The invention relates to a device that reduces the volume of polystyrene. The apparatus described comprises a heating means to heat a sample of oil to a temperature below the boiling point of the oil and a means to direct the heated oil on a sample of waste polystyrene. The oil acts on the polystyrene to reduce the aerated form of the polystyrene to a more non aerated form which is smaller in volume and which is acceptable for dumping at a landfill site. The apparatus may be attached to a moveable vehicle for ease of transportation. The invention also relates to a method of reducing the volume of a sample of polystyrene to a more manageable form.
Date of publication of the international search report:
24 May 2014
INTERNATIONAL SEARCH REPORT

International application No.
PCT/2013/000206

A. CLASSIFICATION OF SUBJECT MATTER

B05B 1/24 (2006.01) B05B 9/00 (2006.01) B05B 13/00 (2006.01) C08J 9/33 (2006.01) C08J 9/36 (2006.01)
C08J 11/04 (2006.01)

According to International Patent Classification (IPC) or both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic database consulted during the international search (name of database and, where practicable, search terms used)
EPDOC, WPI, GOOGLE PATENTS: B05B & keywords: heat, temperature, hot, oil, nozzle & similar terms

C. DOCUMENTS CONSIDERED TO BE RELEVANT

<table>
<thead>
<tr>
<th>Category*</th>
<th>Citation of document, with indication, where appropriate, of the relevant passages</th>
<th>Relevant to claim No.</th>
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</table>

Documents are listed in the continuation of Box C

[ ] Further documents are listed in the continuation of Box C [ ] See patent family annex

"#" Special categories of cited documents:
"X" document defining the general state of the art which is not considered to be of particular relevance
"E" earlier application or patent 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 when the document is taken alone
"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

Date of the actual completion of the international search 30 May 2014
Date of mailing of the international search report 30 May 2014

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Telephone No. 0262833149

Form PCT/ISA/210 (fifth sheet) (July 2009)
**INTERNATIONAL SEARCH REPORT**

**International application No.**
PCT/NZ2013/000206

**Box No. II  Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)**

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

1. [ ] Claims Nos.:
   - because they relate to subject matter not required to be searched by this Authority, namely:
     - the subject matter listed in Rule 39 on which, under Article 17(2)(a)(i), an international search is not required to be carried out, including

2. [ ] Claims Nos.:
   - 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. [ ] Claims Nos.:
   - because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a)

**Box No. III  Observations where unity of invention is lacking (Continuation of item 3 of first sheet)**

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

*See Supplemental Box for Details*

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

2. [ ] As all searchable claims could be searched without effort justifying additional fees, this Authority did not invite payment of additional fees.

3. [ ] As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:

4. [x] 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 claims Nos.:
   - 1-9

**Remark on Protest**

[ ] The additional search fees were accompanied by the applicant's protest and, where applicable, the payment of a protest fee.

[ ] The additional search fees were accompanied by the applicant's protest but the applicable protest fee was not paid within the time limit specified in the invitation.

[ ] No protest accompanied the payment of additional search fees.
<table>
<thead>
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<th>Citation of document, with indication, where appropriate, of the relevant passages</th>
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<td>X</td>
<td>US 2167940 A (ERICKSON) 01 August 1939 Figure 1</td>
<td>1-5, 9</td>
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<td>X</td>
<td>US 2461766 A (PEEPS) 15 February 1949 Figure 1</td>
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<td>X</td>
<td>US 1062029 A (PILLSBURY) 20 May 1913 Figures 1, 2</td>
<td>1-9</td>
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<td>X</td>
<td>US 2517049 A (STEVENS) 01 August 1950 Figure 1</td>
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<td>A</td>
<td>WO 2006/108082 A2 (KATZ et al.) 12 October 2006</td>
<td>1-9</td>
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</table>
Supplemental Box

Continuation of Box III

This International Application does not comply with the requirements of unity of invention because it does not relate to one invention or to a group of inventions so linked as to form a single general inventive concept.

This Authority has found that there are different inventions based on the following features that separate the claims into distinct groups:

- Claims 1-9 are directed to an apparatus for reducing the volume of polystyrene. The feature of an apparatus comprising a heating means to heat oil, a means of directing the heated oil to a spray means and a spray means is specific to this group of claims.

- Claims 10-13 are directed to a method of reducing the volume of a sample of polystyrene. The feature of a method comprising heating oil to a temperature below its boiling point, directing the oil through an oil flow means towards the polystyrene and spraying the heated oil onto the polystyrene is specific to this group of claims.

PCT Rule 13.2, first sentence, states that unity of invention is only fulfilled when there is a technical relationship among the claimed inventions involving one or more of the same or corresponding special technical features. PCT Rule 13.2, second sentence, defines a special technical feature as a feature which makes a contribution over the prior art.

When there is no special technical feature common to all the claimed inventions there is no unity of invention.

In the above groups of claims, the identified features may have the potential to make a contribution over the prior art but are not common to all the claimed inventions and therefore cannot provide the required technical relationship. Therefore there is no special technical feature common to all the claimed inventions and the requirements for unity of invention are consequently not satisfied a priori.

Note that the use of the wording "an apparatus for reducing the volume of polystyrene" in claim 1 defines a capability only and the apparatus is not considered to be limited to the use of reducing the volume of polystyrene.

While the PCT rules for determining unity of invention allow an independent claim for a given process plus an independent claim for an apparatus or means specifically designed for carrying out the said process, the apparatus or means is only considered designed for carrying out a process if the contribution over the prior art of the apparatus or means corresponds to the contribution the process makes over the prior art. In the present case, the apparatus appears to be indistinguishable from other prior art sprayers which include a heating means. The apparatus of claim 1 does not have any special adaptation to carry out the process of claim 10.
This Annex lists known patent family members relating to the patent documents cited in the above-mentioned international search report. The Australian Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

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<tr>
<td>Publication Number</td>
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<td>US 2167940 A</td>
<td>01 August 1939</td>
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<td>US 2461 766 A</td>
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End of Annex

Due to data integration issues this family listing may not include 10 digit Australian applications filed since May 2001.