PCT WORLD INTELLECTUAL PROPERTY ORGANIZATION
International Bureau

INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification 4 :		(11) International Publication Number:
F23G 5/40, 7/00, F23L 9/02	A1	WO 86/ 01278
		(43) International Publication Date: 27 February 1986 (27.02.86)

(21) International Application Number: PCT/SE85/00298

(22) International Filing Date: 1 August 1985 (01.08.85)

(31) Priority Application Number: 8403961-9

(32) Priority Date: 2 August 1984 (02.08.84)

(33) Priority Country: SE

(71) Applicant *(for all designated States except US):* ROLF COLLIN AB [SE/SE]; Gamla Allén 8, S-131 50 Saltsjö-Duvnäs (SE).

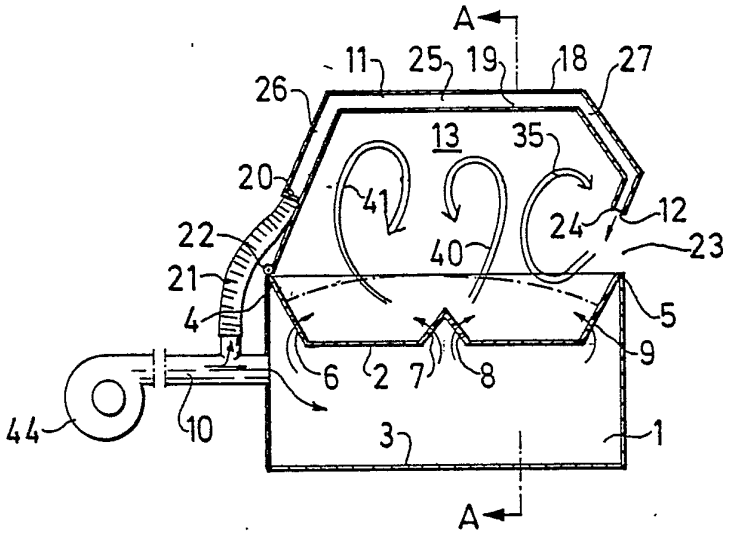
(72) Inventors; and
(75) Inventors/Applicants *(for US only) :* COLLIN, Rolf [SE/SE]; Gamla Allén 8, S-131 50 Saltsjö-Duvnäs (SE). VACLAVINEK, Jiri [SE/SE]; Sjövägen 5, S-182 33 Danderyd (SE).

(74) Agent: ÖRTENBLAD, Bertil; Noréns Patentbyrå AB, Banérgatan 73, S-115 26.Stockholm (SE).

(81) Designated States: BE (European patent), DK, FI, FR (European patent), GB (European patent), IT (European patent), JP, NL (European patent), NO, US.

Published
With international search report.
In English translation (filed in Swedish).

(54) Title: AN ARRANGEMENT IN INCINERATORS



(57) Abstract

An incinerator which incorporates a chest having a lower bottom and an upper bottom which is spaced from the lower bottom and forms a bed for supporting material to be burned, the upper bottom being provided with apertures through which combustion air introduced into the space between the bottoms flows. According to the invention there is provided a hood (11), which extends from one long side (4) of the chest (1), up over the chest in spaced relationship with the upper edge thereof, and down towards the opposite long side (5) of the chest. The hood (11) is provided with an air slot (12) which is intended for supplying secondary air of combustion and which faces the upper bottom (2) of the chest (1), there being formed between the upper bottom (2) of the chest and the hood (12) a space (13). This space is open at least between the respective upper edges of the two remaining mutually opposite sides of the chest and the side edges of the hood.

FOR THE PURPOSES OF INFORMATION ONLY

Codes used to identify States party to the PCT on the front pages of pamphlets publishing international applications under the PCT.

AT	Austria	GA	Gabon	MR	Mauritania
AU	Australia	GB	United Kingdom	MW	Malawi
BB	Barbados	HU	Hungary	NL	Netherlands
BE	Belgium	IT	Italy	NO	Norway
BG	Bulgaria	JP	Japan	RO	Romania
BR	Brazil	KP	Democratic People's Republic of Korea	SD	Sudan
CF	Central African Republic			SE	Sweden
CG	Congo	KR	Republic of Korea	SN	Senegal
CH	Switzerland	LI	Liechtenstein	SU	Soviet Union
CM	Cameroon	LK	Sri Lanka	TD	Chad
DE	Germany, Federal Republic of	LU	Luxembourg	TG	Togo
DK	Denmark	MC	Monaco	US	United States of America
FI	Finland	MG	Madagascar		
FR	France	ML	Mali		

An arrangement in incinerators

The present invention relates to an arrangement in incinerators. The incinerator to which the invention relates is primarily intended for incinerating waste in situations where total destruction is required. One particular field of application in this regard is the on-site destruction of oil and not-readily combusted material, by which is meant the total destruction by burning of material on the spot in which it is found. Naturally, the incinerator is also capable of burning other material waste, such as domestic refuse, forestry waste, etc..

The incinerator is intended primarily to solve the problem of burning material in such open spaces as those where the formation of soot particles is not desirable and where the risk of accidental fires may be high. The incinerator shall also be readily transportable, while enabling a large quantity of material to be burned in relation to the size of the incinerator per unit of time.

It has been found extremely difficult to destroy on-site such materials for example as oil-residue agglomerations created by water-carried oil slicks. The transportation of such agglomerations, which often include oil-saturated seaweed and other oil-saturated materials, to central or large incinerator depots is extremely costly. Moreover, such materials are difficult to burn effectively, due to their high water content. The risk of starting unintentional fires is also high, when burning oil-wastes on open fires in exposed areas. Associated with those problems is the reluctance to subject the surrounding countryside, coastline, off-shore islands etc. to the effect of environmentally harmful and often troublesome non-combusted or partially burned oil-products and other materials. In addition, an on-site incinerator as hereinbefore defined must be mobile in the sense that it can be transported readily to and from the various sites.

The present invention solves these problems and fulfils the aforesaid objects.

Accordingly, the invention resides in an arrangement in incinerators of the kind which incorporate an elongated incinerator chest comprising a lower bottom and an upper bottom which is spaced fromthe lower bottom and forms a bed for supporting material to be incinerated,which upper bottom has provided therein apertures through which combustion air introduced into the space between the upper and lower bottoms flows this arrangement being characterized by theprovision of a hood which extends from one long side of the chest up over the chest, in spaced relationship with the upper edge of the chest, and down towards the opposite long side of the chest, where the hood is provided with an air-slot which faces the upper bottom of the chest and which is intended for the supply of secondary air of combustion, there being formed between the upper chest-bottom and the hood a space which is open at least between the respective upper edges of the two remaining, mutually opposite sides of the chest and the side edges of the hood.

The invention will now be described in more detail with reference to an embodiment of the invention as shown in the accompanying drawing, where

Figure 1 is a sectional view of one embodiment of an incinerator according to the invention taken on the line B-B in Figure 2;

Figure 2 is a sectional view taken on the line A-A in Figure 1; and

Figure 3 is a sectional view which corresponds to the view of Figure 1 and which illustrates a further embodiment of an incinerator according to the invention.

In Figure 1 there is shown an incinerator arrangement 1

constructed in accordance with the invention and comprising an elongated receptacle which has an upper bottom 2 and a lower bottom 3, and which can thus be said to form a fire chest. The upper bottom 2 is lowered in relation to the upper edges of the long sides 4,5 of the chest. The upper bottom 2 has formed therein a plurality of apertures 6,7,8,9 through which primary air of combustion is intended to flow. Connected to the interior of the chest is a pipe-connection 10 or like device, through which air required for combustion is delivered to the chest by way of a fan 44. The upper bottom 2 thus serves as a bed for the material to be burned. Such material is shown schematically in Figures 1 and 2 by a broken line.

The incinerator according to the invention also incorporates a hood 11 which extends from one long side 4 of the chest 2, up over the chest in spaced relationship with the upper edge thereof, and down towards the opposite long side 5 of the chest.

The end of the hood 11 spaced from the aforesaid long side 5 of the chest presents an air slot 12 which is directed towards the upper bottom 2 of the chest and which is intended for supplying secondary air of combustion to the combustion process.

Thus, there is formed between the upper bottom 2 of the chest and the hood 11 a space 13, which is open at least in the region between the respective upper edges of the two remaining, mutually opposite sides 14,15 of the chest and the side edges 16,17 of the hood 11. It can thus be said that the "end-walls" are open.

According to one preferred embodiment of the invention, the whole or a part of the hood is double-walled and has twin plates 18,19 which are spaced apart to form a cavity therebetween. This cavity is closed along the side edges 16,17 of the hood and opens at one end thereof into the air slot 12. The other end of the cavity connects with

a pipe-connector 20 or the like, which is connected to the first-mentioned pipe-connector 10 via a channel 21, or alternatively is connected directly to a fan, not shown, therewith to deliver air to the air slot through the slot-like cavity.

In accordance with a preferred embodiment, the hood is hinged to the upper edge of the said one long side 4 of the chest ... as exemplified by the hinge means 22. This enables the hood to be readily lifted, when charging the incinerator with material to be burned therein. In addition, such a hinge arrangement enables adjustments to be made to the opening 23 defined by the free edge 24 of the hood and the upper edge of the other long side 5 of the chest.

When seen in section, parallel with the side edges 16,17 of the hood, i.e. the section shown in Figure 1, the hood presents preferably a planar upper surface 25 adjoined by outwardly and downwardly extending hood-parts 26,27.

Figure 3 illustrates a further embodiment of an incinerator according to the invention in which the hood, here referenced 28, is of different construction to the hood shown in Figures 1 and 2. The hood 28 of the Figure 3 embodiment presents an air-slot 29,30 along both its long sides. Each of the air-slots faces in towards the upper bottom 2 of the chest 1.

In other respects the incinerator 1 is the same as that described with reference to Figures 1 and 2, and hence the various incinerator components are designated with the same references as corresponding components of the first-described embodiment. The hood 28 of the Figure 3 embodiment is preferably also double-walled and is provided with a pipe-connector 31 through which air is delivered from a fan 45 to the air-slots 29,30 via the slot-like cavity formed by the double-walls. The hood

28 may be made raisable and lowerable, in order to facilitate charging of material to be burned. The hood of the Figure 3 embodiment also presents a planar upper surface 32 and adjoining downwardly and outwardly sloping hood parts 33,34.

The single arrows drawn in the Figures illustrate the directions of the primary and secondary air flows. The double arrows illustrate the pattern of the smoke gases generated during combustion.

The incinerator is suitably made entirely from sheet metal having a thickness compatible to the size of the incinerator.

The incinerator may, of course, be given any desired size, depending upon the use to which it is put. For example, an incinerator chest having breadth x length x height measurements of 1.8 m x 3.0 m x 0.8 m and a hood of commensurate size will burn about 4 m^3 of water-saturated waste per hour. The incinerator is thus highly effective in relation to its size.

The provision in the hood 11,28 of either one or two air-slots 12; 29,30 which face towards the upper bottom 2 of the incinerator chest results in the creation of powerful turbulence, as shown in the Figures by the double arrows. Naturally, in order to create this turbulence, it is necessary to supply sufficient air through the air slots. Since this turbulence can be readily discerned in operation, it is relatively simple to regulate the inflow of air to achieve desired turbulence conditions.

The incoming air is preferably divided, so that approximately half ot the total amount of air supplied is fed through the upper bottom 2 and half through the air slots 12; 29,30. The turbulence 35; 36,37 created inwardly of

the air slots contains a considerable amount of secondary air. Due to the powerful turbulence created, this secondary air is mixed with the partially non-combusted hot flue gases rising from the fire hearth, therewith to completely burn all residual non-combusted materials and compounds present in the flue gases, to provide complete combustion.

In addition to the effect caused by the aforesaid turbulence, it is impossible for the non-combusted flue gases to be conducted through the apertures 23; 38,39, without having come into contact with the secondary air injected through the air slots.

In the Figure 1 embodiment the turbulence, or vortex, referenced 40 also contains considerable quantities of oxygen, which is also admixed with the turbulence, or vortex, referenced 41. Consequently, as with the Figure 3 embodiment, flue gases leaving the incinerator chest at its end walls, as illustrated by the arrows 42,43, are substantially fully combusted.

It will be seen that because the hood is double-walled, the secondary air present in the cavity thus formed in the hood is heated prior to leaving through the air slots, by takingheat from the hood walls. The secondary air thus also serves as a coolant, for cooling the hood.

The whole of the incinerator chest, or a part thereof, may be thermally insulated if desired.

Full scale tests have shown that the gases leaving the incinerator contain substantially no combustible matter, i.e. the exit gases are fully combusted. As a result of the overlyinghood, the level of temperature within the incinerator chest is high, and therewith enables not-readily combusted materials, such as water-sodden plant residues, to be incinerated more easily.

The risk of secondary fires is reduced to a minimum, due to the fact that the fire in the incinerator is fully enclosed by the incinerator chest and the hood.

Moreover, as beforementioned, the burning capacity of the incinerator is high in relation to its comparatively small dimensions. This enables the incinerator to be given such small dimensions as to enable it to be transported in a small truck or lorry, or an average size boat, while still providing an incinerator capable of destroying considerable quantities of waste, such as oil and oil-saturated material in coastal areas.

The aforementioned problems are thus fully solved by means of the present invention.

The present invention is not restricted to the afore-described embodiments, and modifications can be made within the scope of the following claims.

CLAIMS

1. An incinerator comprising a fire chest which includes a lower bottom and an apertured upper bottom which is spaced from the lower bottom and which forms a bed for supporting material to be burned, and in which combustion air introduced into the space between the upper and lower bottoms flows out through the apertures in the upper bottom, characterized by a hood(11; 28) which extends from one long side (4) of the chest (1), up over the chest in spaced relationship with the upper edge thereof, and down towards the opposite long side (5) of the chest, where the hood (11; 28) is provided with an air slot (12; 29,30) which is intended for supplying secondary air of combustion and which faces the upper bottom (2) of the chest (1), there being formed between the upper bottom (2) of the chest and the hood (12; 29,30) a space which is open at least between the respective upper edges of the two remaining mutually opposite sides of the chest and the side edges of the hood.

2. An incinerator according to Claim 1, characterized in that the hood (11) extends down to said one long side (4) of the chest and is hingedly connected to said side.

3. An incinerator according to Claim 1, characterized in that the hood (28) is provided with an air slot (29,30) along a respective oneof its two long sides, each of said slots being directed in towards the upper bottom (2) of the chest (1).

4. An incinerator according to Claim 1, 2 or 3, characterized in that the hood (11; 28) comprises totally, or in part, a double-wall structure, such as to present a slot-like cavity which is closed along the side edges of the hood (11; 28) and opens into said air-slot (13) or air-slots (29,30) at either one or both of the long sides of the hood (11; 28), and which cavity communicates with a

pipe connector or the like for supplying air to said air-slot or air-slots through the slot-like cavity.

5. An incinerator according to Claim 1, 2, 3 or 4, characterized in that when seen in section, parallel with said side edges, the hood (11; 28) has an upper part (25; 32) from which outwardly and downwardly sloping parts (26,27; 33,34) extend.

Fig. 1

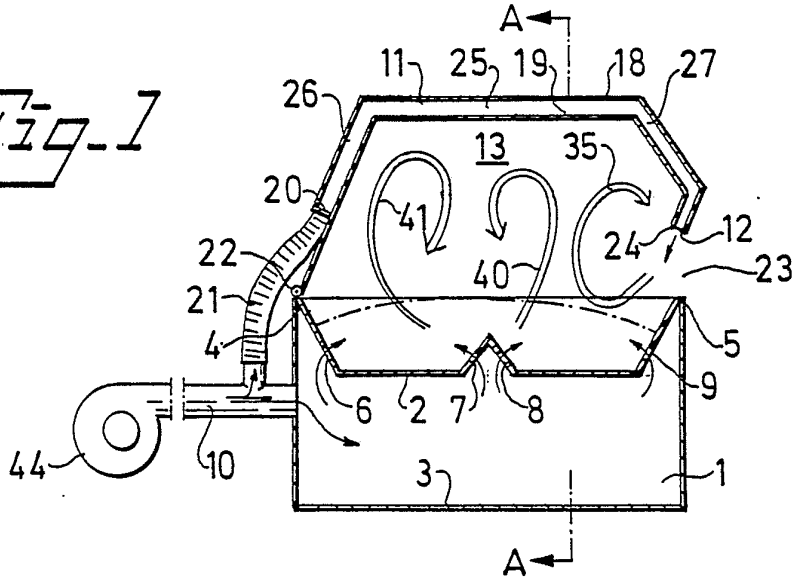


Fig. 2

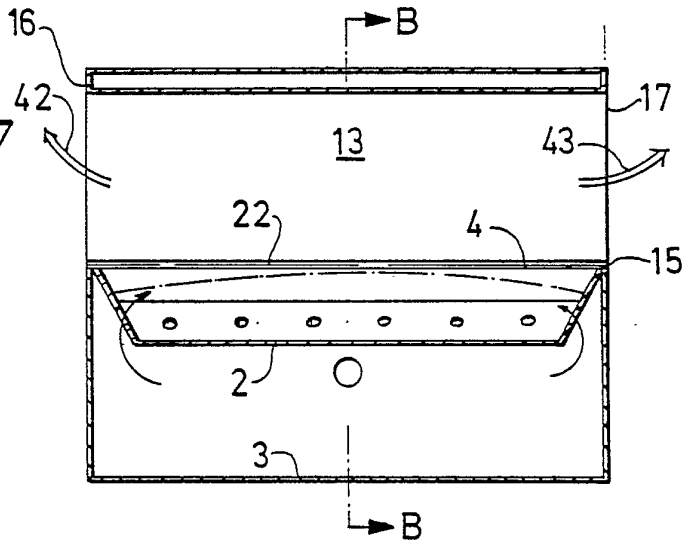
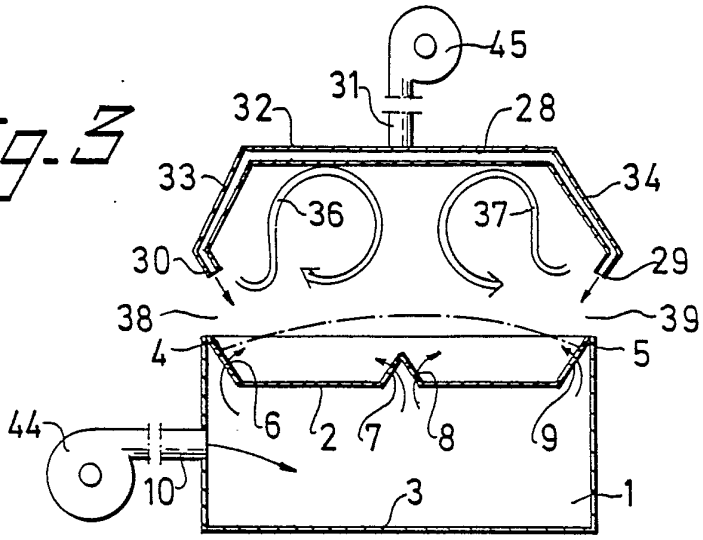


Fig. 3



INTERNATIONAL SEARCH REPORT

International Application No PCT/SE85/00298

I. CLASSIFICATION OF SUBJECT MATTER (if several classification symbols apply, indicate all) [6]

According to International Patent Classification (IPC) or to both National Classification and IPC 4

F 23 G 5/40, F 23 G 7/00, F 23 L 9/02

II. FIELDS SEARCHED

Minimum Documentation Searched [7]

Classification System	Classification Symbols
IPC 4	F 23 G 5/00, /40, 7/00, /06, 9/00; F 23 C 11/02; F 23 L 9/00-/06; F 27 D 17/00
Nat Cl	24d:2

.../...

Documentation Searched other than Minimum Documentation to the Extent that such Documents are Included in the Fields Searched [8]

SE, NO, DK, FI classes as above

III. DOCUMENTS CONSIDERED TO BE RELEVANT [9]

Category *	Citation of Document, [11] with Indication, where appropriate, of the relevant passages [12]	Relevant to Claim No. [13]
X,Y	DE, A1, 3 246 721 (DAN-FIRE-ENERGY A/S) 15 December 1983	1-5
X,Y	US, A, 3 859 934 (BLICK EQUIPMENT CORPORATION) 14 January 1975 & CA, 1013619	1-5
Y,A	SE, B, 436 793 (8005284-8) (STIFTELSEN F. PRODUKTUTVECKLINGSCENTRUM I ÖSTERGÖTLAND) 21 July 1980	1-5
Y,A	DE, A1, 2 449 798 (RHEINSTAHL AG) 29 April 1976	1-5
Y,A	CH, A5, 577 144 (MUSTAD STOPERI & MEK. VERKSTAD A/S) 30 June 1976	1-5
Y,A	GB, A, 2 072 831 (MICHAEL ORMROD TOWLER) 7 October 1981	1-5

* Special categories of cited documents: [10]

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

IV. CERTIFICATION

Date of the Actual Completion of the International Search	Date of Mailing of this International Search Report
1985-09-24	1985 -10- 03
International Searching Authority	**Signature of Authorized Officer**
Swedish Patent Office	Eva Medin

Form PCT/ISA/210 (second sheet) (January 1985)

FURTHER INFORMATION CONTINUED FROM THE SECOND SHEET

II Fields searched (cont).

US Cl 110:7, 8c, 17, 19, 210-214, 235-238, 241, 248

V. ☐ OBSERVATIONS WHERE CERTAIN CLAIMS WERE FOUND UNSEARCHABLE [1]

This international search report has not been established in respect of certain claims under Article 17(2) (a) for the following reasons:

1. ☐ Claim numbers....., because they relate to subject matter not required to be searched by this Authority, namely:

2. ☐ Claim numbers....., because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:

3. ☐ Claim numbers....., because they are dependent claims and are not drafted in accordance with the second and third sentences of PCT Rule 6.4(a).

VI. ☐ OBSERVATIONS WHERE UNITY OF INVENTION IS LACKING [2]

This International Searching Authority found multiple inventions in this international application as follows:

1. ☐ As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims of the international application.

2. ☐ As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims of the international application for which fees were paid, specifically claims:

3. ☐ No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claim numbers:

4. ☐ As all searchable claims could be searched without effort justifying an additional fee, the International Searching Authority did not invite payment of any additional fee.

Remark on Protest

☐ The additional search fees were accompanied by applicant's protest.

☐ No protest accompanied the payment of additional search fees.