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INCINERATORS

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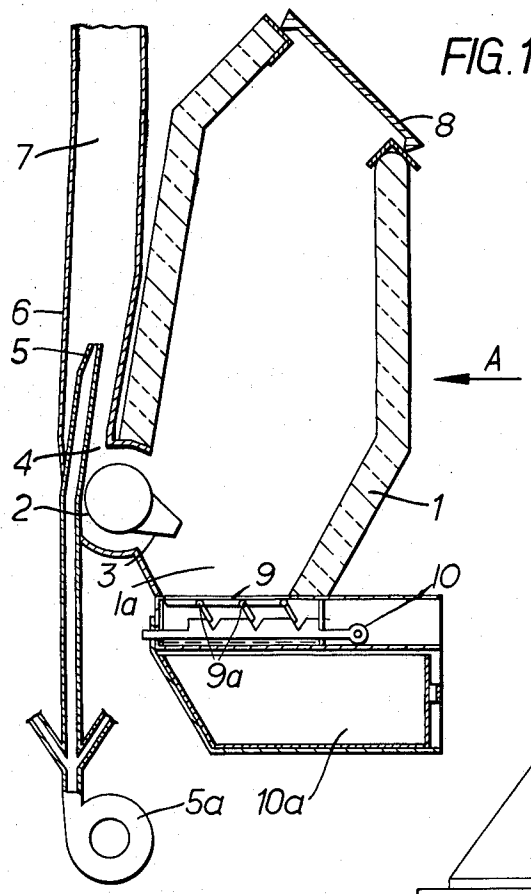
FIG. 1.



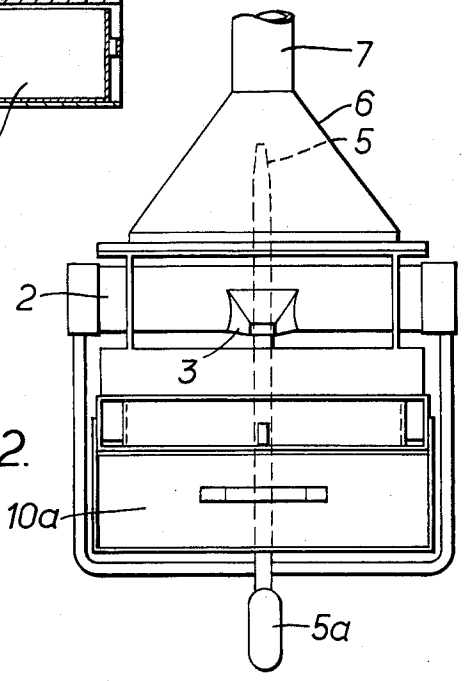


FIG. 2.

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FIG. 5

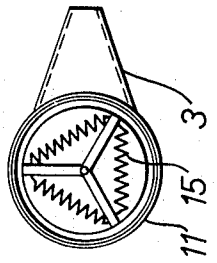


FIG. 3

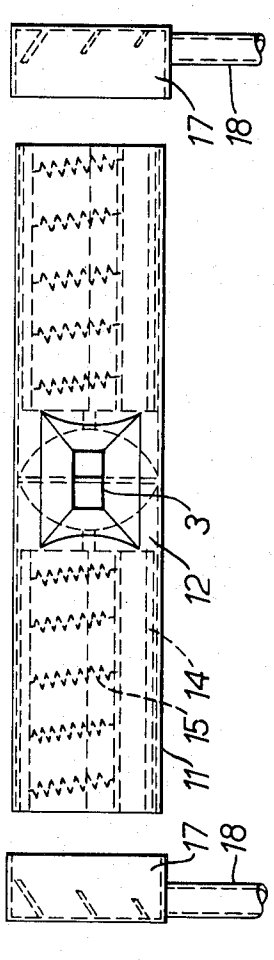
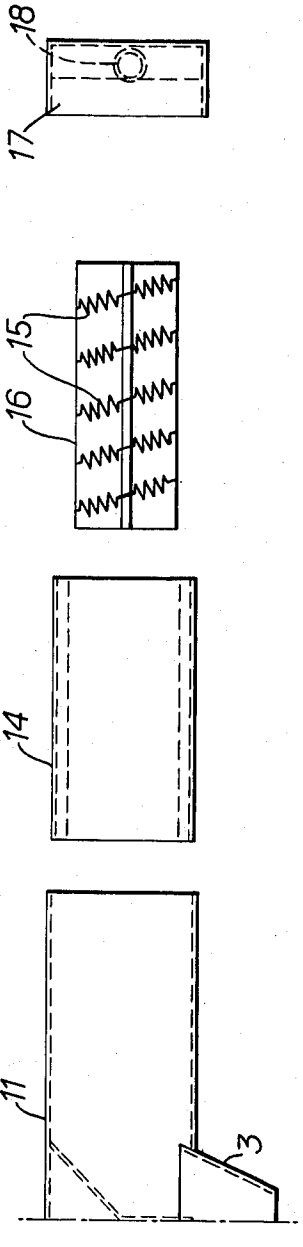


FIG. 4



United States Patent Office 3,241,504 Patented Mar. 22, 1966

3,241,504

INCINERATORS

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Filed Oct. 15, 1963, Ser. No. 316,297
7 Claims. (Cl. 110—7)

The invention relates to incinerators and particularly to incinerators for use within a building, as, for example a hospital, where waste material which is frequently wet has to be burnt.

Incinerators are generally constructed for combustion to take place in a zone near the bottom of the incinerator so that as the material burns, more material is fed into the combustion zone by gravity. Heretofore, however, incinerator construction has permitted the gaseous effluent from the combusted material to pass through the mass of uncombusted material in the incinerator before being drawn out the flue. As the gaseous effluent passes through the uncombusted material, it is cooled and forms smoke which subsequently issues from the flue. This is especially true when the material to be burned is wet.

Obviously, the formation of large quantities of smoke billowing from the flue of an incinerator is disadvantageous. It may even require that the incinerator be shut down if located in an area which has been zoned with smoke restrictions.

It is among the objects of the invention to provide an incinerator which minimises this disadvantage.

According to the invention an incinerator comprises a combustion chamber shaped to facilitate movement of the material to be burnt towards a combustion zone and means for removing the gaseous effluent from the combustion zone without passing through any appreciable amount of unburnt material.

The heating in the combustion zone may be effected by tubular or jet members for directing a stream of hot air to initiate combustion in the zone.

In one construction, the incinerator is provided with an outlet or flue which at one end, opens directly and immediately into the combustion zone, said outlet or flue being provided with means effective to suck substantially all gaseous products of combustion directly into the outlet or flue.

Thus, the means for removing the gaseous effluent from the combustion zone may comprise blower means disposed within or adjacent to the flue of the incinerator and adapted to create in the incinerator a forced draught drawing the effluent from the zone of combustion without permitting it to come into contact with the unburnt mass of material in the combustion chamber.

By such means, the gaseous effluent emerges from the combustion zone into the flue of the incinerator in a heated condition and without having contacted the unburnt material in the chamber which would have the effect of producing smoke.

The invention is illustrated by way of example in the accompanying diagrammatic drawings in which:

FIGURE 1 is a sectional view of the combustion chamber of the incinerator and of the means for removing the gaseous effluent products of combustion;

FIGURE 2 is a view looking in the direction of the arrow A on FIGURE 1 with the combustion chamber removed;

FIG. 3 is an exploded view in side elevation illustrating the heater of the subject invention with the end caps removed from the body portion;

FIG. 4 is an exploded top plan view of one half of the heater shown in FIG. 3, the components being drawn out on their common axis; and

FIG. 5 is a view in end elevation of the body portion of the heater shown in FIG. 3 with the end cap removed.

In the drawings the walls of the combustion chamber **1** are shaped to facilitate a downward movement of the material to be burnt towards a combustion zone **1***a*. The flue outlet **4** is disposed adjacent the combustion zone **1***a*, and is so shaped as to accommodate the tubular body **2** of a heater. Forming part of the body **2** is a nozzle **3**. Air is forced by means of a fan through the body **2** of the heater, is heated by the elements of the heater and is directed into the combustion zone **1***a* through the nozzle **3**. The hot jet of air so delivered ignites and maintains in combustion the material in the combustion zone. Gaseous products of combustion pass directly into the flue outlet **4**, and are there subjected to the effect of residual heat emitted from the tubular body **2** of the heater.

A nozzle **5** delivers forced air from a fan **5***a* into a venturi section **6** of the flue outlet passage **7** thus increasing the movement of the combustion gases from the combustion zone **1***a*, over the heater body **2** and thence into the flue outlet passage **7**.

Thus, the material to be burnt can be quickly subjected to a high temperature by means of the jet of hot air issuing from the nozzle **3** and immediate combustion effected. Without allowing cooling of the combustion gases by passage through unburnt material, the gases are passed at slow speed over the heater body **2** which emits considerable residual heat. Carbonaceous particles or other solid matter consumed in the gases and the final effluent is then forced through the venturi section of the flue into the flue outlet passage to be mixed with pressurised air from the fan **5***a* and passed into the external flue.

A high degree of control of gas movement is necessary for the success of this operation. With access door **8** of the combustion chamber closed and hearth **9** adjustable so as to provide an unbroken base, that is to say, a base without any openings through the base, a jet of air is delivered through the nozzle **3** of the heater and is so restricted as to produce a high temperature primary local combustion, and to maintain a slow exit speed of the effluent, so that the fullest secondary combustion of the effluent may be effected by the residual heat from the tubular body **2** of the heater.

The hearth **9** of the combustion chamber is made up of a series of pivotal slats which, when closed, form an unbroken base. For the removal of ash a lever **10** pivots the slats at **9***a* into an upright position allowing the ash residue to pass into an ash drawer **10***a* below. By the withdrawal of the entire set of slats from the base of the combustion chamber, all residual matter in the combustion chamber as, for example, incombustible matter, may be dumped into the ash drawer.

The heater illustrated in FIGURE 3 comprises a thin gauge tubular steel body **11** having a middle part **12**, and external nozzle **3**. On each side of the part **12** is a ceramic coated tube **14** which houses a helical heating element **15** on a ceramic former **16**.

As an alternative, in cases where greater emission of heat from the body is required, the tubular body **11** may be constructed entirely of a ceramic substance.

Caps **17** are fitted at each end of the tubular body **11**, having duct connections **18** from the fan unit **5***a*. The main body of the heater lies in the lower part of the flue exit, with the nozzle **3** directed into the combustion zone **1***a* whilst the end caps **17** are outside the flue exit.

Air from the fan unit **5***a* enters the tubular body **2** from both ends, passes over the heating elements **15** and is directed into the nozzle **3** through the middle part **12**. The heat and air movement are adjusted to produce a jet of sufficiently high temperature to initiate and maintain combustion.

As the material in the combustion zone is burnt away more material feeds down under gravity into the combustion zone, the downward movement being facilitated by the shape and disposition of the walls of the combustion chamber **1**.

I claim:

1. An incinerator comprising, in combination, a combustion chamber, walls for said chamber mutually inclined to and shaped to facilitate a downward movement of the material to be burned towards a combustion zone at the bottom of said chamber, a flue extending upwardly and to the rear of said chamber, a flue outlet disposed adjacent said combustion zone, a heater disposed in said flue outlet, said heater including a thin gauge tubular steel body having a middle part and a ceramic coated tube on each side of said middle part housing a helical heating element on a ceramic former, said heater adapted to direct air under pressure into said combustion zone to ignite and maintain combustion of the material in said combustion zone, the combustion gases thereby passing slowly over said heater to absorb residual heat from said heater so that solid matter in said combustion gases is consumed and gaseous effluent passed out through said flue, whereby said gaseous effluent does not contact a substantial portion of the uncombusted material in said combustion chamber and said flue is thereby substantially free of smoke.

2. An incinerator comprising, in combination, a combustion chamer, walls for said chamber mutually inclined to and shaped to facilitate a downward movement of the material to be burned towards a combustion zone at the bottom of said chamber, a flue extending upwardly and to the rear of said chamber, a flue outlet disposed adjacent said combustion zone, a heater disposed in said flue outlet, said heater including a tubular ceramic body having a middle part and a ceramic coated tube on each side of said middle part housing a helical heating element on a ceramic former, said heater adapted to direct air under pressure into said combustion zone to ignite and maintain combustion of the material in said combustion zone, the combustion gases thereby passing slowly over said heater to absorb residual heat from said heater so that solid matter in said combustion gases is consumed and gaseous effluent passed out through said flue, whereby said gaseous effluent does not contact a substantial portion of the uncombusted material in said combustion chamber and said flue is thereby substantially free of smoke.

3. An incinerator comprising: a combustion chamber adapted to receive material to be burned, a flue outlet provided near the bottom of said combustion chamber, closed flue means extending upwardly from said flue outlet, electric heater means provided in said flue outlet, said heater means including nozzle means and blower means

for producing a jet of hot air, said nozzle means directing said hot air jet into said combustion chamber, said hot air jet igniting and maintaining combustion in a localized zone in substantially close spaced relationship to said heater means, and means for causing the gaseous effluent of said combustion reaction to pass directly from said combustion zone to said flue outlet, whereby said gaseous effluent does not contact a substantial portion of the uncombusted material in said combustion chamber and said flue is thereby substantially free of smoke.

4. An incinerator according to claim **3**, wherein the bottom of said combustion chamber includes an adjustable hearth adapted to provide said combustion chamber wtih an unbroken base.

5. An incinerator according to claim **4**, including an ash-drawer disposed beneath said adjustable hearth, said adjustable hearth comprising a series of adjacent pivotal slat members, and including means adapted to pivot said slat members into a closed position to form an unbroken base, and into an open position, permitting uncombustible material to pass into said ash drawer.

6. An incinerator according to claim **1**, wherein said heater is fitted with cap members at each end thereof, and wherein said middle part includes a nozzle extending therefrom in a direction toward said combustion zone, said caps being connected to blower means whereby air is passed over said heating elements and directed into said nozzle.

7. An incinerator as claimed in claim **3** wherein said flue is formed as a venturi and wherein said blower means also create a forced draught from the combustion zone of the incinerator to the flue outlet, thereby drawing the gaseous effluent from the zone of combustion into the flue without permitting it to come into contact with a substantial portion of the unburnt mass of material in the combustion chamber, and thus without producing smoke.

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