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

(11) Publication number: **0 048 771**
A1

(12) # EUROPEAN PATENT APPLICATION

(21) Application number: **80105923.9**

(22) Date of filing: **30.09.80**

(51) Int. Cl.³: **C 11 B 1/12**

(43) Date of publication of application: **07.04.82**
Bulletin 82/14

(84) Designated Contracting States: **DE FR GB IT NL**

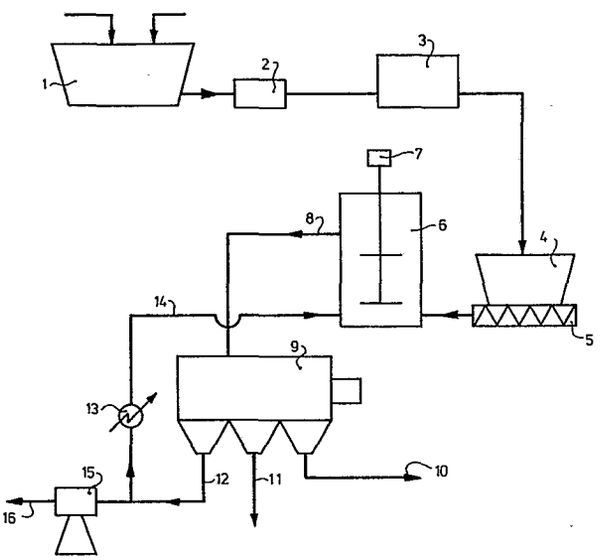
(71) Applicant: **The Meat Industry Research Institute of New Zealand, Inc., East Street, Hamilton (NZ)**

(72) Inventor: **Fernando, Tissa, 83 Aurora Terrace, Hamilton (NZ)**
Inventor: **Dunn, Steven Eric, 287 Clarkin Road, Hamilton (NZ)**

(74) Representative: **Sajda, Wolf E., Dipl.-Phys. et al,**
Patentanwälte Dipl.-Ing. Dipl.-Wirt.-Ing. Dr. Eugen Popp
Dipl.-Phys. Wolf E. Sajda
Maria-Theresia-Str. 30 Postfach 86 06 24,
D-8000 München 80 (DE)

(54) **Rendering process.**

(57) A process comprising reducing the particle size of fat and oil bearing raw material, heating the reduced raw material in a rendering vessel (6) to a rendering temperature without the introduction of any process water and/or steam and moving a flow (8) of the heated material to a separator (9).



EP 0 048 771 A1

This invention relates to a rendering process and more particularly to a rendering process for treating animal and/or vegetable material.

The aforementioned materials generally contain two or all of the following phases: fat, fat-free solids, and water. In the case of animal by-products, for example material from slaughter houses, packing houses and the like such as a mixture of beef and mutton offal, the phases after rendering are a liquid phase which consists essentially of fats and oils and a solid phase which consists essentially of meat and bone meal. The solid phase is usually high in protein and processed into animal feed. The liquid phase is separated into tallow and waste process water.

Rendering of animal tissues by heat is carried out presently by two types of processes: dry rendering(high temperature (135^{o}C) and low temperature (70-100^{o}C) wet rendering.

In dry rendering, the raw material is heated, separated into the tallow, fat-free solid and water phases and dried in the same operation. This process suffers from several drawbacks: 10-15% residual fat in meal; raw material must be washed thoroughly to ensure that the tallow products is of premium grade; the nutritive value of the meal is downgraded by the high temperature of the process; the process required

high grade steam and has a higher energy consumption compared with low temperature rendering systems.

The low temperature rendering systems include: the traditional 'digester' type direct steam injection process which produces high losses of product in the stick-water; the Pfaudler process (US Patent Specificaiton 3519662) and the Alfa-Laval 'Centritherm' and 'Centribone' process. (NZ Patent Specification 186249). The latter processes are generally regarded as 'wet rendering' as water is introduced into the raw material and live steam is directly injected into the raw material.

The use of steam requires that the processing plant has a facility to raise process steam. In addition the injection of live steam or extra water into the flow of raw material increases the amount of process water and can lead to a high B.O.D. level in the process water so that further separation must take place before the process water can be released into existing sewers and effluent treatment plants.

The main object of the present invention is to provide a low temperature rendering process in which no extra water and no steam is introduced into the raw material being rendered.

In one broad aspect the invention provides a rendering process in which fats and oils are rendered from fat and oil bearing raw materials comprising reducing the particle size of the raw material in a rendering vessel to a rendering temperature without the introduction of any process water and/or steam and moving a flow of the heated material to a separator.

Preferably the raw material in the rendering vessel is heated to a temperature which is less than the termal degrading temperature of the material i.e. in the range of 75° to 100°C. Acid can be added to the raw material prior to being comminuted in size. The raw material is preferably acidified to a pH of 3.8 to 4.5.

In a preferred form of the invention, recycled tallow or a recycled tallow phase is added to the raw material in the rendering vessel.

To more fully describe the invention reference will be made to the accompanying drawing which is a schematic flow diagram of one form of the apparatus by which the process of the present invention can be carried out.

The raw material which when derived from slaughter houses, packing houses and the like may include fat and oil

bearing animal material being tissue, muscle, hide, blood, bone, viscera, offal and the like is fed into a storage bin 1 or directly into a grinder.

In the preferred form of the invention, the plant consists of a raw material holding bin 1 which stores pre-broken raw material of approximately 50mm x 50mm. By means of a spray nozzle or any other suitable device or method, acid is added to the pre-broken raw material in order to preserve the raw material, reduce odour and to contain the free fatty acid content of the tallow produced. The pre-broken material passes from holding bin 1 through a metal detector 2 and into a grinder 3, which grinds the raw material through a grinding plate of approximately 18mm or 12mm hole size. If required, further acid addition can be carried out at this grinding stage. The ground acidified material is passed on to a hopper 4 and is pumped by a suitable pump 5 to a rendering vessel 6.

The preferred rendering vessel is a tall non-pressurized cylindrical vessel with a heating apparatus in the form of a vertical coil or vertical pipe and an agitator 7. The vertical heating apparatus acts as baffles. Turbine propeller type inpellers (not shown) are attached to the agitator 7..

Recycle tallow 14 is heated in a heat exchanger 13 in the range of 80°C to 150°C and pumped into the rendering vessel 6 at a specific tallow/raw material ratio. The temperature in the rendering vessel is controlled in the preferred range 75°C to 95°C. By means of an overflow pipe 8 the rendered material passes by gravity or is pumped into a three phase co-current decanter centrifuge 9 which separates the feed stream into: A solids phase 10 with approximately 50 - 70% water and 6 - 9% fat; a stickwater phase 11 with approximately 2 - 3% total solids and 0.04 - 0.20% fat; and a tallow phase 12 with approximately 3 - 10% water.

The solids phase 10 is sterilized if required and dried in a dryer to produce a meal with a residual fat content of 6 - 9% and 6 - 10% moisture. The stickwater phase 11 is either dumped to waste or the solids and fat in this stream are recovered by ultrafiltration. Part of tallow phase 12 is recycled as recycle tallow 14 and the other part is polished through a disc-type centrifugal separator and stored as polished tallow 16.

The acid used in the process to preserve the raw material can be any acidic substance which includes the following acids:
Hydrochloric, sulphuric, phosphoric, citric, tannic, oxalic, tartaric, acetic, malic, formic, benzoic, lactic and their

water soluble salts. The pH of the raw material by acid addition is adjusted to 3.8 to 4.5. The addition of acid for preservation consequently has a beneficial effect on the separation of fat in the three phase decanter 9; the fat and protein in the stickwater phase is minimized.

Conveying of material to and from individual processing equipment can be by means of either pump, screw conveyors, belt conveyors or pneumatic conveyors or chutes.

The rendering vessel 6 in addition to the vertical heating apparatus, can be fitted with a heating jacket or a horizontal pan-cake type coil to provide extra heat transfer area.

Instead of the three phase co-current decanter centrifuge a three phase countercurrent decanter centrifuge or a two phase decanter centrifuge can be used.

The tallow to raw material ratio (T:RM) varies with the type of raw material; for bone/beef trimmings/soft guts mixture with approximately 50 - 65% water the T:RM is 0.3 to 0.5. With beef trimmings only the T:RM is 0.5 to 1.0 and with bone only the T:RM is 2.0 to 3.0. If required the recycle tallow 14 stream can be derived from the polished tallow 16 stream.

The residence time in the rendering vessel is in the range of approximately 2 minutes to 10 minutes.

Heating in the rendering vessel 6 and heat exchanger 13 can be carried out by steam or any other suitable heat transfer fluid.

Sterilization of the solids phase 10 is carried out in a pressure vessel and drying is carried out in one of the following type driers: direct fired rotary direr, batch or continuous dry rendering cooker, ring drier, fluidized bed or spouted drier, jet drier.

Instead of drying the solids phase 10, the material can by itself or mixed with other ingredients, be canned frozen or dehydrated to produce a foodstuff for humans or pets.

Control of the rendering process is achieved by sensing the current drawn by the agitator which is indicative of the viscosity of the material in the rendering vessel 6. When the viscosity in the vessel becomes too high for satisfactory fluidization, mixing and heat transfer in the rendering vessel, control means shut off or reduce the rate of the raw material being pumped and increase the tallow rate in order to reduce the viscosity in the rendering vessel.

The plant is illustrated further by the following examples giving operational data:

Example 1:

5000 kg/h of beef/mutton mixed offal was rendered with 2500 kg/h of recycle tallow phase (ex-three phase decanter). The products from the three phase decanter centrifuge were 2200 kg/h of solids phase with 65% water and 7-5% fat (dry basis); 3300kg/h of tallow phase with 2% water and 3% fat-free solids and 2000 kg/h of stickwater with 2.8% total solids and 0.06% fat. The free fatty acid content of the tallow produced was 0.6% and the bleachability of the tallow was 0.2 Red. The steam consumption was 0.14 kg of steam per kg of raw material.

Example 2:

3000 kg/h of beef trimmings and mutton soft offal were rendered with 1500 kg/h of polished recycled tallow. The products from the three phase decanter centrifuge were 855 kg/h of solids phase with 69% water and 7% fat (dry basis); 2565 kg/h of tallow phase with 21% water and 1% fat-free solids; 1080 kg/h of stickwater with 2.3% total solids and 0.40% fat. The free fatty acid content of the tallow produced was 0.5% and the bleachability of the tallow was 0.3 Red. The steam consumption was 0.12 kg of steam per kg of raw material.

The invention thus provides a rendering process in which the amount of material lost in process water is reduced. No water or steam is introduced into the rendering process in contrast to known rendering processes. A good level of separation is achieved by use of the three phase decanter after the material has been heated in the rendering vessel.

The process can be carried out in a plant which does not need to have any facility to raise process steam for the purpose of supplying heat to the rendering vessel 6. As disclosed rendering vessel 6 is heated by heat transfer means. The rendering process is carried out at temperatures below 100°C which due to lack of thermal degradation results in the production of high quality tallows and meals.

1. A rendering process in which fats and oils are rendered from fat and oil bearing raw materials comprising reducing the particle size of the raw material, heating the reduced raw material in a rendering vessel (6) to a rendering temperature without the introduction of any process water and/or steam and moving a flow (8) of the heated material to a separator.

2. The process of Claim 1, wherein acid is added to the raw material prior to said material being reduced in size.

3. The process of Claim 1 or 2, wherein the rendering temperature is in the range of 75° to 100°C.

4. The process of Claim 3, wherein recycled tallow or a recycled tallow phase is added to the raw material in the rendering vessel (6).

5. The process of Claim 4, wherein the tallow/raw material ratio is in the range of 0.3/1.0 to 3.0/1.0.

6. The process of Claim 4 or 5, wherein the residence time of the raw material and tallow in the rendering vessel (6) is in the range of substantially 2 to 10 minutes.

7. The process of any one of the preceding claims, wherein the rendering vessel (6) is a non pressurized tank having an agitator (7) and heat exchanger means.

8. The process of Claim 7, wherein the heat exchanger means is in the form of a vertical coil or pipes which act as baffles within the vessel.

9. The process of Claim 7 or 8, wherein rendering in the rendering vessel (6) is controlled by sensing the current drawn by the electric prime mover of the agitator (7) and thus determining the viscosity of the material in the rendering vessel, means being provided to control the ratio of raw material entering the vessel and the rate of addition of recycle tallow.

10. The process of Claim 8 or 9, wherein additional heat transfer to the raw material in the rendering vessel (6) is provided by an external heating jacket or a pancake type coil fitted to the rendering vessel.

11. The process as claimed in Claim 2, or any one of Claims 3 to 10, when dependent directly or indirectly on Claim 2, wherein the raw material is acidified to a pH of 3.8 to 4.5.

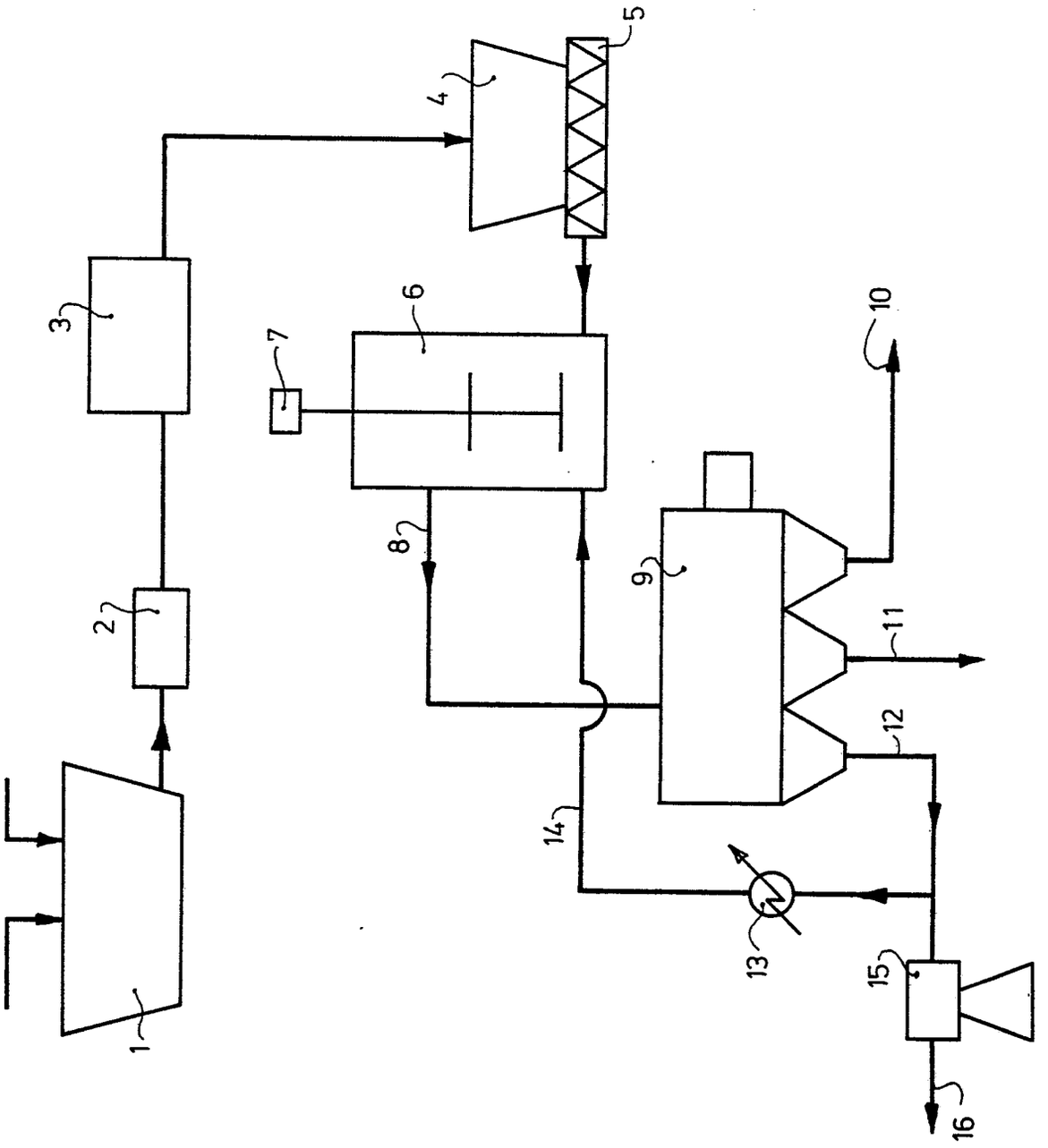
12. The process of Claim 11, wherein the acid is any one or a combination of acids selected from hydrochloric, sulphuric, phosphoric, citric, tannic, oxalic, tartaric, acetic, malic, formic, benzoic and lactic acids and their water soluble salts.

13. The process of any one of the preceding claims, wherein the raw material is comminuted (3) to a particle size in the range of substantially 12mm to 18mm.

14. The process of any one of the preceding claims, wherein the rendered material is separated in a three phase co-current decanter centrifuge (9), three phase countercurrent decanter centrifuge or a two phase decanter centrifuge.

15. The process of any one of the preceding claims, wherein the resultant stickwater (11) is ultrafiltered to recover solids and fat.

16. The process of any one of Claims 4 to 15, wherein the recycle tallow (14) is heated in a heat exchanger (13), said heat exchanger and the heat exchanger means of the rendering vessel being heated by steam or other suitable heat transfer fluid.


1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16

European Patent Office

EUROPEAN SEARCH REPORT

Application number
0048771
EP 80 10 5923

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim
X	US - A - 3 345 353 (O. KLUBIEN) * Column 1, line 54 to column 2, line 35; column 3, lines 1-43; examples 2-6 *	1,4-7, 10,14
X	FR - A - 1 062 003 (BELL S.A.) * Page 2, column 2, paragraph 2 to page 3, column 3; paragraph 3 *	1,3,6, 14
X	BE - A - 682 514 (BRITISH GLUES & CHEMICALS LTD.) * Page 2, line 26 to page 3, line 28; claim 1; examples * & GB - A - 1 094 915	1,3,13
D	US - A - 3 519 662 (M.E. GRUVER et al.) * Column 2, lines 26-40; column 3, lines 61-72; claims 1-3 *	2,11, 12,14
	FR - A - 1 409 660 (LYCOIL INC.) * Abstract 1; page 3, column 2, paragraph 2 *	14
	CHEMICAL ABSTRACTS, vol. 92, no. 23, June 1980, page 529, abstract 196554a, COLUMBUS, OHIO (US) R. DIEZ et al.: "Continuous process for obtaining edible fats and proteins" & Ind. Quim. 1979, 255, 34-7 * The whole abstract *	1,3

CLASSIFICATION OF THE APPLICATION (Int. Cl.³)

C 11 B 1/12

TECHNICAL FIELDS SEARCHED (Int. Cl.³)

C 11 B 1/12
C 11 B 1/00

CATEGORY OF CITED DOCUMENTS

X: particularly relevant
A: technological background
O: non-written disclosure
P: intermediate document
T: theory or principle underlying the invention
E: conflicting application
D: document cited in the application
L: citation for other reasons

&: member of the same patent family, corresponding document

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	24.07.1981	SCHUERMANS

EPO Form 1503.1 06.78