(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) EP 0 792 085 A3

(12) EUROPEAN PATENT APPLICATION

(88) Date of publication A3:
12.04.2000 Bulletin 2000/15

(43) Date of publication A2:
27.08.1997 Bulletin 1997/35

(21) Application number: **97300635.6**

(22) Date of filing: **31.01.1997**

(51) Int Cl.[7]: **H05B 6/70**, H05B 6/78

(84) Designated Contracting States:
AT BE CH DE DK ES FI FR GB GR IE IT LI NL PT SE

(30) Priority: **23.02.1996 EP 96301230**

(71) Applicants:
- **UNILEVER PLC**
  London EC4P 4BQ (GB)
  Designated Contracting States:
  GB IE
- **UNILEVER N.V.**
  3013 AL Rotterdam (NL)
  Designated Contracting States:
  BE CH DE DK ES FI FR GR IT LI NL PT SE AT

(72) Inventors:
- **Barratt, Lawrence**
  Cambridge, Cambridgeshire CB5 8SE (GB)
- **Bows, John Richard**
  Wellingborough,Northamptonshire NN10 8LP (GB)
- **Mullin, James Thomas**
  Towcester, Northamptonshire NN12 6XP (GB)
- **Blindt, Renoo Avinash**
  Wellingborough,Northamptonshire NN14 4DH (GB)
- **Crilly, James Francis**
  West Clandon, Guildford GU14 7UE (GB)

(74) Representative:
Mulder, Cornelis Willem Reinier, Dr. et al
Unilever PLC,
Patent Division,
Colworth House
Sharnbrook, Bedford MK44 1LQ (GB)

(54) Apparatus & method for heating objects with microwaves

(57) An apparatus and method for heating planar and non-planar objects using microwaves, the method comprising: providing at least two beams of travelling microwaves from a coherent microwave source (4); directing each beam of travelling microwaves into separate arms (8,10) of a waveguide (6); isolating the beam of travelling microwaves in each arm using a microwave circulator (12); forming a standing wave from the travelling waves at the working area (14) where the arms meet; and varying the phase of at least one beam of travelling microwaves by altering the path length of the microwaves in the waveguide to move the standing wave. An object passing through the working area is irradiated by the microwaves, thereby generating complex interference patterns in the object. Controlling changes to the phases of the incident microwaves changes and controls the time-averaged superposition of the interference patterns, facilitating effective volumetric heating of the object.

EP 0 792 085 A3

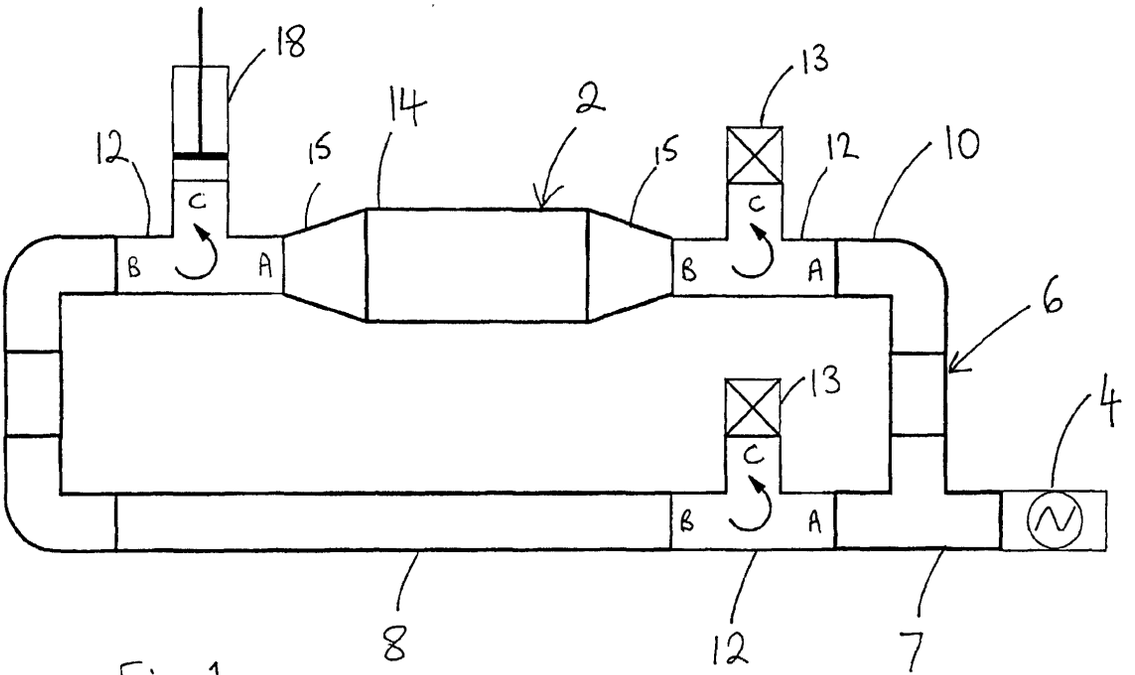

Fig. 1

European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 97 30 0635

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.6)
A	US 4 378 806 A (HENLEY-COHN JULIAN L) 5 April 1983 (1983-04-05) * claims 1,2,4,5 *	1,3	H05B6/70 H05B6/78
A	EP 0 085 110 A (MATSUSHITA ELECTRIC IND CO LTD) 10 August 1983 (1983-08-10) * claims 1,3 *	1	
A	FR 2 128 936 A (THOMSON-CSF) 27 October 1972 (1972-10-27) * claim 1 *	1	
A	FR 2 709 912 A (RENAULT ;PEUGEOT; CITROEN SA; ELECTRICITE DE FRANCE; CENTRE NAT RE) 17 March 1995 (1995-03-17)		
A	US 4 323 746 A (GERLING JOHN E) 6 April 1982 (1982-04-06)		

TECHNICAL FIELDS SEARCHED (Int.Cl.6)

H05B

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	1 December 1997	De Smet, F

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
Y : particularly relevant if combined with another document of the same category
A : technological background
O : non-written disclosure
P : intermediate document

T : theory or principle underlying the invention
E : earlier patent document, but published on, or after the filing date
D : document cited in the application
L : document cited for other reasons

& : member of the same patent family, corresponding document

EPO FORM 1503 03.82 (P04C01)

ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 97 30 0635

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

01-12-1997

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 4378806 A	05-04-1983	NONE	
EP 0085110 A	10-08-1983	JP 1369772 C	25-03-1987
		JP 58026487 A	16-02-1983
		JP 61037756 B	26-08-1986
		AU 549050 B	09-01-1986
		AU 8739382 A	22-02-1983
		WO 8300595 A	17-02-1983
		US 4621179 A	04-11-1986
FR 2128936 A	27-10-1972	NONE	
FR 2709912 A	17-03-1995	NONE	
US 4323746 A	06-04-1982	NONE	

EPO FORM P0459

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82