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(54) **Apparatus and method for comminuting food products, such as meat, under vacuum**

Vorrichtung und Verfahren zum Zerkleinern von Nahrungsmitteln, insbesondere Fleisch, unter Vakuum

Procédé et dispositif de hachage de produits alimentaires, notamment de la viande, sous vide

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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.

**[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, 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 7-9.

**[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]** 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.

**[0007]** The connection element may lead forward to

the comminuting tool from the inlet or the outlet side for the product.

**[0008]** 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.

**[0009]** 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.

**[0010]** 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, the connection element in a manner not shown being connected to a vacuum system sucking air away in the direction of 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. 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).

**[0011]** 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.

**[0012]** In the embodiment shown the connection ele-

ment 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.

**[0013]** 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.

**[0014]** 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, further 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), the comminuting tool comprising a stationary perforated disc (1) and a rotating knife (2) with a central hub for connecting to a drive axle, wherein the connection element (3) is connected sealingly against the hub of the knife and the connection element (3) is provided with openings (4) immediately adjacent to the central hub of the rotating knife (2), the rotation of the knife (2) pressing the supplied food products outwardly towards a periphery of the perforated disc (1), **characterized in that** the connection element is connected to a vacuum system, so that in use air is removed from the food products through the openings (4, 5).
2. Apparatus according to claim 1, **characterised by** comprising ducts (6) constructed in the rotating ele-

ment(s), said ducts (6) connecting the connection element (3) with openings (5) in the rotating element (s).

- 5 3. Apparatus according to claim 1 or 2, **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).
- 10 4. 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).
- 15 5. 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).
- 20 6. 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).
- 25 7. 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.
- 30 8. Method according to claim 7, **characterised in that** the provided vacuum is used for conveying the food product to the comminuting tool.
- 35 9. Method according to claim 7 or 8, **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.

### Patentansprüche

- 45 1. Vorrichtung zum Zerkleinern und/oder Emulgieren von Nahrungsmittelprodukten mit einem Zerkleinerungswerkzeug mit einem oder mehreren sich drehenden Elementen, ferner mit einem Verbindungselement (3), das mit Öffnungen (4, 5) versehen ist, die nahe der Drehachse des/der sich drehenden Elements/e (2) im Zerkleinerungswerkzeug (2) mit dem Zerkleinerungswerkzeug (1, 2) verbunden sind, wobei das Zerkleinerungswerkzeug eine feststehende perforierte Scheibe (1) und ein sich drehendes Messer (2) mit einer mittleren Nabe zur Verbindung mit einer Triebachse aufweist, wobei das Verbindungselement (3) dichtend mit der Nabe des Messers verbunden ist und das Verbindungselement (3) unmittelbar neben der mittleren Nabe des sich drehenden

- Messers (2) mit Öffnungen (4) versehen ist, wobei die zugeführten Nahrungsmittelprodukte durch die Drehung des Messers (2) nach außen zu einem Umfang der perforierten Scheibe (1) gedrückt werden, **dadurch gekennzeichnet, dass** das Verbindungselement mit einem Vakuumsystem verbunden ist, so dass im Gebrauch Luft aus den Nahrungsmittelprodukten durch die Öffnungen (4, 5) entfernt wird.
2. Vorrichtung nach Anspruch 1, **dadurch gekennzeichnet, dass** sie Kanäle (6) aufweist, die in dem/den sich drehenden Element/en konstruiert sind und das Verbindungselement (3) mit Öffnungen (5) in dem/den sich drehenden Element/en verbinden.
  3. Vorrichtung nach Anspruch 1 oder 2, **dadurch gekennzeichnet, dass** das Verbindungselement (3) als ein Rohr konstruiert ist, das sich entlang der Drehachse des/der sich drehenden Elements/e in dem Zerkleinerungswerkzeug (1, 2) erstreckt.
  4. Vorrichtung nach einem der vorhergehenden Ansprüche, **dadurch gekennzeichnet, dass** das Verbindungselement (3) integriert in der Triebachse des/der sich drehenden Elements/e (1, 2) konstruiert ist.
  5. Vorrichtung nach einem der vorhergehenden Ansprüche, **dadurch gekennzeichnet, dass** das Verbindungselement (3) an der Auslassseite des Zerkleinerungswerkzeugs (1, 2) platziert ist.
  6. Vorrichtung nach einem der vorhergehenden Ansprüche, **dadurch gekennzeichnet, dass** das Verbindungselement (3) an der Einlassseite des Zerkleinerungswerkzeugs (1, 2) platziert ist.
  7. Verfahren zur Verwendung der Vorrichtung nach einem der vorhergehenden Ansprüche, **dadurch gekennzeichnet, dass** das Verbindungselement (3) zur Evakuierung des Bereichs um das Zerkleinerungswerkzeug (1, 2) verwendet wird, wobei die von den sich drehenden Elementen aufgebrachte Zentrifugalkraft zum Trennen des Nahrungsmittelprodukts von der abgesaugten Luft eingesetzt wird.
  8. Verfahren nach Anspruch 7, **dadurch gekennzeichnet, dass** das bereitgestellte Vakuum zum Transportieren des Nahrungsmittelprodukts zum Zerkleinerungswerkzeug verwendet wird.
  9. Verfahren nach Anspruch 7 oder 8, **dadurch gekennzeichnet, dass** das mittels Vakuum bereitgestellte und auf kompakte Weise zugeführte Material als eine Luftdrosselanordnung im Zufuhrbereich des Zerkleinerungswerkzeugs verwendet wird.

## Revendications

1. Appareil destiné à hacher et / ou à émulsifier des produits alimentaires, comportant un outil de hachage doté d'un ou plusieurs éléments rotatifs, comportant en outre un élément (3) de liaison, ledit élément (3) de liaison étant construit avec des ouvertures (4, 5) reliées à l'outil (1, 2) de hachage près de l'axe de rotation du ou des éléments (2) rotatifs de l'outil (1, 2) de hachage, l'outil de hachage comportant un disque (1) perforé fixe et un couteau (2) rotatif doté d'un moyeu central en vue d'une liaison avec un axe d'entraînement, l'élément (3) de liaison étant raccordé de façon étanche contre le moyeu du couteau et l'élément (3) de liaison étant pourvu d'ouvertures (4) immédiatement adjacentes au moyeu central du couteau (2) rotatif, la rotation du couteau (2) pressant les produits alimentaires fournis vers l'extérieur en direction d'une périphérie du disque (1) perforé, **caractérisé en ce que** l'élément (3) de liaison est relié à un système de vide, de sorte que, pendant l'utilisation, de l'air est extrait des produits alimentaires à travers les ouvertures (4, 5).
2. Appareil selon la revendication 1, **caractérisé en ce qu'il** comprend des conduits (6) ménagés dans le ou les éléments rotatifs, lesdits conduits (6) reliant l'élément (3) de liaison à des ouvertures (5) dans le ou les éléments rotatifs.
3. Appareil selon la revendication 1 ou 2, **caractérisé en ce que** l'élément (3) de liaison est construit comme un tube s'étendant le long de l'axe de rotation du ou des éléments rotatifs dans l'outil (1, 2) de hachage.
4. Appareil selon l'une quelconque des revendications précédentes, **caractérisé en ce que** l'élément (3) de liaison est construit de manière intégrée à l'axe d'entraînement du ou des éléments rotatifs (1, 2).
5. Appareil selon l'une quelconque des revendications précédentes, **caractérisé en ce que** l'élément (3) de liaison est placé du côté de la sortie de l'outil (1, 2) de hachage.
6. Appareil selon l'une quelconque des revendications précédentes, **caractérisé en ce que** l'élément (3) de liaison est placé du côté de l'entrée de l'outil (1, 2) de hachage.
7. Procédé d'utilisation de l'appareil selon l'une quelconque des revendications précédentes, **caractérisé en ce que** l'élément (3) de liaison est utilisé pour mettre sous vide la zone entourant l'outil (1, 2) de hachage, la force centrifuge créée par les éléments rotatifs étant utilisée pour séparer le produit alimentaire de l'air extrait.

8. Procédé selon la revendication 7, **caractérisé en ce que** le vide créé est utilisé pour acheminer le produit alimentaire jusqu'à l'outil de hachage.

9. Procédé selon la revendication 7 ou 8, **caractérisé en ce que** le matériau amené au moyen du vide et fourni de façon compacte est utilisé comme moyen de limitation du flux d'air dans la région d'alimentation de l'outil de hachage.

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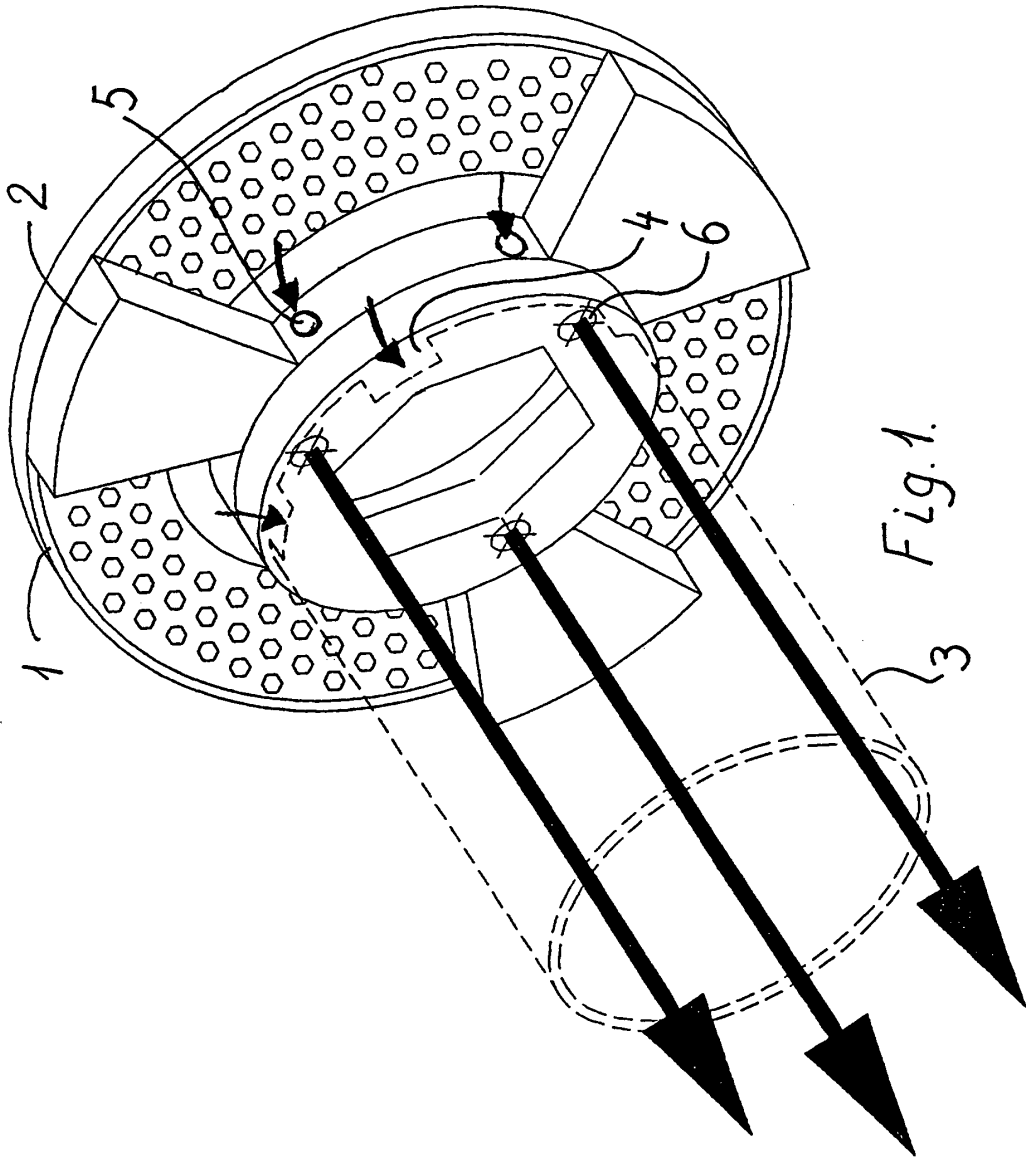
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**REFERENCES CITED IN THE DESCRIPTION**

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