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

(11) EP 1 331 460 A2

(12) EUROPEAN PATENT APPLICATION

(43) Date of publication:
30.07.2003 Bulletin 2003/31

(51) Int Cl.[7]: **F26B 5/08**

(21) Application number: **03425025.8**

(22) Date of filing: **22.01.2003**

(84) Designated Contracting States:
AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HU IE IT LI LU MC NL PT SE SI SK TR
Designated Extension States:
AL LT LV MK RO

(30) Priority: **23.01.2002 IT RM20020032**

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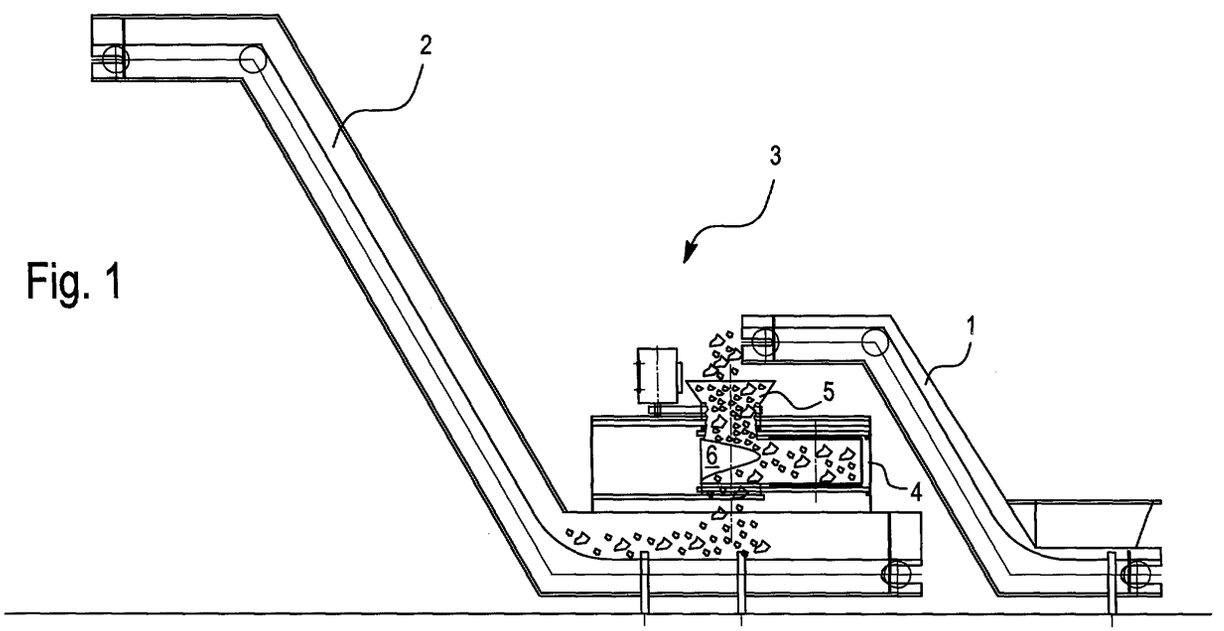
(54) Apparatus for continuous centrifugation, particularly for leaf food products

(57) The invention relates to an apparatus for the continuous centrifugation, particularly for leaf foodstuffs, comprising loading means (1) for the product to be dried; discharge means (2) for the dried product; a fixed body (4), having a substantially circular shape, said body having a central vertical axis (A-A); feeding means (5) for the product to be dried, substantially in correspondence of the central axis (A-A) of said fixed body (4); a structure (6, 11) to address the product toward drying means; drying means (7) including a translating belt cage and a holed lateral surface; said drying means (7) being provided with a rotative motion about an axis coincident with said central axis (A-A) of the fixed body (4), and with a translation motion of said translating band (7), and addressing means of the dried product toward said discharge means (2) for the dried product.

Fig. 1



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Description

[0001] The present invention relates to an apparatus for continuous centrifugation, particularly for leaf foodstuffs.

[0002] More specifically, the invention concerns to an apparatus of the above kind allowing to continuously centrifuging salad and similar delicate products.

[0003] As it is well known, in the foodstuffs processing products, such as leaf vegetables and similar, a drying step of the same products is provided.

[0004] In some cases, particularly when large amounts of product must be processed, drying is carried out by a heat exchange tunnel, said solution not being usable for drying small amount of products since the apparatus is too much expensive and managing costs are too high.

[0005] Furthermore, the use of the heat exchange tunnel cannot be accepted for delicate products, such leaf salad and like.

[0006] In these cases, centrifugal apparatuses are presently employed, said apparatuses drying the product.

[0007] All the known apparatuses of this kind have a batch mode operation: a set amount of product is loaded within the apparatus, then the drying step is carried out, and then the dried product is withdrawn and a further batch of the product is introduced within the apparatus.

[0008] It is well evident that this kind of procedure is very penalizing as far as the working time is concerned, being it limited by the not continuous operation of the apparatuses.

[0009] Thus, it is high the needing of having a centrifugation apparatus allowing to continuously carry out the drying of products, such as leaf vegetables, loading and unloading of the product not requiring the stopping of the same apparatus.

[0010] Main object of the present invention is that of providing an apparatus of the above kind allowing to carry out a continuous centrifugation drying, with remarkable advantages in term of time and operation costs.

[0011] It is therefore specific object of the present invention an apparatus for the continuous centrifugation, particularly for leaf foodstuffs, comprising loading means for the product to be dried; discharge means for the dried product, a fixed body, having a substantially circular shape, said body having a central vertical axis; feeding means for the product to be dried, substantially in correspondence of the central axis of said fixed body; a structure to address the product toward drying means; drying means including a translating belt cage and a holed lateral surface; said drying means being provided with a rotative motion about an axis coincident with said central axis of the fixed body, and with a translation motion of said translating band, and addressing means of the dried product toward said discharge means for the dried product.

[0012] Preferably, according to the invention, said loading means for the product to be dried and said discharge means for the dried product can be comprised of conveyor belts.

[0013] Furthermore, according to the invention, said product feeding means can be comprised of a hopper.

[0014] Still according to the invention, said product addressing structure toward the drying means and said addressing means for the dried product toward the dried product discharge means can be comprised of a spiral like structure, centrally providing a divider element at the inlet of the product, discharge of the product occurring close to said central axis.

[0015] In a preferred embodiment of the apparatus according to the invention, said drying means can comprise a belt, comprised of holed plastic tissue, with trapezoidal shaped or side toothed guides, two pulleys (upper and lower pulleys, respectively), having guide cave for trapezoidal or toothed belts supporting the belt (maximum centrifugation end).

[0016] Always according to the invention, said operation means for the drying means can be comprised of a first and a second fifth wheel, driven by a single motor, or by distinct motors.

[0017] The present invention will be now described, for illustrative but not limitative purposes, according to its preferred embodiments, with particular reference to the figures of the enclosed drawings, wherein:

figure 1 is a lateral schematic view of an embodiment of the apparatus according to the invention;
figure 2 is a top view of the apparatus of figure 1;
figure 3 is a schematic lateral view of a particular of the apparatus of figure 1; and
figure 4 is a top view of a particular of the apparatus of figure 1.

[0018] Making reference to all the figures of the enclosed drawings, it is shown an embodiment of an apparatus for the continuous centrifugation, particularly for leaf foodstuffs, providing an elevator band 1, for continuously loading the product, an elevator band 2 for continuously discharging the product, a centrifugal apparatus, generally indicated by reference number 3.

[0019] Two bands 1 and 2 only must feed and extract the product to be dried, and will be not described in the greater detail, since they are not specific part of the invention, and could be replaced by other equivalent means, well known and evident to all those skilled in the art.

[0020] Coming now to particularly observe figures 3 and 4, continuous centrifugation apparatus 3 according to the invention provides a fixed body 4, above which a hopper 5 is provided for the introduction of the product arriving from band 1. Under said hopper, a spiral 6 is provided.

[0021] In correspondence of the outlet of the hopper 5, apparatus according to the invention provides a band 7, rotating about itself, and translating according to a

peripheral direction. Motion of said band 7 is determined by two fifth wheels 8, 9, respectively for the rotation of band 7 about axis A-A, and for peripheral translation of the same band 7.

[0022] Peripherally, said band 7 has a cage structure, said structure having meshes so sized to allow the exit of the water, but not of the product leaves. Particularly, the band is comprised of holed plastic tissue provided with trapezoidal or side toothed guides, and two (upper and lower) pulleys provided with guide cave for the trapezoidal or toothed belts, supporting the band 7 (maximum centrifugation end).

[0023] When the product descends from the hopper 5, it is sent, through the spiral 6, along said band 7. Rotation of the band 7 about axis A-A makes the product adhering to the holed, lateral surface of the band 7, while the translation motion of the band 7 makes it advancing along the band.

[0024] Rotation of band 7 according to the direction of arrow B in figure 4 allows to obtain a drying of the product by centrifugation, while advancement of band 7 according to arrow C of figure 4 allows to have a continuous replacement of the product.

[0025] When the product, following arrows C, reaches the opposed end of band 7, will fall along the spiral 6, on the extraction band 2 for the product.

[0026] From figure 4 it can be noted that a central divider 11 is provided, dividing the loading zone from the discharge zone in correspondence of the rotation axis A-A of the cage with the band 7.

[0027] As it can be noted from the figures, a counterweight 10 is provided to balance band 7.

[0028] Motion of fifth wheels 8 and 9 is obtained by a motor, but it could also be obtained by two distinct motors.

[0029] Rotation speed and translation speed of band 7 will be adjusted in such a way to have a centrifugal force sufficient to obtain the drying of the product, and a standing time of the product on the band sufficient to obtain a complete drying.

[0030] As it is well evident from the figures, product is introduced within the centre of the rotation axis of the cage (loading position) and then is distributed on the inner wall of the holed band by a rigid spiral 6.

[0031] Rotation of the cage, and of the band 7 along with the same, makes the salad adhering to the inner parts of the bands 7 by centrifugal force.

[0032] Product is dragged by the translation of the band 7 toward the rotation peripheral end, to come back in the discharge position (under the loading position).

[0033] Maximum centrifugation effect is obtained when the product is in the zone farthest from the rotation centre.

[0034] Varying the rotation and translation speed of the band, drying time is varied. Product, during the return step, falls when it is in the central zone where the centrifugal force acting on the product is almost null.

[0035] The present invention has been described for illustrative but not limitative purposes, according to its preferred embodiments, but it is to be understood that modifications and/or changes can be introduced by those skilled in the art without departing from the relevant scope as defined in the enclosed claims.

Claims

1. Apparatus for the continuous centrifugation, particularly for leaf foodstuffs, **characterised in that** it comprises loading means for the product to be dried; discharge means for the dried product, a fixed body, having a substantially circular shape, said body having a central vertical axis; feeding means for the product to be dried, substantially in correspondence of the central axis of said fixed body; a structure to address the product toward drying means; drying means including a translating belt cage and a holed lateral surface; said drying means being provided with a rotative motion about an axis coincident with said central axis of the fixed body, and with a translation motion of said translating band, and addressing means of the dried product toward said discharge means for the dried product.

2. Apparatus for the continuous centrifugation according to claim 1, **characterised in that** said loading means for the product to be dried and said discharge means for the dried product is comprised of conveyor belts.

3. Apparatus for the continuous centrifugation according to claim 1 or 2, **characterised in that** said product feeding means are comprised of a hopper.

4. Apparatus for the continuous centrifugation according to one of the preceding claims, **characterised in that** said product addressing structure toward the drying means and said addressing means for the dried product toward the dried product discharge means are comprised of a spiral like structure, centrally providing a divider element at the inlet of the product, discharge of the product occurring close to said central axis.

5. Apparatus for the continuous centrifugation according to one of the preceding claims, **characterised in that** said drying means comprise a belt, comprised of holed plastic tissue, with trapezoidal shaped or side toothed guides, two pulleys (upper and lower pulleys, respectively), having guide cave for trapezoidal or toothed belts supporting the belt (maximum centrifugation end).

6. Apparatus for the continuous centrifugation according to one of the preceding claims, **characterised in that** said operation means for the drying means

are comprised of a first and a second fifth wheel, driven by a single motor, or by distinct motors.

7. Apparatus for the continuous centrifugation according to each one of the preceding claims, substantially as illustrated and described.

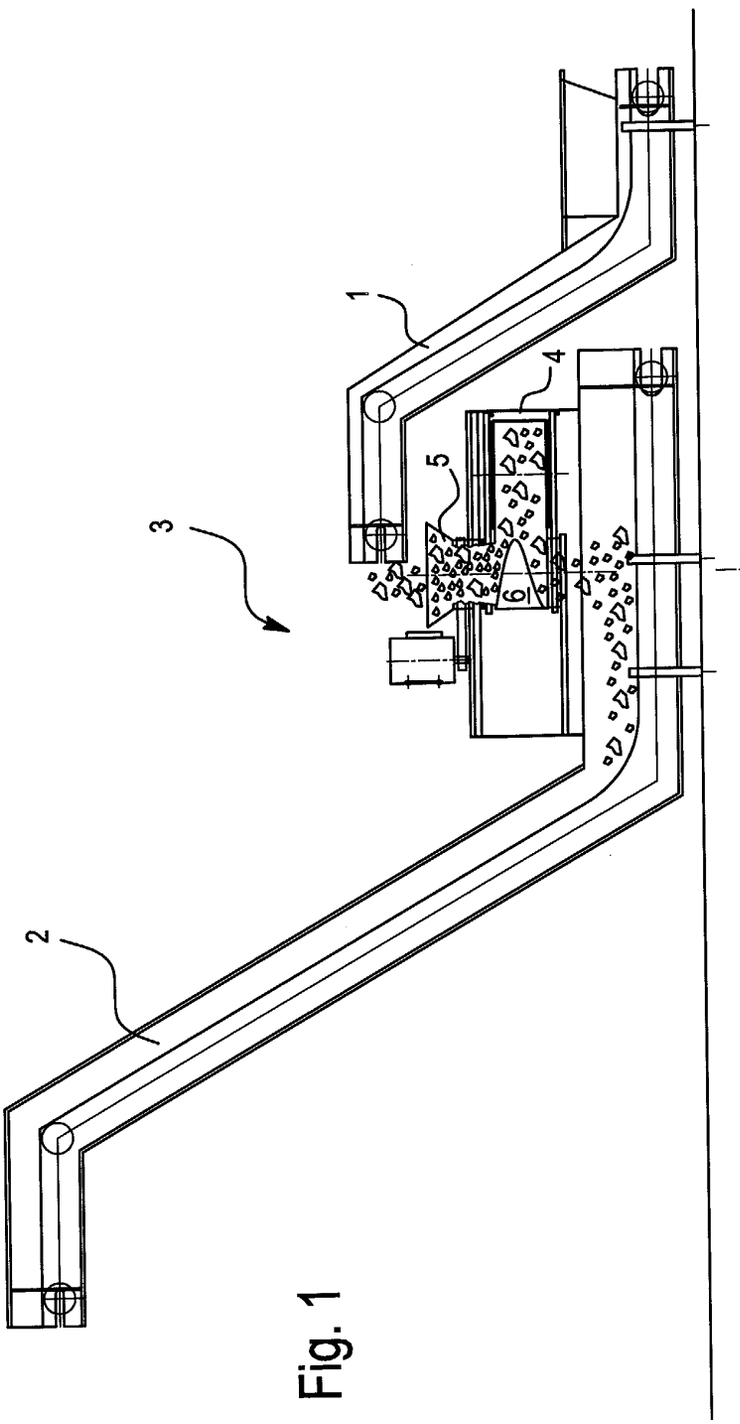

Fig. 1

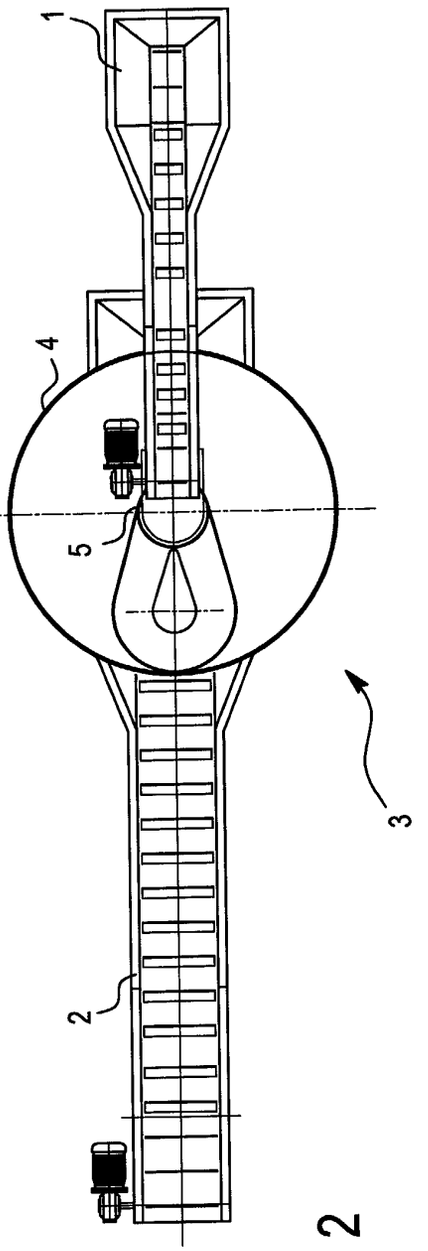

Fig. 2

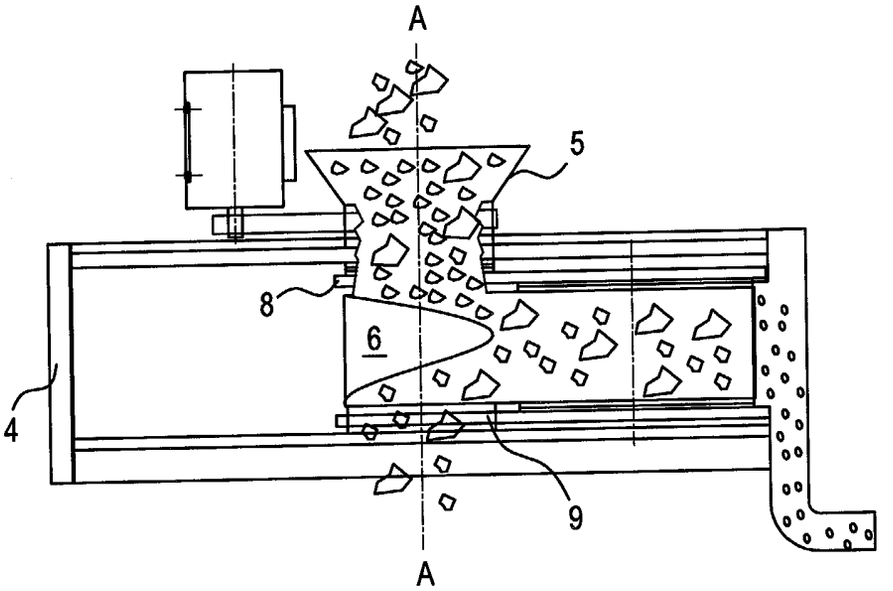

Fig. 3

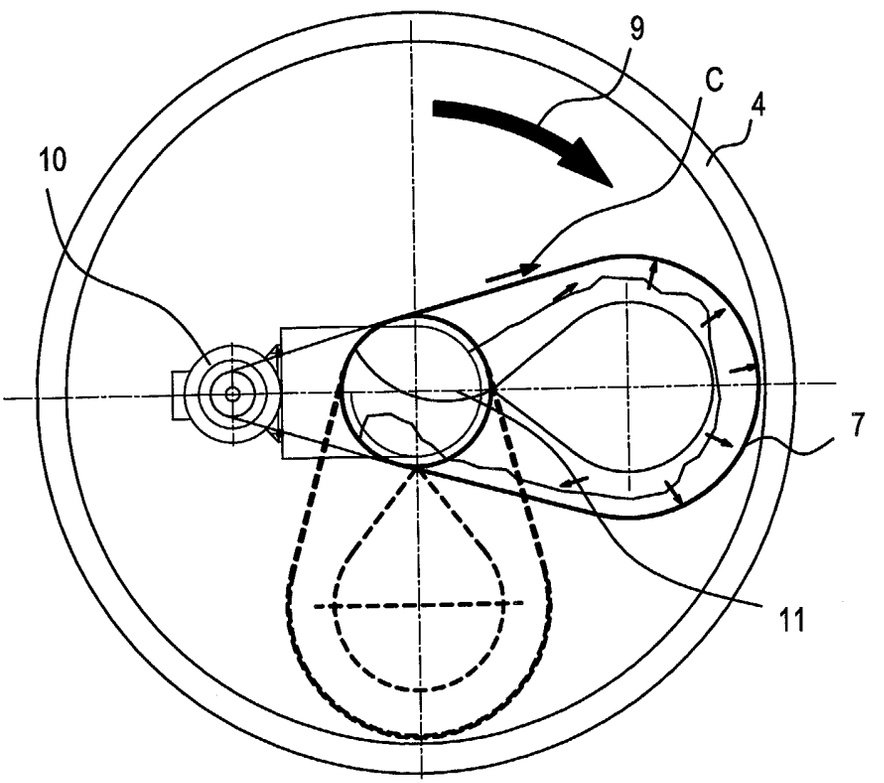

Fig. 4