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3,486,174

DEVICE FOR ELIMINATION OF UNPLEASANT SMELL AT ELECTRIC CLOSETS

Filed June 26, 1967

4 Sheets-Sheet 1

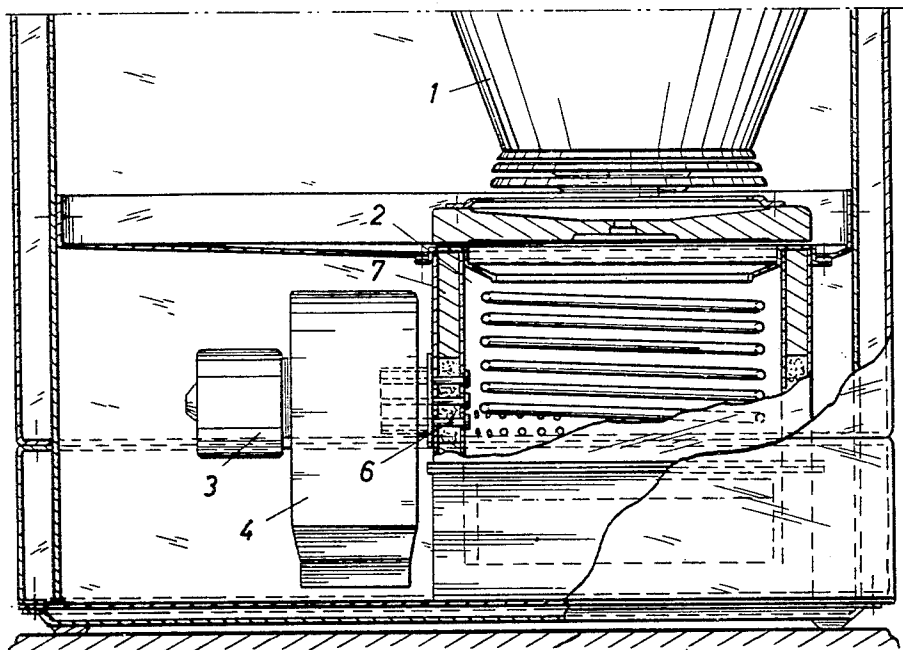


Fig. 1

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4 Sheets-Sheet 2

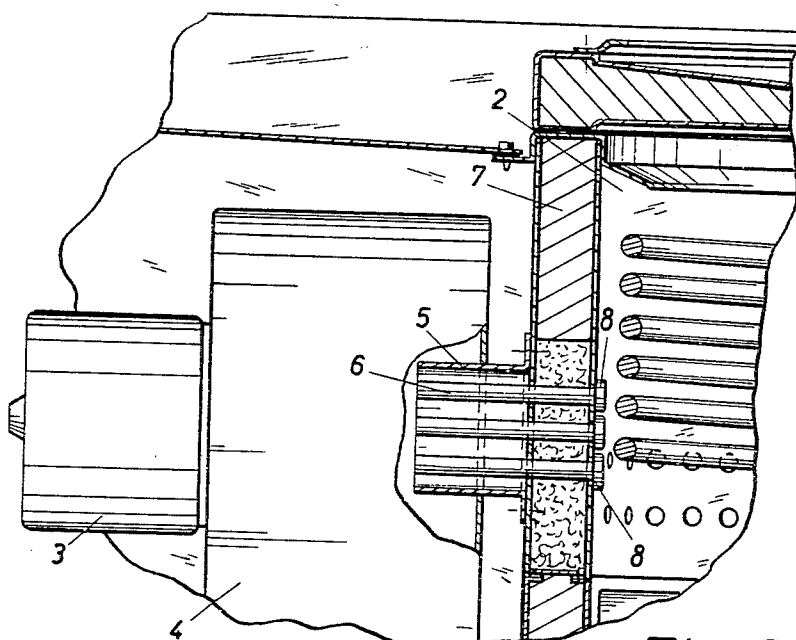


Fig. 2

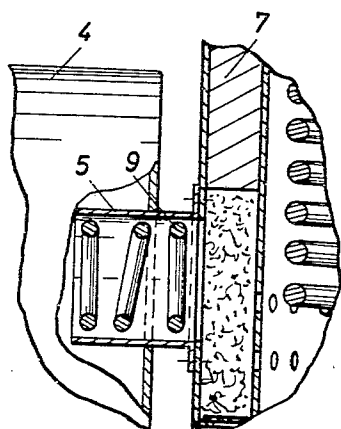


Fig. 3

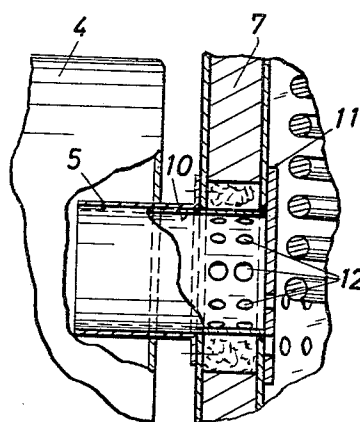


Fig. 4

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4 Sheets-Sheet 3

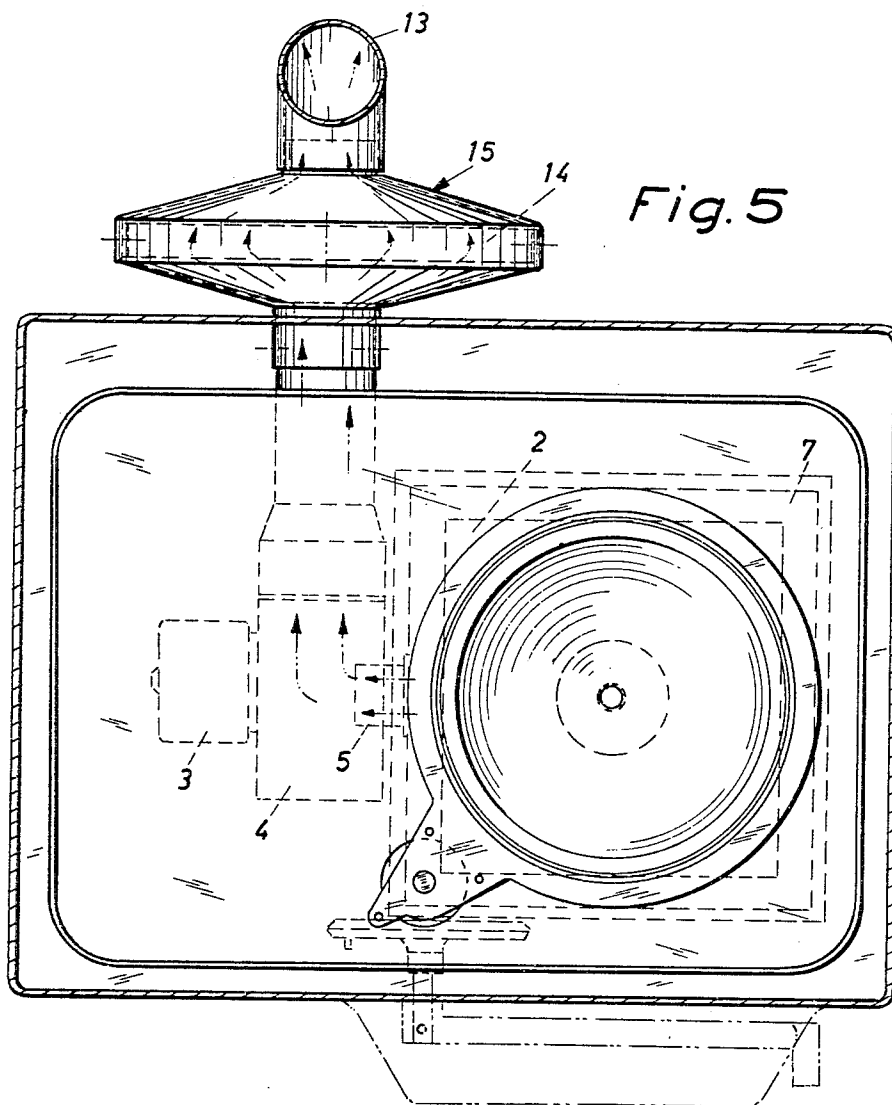


Fig. 5

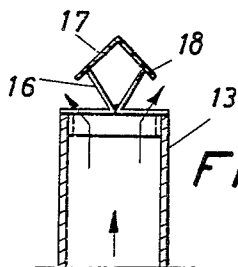


Fig. 6

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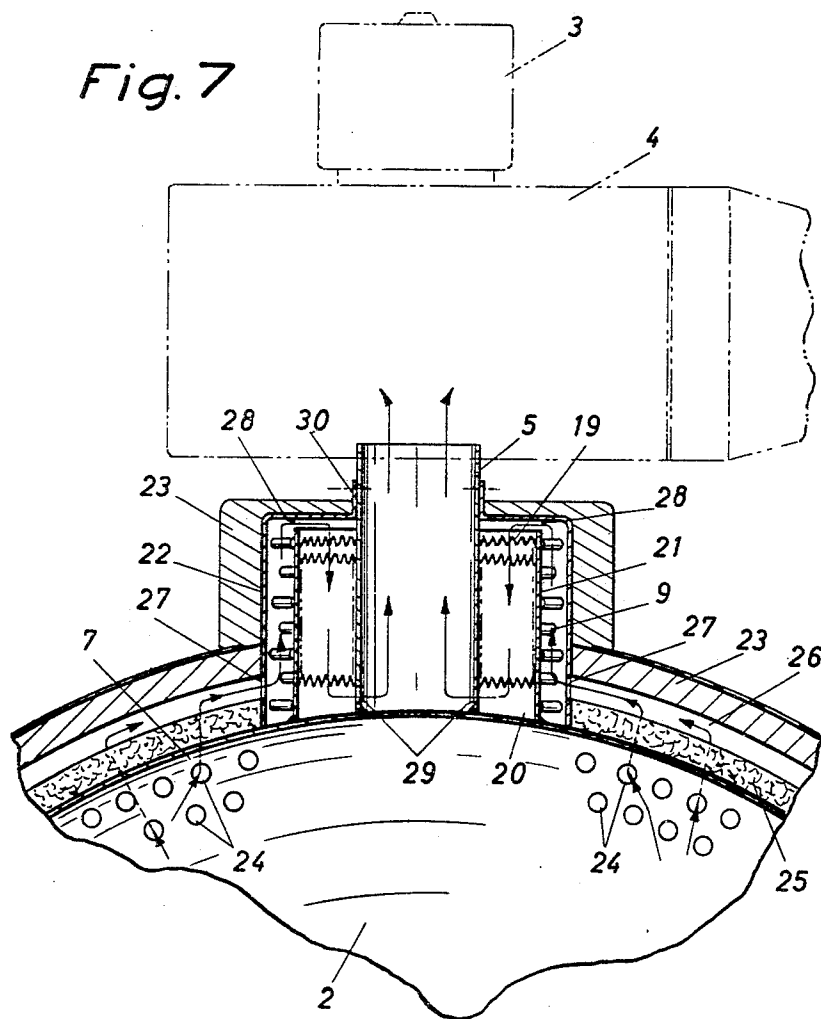
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4 Sheets-Sheet 4



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## DEVICE FOR ELIMINATION OF UNPLEASANT SMELL AT ELECTRIC CLOSETS

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U.S. Cl. 4—131

2 Claims

### ABSTRACT OF THE DISCLOSURE

The present invention relates to a device for making the incineration of faeces and urine complete in electric closets so as to eliminate unpleasant smells. This has according to the invention been achieved by means of an after-burner chamber, arranged between the combusting chamber of the closet and a fan aggregate for exhausting the combustion gases from the closet.

The present invention has reference to a device for the elimination of unpleasant smell at electric closets of the kind comprising two compartments situated one on the top of the other, the upper compartment comprising a closet chair and the lower department comprising an electric combustion chamber with a fan aggregate. The combustion gases formed at the incineration of the faeces in the combustion chamber are sucked out of this chamber by the fan aggregate and conveyed further out through a chimney tube. However, there are certain difficulties to completely eliminate unpleasant smell from the faeces in this way. Special difficulties are present when in the combustion chamber there is only urine at the evaporation gives a very unpleasant smell in spite of a very strong suction by the fan aggregate. The difficulties are in this case caused thereby that the temperature at the combustion only slightly exceeds 100° C. at which no complete combustion takes place.

By means of the different modifications according to the invention the problem of unpleasant smell at the incineration of faeces and urine has been solved in a very satisfactory way. The main feature of the invention is to be seen therein that between the combustion chamber and the fan aggregate there is arranged an after-burner chamber which is adapted, when the fan sucks out the substances being incinerated in the combustion chamber, finally and completely to incinerate these substances. This after-burner chamber can take many a shape which will be obvious from the following description.

According to another embodiment of the invention there is in connection with the fan aggregate arranged a filter which comprises active carbon and through which the discharged combustion gases stream.

In a third embodiment of the device according to the invention for the elimination of unpleasant smell there is in the upper portion of the chimney arranged a cone having its point directed downwards. On this cone there is in its turn arranged a cone having its point directed upwards, the base surface of last mentioned cone being greater than the one of the cone with the point directed downwards. By means of this device the combustion gases streaming upwards through the chimney are more effective than previously intermixed with fresh air and therefore there does no more exist any risk that unpleasant smell be notable outside the building in which the electric closet is arranged.

According to a fourth embodiment of the invention there is in connection with the after-burner chamber ar-

ranged a catalytic element which comprises a number of threads of a material which is resistant to acids and heat, these threads being arranged transversely in relation to the streaming direction of the gases. By means of this element, which causes a very little resistance to the stream of combustion gases, these gases are further heated to about 350° C. and are catalytically incinerated such that any remaining unpleasant smell will be completely eliminated.

In the following, the invention will be described more in detail with reference to the accompanying drawings. In the drawings:

FIG. 1 is a longitudinal section through an electric closet having an after-burner chamber situated between the combustion chamber of the electric closet and a fan aggregate,

FIG. 2 shows the after-burning combustion chamber in FIG. 1 on an enlarged scale,

FIGS. 3 and 4 show the after-burning chamber according to the invention according to other embodiments also on an enlarged scale,

FIG. 5 is a plan view of the combustion chamber and the fan aggregate of an electric closet having a filter inset according to the invention arranged behind the closet,

FIG. 6 shows a longitudinal section of the chimney to an electric closet having mounted above the chimney top two cones facing each other according to the invention, and

FIG. 7 shows a horizontal section through a combustion chamber having an after-burner chamber and a catalytic element according to the invention.

The electric closet comprises three main compartments, viz. a closet chair 1, a combustion chamber 2 and fan aggregate which in its turn comprises a fan 3 and a fan housing 4. The fan aggregate 3, 4 is in communication with the interior of the combustion chamber 2 via an outlet tube 5 for combustion gases and 5 the gases formed at the incineration of the faeces in the combustion chamber are sucked out by the fan 3 through this outlet tube 5. There are, in the outlet tube 5, arranged several heating rods 6 (FIGS. 1 and 2) which extend through an opening in the combustion chamber wall 7. Each one of these heating rods 6 is at its inner end turned towards the heating chamber 2 provided with a flange 8 which increases the ability of the heating rods to absorb heat from the combustion chamber. In this way the outlet tube 5 forms an after-burning chamber.

When the combustion gases which are insufficiently incinerated in the combustion chamber 2, are sucked out through the outlet tube 5 they pass the heating rods 6 and are thereby heated further to about 220° C. This heating in combination with a mixing with air causes any unincinerated remainders brought along in the gases to be completely incinerated.

According to FIG. 3 there is as a heating element in the after-burner chamber arranged to tube element 9 helically found in or about the outlet tube 5. This tube element 9 is electrically heated and thermostatically controlled such that the temperature of the after-burner chamber be kept at the correct level during the whole of the combustion period.

In a third embodiment of the invention the after-burner chamber comprises as shown in FIG. 4 a tube 10 arranged in the combustion chamber wall 7, a sheet 11 being attached to the inner end of the tube turned towards the combustion chamber 2. The sheet 11 serves the same purpose as the flanges 8 on the heating rods 6 described in the foregoing, i.e. giving the tube 10 a possibility to absorb more heat from the combustion chamber 2. Apertures 12 are arranged in the wall of the tube

10 and the total surface of the apertures 12 is essentially equal to the outlet opening of the outlet tube 5. By means of these apertures the combustion gases will stream out of the combustion chamber 2 at the discharge of the same and thereby be heated to 200–300° C., any reminders in the gases then, as in the other embodiments of the after-burner chamber according to the invention, being completely incinerated.

So as to ensure that all the unpleasant smell caused at the incineration of the faeces in the combustion chamber are annihilated during the passage of the combustion gases to the atmosphere there is preferably as shown in FIG. 5 provided a filter insert 15 provided with carbon filters 14. The filter insert 15 is mounted in the chimney tube 13 behind the electric closet. This filter 14 which comprises active carbon is passed through by the outlet combustion gases.

So as to obviate unpleasant smell outside the building in which the electric closet is arranged, the combustion gases must be effectively distributed when leaving the chimney and be mixed with fresh air. Conventional chimney tops have turned out to be insufficient in this respect. Two cones 16 and 17 are according to the invention arranged above the upper end of the chimney tube 13. The lower cone 16 has its point directed downwards towards the centre of the tube 13. The upper cone 17 stands with its base surface on the base surface of the lower cone 16 and extends somewhat outside this surface. It is hereby formed a drip edge 18 which prevents that rain water enters the tube 13. By shaping the chimney to in this way the upward stream of the discharge gases is spread and the gases are more effectively distributed in the atmosphere then previously such that no unpleasant smell be notable outside the building.

The different modifications described of the after-burning chamber have each a capacity to superheat the outlet gases from the combustion chamber 2 up to 300° C. so as to ensure that there is obtained a more complete incineration than the combustion chamber 2 per se is able to carry out. So as to shorten this heating time period and simultaneously to gain a further increase of the incineration of the outlet gases from the combustion chamber 2 there is according to a further embodiment of the invention, as shown in FIG. 7, in connection with the after-burner chamber 9 arranged a catalytic element in the shape of a unit. This catalytic element comprises a number of threads 19 which are arranged in cross-wise direction in an annular interstice 20 between two concentric mantles 5 and 21. The threads 19 are manufactured from an acid and heat resistant material, preferably an alloy of nickel (80%) and chromium (20%) which is provided with a coating of a noble metal such as platinum or palladium.

The after-burner chamber is arranged between the outer mantle 21 and the housing 22 enclosing the unit and comprises in this embodiment electrically heated elements 9 which which extend around the outer mantle which transfers heat from these elements 9 to the threads 19. The mantle 21 transmits to the threads 19 also heat which it has absorbed directly from the combustion chamber 2. There is outside the housing 22 arranged an insulation 23 which extends also around the whole of the combustion chamber 2.

The wall 7 of the combustion chamber 2, this wall 7 being completely closed in front of the inner mantle 5 serving as an outlet tube, is for the rest around its central portions provided without openings 24 for the combustion gases, these openings 24 being arranged preferably in several rows. On the outside of the combustion chamber wall 7 there is arranged a filter 25 reducing the contents of carbon monoxide and covering the openings 24. An interstice 26 is formed between the filters 25 and the insulation 23.

The combination gases formed in the combustion chamber 2 at the incineration of the faeces and the urine

stream through the openings 24 and the filter 25 out through the interstice 26. The combustion gases further stream in the direction indicated by the arrows in FIG. 7 through apertures 27, 28, 29 in the housing 22, the mantle 21 and the mantle 5, respectively. The apertures 28 in the outer mantle 21 are in the connection situated at the end of the mantle turned away from the combustion chamber wall 7 and the apertures 29 in the inner mantle at the end of this mantle turned towards the combustion chamber wall which means that the combustion gas stream is forced to change direction many a time during its passing through the after-burner chamber 9 and the catalytic element 19. It is hereby obtained a heat exchange which means that the efficiency at the catalytic combustion of the gases will be very high.

The threads 19 forming the catalytic element are preferably waved but may also be wound helically. They may also have a rectangular cross section, i.e. be shaped as a ribbon.

At the mounting of the combined after-burner chamber the catalytic threads 19 are preferably first mounted between the mantles 5 and 21 which are welded to the combustion chamber wall 7. The resistance elements 9 of the after-burner chamber are then arranged about the outer mantle 21 and then the whole of the unit is enclosed in the housing 22 which preferably is attached by means of releasable connection 30 to the inner mantle 5 such that it be rendered possible to demount the unit for overhaul, cleaning and repair of the separated details.

The invention has been described in the foregoing for purposes of illustration only and it is not restricted to the shown and described embodiments but may be modified in many ways within the scope of the appended claims. The filter 14 may be arranged horizontally instead of vertically as shown in FIG. 5. The after-burner chamber 6, 9, 10 may be shaped otherwise than according to the modifications described. The catalytic threads 19 may be shaped otherwise than described in the foregoing.

What we claim is:

1. A device for the elimination of unpleasant odors from electric closets comprising an upper and a lower compartment arranged one on the top of the other, said upper compartment comprising a closet chair 1 and said lower compartment comprising an electric combustion chamber 2 and a fan aggregate 3, 4, an after-burner chamber 6, 9, 10 located between said combustion chamber 2 and said fan aggregate 3, 4, said after-burner chamber incinerating finally and completely the substances exposed to incineration in said combustion chamber 2, a chimney tube 13 for combustion gases connected to said lower compartment, a cone 16 with its point directed downwards provided at the upper end of said chimney tube, a second cone 17 mounted on said first cone 16 having a base surface somewhat greater than the base surface of said first cone 16 for effectively distributing combustion gases in the atmosphere.

2. A device for the elimination of unpleasant odors from electric closets comprising an upper and a lower compartment arranged one on the top of the other, said upper compartment comprising a closet chair 1 and said lower compartment comprising an electric combustion chamber 2 and a fan aggregate 3, 4, an after-burner chamber 6, 9, 10 located between said combustion chamber 2 and said fan aggregate 3, 4, said after-burner chamber incinerating finally and completely the substances exposed to incineration in said combustion chamber 2, a catalytic element in said after-burner chamber arranged adjacent said combustion chamber 2, said catalytic element comprising a number of threads 19 made of an acid and heat resistant material and extending cross-wise to the streaming direction of the combustion gases, said threads 19 being arranged cross-wise in an annular interstice 20 between concentric mantles 5, 21, the inner one 5 of these concentrically arranged mantles 5, 21 being provided with openings 29 at its end turned towards said

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combustion chamber 2 and the outer one 21 of said  
mantles being provided with apertures 28 at its end  
turned away from said combustion chamber 2 so that the  
stream of combustion gases is forced to change stream-  
ing direction several times during its passage through  
said after-burner chamber provided with said catalytic  
element.

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