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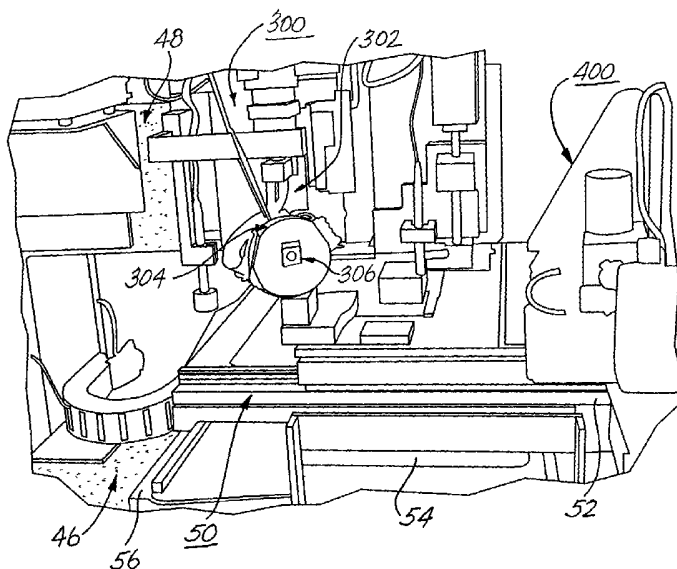
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- (71) Applicant (*for all designated States except US*): **LI LOGIX, INC., D/B/A RD AUTOMATION** [US/US]; 10 Tinker Avenue, Londonderry, New Hampshire 03053 (US).
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- (84) Designated States (*regional*): ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, SK, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).
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[Continued on next page]

(54) Title: PROCESS AND APPARATUS FOR MOUNTING SEMICONDUCTOR COMPONENTS TO SUBSTRATES AND PARTS THEREFOR



(57) Abstract: The present invention provides a process and apparatus (10) for mounting semiconductor components (12) to substrates (20). More particularly, the apparatus (10) includes a placing mechanism (300) positioned on a support frame (40) for placing the semiconductor components (12) to the substrates (20). A reflow oven/furnace (400) is integrated into the apparatus (10), thereby eliminating the need to transport the semiconductor components (12) and substrates (20) to an external furnace. Another feature of the present invention involves providing an improved vacuum substrate chuck array (200, 250) adapted for efficient application of suction to substrates (20) carried thereby. Yet another feature of the invention involves a fluxless reflow process for inhibiting oxidation of eutectic solders (610) provided on substrates (20). (Fig.4).

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INTERNATIONAL SEARCH REPORT

International Application No
PCT/US 02/24023

A. CLASSIFICATION OF SUBJECT MATTER IPC 7 H01L21/00 H01L21/60 B23K37/02		
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 7 H01L B23K		
Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched		
Electronic data base consulted during the international search (name of data base and, where practical, search terms used) EPO-Internal, WPI Data, PAJ		
C. DOCUMENTS CONSIDERED TO BE RELEVANT		
Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 6 070 780 A (ARAI HISASHI ET AL) 6 June 2000 (2000-06-06) abstract; claims; figures ---	1,42
X	US 6 226 452 B1 (KEE KWAN YEW ET AL) 1 May 2001 (2001-05-01) abstract; claims; figures ---	1,42
X	US 5 988 481 A (MAKI SHINJI ET AL) 23 November 1999 (1999-11-23) the whole document ---	1,42
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-/--		
<input checked="" type="checkbox"/> Further documents are listed in the continuation of box C.		
<input checked="" type="checkbox"/> Patent family members are listed in annex.		
° 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 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 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 <p style="text-align: center;">21 March 2003</p>	Date of mailing of the international search report <p style="text-align: center;">02. 04. 2003</p>	
Name and mailing address of the ISA European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax: (+31-70) 340-3016	Authorized officer <p style="text-align: center;">Hamdani, F</p>	

INTERNATIONAL SEARCH REPORT

International Application No

PCT/US 02/24023

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 6 029 427 A (FREUND JOSEPH MICHAEL ET AL) 29 February 2000 (2000-02-29) abstract; claims; figures ---	25
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INTERNATIONAL SEARCH REPORT

International application No.
PCT/US 02/24023

Box I Observations where certain claims were found unsearchable (Continuation of item 1 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 II Observations where unity of invention is lacking (Continuation of item 2 of first sheet)

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

see additional 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 an additional fee, this Authority did not invite payment of any additional fee.

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.:

Remark on Protest

- The additional search fees were accompanied by the applicant's protest.
- No protest accompanied the payment of additional search fees.

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

This International Searching Authority found multiple (groups of) inventions in this international application, as follows:

1. Claims: 1-24, 42-50

Apparatus and method for mounting semiconductor components to substrates characterized by carrying placing and heating steps in a substantial single operation.

2. Claims: 25-41

A device for carrying a plurality of substrates

3. Claims: 51-75

A method for mounting semiconductor components to substrates in an air-tight compartment.

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/US 02/24023

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