Title: APPARATUS, SYSTEM, AND METHOD FOR A HEATING SURFACE HAVING A SELECTABLE SHAPE, SIZE, LOCATION, AND HEAT INTENSITY

Abstract: A heating appliance includes a heating structure having a lower surface and a flat upper surface for supporting and imparting heat into an object, such a pot or pan used to cook food. The heating structure includes an array of heating elements arranged on the lower surface of the heating structure in an m x n array having m columns and n rows. Each element is thermally coupled to a region of the structure for heating its respective region of the structure independently of other regions of the structure associated with the other heating elements.
— before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments (Rule 48.2(h))

(88) Date of publication of the international search report: 8 January 2015
### INTERNATIONAL SEARCH REPORT

**A. CLASSIFICATION OF SUBJECT MATTER**

*IPC(8) - H05B 3/68 (2014.01)*

*USPC - 219/443.1*

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

**B. FIELDS SEARCHED**

Minimum documentation searched (classification system followed by classification symbols)

*IPC(8) - H05B 3/16, 3/68, 3/76 (2014.01)*

*USPC - 219/all, 443.1, 445.1, 448.11*

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

*CPC - H05B 3/16, 3/68, 3/76 (2014.09)*

Electronic database consulted during the international search (name of database and, where practicable, search terms used)

Orbit, Google Patents, Google Scholar

**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>
</tr>
</thead>
<tbody>
<tr>
<td>X</td>
<td>US 7,919,730 B2 (SHAW et al) 05 April 2011 (05.04.2011) entire document</td>
<td>1-5, 8</td>
</tr>
<tr>
<td>Y</td>
<td>GB 2, 061, 679 A (GOSSLER) 13 May 1981 (13.05.1981) entire document</td>
<td>6, 7</td>
</tr>
<tr>
<td>Y</td>
<td>US 7,732,221 B2 (LERNER) 06 February 2007 (06.02.2007) entire document</td>
<td>7</td>
</tr>
</tbody>
</table>

Further documents are listed in the continuation of Box C.

**Date of the actual completion of the international search**

14 October 2014

**Date of mailing of the international search report**

07 NOV 2014

Name and mailing address of the ISA/US

Mail Stop PCT, Attn: ISA/US, Commissioner for Patents

P.O. Box 1450, Alexandria, Virginia 22313-1450

Facsimile No. 571-273-3201

Authorized officer: Blaine R. Copenheaver

PCT Helpdesk: 571-272-4300

PCT OSP: 571-272-7774
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:

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).

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

see extra sheet

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. [ ] 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.:

1-8

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.
This application contains the following inventions or groups of inventions which are not so linked as to form a single general inventive concept under PCT Rule 13.1. In order for all inventions to be examined, the appropriate additional examination fees must be paid.

Group I, claims 1-8, drawn to a heating appliance.
Group II, claims 9-20, drawn to a selective shape and size heating system and method of heating.

The inventions listed as Groups I-II do not relate to a single general inventive concept under PCT Rule 13.1 because, under PCT Rule 13.2, they lack the same or corresponding special technical features for the following reasons: the special technical feature of the Group I invention: wherein a portion of the heating elements are selectively energized such that their respective regions form a shape and size of the heating structure that is heated as claimed; therein is not present in the invention of Group II. The special technical feature of the Group II invention: a controller coupled to the heating elements to: receive information associated with a shape and size of a portion of the heating structure to be heated; determine a subset of the heating elements to be used for heating the received shape and size of the heating structure; and control the subset of heating elements to heat their respective regions of the heating structure as claimed therein is not present in the invention of Groups I.

Groups I and II lack unity of invention because even though the inventions of these groups require the technical feature of a heating structure having a lower surface and a flat upper surface for supporting and imparting heat into an object; and an array of heating elements arranged on the lower surface of the heating structure in an m x n array having m columns and n rows, each element thermally coupled to a region of the structure for heating its respective region of the structure independently of other regions of the structure associated with the other heating elements, wherein a portion of the heating elements are selectively energized, this technical feature is not a special technical feature as it does not make a contribution over the prior art. Specifically, Shaw et al. (US 7,919,730 B2) teach a heating appliance (multiple heating array assembly) (Figures 1A and 1B) comprising: a heating structure having a lower surface (illustrated in Fig. 1B) and a flat upper surface (top layer 15) for supporting and imparting heat into an object (col. 2, lines 58-67, e.g., heating surface may heat cooking pots); and an array of heating elements (heating element array 14) arranged on the lower surface of the heating structure (lower surface is illustrated in Fig. 1B) in an m x n array having m columns and n rows (as illustrated in Fig. 1B the heating element array is a 2x2 array). Each element of the heating element array 14 thermally coupled to a region of the structure (e.g., block 12) for heating its respective region of the structure (e.g., block 12) independently of other regions of the structure (e.g., block 12) associated with the other heating elements (col. 1, lines 15-20, col. 2, lines 7-13, heating elements are independently controlled), wherein a portion of the heating elements (heating element array 14) are selectively energized (col. 6, lines 5-20, array provides for selective application of thermal energy only where needed) such that their respective regions form a shape and size of the heating structure that is heated (col. 4, lines 30-50, the regions correspond to areas of a utensil desired to be heated).

Since none of the special technical features of the Group I or II inventions are found in more than one of the inventions, unity of invention is lacking.