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(12) **EUROPEAN PATENT APPLICATION**

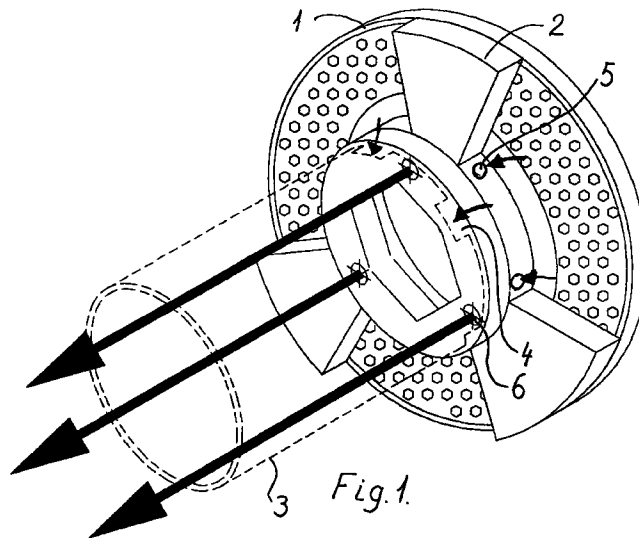
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(54) **Apparatus and method for comminuting food products, such as meat, under vacuum, or gas or liquid being added**

(57) Apparatus for comminuting and/or emulgating food products comprising a comminuting tool having one or several rotating elements comprising a connection element (3) provided with openings (4, 5) being in connection with the comminuting tool (1, 2) close to the axis of rotation of the rotating element(s) (2) in the com-

minuting tool (2).
The connection element (3) is used for evacuating the region around the comminuting tool (1, 2) or for adding a gas or a liquid to the food product.



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Description

[0001] The present invention relates to an apparatus and a method for comminuting food products, such as meat, under vacuum, or gas or liquid being added.

[0002] Such apparatuses and methods are known in numerous forms and are used in the food industry, preferably for processing meat products. So, with a view to the colour and durability of the resulting product, it is desirable that the comminuting is made under vacuum. This is especially the case when producing forcemeat products, such as sausage meat.

[0003] DE 3,604,595 discloses a method and an apparatus for comminuting food products, especially meat, under vacuum. The publication describes that the whole of the apparatus, i.e. funnel, feeding well and worm house, is evacuated through a vacuum connection placed in the cover, the placement in the cover and the gravitation preventing the product from being sucked out into the vacuum system. This embodiment has the effect that a large volume has to be closed from the surroundings and evacuated, leaving no possibility of a continuous flow of new raw material during the process which consequently must run in portions or intermittent. Further, the process described demands sealing of various axle bushings for drive axles for the worm and the rotating knife.

[0004] On the basis of this known prior art it is the object of the present invention to provide an apparatus and a method with which the comminution may be carried out under vacuum, or gas or liquid being added, and with the above disadvantages of the known prior art having been reduced. This object is achieved by using an apparatus of the above mentioned kind characterised by the arrangements set forth in the characterising part of claim 1 and by methods for using this apparatus characterised by the arrangements set forth in the characterising part of the claims 8 - 14.

[0005] By using the apparatus in connection with vacuum the centrifugal force provided in connection with the rotating tool is exploited by the invention for separating a product from the air being extracted, and the vacuum desired is provided close to the comminuting tool where exactly a minimum air content is desirable in order to prevent air being mixed into the product during and after the comminution.

[0006] In a surprising way the same apparatus which is used under vacuum may be used also for adding gas or liquid to the food product in order to obtain an increased volume or an increased temperature, an increased durability or a changed consistence or taste of the resulting product.

[0007] Preferred embodiments of the invention are revealed in the subordinate claims. Accordingly, the provided vacuum may be used for conveying the product to the comminuting tool, and the product being on its way to the tool may function as an air restricting arrangement. The evacuation of the region at the comminuting

tool may be provided by openings in a connection element providing a connection to a vacuum system, or by openings constructed in the rotating element(s) of the comminuting tool, said openings being connected to the connection element by means of ducts constructed in the rotating element(s) of the comminuting tool.

[0008] The connection element may lead forward to the comminuting tool from the inlet or the outlet side for the product.

[0009] Some additional advantages are achieved by the invention, since the vacuum provided at the axis of rotation gives a better radial distribution of the product over the comminuting tool, said vacuum pulling the product against the centrifugal force towards the axis of rotation. Further, the vacuum created may be used for conveying the product to the comminuting tool, it being possible - by means of a flexible hose - to suck up the product from a container and advance it to the comminuting tool.

[0010] When adding gas or liquid to the food product the added gas may e.g. be air, with the sole object of increasing the volume of the resulting product, or an inactive or active gas with the object of increasing the durability, the inactive gas displacing the oxygen being present, or it may be water vapour at a relatively high temperature with the object of increasing the temperature of the resulting product.

[0011] When adding liquid, the object may be to change the consistence of the resulting product or to change the taste of the resulting product, since the liquid may contain various flavouring agents.

[0012] The invention is explained in detail in the following by means of an exemplary embodiment with reference to the drawing, the only figure of which roughly shows a comminuting tool comprising a perforated disc and a rotating knife constructed in correspondence with a preferred embodiment of the invention.

[0013] The comminuting apparatus shown in the drawing comprises a stationary perforated disc 1 and together with the latter a rotating knife 2 and a connection element 3 placed close to the hub of the knife 2. The connection element 3 is placed in the main sealingly against the hub of the knife 2 and provided with recesses 4, through which air may be extracted from the region around the comminuting tool, or gas or liquid may be added to the region around the comminuting tool, the connection element in a manner not shown being connected to a vacuum system sucking air away in the direction of the arrows, or to a system for supplying gas or liquid which supplies gas or liquid in the direction opposite to the arrows. Additionally, the hub of the knife 2 is provided with radially opening holes 5, which by means of connection ducts 6 are connected with the connection element 3, so that said holes 5 may be used with the same function as the recesses 4, as described above. The comminuting tool shown is placed in a tubular house not shown to which the material to be comminuted is supplied. The knife 2 is made to rotate by

means of an axle not shown extending through the hub of the knife in engagement with the hexagonal hole. Caused by the rotation of the knife the centrifugal force will press the supplied material outwardly towards the periphery of the perforated disc 1, in such a way that the holes 5 and the slots 4 may be used for removing air from the supplied material or, alternatively, supply gas or liquid to the supplied material. Consequently, the supplied material will when providing vacuum be sucked towards the knife 2 and the perforated disc 1 and the further conveyance through the holes in the perforated disc 1 is provided by the knife 2 being shaped like a propeller (not shown in the drawing).

[0014] With the apparatus shown it is possible to obtain a comminution/emulgating and vacuuming of the supplied product in one processing step. The vacuum at the central part of the knife 2 will provide a better distribution of the product over the area of the perforated disc 1, the product being sucked towards the central part against the centrifugal force. The conveyance of the product to the knife 2 and the perforated disc 1 may be carried out in a traditional manner by using a worm or a pump or by means of a funnel or by using the vacuum provided around the comminuting tool.

[0015] In the embodiment shown the connection element 3 is shown as a tube extending centrally around the axis of rotation of the knife 2 on the inlet side for material, as the drive axle of the knife 2 is supposed to run inside the connection element 3. In the embodiment shown the drive axle is supposed to be connected to the hub of the knife 2 in a sealing manner. Alternatively, the drive axle is supposed to extend from the opposite side of the perforated disc 1 through the latter, thus preventing the connection element 3 from being partly blocked by the drive axle. Alternatively, the connection element 3 is supposed to be placed on the outlet side of the comminuting tool, the connection element 3 being connected to the hub of the knife 2 through a central hole in the perforated disc 1 in a manner to provide a sealing connection between the connection element 3 and the hub of the rotating knife 2, and the connection ducts in the hub of the knife 2 provide a connection between the connection element 3 and the radially opening holes 5 in the hub.

[0016] Even though the invention has been described above in connection with a specific embodiment of a comminuting tool, as shown in the drawing, the invention may be used with the same advantages in connection with other comminuting tools which e.g. may comprise a number of perforated discs with rotating knives etc.

[0017] Further, the invention makes it possible to convey a product to the comminuting tool by means of the provided vacuum, since the housing containing the comminuting tool may be provided with a flexible hose, through which the product may be sucked towards the comminuting tool from a container or the like.

Claims

1. Apparatus for comminuting and/or emulgating food products comprising a comminuting tool having one or several rotating elements, **characterised** by comprising a connection element (3), said connection element (3) being constructed with openings (4, 5) being connected to the comminuting tool (1, 2) close to the axis of rotation of the rotating element(s) (2) in the comminuting tool (2).
2. Apparatus according to claim 1 in which the comminuting tool comprises a stationary perforated disc (1) and a rotating knife (2) with a central hub for connecting to a drive axle, **characterised** in that the connection element (3) is provided with openings (4) immediately adjacent to the central hub of the rotating knife (2).
3. Apparatus according to claim 1 or 2, **characterised** by comprising ducts (6) constructed in the rotating element(s), said ducts (6) connecting the connection element (3) with openings (5) in the rotating element(s).
4. Apparatus according to any of the previous claims, **characterised** in that the connection element (3) is constructed as a tube extending along the axis of rotation of the rotating element(s) in the comminuting tool (1, 2).
5. Apparatus according to any of the previous claims, **characterised** in that the connection element (3) is constructed as integrated with the driving axle of the rotating element(s) (1, 2).
6. Apparatus according to any of the previous claims, **characterised** in that the connection element (3) is placed on the outlet side of the comminuting tool (1, 2).
7. Apparatus according to any of the previous claims, **characterised** in that the connection element (3) is placed on the inlet side of the comminuting tool (1, 2).
8. Method for using the apparatus according to any of the previous claims, **characterised** in that the connection element (3) is used for evacuating the area around the comminuting tool (1, 2), the centrifugal force provided by the rotating elements being used for separating the food product from the extracted air.
9. Method according to claim 8, **characterised** in that the provided vacuum is used for conveying the food product to the comminuting tool.

10. Method according to claim 8 or 9, **characterised** in that the material provided by means of vacuum and supplied in a compact way is used as an air restricting arrangement in the supply region of the comminuting tool. 5
11. Method for using the apparatus according to any of the claims 1 - 7, **characterised** in that the connection element is used for adding a gas to the food product close to the axis of rotation of the rotating element(s). 10
12. Method according to claim 11, **characterised** in that the supplied gas has at least one of the following properties: 15
- a) Preserving function
 - b) Heating function (e.g. steam)
 - c) Volume increasing function 20
13. Method for using the apparatus according to any of the claims 1 - 7, **characterised** in that the connection element is used for adding a liquid to the food product close to the axis of rotation of the rotating element(s). 25
14. Method according to claim 13, **characterised** in that the added liquid is added with a view to obtaining a preservation and/or a changed consistence, colour or taste of the resulting product. 30

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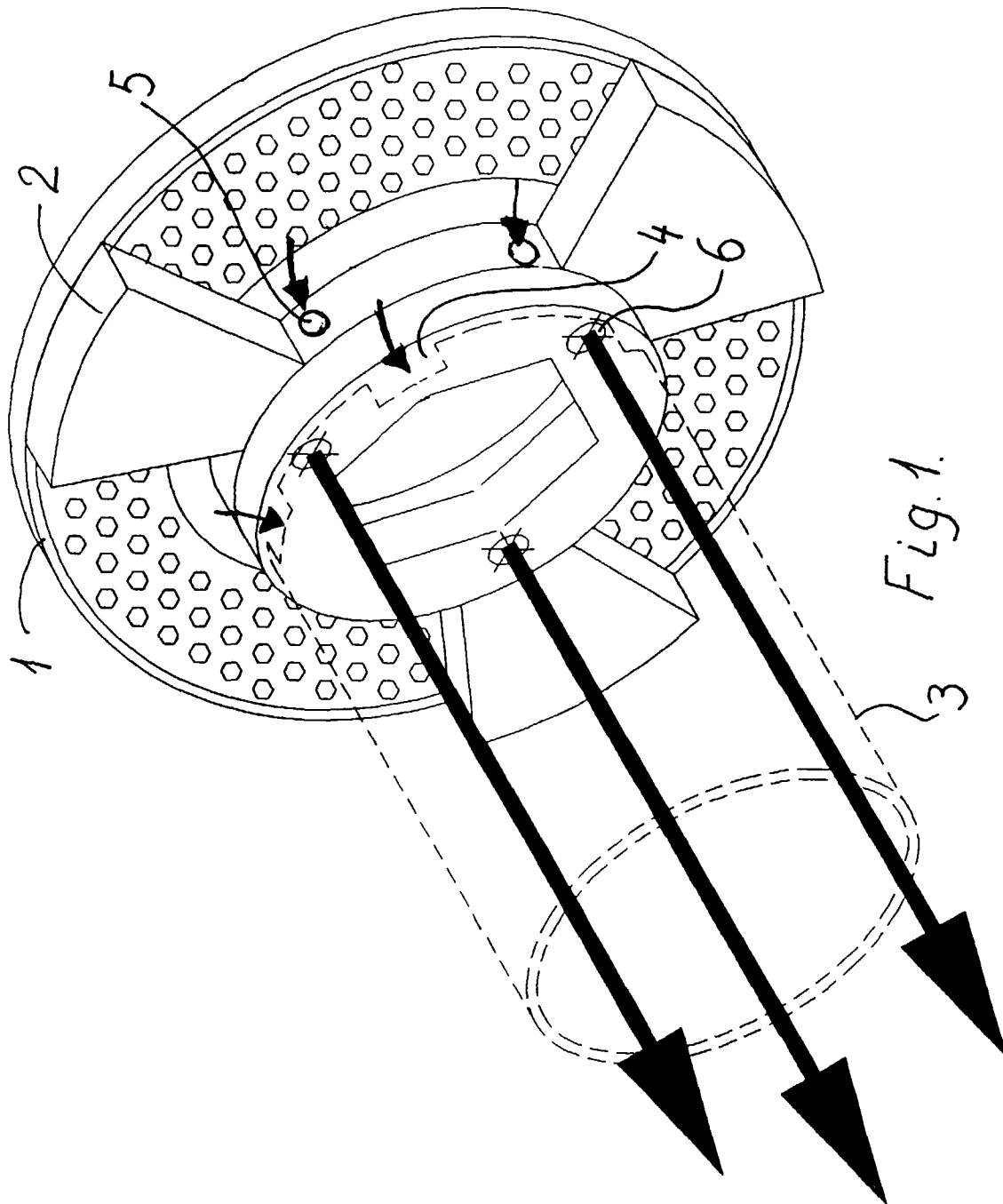


Fig. 1.



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EUROPEAN SEARCH REPORT

Application Number
EP 99 10 9803

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.6)
X	FR 2 474 342 A (EISENWERKE FRIED W DUKER GMBH) 31 July 1981 (1981-07-31) * page 5, line 16 - page 6, line 6; figures 1,2 *	1,2,4,6	B02C18/30 B02C23/18
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			TECHNICAL FIELDS SEARCHED (Int.Cl.6)
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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		9 September 1999	Verdonck, J
CATEGORY OF CITED DOCUMENTS		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document	
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ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.

EP 99 10 9803

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For more details about this annex : see Official Journal of the European Patent Office, No. 12/82