves upon opening of the door, wall means forming a spark collecting chamber having at least one spark expelling opening in the wall thereof, a stack connection within the spark collecting chamber extending from one end and terminating at a point spaced from the other end, a flue passage from the fire box into the spark collecting chamber at the stack connection end thereof and directed tangentially thereof, and blower means connected into the stack connection to create a draft thereinto.

9. An incinerator comprising a fire box having a grate, a firing passage into the fire box above the grate, an ash passage into the fire box under

the grate, doors for each passage, wall means forming a cooling chamber surrounding the fire box, the cooling chamber having an opening into each passage, a valve for each opening connected with the firing passage door to close the valves upon opening of the door, wall means forming a spark collecting chamber having at least one spark expelling opening in the wall thereof, a stack connection within the spark collecting chamber extending from one end and terminating at a point spaced from the other end, a flue passage from the fire box into the spark collecting chamber at the stack connection end thereof and directed tangentially thereof, a blower nozzle extending into the stack connection and means to supply air under pressure to the cooling chamber and blower nozzle.

10. An incinerator comprising a fire box having a grate, a firing passage into the fire box above the grate, an ash passage into the fire box under the grate, doors for each passage, wall means forming a cooling chamber surrounding the fire box, the cooling chamber having an opening into each passage, a valve for each opening connected with the firing passage door to close the valves upon opening of the door, wall means forming a spark collecting chamber having at least one spark expelling opening in the wall thereof, a stack connection within the spark collecting chamber extending from one end and terminating at a point spaced from the other end, a flue passage from the fire box into the spark collecting chamber at the stack connection end thereof and directed tangentially thereof, a connection from the cooling chamber into the flue passage, a blower nozzle extending into the stack connection, and means to supply air under pressure to the cooling chamber and the blower nozzle.

11. An incinerator comprising a fire box having a grate, a firing passage into the fire box above the grate, an ash passage into the fire box under the grate, doors for each passage, wall means forming a spark collecting chamber adjacent to the fire box and having at least one spark expelling opening in the wall thereof, a stack connection within the spark collecting chamber extending from one end and terminating at a point spaced from the other end, a flue passage from the fire box into the spark collecting chamber at the stack connection end thereof and directed tangentially thereof, wall means forming a cooling chamber surrounding the fire box and the spark collecting chamber, an air inlet into the chamber, the cooling chamber having an opening into the ash passage and the firing passage, a valve for each opening connected with the firing passage door to close the valves upon opening of the door, and jet means extending into the stack connection and connected with the cooling chamber.

12. An incinerator comprising a fire box having a grate, a firing passage into the fire box above the grate, an ash passage into the fire box under the grate, doors for each passage, wall means forming a horizontally disposed spark collecting chamber adjacent to the fire box and having at least one spark expelling opening in the wall at the bottom thereof, a stack connection within the spark collecting chamber extending from one end and terminating at a point spaced from the other end, a flue passage from the fire box into the spark collecting chamber at the stack connection end thereof and directed tangentially thereof, wall means forming a

cooling chamber surrounding the fire box, an air inlet into the chamber, the cooling chamber having an opening into the ash passage and the firing passage, a valve for each opening connected with the firing passage door to close the valves upon opening of the door, and means providing an air connection into the stack connection to create a draft therein.

13. An incinerator comprising a fire box having a grate, a firing passage into the fire box above the grate, an ash passage into the fire box under the grate, doors for each passage, wall means forming a horizontally disposed spark collecting chamber adjacent the fire box having at least one spark expelling opening in the wall thereof, a stack connection within the spark collecting chamber extending from one end and terminating at a point spaced from the other end, a flue connection from the fire box into the spark collecting chamber at the stack connection end thereof and directed tangentially thereof, a nozzle extending into the end of the stack connection, wall means forming a cooling chamber surrounding the spark collecting chamber having an outlet therefrom surrounding the stack connection, and means creating a draft through the nozzle into the stack connection to provide induced draft for the furnace and supply cooling air to the cooling chamber.

14. Spark collecting means for use with a furnace comprising wall means forming a spark collecting chamber having at least one spark expelling opening in the wall thereof, a stack connection within the spark collecting chamber extending from one end and terminating at a point spaced from the other end, a flue connection into the spark collecting chamber at the stack connection end thereof and directed tangentially thereof, a nozzle extending into the end of the stack connection, wall means forming a cooling chamber surrounding the spark collecting chamber and having an outlet, and means creating a draft through the nozzle into the stack connection to provide draft within the spark collecting chamber and supply cooling air to the cooling chamber.

15. Spark collecting means for use with a furnace comprising wall means forming a collecting chamber adjacent the fire box having at least one spark expelling opening in the wall thereof, a stack connection within the spark collecting chamber extending from one end and terminating at a point spaced from the other end, a flue connection from the fire box into the spark collecting chamber at the stack connection end thereof and directed tangentially thereof, a nozzle extending into the end of the stack connection, wall means forming a cooling chamber surrounding the spark collecting chamber and having an outlet around the stack connection to cool the same, and means creating a draft through the nozzle into the stack connection to provide draft for the furnace and supply cooling air to the cooling chamber.

16. Spark collecting means for use with a furnace comprising wall means forming a spark collecting chamber having at least one spark expelling opening in the wall thereof, a stack connection within the spark collecting chamber extending from one end and terminating at a point spaced from the other end, a flue connection from the fire box into the spark collecting chamber at the stack connection end thereof and directed tangentially thereof, a nozzle extending into the end of the stack connection, wall means forming

a cooling chamber surrounding the spark collecting chamber and having an outlet, an opening between the cooling chamber and the spark collecting chamber around the flue connection to provide a film of cooling air around the inner surface thereof, and means creating a draft through the nozzle into the stack connection to provide induced draft for the furnace and supply cooling air to the cooling chamber.

17. An incinerator comprising wall means forming a fire box chamber, means forming a spark collecting chamber adjacent the fire box having at least one spark expelling opening in the wall thereof, a stack connection to the spark collecting chamber at one end, wall means forming a cooling chamber enclosing at least one of the aforesaid chambers, a flue connection from the fire box into the spark collecting chamber at the stack connection end thereof and directed tangentially thereof, and an air inlet around one of the connections and connected with the cooling chamber to provide a film of cooling air around the connection.

18. An incinerator comprising a furnace chamber having a firebox, one or more passages into the fire box including a firing passage, a door for each passage, wall means forming a spark collecting chamber adjacent the fire box having at least one spark expelling opening in the wall thereof, a stack connection within the spark collecting chamber extending from one end and terminating at a point spaced from the other end, a flue connection from the fire box into the spark collecting chamber at the stack connection end thereof and directed tangentially thereof, wall means forming a cooling chamber surrounding

at least one of the aforesaid chambers and having an opening into the furnace, valve means at the opening controlling the feeding of air from the cooling chamber to the furnace, and means connecting the door with the valve means to open the valve means for feeding of air to the furnace when the door is closed.

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REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
601,355	Paterson -----	Mar. 29, 1898
1,035,988	Miller -----	Aug. 20, 1912
1,194,335	Hoover -----	Aug. 15, 1916
1,622,431	Reigenbaum -----	Mar. 29, 1927
1,729,997	Carpenter -----	Oct. 1, 1929
1,731,043	Carpenter -----	Oct. 8, 1929
1,747,619	Carpenter -----	Feb. 18, 1930
1,875,846	Brown -----	Sept. 6, 1932
1,891,069	Suciu -----	Dec. 13, 1932
1,967,883	Hofmann -----	July 24, 1934
1,977,410	Seley -----	Oct. 16, 1934
1,995,216	Morrow -----	Mar. 19, 1935
2,070,536	Hoffman -----	Feb. 9, 1937
2,100,189	Irsch -----	Nov. 23, 1937
2,228,970	Owens -----	Jan. 14, 1941
2,332,591	Nicol -----	Oct. 26, 1943

FOREIGN PATENTS

Number	Country	Date
22,274	Great Britain -----	Sept. 26, 1910