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(54) Method and apparatus for processing slaughterhouse waste

(57) The present invention relates to a method for processing slaughterhouse waste, comprising the steps of reducing, dewatering and incinerating the slaughterhouse waste. The present invention furthermore relates to an apparatus for carrying out such a method.

It is an object of the present invention to provide a method and an apparatus for processing slaughterhouse waste, in which a calorically balanced mixture is supplied to the incinerator, so that the incineration thereof will take place under stable conditions.

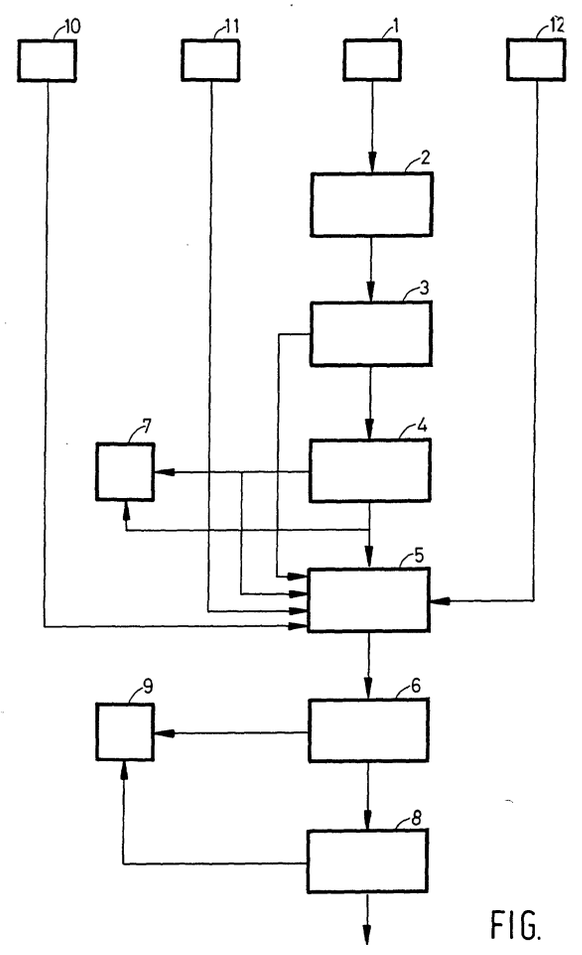

FIG.

EP 1 319 891 A1

Description

[0001] The present invention relates to a method for processing slaughterhouse waste, comprising the steps of reducing, dewatering and incinerating the slaughterhouse waste. The present invention furthermore relates to an apparatus for carrying out such a method.

[0002] The method referred to in the introduction is known per se from US patent No 6,055,917. According to the method that is known therefrom, animal carcasses are introduced into a reducing plant, after which the material reduced therein is transported to a closed, heated tube, in which the material is simultaneously dehydrated and transported to a primary incinerator. In the primary incinerator, the reduced, dehydrated slaughterhouse waste is incinerated to yield an ash component and a by-product component, which by-product component is subsequently transported to a secondary incinerator. In said secondary incinerator, the by-product component is incinerated anew and the exhaust gases being produced are filtered. The hot exhaust gases from the primary incinerator are reused in a useful manner for heating the closed tube into which the reduced slaughterhouse waste is carried.

[0003] One drawback of the method as described above is the fact that the direct incineration of reduced slaughterhouse waste presents a number of problems. In particular the inhomogeneity of the raw materials plays a large role in this connection, which inhomogeneity is caused by the fact that the various raw materials are of different origin, as well as by the presence of impurities therein, such as metals, ropes, plastics, stones and the like. An additional problem is the fact that it is not possible in practice to effect a steady supply of the raw materials through the day and through the week, in which connection mention should furthermore be made of the fact that such natural raw materials are liable to decay, in particular in the summer, which leads to environmental problems. In addition, the method that is known from the aforesaid document is not designed to cope with peaks in the supply of the raw materials.

[0004] The object of the present invention is thus to provide a method as well as an apparatus for processing slaughterhouse waste, by means of which the aforesaid problems of the prior art can be eliminated.

[0005] Another object of the present invention is to provide a method and an apparatus for processing slaughterhouse waste, in which a calorically balanced mixture is supplied to the incinerator, so that the incineration thereof will take place under stable conditions.

[0006] Another object of the present invention is to provide a method and an apparatus for processing slaughterhouse waste, which make it possible to cope with supply peaks in an advantageous manner.

[0007] Yet another object of the present invention is to provide a method and an apparatus for processing slaughterhouse waste in which also other waste flows besides slaughterhouse waste can be processed in an advantageous manner.

[0008] According to the present invention, the method as referred to in the introduction is characterized in that it comprises the following steps:

i) supplying the slaughterhouse waste to a buffer vessel after reduction thereof,
ii) supplying the contents of the buffer vessel to a separator,
iii) effecting a separation into a dry fraction and a wet fraction in said separator,
iv) subjecting the wet fraction obtained in step iii) to an additional separating step so as to obtain a water fraction and a fat fraction,
v) mixing the fat fraction from step iv), the water fraction from step iv) and the dry fraction from step iii) in the desired ratio in a mixer,
vi) supplying the flow obtained in the mixer of step v) to the incinerator.

[0009] Since the reduced slaughterhouse waste is supplied to a buffer vessel in step i), it is possible to cope with peak loads in the supply of the slaughterhouse waste. The reducing step is preferably carried out in a space whose floor consists of screw conveyors in large part. The screw conveyors that are disposed on the floor convey the materials to other screw conveyors, which load the materials into a coarse crusher. After this coarse crushing step, demetallising and fine crushing take place, with the slaughterhouse waste eventually having a dimension of, preferably, maximally 20 mm. Before the thus reduced slaughterhouse waste is supplied to a buffer vessel, the reduced slaughterhouse waste is pumped through an apparatus in which direct heating takes place. An apparatus which is suitable for that purpose is a so-called disc apparatus, viz. a horizontal vessel in which the heat content of, for example, steam is transmitted to the reduced slaughterhouse waste by means of a mixing gear having a large heat-transmitting area. Said heating step is preferably carried out in such a manner that the temperature of 85 °C is reached. After the thus heated, reduced slaughterhouse waste has been pumped into the buffer vessel, the contents thereof are kept in motion so as to prevent deposition of the solid components, which is preferably realised by circulating the contents of the buffer vessel by means of centrifugal pumps. Any vapours that may be released are discharged to a steam boiler or to an incinerator. The outlet of the buffer vessel is connected to a separator, in which a separation into a dry fraction and a wet fraction takes place, which wet fraction is additionally separated into a water fraction and a fat fraction in another installation. Such a separation is in particular desirable because it has become apparent in practice that minor inhomogeneities with regard to the amount of fat and the amount of water in the mixture that is supplied to the incinerator have a highly disturbing effect on the incineration process that takes place in the inciner-

ator.

[0010] In a special embodiment of the present method, part of the wet fraction from step iii) may be directly supplied to the mixer as used in step v). Such an operation is in particular desirable if the composition of the mixture being supplied to the incinerator is too dry for said mixture to be supplied to the incinerator by pumping.

[0011] In a special embodiment of the present method it is furthermore preferred to discharge part of the fat fraction from step iv).

[0012] Such a measure is in particular taken if the amount of fat, a material having a high caloric value, that is present in the slaughterhouse waste is too high to obtain a homogeneous incineration in the incinerator.

[0013] In addition to that it may be preferred to discharge part of the water fraction from step iv).

[0014] Such a measure is in particular taken if the caloric value of the mixture being supplied to the incinerator is too low, so that the extraction of water from the slaughterhouse waste will lead to an increased caloric value. In a specific embodiment it is also possible to discharge part of the wet fraction from step iii).

[0015] The method according to the present invention can be carried out in such a manner that besides the slaughterhouse waste also one or more additional flows, such as tankage, blood, sludge or mixtures thereof, can be supplied to the mixer as used in step v). This means that the present method can be carried out in such a flexible manner that also other residual flows, which so far have been difficult to incinerate, can be supplied to the incinerator and be incinerated therein.

[0016] Furthermore, in order to obtain a substantially complete incineration of the slaughterhouse waste, it is preferred to use a fluid bed incinerator in step v), possibly provided with a flue gas purification plant disposed downstream thereof for removing any toxic and other undesirable components from the flue gas before emission into the atmosphere takes place.

[0017] The present invention furthermore relates to an apparatus for processing slaughterhouse waste, which apparatus comprises the required pumps, piping, valves and control elements, which apparatus is characterized in that the device for reducing slaughterhouse waste is connected to a buffer vessel disposed downstream thereof, which buffer vessel is connected to a separator disposed downstream thereof, which separator effects a separation into a wet fraction and a dry fraction, in which the wet fraction is supplied to a device disposed downstream thereof for separating the wet fraction into a fat fraction and a water fraction, in which the dry fraction is supplied to a mixer disposed downstream thereof, which mixer is furthermore connected to a pipe for receiving the water fraction and to a pipe for receiving the fat fraction, in which mixer the water fraction, the fat fraction and the dry fraction are mixed according to a specific ratio, which mixer is finally connected to an incinerator disposed downstream thereof.

[0018] In a special embodiment of the present invention, it is in particular preferred for the mixer to comprise one or more feeding arrangements for tankage, blood and sludge, or a mixture thereof.

[0019] In order to obtain an optimally advantageous incineration, the incinerator is preferably a fluid bed incinerator, possibly provided with a flue gas purification plant disposed downstream thereof.

[0020] The present invention will be explained hereinafter with reference to a figure; it should be noted, however, that the figure is solely added by way of illustration.

[0021] The appended figure is a schematic representation of the present method.

[0022] The slaughterhouse waste is supplied and stored in a hopper 1, which hopper 1 has a floor which consists of screw conveyors in large part. The screw conveyors disposed on the floor convey the waste materials to other screw conveyors, after which a number of reducing steps are carried out, in particular coarse crushing, demetallizing and fine crushing. The thus reduced material is subjected to a heating step (not shown), which heating step in particular comprises a disc apparatus in which the reduced slaughterhouse waste is heated to a temperature of about 85 °C, at which temperature further decay is minimised, by means of a mixing gear having a large heat-transmitting area. After sufficient heating, the reduced, heated slaughterhouse waste is supplied to a buffer vessel 2, which buffer vessel 2 preferably comprises means for preventing the deposition of solid components, in particular by using a circulating installation comprising centrifugal pumps. The vapours being released in the buffer vessel 2 are supplied to a steam boiler (not shown) after condensation, or to the incinerator 6. The buffer vessel 2 is provided with a discharge pipe, which is connected to a separator 3, in which a separation into a dry fraction and a wet fraction takes place, which wet fraction is additionally separated into a water fraction and a fat fraction in a separator 4. Both the water fraction and the fat fraction from the separator 4 are supplied to a mixer 5. Part of the fat fraction as well as part of the water fraction are supplied to a storage unit 7. In the mixer 5, a homogeneous mixture consisting of the dry fraction from the separator 3, the fat fraction from the separator 4 and the water fraction from the separator 4 is prepared. In addition to that, one or more additional flows may be supplied to the mixer 5, such as tankage from the container 10, blood from the container 11 or sludge from the container 12, or a mixture thereof (not shown). It should be understood that the present method may comprise a number of return flows, which return flows are not shown for the sake of simplicity. Thus, part of the water fraction may be returned, for example, to the disc apparatus or to the buffer vessel 2, for example.

[0023] After sufficient mixing according to the desired ratio in the mixer 5, the mixture thus obtained is transported to an incinerator 6, in which a homogeneous incineration is effected by carrying out the present method

steps, resulting in a solid residual flow which is discharged to a container 9. The flue gases produced as a result of the incineration in the incinerator 6 are subjected to a subsequent treatment in a flue gas unit 8, and the collected solid materials are discharged to the container 9. The purified flue gases are subsequently discharged into the atmosphere.

[0024] The essence of the present invention is in particular the realisation of the desired composition of the mixture to be incinerated, which mixture is supplied to the incinerator. The fact is that if a composition outside the desired range is presented to the incinerator, a distinct disturbance of the incineration process will occur, in particular as regards temperature fluctuation and emission of harmful substances into the atmosphere, which is undesirable. The desired composition is obtained by subjecting the reduced, heated slaughterhouse waste exiting the buffer vessel to two separating operations, viz. effecting a separation into a dry fraction and a wet fraction and subsequently subjecting the wet fraction to an additional separation so as to obtain a water fraction and a fat fraction, in which the dry fraction, the water fraction and the fat fraction are mixed according to a specific ratio in the mixer, after which the obtained mixture is supplied to the incinerator in order to thus effect a homogeneous incineration therein.

Claims

1. A method for processing slaughterhouse waste, comprising the steps of reducing, dewatering and incinerating the slaughterhouse waste, **characterized in that** the method comprises the following steps:

   i) supplying the slaughterhouse waste to a buffer vessel (2) after reduction thereof,
   ii) supplying the contents of the buffer vessel to a separator (3),
   iii) effecting a separation into a dry fraction and a wet fraction in said separator (3),
   iv) subjecting the wet fraction obtained in step iii) to an additional separating step (4) so as to obtain a water fraction and a fat fraction,
   v) mixing the fat fraction from step iv), the water fraction from step iv) and the dry fraction from step iii) in the desired ratio in a mixer (5),
   vi) supplying the flow obtained in the mixer (5) of step v) to an incinerator (6).

2. A method according to claim 1, **characterized in that** in accordance with step i) the slaughterhouse waste is heated after being reduced and subsequently supplied to the buffer vessel (2).

3. A method according to claim 1, **characterized in that** part of the wet fraction from step iii) is directly supplied to the mixer (5) as used in step v).

4. A method according to any one or more of the preceding claims, **characterized in that** part of the fat fraction from step iv) is discharged.

5. A method according to any one or more of the preceding claims, **characterized in that** part of the water fraction from step iv) is discharged.

6. A method according to any one or more of the preceding claims, **characterized in that** part of the wet fraction from step iii) is discharged.

7. A method according to any one or more of the preceding claims, **characterized in that** one or more additional flows (10, 11, 12) selected from the group consisting of tankage, blood and sludge or a mixture thereof, can be supplied to the mixer (5) as used in step v).

8. A method according to any one or more of the preceding claims, **characterized in that** said buffer vessel (2) is provided with means for preventing the deposition of reduced slaughterhouse waste.

9. A method according to any one or more of the preceding claims, **characterized in that** a fluid bed incinerator is used in step v), possibly provided with a flue gas purification plant (8) disposed downstream thereof.

10. An apparatus for processing slaughterhouse waste, which apparatus comprises the required pumps, piping, valves and control elements, **characterized in that** the device for reducing slaughterhouse waste is connected to a buffer vessel (2) disposed downstream thereof, which buffer vessel (2) is connected to a separator (3) disposed downstream thereof, which separator (3) effects a separation into a wet fraction and a dry fraction, in which the wet fraction is supplied to a device (4) disposed downstream thereof for separating the wet fraction into a fat fraction and a water fraction, in which the dry fraction is supplied to a mixer (5) disposed downstream thereof, which mixer (5) is also connected to a pipe for receiving the water fraction and to a pipe for receiving the fat fraction, in which mixer (5) the water fraction, the fat fraction and the dry fraction are mixed according to a specific ratio, which mixer (5) is finally connected to an incinerator (6) disposed downstream thereof.

11. An apparatus according to claim 10, **characterized in that** means for heating the reduced slaughterhouse waste are disposed between the device for reducing slaughterhouse waste and the buffer vessel (2).

12. An apparatus according to any one or more of the preceding claims 10-11, **characterized in that** the mixer (5) furthermore comprises one or more feeding arrangements (10, 11, 12) for tankage, blood and sludge, or a mixture thereof.

13. An apparatus according to any one or more of the preceding claims 10-12, **characterized in that** the incinerator (6) is a fluid bed incinerator.

14. An apparatus according to any one or more of the preceding claims 10-13, **characterized in that** a flue gas purification plant (8) is disposed downstream of the incinerator (6).

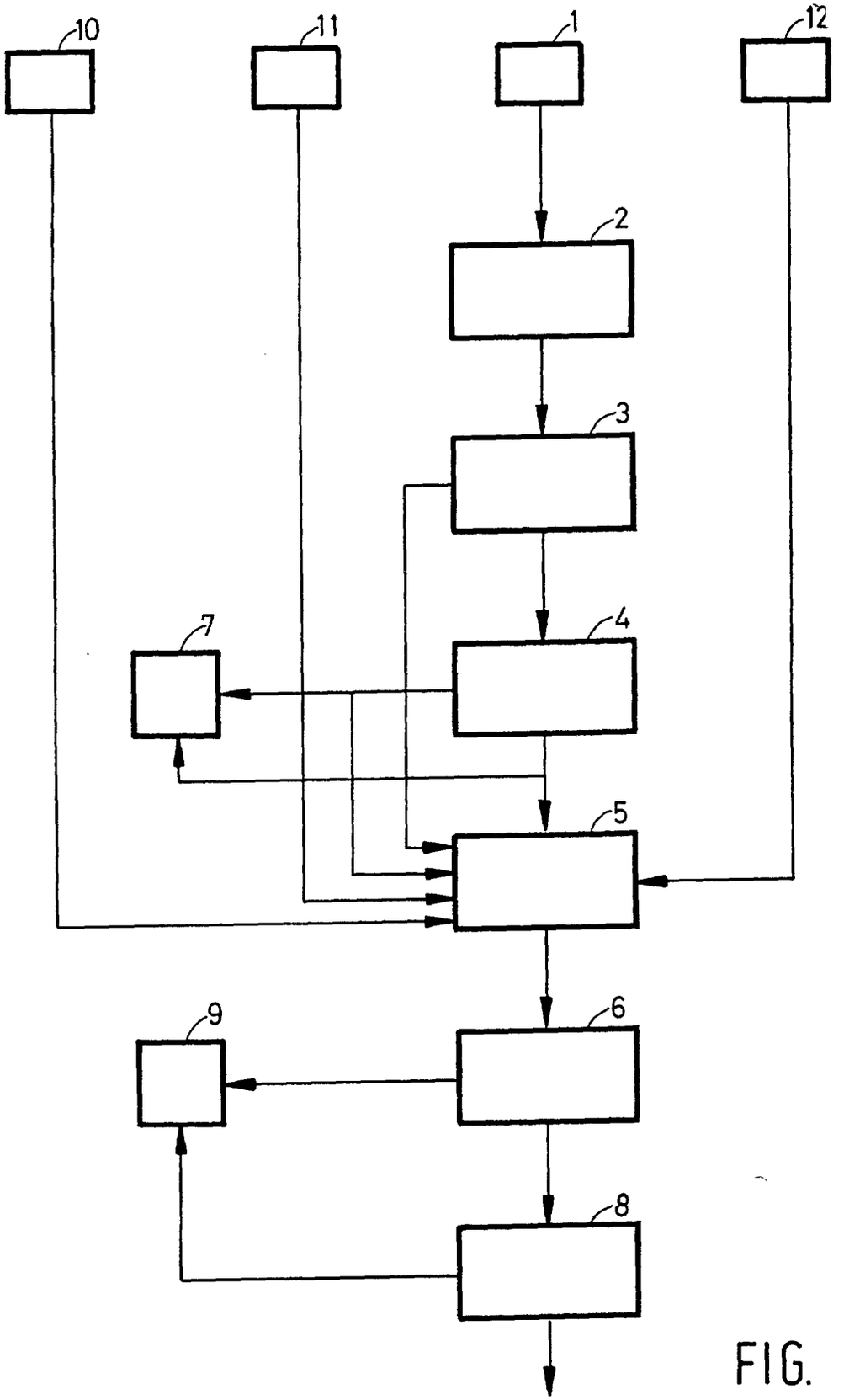

FIG.

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EUROPEAN SEARCH REPORT

Application Number
EP 02 07 9981

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Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.7)
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The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	13 February 2003	Mougey, M

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 02 07 9981

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