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(71) Applicant (for all designated States except US): **CHR. HANSEN A/S** [DK/DK]; Bøge Allé 10-12, DK-2970 Hørsholm (DK).

(72) Inventor; and

(75) Inventor/Applicant (for US only): **DUPONT, Kitt** [DK/DK]; Solvej 5, DK-2990 Nivå (DK).(74) Agent: **UEXKÜLL & STOLBERG**; Beselerstr. 4, 22607 Hamburg (DE).

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27 December 2012

(54) Title: INACTIVATION OF BACTERIOPHAGES IN A LIQUID

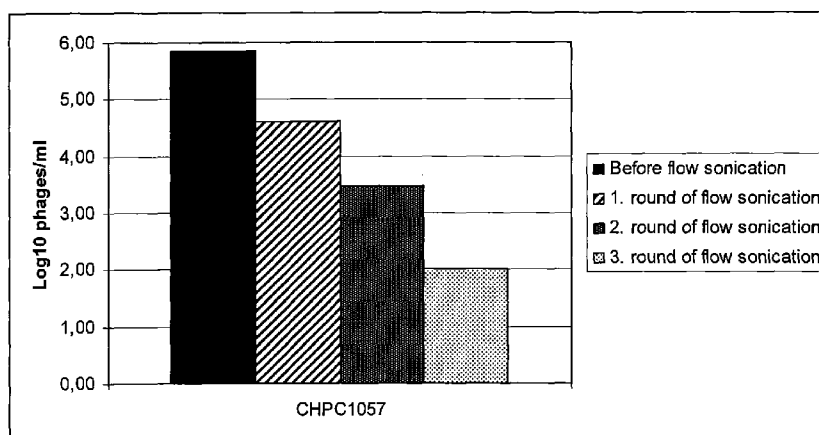


Fig 6

(57) Abstract: The present invention relates to inactivation of bacteriophages in a liquid, such as bacterial growth medium, milk and whey.

INTERNATIONAL SEARCH REPORT

International application No
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A. CLASSIFICATION OF SUBJECT MATTER INV. C12N13/00 C12N7/00 C12M1/42 A23C3/07 A23C19/097 A23L1/025 A23L3/005 A23L3/015 A23L3/30 A23L3/54 A61L2/00		
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) C12N C12M A23C A23L A61L		
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 practicable, search terms used) EPO-Internal, BIOSIS, FSTA, WPI Data		
C. DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	A. P. KRUEGER: "THE EFFECT OF SONIC VIBRATIONS ON PHAGE, PHAGE PRECURSOR, AND THE BACTERIAL SUBSTRATE", THE JOURNAL OF GENERAL PHYSIOLOGY, vol. 24, no. 6, 20 July 1941 (1941-07-20), pages 691-698, XP055032163, ISSN: 0022-1295 the whole document	1,2, 4-16,18, 19,30
X	DE 39 03 648 A1 (BRAN & LUEBBE [DE]; BAYER AG [DE]) 16 August 1990 (1990-08-16) the whole document	1-51
X	GB 671 922 A (JOHAN ERNST NYROP) 14 May 1952 (1952-05-14) the whole document	1-19, 24-51
----- -/-		
☒ Further documents are listed in the continuation of Box C. ☒ See patent family 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 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		
Date of the actual completion of the international search	Date of mailing of the international search report	
10 July 2012	07/11/2012	
Name and mailing address of the ISA/ European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Fax: (+31-70) 340-3016	Authorized officer van de Kamp, Mart	

INTERNATIONAL SEARCH REPORT

International application No

PCT/EP2012/055739

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	PINTO F ET AL: "Effect of surfactants, temperature, and sonication on the virucidal activity of polyhexamethylene biguanide against the bacteriophage MS2", AMERICAN JOURNAL OF INFECTION CONTROL, vol. 38, no. 5, 1 June 2010 (2010-06-01), pages 393-398, XP027088403, ISSN: 0196-6553 the whole document	1,2,4-7, 13-16, 18,19
X	----- DATABASE BIOSIS [Online] BIOSCIENCES INFORMATION SERVICE, PHILADELPHIA, PA, US; 1975, DEBSKA W ET AL: "ULTRASOUND IN PHARMACEUTICAL STUDIES PART 1", XP002679555, Database accession no. PREV197662033419 abstract & DEBSKA W ET AL: "ULTRASOUND IN PHARMACEUTICAL STUDIES PART 1", HERBA POLONICA, vol. 21, no. 1, 1975, pages 91-97, ISSN: 0018-0599	1
X	----- DATABASE BIOSIS [Online] BIOSCIENCES INFORMATION SERVICE, PHILADELPHIA, PA, US; 2002, VAN DER WALT E: "The effect of ultraviolet light, cavitation flow and ultrasound on protozoan cysts and oocysts, bacteriophages and Clostridium.", XP002679556, Database accession no. PREV200300290930 abstract & VAN DER WALT E: "The effect of ultraviolet light, cavitation flow and ultrasound on protozoan cysts and oocysts, bacteriophages and Clostridium.", WATER SA (PRETORIA), no. Special Edition, 2002, pages 16-22, ISSN: 0378-4738	1
A	----- WO 2008/063115 A1 (TETRA LAVAL HOLDINGS & FINANCE [CH]; KRUESEMAN DIETER [DE]; NORDANGER) 29 May 2008 (2008-05-29) the whole document page 2, lines 6,7 page 6, lines 9,10 ----- -/--	1-51

INTERNATIONAL SEARCH REPORT

International application No

PCT/EP2012/055739

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	ATAMER Z ET AL: "Thermal inactivation of the heat-resistant Lactococcus lactis bacteriophage P680 in modern cheese processing", INTERNATIONAL DAIRY JOURNAL, vol. 20, no. 3, 1 March 2010 (2010-03-01), pages 163-168, XP026833951, ISSN: 0958-6946 the whole document figure 1	1-51
A	P PIYASENA ET AL: "Inactivation of microbes using ultrasound: a review", INTERNATIONAL JOURNAL OF FOOD MICROBIOLOGY, vol. 87, no. 3, 1 November 2003 (2003-11-01), pages 207-216, XP055032155, ISSN: 0168-1605 the whole document	1-51

INTERNATIONAL SEARCH REPORT

International application No.
PCT/EP2012/055739

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 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 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.:

1-51

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.

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

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

1. claims: 1-51

A method for inactivation of bacteriophages in a liquid, comprising sonication (ultrasound treatment) of the liquid, eg wherein the liquid is selected from the group consisting of: a dairy product, milk, milk solution, whey, a dairy effluent (such as dairy cleaning water, dairy waste water), water, a bacterial growth medium, must, and juice. An apparatus for inactivation of bacteriophages in a liquid, said apparatus is a dairy process line comprising at a sonicator or a sonicator unit and a cheese vat. Use of a sonicator for inactivation of bacteriophages in a dairy product, such as cheese, cheese curd, fermented milk, milk, whey, whey permeate or cream. A dairy product, such as cheese, cheese curd, fermented milk, milk, whey, whey permeate or cream, obtained by said method.

2. claim: 52(partially)

Lactococcus lactis bacteriophage CHPC1184 (DSM 24632), mutants thereof, and variants thereof.

3. claim: 52(partially)

Streptococcus thermophilus phage CHPC1057 (DSM 23962), mutants thereof, and variants thereof.

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/EP2012/055739

Patent document cited in search report		Publication date		Patent family member(s)		Publication date
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			EP	2124583 A1		02-12-2009
			ES	2378110 T3		09-04-2012
			NZ	576124 A		30-03-2012
			SE	0602474 A		23-05-2008
			WO	2008063115 A1		29-05-2008
