



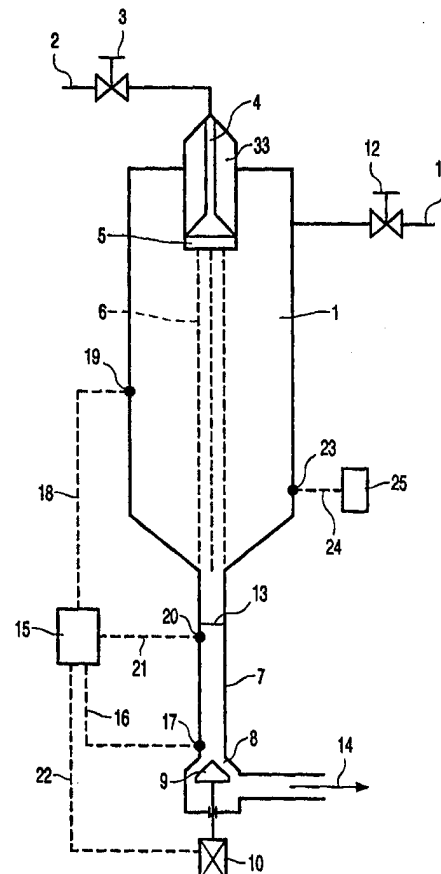
INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

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(21) International Application Number: PCT/NL98/00196 (22) International Filing Date: 7 April 1998 (07.04.98) (30) Priority Data: 1005796 11 April 1997 (11.04.97) NL (71)(72) Applicant and Inventor: DEN HOLLANDER, Adriaan, Gerrit [NL/NL]; Edisonweg 3, NL-4207 HE Gorinchem (NL). (74) Agents: LOUËT FEISSER, Arnold et al.; Arnold & Siedsma, Sweelinckplein 1, NL-2517 GK Den Haag (NL).		(81) Designated States: AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CU, CZ, DE, DK, EE, ES, FI, GB, GE, GH, GM, GW, HU, ID, IL, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, UA, UG, US, UZ, VN, YU, ZW, ARIPO patent (GH, GM, KE, LS, MW, SD, SZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, ML, MR, NE, SN, TD, TG). Published <i>With international search report.</i> <i>Before the expiration of the time limit for amending the claims and to be republished in the event of the receipt of amendments.</i> <i>In English translation (filed in Dutch).</i> (88) Date of publication of the international search report: 18 February 1999 (18.02.99)

(54) Title: A METHOD AND A DEVICE FOR HEATING A LIQUID

(57) Abstract

A method and a device for heating a liquid in a continuous process, wherein the liquid is moved in downward direction in a free fall from a supply plate in a closed vessel, and carried out of said vessel via a discharge valve. Steam for heating the falling liquid is introduced into the vessel, which steam at least partially condenses in the liquid. Liquid is collected in a container at the bottom of the vessel, which liquid is stored in said container for some time before being discharged via the discharge valve. The level of the liquid in the container is measured, and the discharge valve is controlled in dependence on said liquid level, wherein the liquid level can be maintained at a constant predetermined value.



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INTERNATIONAL SEARCH REPORT

Internat. Appl. No.
PCT/NL 98/00196

A. CLASSIFICATION OF SUBJECT MATTER
IPC 6 A23C3/037 A23L3/18

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 6 A23C A23L

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)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	GB 1 420 635 A (DASI INDUSTRIES) 7 January 1976	1,16
Y	see page 3, line 111 - line 124; claims 1,3; figure 1 ---	2,3,5, 17,19
Y	GB 855 206 A (DAVEAT MILK PROCESSES CO) 30 November 1960 see page 4, line 33 - line 67 ---	2,3,5, 17,19
Y	US 3 433 147 A (A. PEDERSON) 18 March 1969 see column 2, line 14 - line 64; figure ---	13,14, 25,26
Y	US 5 389 335 A (S. CHARM) 14 February 1995 see column 7, line 29 - column 8, line 10; claims 1,10,11; figures 4,5 --- -/--	13,14, 25,26

☒ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

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"P" document published prior to the international filing date but later than the priority date claimed

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"&" document member of the same patent family

Date of the actual completion of the international search

24 November 1998

Date of mailing of the international search report

22. 12. 1998

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INTERNATIONAL SEARCH REPORT

Internat I Application No

PCT/NL 98/00196

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	MCCARTHY K L ET AL: "AN INTEGRAL METHOD ANALYSIS OF STEAM INFUSION HEATING OF A FREE FALLING FILM" JOURNAL OF FOOD SCIENCE, vol. 54, no. 3, May 1989, pages 734-737, 747, XP000032269 ----	13,14, 25,26
A	JONG DE P ET AL: "PERFORMANCE OF A STEAM-INFUSION PLANT FOR HEATING MILK" NETHERLANDS MILK AND DAIRY JOURNAL, vol. 48, no. 4, 1 January 1994, pages 181-199, XP000491400 see page 736, column 1; figure 3 ----	13,14, 25,26
X	US 4 161 909 A (A. WAKEMAN) 24 July 1979 see column 1, line 20 - line 27 see column 4, line 10 - column 5, line 15 ----	10,15, 22,27
X	US 4 375 185 A (S. MENCACCI) 1 March 1983 see column 4 - column 5 ----	15,27
X	BURTON H: "ULTRA-HIGH-TEMPERATURE PROCESSING OF MILK AND MILK PRODUCTS " 1988 , ELSEVIER , LONDON XP002085458 see page 111 - page 119 ----	10,15, 22,27
A	NB. FREY: "Unit process energy requirements for steam infusion UHT milk processing" TRANSACTIONS OF THE ASAE, vol. 27, no. 6, 1984, pages 1956-1959, XP002085471 see page 1957, column 1; figure 2 ----	15,27
A	WO 93 12673 A (DEN HOLLANDER ENGINEERING) 8 July 1993 cited in the application see page 9, line 8-18; claim 1 & EP 0 650 332 A ----	1
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1 A	US 5 092 230 A (H. BRONNERT) 3 March 1992 -----	

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INTERNATIONAL SEARCH REPORT

International application No.
PCT/NL 98/00196

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: 1-9,16-21

Heating a liquid in a closed vessel by contact of a free falling liquid with steam whereby the liquid is collected in a container at the bottom of the vessel and stored therein for some time before being discharged via a discharge valve.

2. Claims: 10-12,22-24

Heating a liquid in a closed vessel by contact of the free falling liquid with steam whereby an excess of steam is supplied to the vessel.

3. Claims: 13-14,25-26

Heating a liquid in a closed vessel by contact of the free falling liquid with steam whereby the temperature of the free falling liquid is measured by means of an infrared sensor.

4. Claims: 15,27

Heating a liquid in a closed vessel by contact of the free falling liquid with steam whereby the temperature of the liquid that exits the vessel is determined by calculation of the amount of energy being supplied to the vessel.

INTERNATIONAL SEARCH REPORT

Information on patent family members

Internal Application No

PCT/NL 98/00196

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