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- (71) Applicant: COLORADO STATE UNIVERSITY RE-
SEARCH FOUNDATION [US/US]; P.O. Box 483, Fort
Collins, Colorado 80522 (US).
- (72) Inventors: THOMPSON, Kevin N.; 3401 Westminster
St., Fort Collins, Colorado 80526 (US). FOSTER, Sam
M.; 516 Mathews Street, Fort Collins, Colorado 80521
(US). COGDILL, Craig M.; 3401 Westminster St., Fort
Collins, Colorado 80526 (US). NESTLER, Stanley; 3401
Westminster St., Fort Collins, Colorado 80526 (US).
- (74) Agents: JOHNSON, Samuel Wade et al.; 900 W. 48th
Place, Suite 900, Kansas City, Missouri 64112 (US).

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

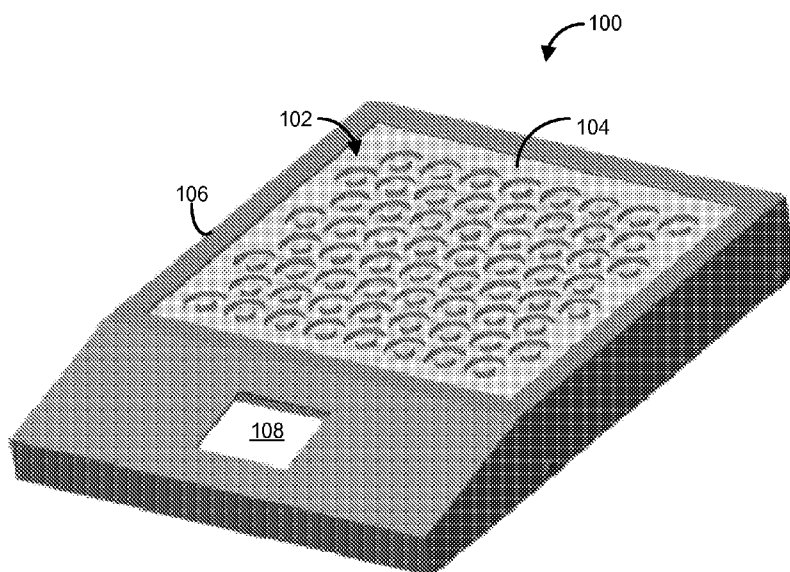


FIG. 1A

(57) Abstract: A heating appliance in-
cludes a heating structure having a lower
surface and a flat upper surface for sup-
porting 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 mxn
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))*

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INTERNATIONAL SEARCH REPORT

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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 data base consulted during the international search (name of data base and, where practicable, search terms used)

Orbit, Google Patents, Google Scholar

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 7,919,730 B2 (SHAW et al) 05 April 2011 (05.04.2011) entire document	1-5, 8
Y		6, 7
Y	GB 2, 061, 679 A (GOSSLER) 13 May 1981 (13.05.1981) entire document	6
Y	US 7,173,221, B2 (LERNER) 06 February 2007 (06.02.2007) entire document	7
A	US 7,759,616 B2 (GOUARDO et al) 20 July 2010 (20.07.2010) entire document	1-8

☐ Further documents are listed in the continuation of Box C.

* Special categories of cited documents:

"A" 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

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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:
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 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 $m \times n$ 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 10, Figures 1 A 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 $m \times n$ array having m columns and n rows (as illustrated in Fig. 1B the heating element array is a 2×2 array), each element (of 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.