(19) DANMARK

(10) DK/EP 2837678 T3

Patent- og Varemærkestyrelsen

(12) Oversættelse af europæisk patentskrift

(51) Int.Cl.: *C 11 B 1/02 (2006.01)* *C 11 B 1/06 (2006.01)* *C 11 B 1/08 (2006.01)* *C 11 B 1/12 (2006.01)* *C 11 B 1/16 (2006.01)* *C 11 B 3/16 (2006.01)*

(45) Oversættelsen bekendtgjort den: **2019-12-09**

(80) Dato for Den Europæiske Patentmyndigheds bekendtgørelse om meddelelse af patentet: **2019-11-06**

(86) Europæisk ansøgning nr.: **14175098.4**

(86) Europæisk indleveringsdag: **2014-06-30**

(87) Den europæiske ansøgnings publiceringsdag: **2015-02-18**

(30) Prioritet: **2013-08-16 US 201361866775 P** **2014-02-13 US 201414180008**

(84) Designerede stater: **AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO RS SE SI SK SM TR**

(73) Patenthaver: **Zitnik, James K., 340 Green Oaks Lane, Southlake, TX 76092, USA**

(72) Opfinder: **Zitnik, James K., 340 Green Oaks Lane, Southlake, TX 76092, USA**

(74) Fuldmægtig i Danmark: **Plougmann Vingtoft A/S, Strandvejen 70, 2900 Hellerup, Danmark**

(54) Benævnelse: **FREMGANGSMÅDE TIL FORBEDRET AFSMELTNING**

(56) Fremdragne publikationer:
US-A- 3 230 054
US-A- 3 398 676
US-A- 3 410 882
US-A- 3 673 227
US-A- 3 899 301

DESCRIPTION

CROSS-REFERENCE TO RELATED APPLICATION

[0001] This application claims the benefit of U.S. Provisional Application No. 61/866,775, entitled "Systems and Methods for Improved Rendering," filed August 16, 2013.

FIELD OF THE INVENTION

[0002] The present invention generally relates to rendering, and more particularly to systems and methods for improved rendering.

BACKGROUND

[0003] Rendering is a process that generally converts animal products into more useful materials. Rendering typically separates the fat from the bone and protein and yields a fat commodity (such as grease) and a protein meal (meat or bone meal). Batch cooking systems and continuous cooker systems have been used for rendering. While these systems may be helpful in rendering, there are deficiencies that can lead to less than desirable end products and also can be energy intensive and are expensive to operate.

[0004] US3230054A discloses an apparatus for rendering oils and fats from solid oil-bearing materials, comprising means for pre-crushing the material, a first heat exchanger provided with means for conveying the material continuously through the heat-exchanger, a disintegrator, a second heat-exchanger provided with means for conveying the material continuously through said second heat-exchanger, and a press for expressing fats and oil from the cells of the material ruptured in the disintegrator.

[0005] US3398676A discloses a method for continuously rendering animal material comprising: reducing the size of the material, heating the material, and feeding the material into a continuously operating press.

[0006] US3673227A discloses a continuous process of dry rendering in which the raw materials are cooked to free the fats therefrom in a single cooking operation, the raw materials being reduced to a mean particle size and then cooked under controlled moisture and temperature conditions and maintained in the cooking vessel for a residence time at least equal to one hour flow rate of the materials through the cooker US3899301A discloses a cooker for a continuous rendering system.

[0007] US3410882 discloses a process and apparatus for continuously rendering fat from

tissue including a plurality of horizontally oriented vertically spaced apart interconnected chambers through which the animal matter to be rendered flows, with the chambers being heated to a temperature within a range of 210 F. to 280 F. and each having agitating means therein to cause the animal matter to be impinged against the inner cylindrical surfaces therein. A gate means within each chamber partially obstructs the interior of each chamber and thereby retains a predetermined volume of animal matter within each chamber whereby causing liquefaction of the fat and rupturing of the fat tissues and means for separating liquefaction and solid materials.

SUMMARY

[0008] According to an aspect of the invention, there is provided a method for improved rendering of animal products, as defined in claim 1. Preferred and/or optional features are set out in the dependent claims. Additional steps may be employed without departing from the present invention.

[0009] The ground materials may be heated to a temperature of approximately 110 degrees Celsius in the heating step. Pressure of approximately 4-5 ATM may be applied to the ground materials in the heating step.

[0010] The pressing step may be performed with a screw press.

[0011] The method may further comprise transferring the oil and water to a decanter, and removing residual solids from the oil and water to form a solution. The decanter may range in size from 10 microns to 1 millimeter. The method also may comprise centrifuging the solution to remove water and fine materials from the oil, employing a vertical separator to further remove waste water and sludge from the oil, employing a waste water oil separator to further separate oil from waste water, and/or employing a sludge oil separator to further separate oil from the sludge. Oil separated through use of the waste water oil separator and the sludge oil separator may be returned to the decanter. Oil separated through use of the waste water oil separator and the sludge oil separator may be transferred to a storage tank.

[0012] The method comprises applying pressure to the protein that has been separated from the oil and water via a protein press, thereby forming further broken-down protein and squeezing residual liquid out of the protein. The squeezed out residual liquid may be transferred to the decanter. The further broken-down protein may be transferred to a protein dryer to form a dried protein, and the dried protein may be crushed to form a powder protein. This crushing step may be performed using a hammer mill.

[0013] According to a non-claimed aspect, there is provided a method for improved rendering of animal products comprising grinding the animal products to form ground materials, transporting and heating the ground materials in one or more steam-jacketed tubes to create a slurry, pressing the slurry to separate protein from oil and water, applying pressure to the

protein that has been separated from the oil and water via a protein press, thereby forming further broken-down protein and squeezing residual liquid out of the protein, transferring the squeezed out residual liquid to the decanter, transferring the further broken-down protein to a protein dryer to form a dried protein, and crushing the dried protein to form a powder protein.

[0014] According to a non-claimed aspect, there is provides a method for improved rendering of animal products comprising grinding the animal products to form ground materials, transporting and heating the ground materials in one or more steam-jacketed tubes to create a slurry, pressing the slurry to separate protein from oil and water, transferring the oil and water to a decanter, removing residual solids from the oil and water to form a solution, centrifuging the solution to remove water and fine materials from the oil, employing a vertical separator to further remove waste water and sludge from the oil, employing a waste water oil separator to further separate oil from waste water, and employing a sludge oil separator to further separate oil from the sludge.

BRIEF DESCRIPTION OF THE DRAWING

[0015] For a more complete understanding of the invention, reference is now made to the following description, taken in conjunction with the accompanying drawings, in which:
The FIGURE depicts a system and method for improved rendering.

DETAILED DESCRIPTION

[0016] Rendering of animal products according to the present invention is accomplished through a multi-step process including at least a heating step employing one or more steam-jacketed tubes as well as a pressing step. However, as will be described in more detail below, additional steps may be employed to subject the animal products to heat and pressure to achieve high quality oil and protein products through rendering.

[0017] The method according to the present invention provides considerable energy savings in rendering, particularly as the capital expenditures (CAPEX) for such an improved rendering system may be considerably lower when compared to existing batch or continuous rendering systems due to cheaper installation and lower operating costs.

[0018] The FIGURE depicts a method for improved rendering. A system and method for improved rendering of animal products, such as the system and method depicted in the

[0019] FIGURE, may provide embodiments that are not claimed. In the grinding/pre-breaking step, fat and whole animal is broken into pieces. A pre-breaker machine is used to break up the bones, and a grinder, such as a Weiler grinder, is used for the grinding portion of this step. However, it should be appreciated that other similarly functioning machines may be used to

perform this step. By finely grinding fat and whole animal in this early step of the process, additional surface area is created. This allows a much lower use of energy to create the desired effect of separating the liquid from the protein in one or more steam-jacketed tubes as described below.

[0020] Once the grinding/pre-breaking step is completed, the ground materials are transported and heated in one or more steam-jacketed tubes. When heated, the ground materials liquefy as they travel through the steam-jacketed tubes to create a slurry. It should be appreciated that the pump pressure used in this step may be approximately 4-5 ATM, and the heating may be performed at a temperature of approximately 110 degrees Celsius according to an embodiment. It should be appreciated that no further mechanical action is required to perform this step of the improved rendering method.

[0021] A progressive cavity pump is used to supply pressure to move the slurry through the steam-jacketed tubes and up to the entry point of a screw press. The screw press is then used to press out the oil and water from the slurry. This drains protein from the liquid mixture of oil and water. It should be appreciated that use of a progressive cavity pump creates a large amount of pressure (i.e., pushing approximately 3630 kg (8,000 pounds) per hour) using a very small motor (approximately 0.93 kW (1.25 horsepower)). This pump pushes material easily through the rendering system without the need for additional mechanical action. The pressure employed inside of the screw press may be approximately 1724 bars (25,000 lbs per square inch). While this pressing step has been described as employing a screw press, it should be appreciated that other similar presses may be used.

[0022] Once the slurry is transferred into the press, water and oil are separated from the protein. The oil and water may be transferred to a decanter so that residual or heavy solids may be removed from the oil and water. It should be appreciated that a minimum of a 10-micron and a maximum of 1 millimeter sized decanter should be used to perform this separation.

[0023] By using this decanting step, use of settling tanks may be eliminated and a higher quality oil product may be produced.

[0024] High pressure is applied to the protein that has been separated from the oil and water through a protein press and/or a second press in order to further break down the protein and squeeze out any residual liquid or fat. Any residual liquid or fat that may be separated from the protein may be transferred to the decanter, and the decanting step may be employed with respect to this residual liquid or fat.

[0025] Following the decanting step(s), a centrifuge, such as a vertical centrifuge, or other similar mechanism may be used to remove water and extremely fine material (generally below approximately 10-20 microns in size) from the oil. This centrifuge step may provide for a final separation of the oil and water.

[0026] A vertical separator or other similar mechanism may then be used for residual oil collection with water and sludge coming off. A waste water oil separator may then be used to further separate oil from the resultant waste water, wherein the separated oil may be returned to the decanter. Similarly, a sludge oil separator may then be used to further separate oil from sludge, wherein the separated oil may be returned to the decanter. It also should be appreciated that the oil that remains following the centrifuge step may then be stored in storage tanks. The centrifuge step, like the decanting step, may eliminate the need to use settling tanks and may allow for a more high quality oil product to be produced.

[0027] The further broken-down protein that remains after the residual fat has been squeezed out may be then transferred to a protein dryer and then a hammer mill or another similar machine that may shred or crush the protein into smaller pieces, such as a protein powder.

[0028] It should be appreciated that the system and method for improved rendering may be used on any type of animal fat and/or bone. Further, while certain machines have been described as being used in particular steps of the improved rendering method, it should be appreciated that other machines may be used in place of or in addition to those described to perform similar functions.

REFERENCES CITED IN THE DESCRIPTION

This list of references cited by the applicant is for the reader's convenience only. It does not form part of the European patent document. Even though great care has been taken in compiling the references, errors or omissions cannot be excluded and the EPO disclaims all liability in this regard.

Patent documents cited in the description

- US61866775 **[0001]**
- US3230054A **[0004]**
- US3398676A **[0005]**
- US3673227A **[0006]**
- US3899301A **[0006]**
- US3410882A **[0007]**

Patentkrav

1. Fremgangsmåde til forbedret afsmeltning af dyreprodukter, hvilken fremgangsmåde omfatter:

at formale og forknuse fedt og en dyrekrop i en kværn og en forknusningsmaskine, idet forknusningsmaskinen er konfigureret til at knuse fedtet og dyrekroppen, og kværnen er konfigureret til at danne formalede materialer;

at transportere og opvarme de formalede materialer i et eller flere dampkapperør for at danne en opslæmning, efterhånden som de formalede materialer bliver flydende;

at påføre tryk på opslæmningen gennem en ekscentrisk snekkepumpe for at transportere opslæmningen gennem et eller flere dampkapperør uden yderligere mekanisk påvirkning;

at presse opslæmningen for at separere protein fra olie og vand;

at påføre tryk på protein som er blevet separeret fra olie og vand via en proteinpresse, for derved at danne yderligere nedbrudt protein,

hvor den ekscentriske snekkepumpe skubber omtrent 3630 kg (8.000 pund) af de formalede materialer pr. time,

hvor den ekscentriske snekkepumpe anvender en motor med omtrent 0,93 kW (1,25 hestekræfter), og

hvor en resterende væske fjernes fra proteinet.

2. Fremgangsmåde ifølge krav 1, hvor de formalede materialer opvarmes til en temperatur på omtrent 110 grader celsius i opvarmningstrinnet.

3. Fremgangsmåde ifølge krav 1 eller ifølge krav 2, hvor der påføres tryk på omtrent 4-5 ATM på de formalede materialer i opvarmningstrinnet.

4. Fremgangsmåde ifølge krav 1 eller et hvilket som helst af kravene 2 til 3, hvor presning udføres med en skruepresse.

5. Fremgangsmåde ifølge krav 1, endvidere omfattende:

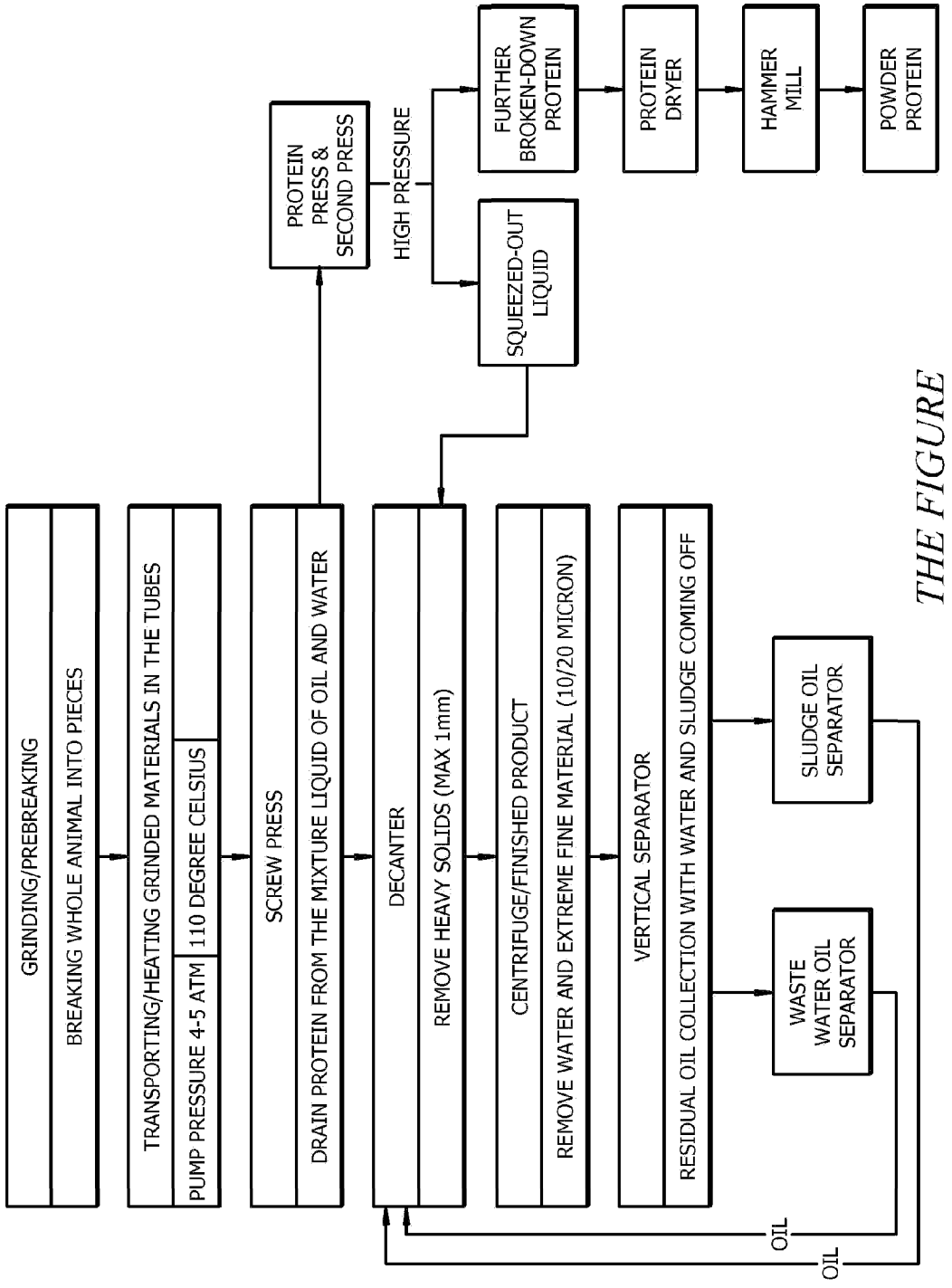
at overføre den udpressede resterende væske til en dekanter: og/eller

at overføre det yderligere nedbrudte protein til en proteintørrer for at danne et tørret protein; og

at knuse det tørrede protein for at dannet et pulverprotein; og

eventuelt eller fortrinsvis hvor knusningstrinnet udføres under anvendelse af en hammermølle.

DRAWINGS



THE FIGURE