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(54) BLADE ASSEMBLY AND METHOD FOR MAKING CUT FOOD PRODUCTS
KLINGENANORDNUNG UND VERFAHREN ZUR HERSTELLUNG VON GESCHNITTENEN LEBENSMITTELPRODUKTEN
ENSEMBLE LAME ET PROCÉDÉ DE FABRICATION DE PRODUITS ALIMENTAIRES DÉCOUPÉS

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Description

FIELD

[0001] The specification relates to blade assemblies for making cut food products. More particularly, the specification relates to blade assemblies comprising a plurality of wave-shaped blades.

INTRODUCTION

[0002] The discussion in the following paragraph is not an admission that any information discussed therein is prior art or part of the common general knowledge of persons skilled in the art.

[0003] U.S. Patent 7,096,771 discloses a cutter blade assembly that presents a sequential series of perpendicularly oriented cutting knife arrays which are attached to a frame. A first set of cutting knives is comprised of knives that are generally scalloped-shaped. A second set of cutting knives is comprised of knives that are generally straight and are connected in general perpendicular orientation to the first set of strip knives. When a vegetable product such as a potato is forced through the cutter blade assembly, the first set of knives cuts the potato into a scalloped shaped slab. The second set of knives then cuts the slab into a scoop shaped potato piece emulating a portion of a cut stalk of celery.

SUMMARY

[0004] The following introduction is provided to introduce the reader to the more detailed discussion to follow. The introduction is not intended to limit or define the claims.

The invention is defined in claims 1 and 13.

[0005] According to claim 1, a blade assembly is provided. The blade assembly comprises a support and at least one pair of wave-shaped blades secured to a support. The wave-shaped blades are arranged substantially parallel to each other, and the at least one pair of wave-shaped blades are spaced laterally from each other. Each wave-shaped blade extends along a central axis and each wave-shaped blade comprises at least one blade peak and at least one blade trough in any alternative arrangement. Each blade peak has a maximum, and each blade trough has a minimum and the blade peaks are located on one side of the central axis and the blade troughs are located on an opposing side of the central axis, wherein the blade peaks have a substantially identical shape to the blade troughs. An intermediate portion extends between the maximum and the minimum of each adjacent blade peak and blade trough, wherein each intermediate portion comprises a central portion, the central portion defining a mid-point, wherein the mid-point is located at an intersection of the central portion with the central axis. At least one sectioning blade is secured to the support and is arranged substantially transverse to the wave-shaped blades. The or each sectioning blade is aligned with an intermediate portion of the wave-shaped blades, such that a plane defined by the sectioning blade intersects the wave-shaped blades at one of their mid-points.

[0006] In some examples, the central portion comprises one third of a length of the intermediate portion. Each central portion may be straight.

[0007] In some examples, the sectioning blades are straight.

[0008] In some examples, the or each sectioning blade extends at an angle of between 45 degrees and 135 degrees to the central axis.

[0009] In some examples, the blade assembly further comprises a plurality of the supports for supporting the wave-shaped blades and the or each sectioning blade.

[0010] In some examples, the blade assembly further comprises a plurality of said pairs of wave-shaped blades, wherein the pairs are spaced longitudinally apart.

In some examples, the central axis of the or each sectioning blade is spaced longitudinally from the central axis of each wave-shaped blade.

[0011] In some examples, the wave-shaped blades may have an absence of cusps and corners.

In some examples, the blade assembly may be configured for making a cut food product form a starting food product, the cut food product comprising at least one slab, wherein the at least one pair of wave-shaped blades is configured to cut the starting food product into the at least one slab having at least one slab peak and at least one slab trough adjacent the at least one slab peak, wherein the sectioning blade is configured to cut the slab such that the cut food product is formed from the slab peak and another cut food product is formed from the slab trough. In some examples, the pair of wave-shaped blades is configured to cut the starting food product into the slab, wherein the slab has a plurality of slab peaks and a plurality of slab troughs.

In some examples, the blade assembly comprises a plurality of the sectioning blades positioned to cut the plurality of the sectioning blades positioned to cut the slab such that the cut food product is formed for each slab peak and slab trough.

[0012] According to claim 13, a method of making cut food products from a starting food product is provided. The method comprises cutting the starting food product into at least one slab by passing the starting food product through at least one pair of wave-shaped blades, wherein each wave-shaped blade comprises an alternating arrangement of at least one blade peak and at least one blade trough adjacent the at least one blade peak, each wave-shaped blade extending along a central axis, wherein the blade peaks are located on one side of the central axis and the blade troughs are located on an opposing side of the central axis, wherein the blade peaks have a substantially identical shape to the blade troughs, wherein each wave-shaped blade further comprises an intermediate portion located between the maximum and
the minimum of each adjacent blade peak and blade trough, wherein each intermediate portion comprises a central portion, the central portion defining a mid-point, wherein the mid-point is located at an intersection of the central portion with the central axis. The slab comprises at least one slab peak and at least one slab trough. The slab peak has a slab peak maximum, and the slab trough has a slab trough minimum, and an intermediate slab portion is between the slab peak maximum and the slab peak minimum. The method further comprises cutting the slab at the intermediate slab portion such that one of the cut food products is formed from each slab peak and another of the cut food products is formed from each slab trough.

[0013] In some examples, the method further comprises cutting the slab at the intermediate slab portion by passing the slab through a sectioning blade positioned transversely to the pair of wave-shaped blades, such that one cut food product is formed from each slab peak and another substantially identical cut food product is formed for each slab trough, wherein a plane defined by the sectioning blade intersects the pair of wave-shaped blades at one of their mid-points.

[0014] In some examples, each intermediate slab portion comprises a central slab portion, the central slab portion having a length that is one third of the length of the intermediate slab portion, and the method further comprises cutting the slab at the central slab portion.

DRAWINGS

[0015] Examples will be described below with reference to the following figures:

[0016] Figure 1 is a partial perspective schematic illustration of a hydraulic cutting assembly;

[0017] Figure 2 is a perspective illustration of a blade assembly used in the cutting assembly of Figure 1;

[0018] Figure 3 is a top plan view of the blade assembly of Figure 2;

[0019] Figure 4 is an enlarged view of the region shown in circle 4 in Figure 3;

[0020] Figures 5A to 5C are elevation views of alternative embodiments of a wave-shaped blade;

[0021] Figure 6 is a schematic perspective illustration of a starting food product being cut into a plurality of slabs; and

[0022] Figure 7 is a schematic perspective illustration of a slab being cut into a plurality of cut food products.

DESCRIPTION OF VARIOUS EXAMPLES

[0023] Various apparatuses or methods will be described below to provide an example of each claimed invention. No example described below limits any claimed invention and any claimed invention may cover processes or apparatuses that are not described below. The claimed inventions are not limited to apparatuses or processes having all of the features of any one apparatus or process described below or to features common to multiple or all of the apparatuses described below. It is possible that an apparatus or process described below is not an example of any claimed invention.

[0024] Referring to Figure 1, a partial schematic representation of an exemplary hydraulic cutting assembly 100 is shown. The hydraulic cutting assembly comprises a nozzle gun 102, and a cutter blade assembly 104. Nozzle gun 102 may be any suitable nozzle gun, and serves to align a starting food product, such as whole potatoes, and accelerate the starting food product into the blade assembly 104. It will be appreciated that the starting food product may be any other type of food product to be cut, including without limitation sweet potatoes, turnip, and celeriac. The starting food product 141 (a potato is shown in Fig. 6 by way of example) enters the cutter blade assembly 104, and a cut food product 108 (shown in Fig. 7) exits the cutter blade assembly into outlet 106.

[0025] An exemplary embodiment of a blade assembly 104 is shown in Figures 2-4. The blade assembly 104 is configured to cut a starting food product 141 (shown in Fig. 6), such as a potato, into a cut food 108 product that is generally scoop shaped, as shown in Figure 7. The scoop shaped food product may optionally then be cooked, and may be used for scooping or dipping.

[0026] Referring to Figures 2-4, cutter blade assembly 104 includes a number of wave shaped blades 110. Each wave shaped blade 110 extends along a central axis 112, as shown in Figure 4. For simplicity, only the central axis 112 of wave-shaped blade 110a is shown in Figure 4. Each wave shaped blade 110 includes a number of alternating blade peaks 114, and blade troughs 116. For simplicity, not all blade peaks and blade troughs have been labeled in all figures. In the example shown, each wave-shaped blade 110 has two blade peaks 114, and two blade troughs 116. In alternative embodiments, each wave-shaped blade 110 may include only one blade peak and only one blade trough, or more than two blade peaks and more than two blade troughs. Further, in alternative embodiments, a given wave-shaped blade may include an unequal number blade of peaks and blade troughs.

[0027] In the embodiment shown in Figures 2 to 4, each blade peak 114 is a substantially smooth curve, and each blade trough 116 is a substantially smooth curve, without any cusps or corners. That is, each blade peak 114 and each blade trough 116 is absent any cusps or corners. However, in alternative embodiments, the blade peaks 114 and/or blade troughs 116 may include plateaux or corners. For example, the blade peaks 114 may be shaped as an inverted V, and the blade troughs 116 may be shaped as a V, as shown in Figure 5A. Alternatively, the wave-shaped blade 110 may have plateaued peaks and troughs, as shown in Figure 5B.

[0028] In the embodiment shown, the blade peaks 114 and blade troughs 116 are essentially mirror images of each other. That is, the blade peaks are 114 of the same
shape and size as the blade troughs 116. Further, in the example shown, the blade peaks 114 have substantially the same shape as each other blade peak, and the blade troughs 116 have substantially the same shape as each other blade trough. In alternative embodiments, the blade peaks 114 and blade troughs 116 may not be mirror images of each other. Further, particular blade peaks 114 may have different shapes than other blade peaks, and particular blade troughs 116 may have different shapes than other blade troughs.

[0029] Each blade peak 114 has a maximum 118, and each blade trough 116 has a minimum 120 (shown in Figure 4). The maximum 118 of a blade peak 114 is the portion of the blade peak having a perpendicular distance C1 furthest from central axis 112 in one direction. The minimum 120 of a blade trough 116 is the portion of the blade trough spaced furthest by perpendicular distance C2 from central axis 112 in the other direction. In the example shown, the maximums 118 and the minimums 120 are at smoothly curved portions of the blade peaks 114 and blade troughs 120, respectively. Accordingly, the maximums 118 and minimums 120 are maximum points, and the minimums 120 are minimum points (i.e. the points wherein the slope of the blade is parallel to the central axis 112 of the blade). Similarly, in embodiments wherein the blade peaks 114 are inverted V-shaped, and the blade troughs 116 are V-shaped, as shown in Figure 5A, the maximums 118 are maximum points, and the minimums 120 are minimum points. In alternative embodiments, however, the maximums 118 and minimums 120 may be at a flat portion of the blade peaks 114 and blade troughs 116, respectively, as shown in Figure 5B. In such examples, the maximum 118 may be a maximum region, and the minimum 120 may be a minimum region.

[0030] Continuing to Fig. 4, an intermediate portion 122 is defined between the maximum 118 and the minimum 120 of each adjacent blade peak 114 and blade trough 116. Preferably, the intermediate portions 122 each include three portions: a lower portion 124, a central portion 126, and an upper portion 128 (for simplicity, shown only once in Figure 4). The lower portion 124 extends upwardly from the minimum 120 of a given blade trough 116, and the upper portion 128 extends downwardly from the maximum 118 of an adjacent blade peak 114. The central portion 126 is located between the lower portion 124 and the upper portion 128. In the embodiment shown, the lower portion 124, central portion 126, and upper portion 128 each occupy approximately one-third of the length of the intermediate portion 122.

[0031] In the embodiment shown, each central portion 126 is substantially straight. Further, each lower portion 124 and each upper portion 128 is curved. In alternate examples, the central portions 126 may be curved, as shown in Figure 5C.

[0032] Preferably, each central portion 126 is at an angle of about 67.5 degrees with respect to each central axis. For example, each central portion may be at an angle of about 56.25 degrees with respect to each central axis. In alternative embodiments, different angles may be used.

[0033] Continuing to refer to Figures 2 to 4, in the blade assembly 104, the wave shaped blades 110 are arranged substantially parallel to each other. That is, central axes 112 are substantially parallel to each other.

[0034] Further, in the blade assembly shown, the wave-shaped blades 110 are spaced laterally apart from each other. That is, the wave-shaped blades 110 are spaced apart in a direction perpendicular to central axes 112 (indicated by arrow A1).

[0035] Referring to Figure 2, the wave shaped blades 110 are arranged in pairs 130, and the pairs 130 are spaced longitudinally apart from each other (in a direction indicated by arrow A2). More particularly, in the example shown, the central axes of a given blade pair 130 are spaced longitudinally apart from the central axes of an adjacent pair. That is, in the example shown, the edges 138 of pair 130a are longitudinally aligned with edges 138 of pair 130b. However, the central axes of pair 130a are spaced longitudinally apart from the central axes of pair 130b. It will be appreciated that in alternate examples, the edges 138 of a given pair may be spaced longitudinally apart from the edges 138 of an adjacent pair, or the edges 138 of a given pair may overlap with the edges 138 of an adjacent pair. Furthermore, in other alternate examples, the wave shaped blades 110 may not be arranged in pairs 130, and may not be spaced longitudinally apart from each other.

[0036] Continuing to refer to Fig. 2, in the embodiment shown, the first pair 130a of wave-shaped blades 110 is located at a first longitudinal end 132 of the blade assembly 104. Preferably, the first end 132 of the blade assembly 104 is the downstream end. The wave-shaped blades 110a, 110b of the first pair 130a are spaced laterally apart by a distance D1 (shown in Fig. 4). A second pair 130b of wave-shaped blades 110 is longitudinally spaced from the first pair 130a, such that the edges 138 of the first pair 130a are aligned with the edges 138 of the second pair 130b. Wave-shaped blade 110c of the second pair 130b is laterally spaced from wave-shaped blade 110a of the first pair 130a by a distance equal to D1. Accordingly, the wave-shaped blades 110 of the second pair 130b are spaced laterally apart from each other by a distance equal to 3 x D1. This pattern is repeated for each subsequent (i.e. spaced longitudinally) pair of wave-shaped blades 110, such that a wave-shaped blade 110 of a given pair is spaced laterally from a wave-shaped blade 110 of a subsequent pair by a distance equal to D1, and each pair of wave-shaped blades is spaced further apart laterally than the previous pair of wave-shaped blades (when looking at the cutter blade assembly from the downstream end to the upstream end).

[0037] Referring now to Figs. 2 and 6, the wave shaped blades 110 are configured to cut a starting food product
141 into a plurality of final slabs, such as slabs 140a and 140b. Each final slab 140a,b is preferably composed of at least one slab peak 142, at least one slab trough 144, and an intermediate slab portion 147 located between the slab peak and slab trough. For clarity, reference parts 142, 144, and 147 are only shown on final slab 140a. Further, each slab peak 142 has a slab peak maximum 143, each slab trough 144 has a slab trough minimum 145. Each intermediate slab portion 147 has a slab central portion 149. For clarity, reference parts 143, 145, and 149 are only shown on final slab 140b. For example, the first pair 130 of wave-shaped blades closest to an up-stream end 133 of the blade assembly 104 will pass through a starting food product 141 and the starting food product will be cut into a first intermediate slab 200, a first end piece 146, and a second end piece 148. A subsequent wave blade pair 130 downstream of the first wave pair blade will cut the first intermediate slab 200 into final slabs 140a,b and second intermediate slab 202. A subsequent downstream wave blade pair 130 will cut the second intermediate slab 202 into two more final slabs (not shown) and a third intermediate slab (not shown), and so on until the final downstream wave blade pair 130a cut the last intermediate slab into final slabs. It will be appreciated that due to the longitudinal spacing the pairs 130 of wave-shaped blades 110, the first intermediate slab 200 may begin to be cut into the first and second final slab 140a,b before the first intermediate slab 200 is completely severed from the first and second end pieces 146, 148. It will also be appreciated that the orientation of the blade assembly 104 may be reversed, with the upstream end 133 being located downstream and the downstream end 132 being located upstream. In such an orientation, the cutting of the food product 141 will occur in a different fashion. Specifically, the final slabs will be cut from the end pieces as the food product is forced through the blade assembly, and intermediate slabs may not be produced.

[0038] In the embodiment shown in Figures 2 to 4, supports 134a and 134b are provided. Supports 134a and 134b are generally pyramidally shaped, and comprise a plurality of pairs mounting surfaces 136, to which the wave-shape blades 110 are mounted.

[0039] Referring back to Figures 2 to 4, the blade assembly 104 further includes a number of sectioning blades 150. In the embodiment shown, the sectioning blades 150 are substantially straight. However, it will be understood by those skilled in the art that the sectioning blades 150 may be curved, bent, or any other suitable shape.

[0040] In the embodiment shown, the blade assembly 104 comprises seven sectioning blades 150a to 150g. However, it will be appreciated that in alternate embodiments, the number of sectioning blades 150 may vary depending on the number of blade peaks 114 and blade troughs 116 of the wave blades 110. For example, if the wave blades 110 comprise only one blade peak 114 and one blade trough 116, only one sectioning blade 150 may be provided.

[0041] In the blade assembly 104, the sectioning blades 150 are arranged substantially transverse to the wave-shaped blades 110, and are aligned with the intermediate portions 122 of the wave shaped blades 110. As used herein, "aligned" means that, when the blade assembly 104 is viewed from above as shown in Figures 3 and 4, the sectioning blades 150 intersect the wave-shaped blades or a plane defined by the wave-shaped blades at intermediate portions 122.

[0042] More particularly, in the example shown, the sectioning blades 150 are at an angle θ1 with respect to central axes 112 of the wave-shaped blades, and at an angle θ2 with respect to intermediate portions 122. Angle θ1 is preferably in the range of between about 45 degrees and about 135 degrees, and more preferably, is about 90 degrees. Preferably, θ2 is in the range of between about 22.5 degrees and about 45 degrees, and more preferably, is about 33.5 degrees. In alternative embodiments, sectioning blades 150 may be oriented at any another suitable angle, provided that a given sectioning blade is not parallel or tangential to the intermediate portions 122 which it crosses. For example, sectioning blades 150 may be perpendicular to intermediate portions 122. Alternately, sectioning blades may be parallel to central axis 112 of wave-shaped blades.

[0043] An angle θ2 of between 22.5 and 45 degrees may be particularly advantageous because the resulting cut food product 108 may have substantially sharp edges 154 (shown in Figure 7). Such sharp edges 154 may become substantially crispy when the cut food product is cooked.

[0044] As mentioned above, the sectioning blades 150 are aligned with the intermediate portions 122 of the wave shaped blades 110. In the example shown, the sectioning blades 150 are aligned with the central portions 126 of the intermediate portions 122. More particularly, in the example shown, the sectioning blades 150 are aligned with a midpoint 156 of the central portions 126 of the intermediate portions 122. In alternative embodiments, the sectioning blades 150 may be aligned with another point on the intermediate portions 122 of the wave shaped blades 110. For example, the sectioning blades may be aligned with the wave-shaped blades at the junction of the central portion 126 of the upper portion 128, or at the junction of the central portion 126 and the lower portion 124.

[0045] In the embodiment shown, each sectioning blade 150 extends across (i.e. intersects when viewed from above) each of the wave-shaped blades 110. In alternate examples, each sectioning blade 150 may extend across some of the wave-shaped blades, for example only two of the wave shaped blades.

[0046] In the blade assembly 104, the sectioning blades are preferably spaced longitudinally from the wave-shaped blades 110 (in a direction indicated by arrow A2). More particularly, in the example shown, the sectioning blades 150 are spaced from the central axes.
112 of the wave-shaped blades, such that the width W (shown in Figure 2) of each sectioning blade 150 extends between the central axes of an adjacent pair 130 of wave-shaped blades. In the example shown, the wave-shaped blades 110 includes slots 158 in which portions the sectioning blades 150 are received.

[0047] The sectioning blades of the embodiment shown will now be described with reference to Figure 2, working from the left side of Figure 2 to the right side thereof and in reverse order to the direction of movement of the starting food product through the blade assembly 104. A preferably single first sectioning blade 150a is positioned such that the width W thereof extends between the central axes 112 of the first pair 130a of wave-shaped blades and the central axes of the second pair 130b of wave-shaped blades. A second sectioning blade 150b and a third sectioning blade 150c are positioned such that the widths W thereof extend between the central axes of the second pair 130b of wave-shaped blades and a third pair 130c of wave-shaped blades. A fourth and a fifth sectioning blade 150d, 150e, respectively, are positioned such that the widths W thereof extend between the central axes of the third pair of wave-shaped blades (not labeled) and a fourth pair (not labeled) of wave-shaped blades. A sixth and a seventh sectioning blade 150f, 150g are positioned such that the widths W thereof extend between the central axes of the fourth pair (not labeled) of wave-shaped blades and a fifth pair (not labeled) of wave-shaped blades.

[0048] In alternative embodiments, the sectioning blades 150 may not be spaced longitudinally apart from the wave-shaped blades 110.

[0049] In the example shown, some of the sectioning blades 150 are spaced laterally apart from each other (in a direction indicated by arrow A3), and some are not (i.e. some are laterally aligned), such that each intermediate portion 122 of each wave-shaped blade is aligned with at least one sectioning blade. For example, the first sectioning blade 150a is spaced laterally apart from the second sectioning blade 150b. However, the second sectioning blade 150b is not laterally spaced apart from the fourth sectioning blade 150d.

[0050] In alternative embodiments, all of the sectioning blades 150 may be spaced laterally apart from each other, or all of the sectioning blades may be laterally aligned, depending on the configuration of the wave-shaped blades.

[0051] Accordingly, the sectioning blades 150 are positioned to cut the slabs 140 such that a cut food product is formed for each slab peak 142, and another cut food product is formed for each slab trough 144. For example, referring to Figures 2, 6 and 7, as the starting food product 141 passes through the pair 130 of wave blades 110 located furthest upstream, the starting food product 141 is cut into the first intermediate slab 200 and the two end pieces 146, 148. Then the upstream-most sectioning blades 150g,f pass through the first intermediate slab 200 and the two end pieces 146, 148. Subsequent sectioning blades located downstream of upstream-most sectioning blades 150f cut the final slabs 140a,b into cut food products 108a,b (shown in Fig. 7).

[0052] It will be appreciated that due to the longitudinal spacing of the sectioning blades 150 with respect to the wave-shaped blades 110, the sectioning blades 150 may begin to cut the slabs before the slabs are fully severed from the starting food product or from each other. That is, cutting of the starting food product into slabs, and of the slabs into cut food products, may occur at least partially simultaneously.

[0053] In the example shown, the blade assembly 104 comprises supports 134c and 134d, which support the sectioning blades. Supports 134c and 134d comprise a plurality of pairs mounting surfaces 136, to which the sectioning blades 110 are mounted in any suitable fashion, such as by fasteners.

[0054] Referring to Figures 1, 3, 6 and 7, in operation, the starting food product 141, such as potatoes, are aligned in the nozzle gun 102 of the hydraulic cutting assembly 100 and accelerated into the cutter blade assembly 104. As the starting food product passes from the upstream end 133 to the downstream end 132 of the cutter blade assembly 104, the starting food product is cut into the cut food products 108a,b (such as scoop-shaped potato pieces), as described above. The cut food products 108a,b exit the cutter blade assembly 104 via the outlet 106.

[0055] Referring now to Fig. 7, the resulting cut food products 108a, 108b are generally scoop shaped. In some embodiments, the cut food products 108a 108b have a depth D2 in the range of about 2 mm to about 60 mm, and preferably about 10 mm. It has been determined that if the scoop-shaped cut food product is subsequently cooked, for example deep fried, such a depth may allow for the scoop-shaped cut food product to maintain its shape during cooking. For example, some scoop-shaped cut food products may puff when deep-fried, and become pillow shaped. However, scoop-shaped cut food products of this depth may undergo reduced puffing. Further, as the final slabs 140 are cut at the intermediate portions 147 to form substantially sharp corners (i.e. having an angle of between 30 degrees and 60 degrees), the corners may become substantially crispy when deep fried. Such crispy corners may provide good organoleptic properties. Further, such crispy corners may provide strength to the scoop-shaped food product, such that when dipped into other food products, the scoop-shaped food product better resists breaking.

Claims

1. A blade assembly (104) comprising:
   a) a support (134);
   b) at least one pair of wave-shaped blades (130) secured to the support (134) and arranged sub-
stantially parallel to each other, the at least one pair of wave-shaped blades (130) being spaced laterally from each other, each wave-shaped blade (110) extending along a central axis (112), characterized in that:

each wave-shaped blade (110) comprises:

i) at least one blade peak (114) and at least one blade trough (116) in an alternating arrangement, each blade peak (114) having a maximum (118), and each blade trough (116) having a minimum (120), wherein the blade peaks (114) are located on one side of the central axis (112) and the blade troughs (116) are located on an opposing side of the central axis (112), wherein the blade peaks (114) have a substantially identical shape to the blade troughs (116); and

ii) an intermediate portion (122) located between the maximum (118) and the minimum (120) of each adjacent blade peak (114) and blade trough (116), wherein each intermediate portion (122) comprises a central portion (126), the central portion (126) defining a midpoint, wherein the midpoint is located at an intersection of the central portion (126) with the central axis (112); and

c) at least one sectioning blade (150) secured to the support (134) and arranged substantially transverse to the wave-shaped blades (110), the or each sectioning blade (150) being aligned with the intermediate portion (122) of the wave-shaped blades (110) such that a plane defined by the sectioning blade (150) intersects the wave-shaped blades (110) at one of their midpoints.

2. The blade assembly (104) of claim 1, wherein the central portion (126) comprises one third of a length of the intermediate portion (122).

3. The blade assembly (104) of any one of claims 1-2, wherein each central portion (126) is straight.

4. The blade assembly (104) of any one of claims 1-3, wherein the sectioning blades (150) are straight.

5. The blade assembly (104) of claim 4, wherein the or each sectioning blade (150) extends at an angle of between 45 degrees and 135 degrees to the central axis (112).

6. The blade assembly (104) of any one of claims 1-5, further comprising a plurality of the supports (134) for supporting the wave-shaped blades (110) and the or each sectioning blade (150).

7. The blade assembly (104) of any one of claims 1-6, comprising a plurality of said pairs of wave-shaped blades (130), wherein the pairs are spaced apart longitudinally.

8. The blade assembly (104) of any one of claims 1-7, wherein a central axis (112) of the or each sectioning blade (150) is spaced longitudinally from the central axis (112) of each wave-shaped blade (110).

9. The blade assembly (104) of any one of claims 1-9, wherein the wave-shaped blades (110) have an absence of cusps and corners.

10. The blade assembly (104) of any one of claim 1-9, wherein the blade assembly (104) is configured for making a cut food product (108) from a starting food product (141), the cut food product (108) comprising at least one slab (140), wherein the at least one pair of wave-shaped blades (130) is configured to cut the starting food product (141) into the at least one slab (140) having at least one slab peak (142) and at least one slab trough (144) adjacent the at least one slab peak (142), wherein the sectioning blade (150) is configured to cut the slab (140) such that one cut food product (108) is formed from the slab peak (142) and another cut food product (108) is formed from the slab trough (144).

11. The blade assembly (104) of claim 10, wherein the pair of wave-shaped blades (130) is configured to cut the starting food product (141) into the slab (140), wherein the slab (140) has a plurality of slab peaks (142) and a plurality of slab troughs (144).

12. The blade assembly (104) of claim 10 or 11, wherein the blade assembly (104) comprises a plurality of the sectioning blades (150) positioned to cut the slab (140) such that the cut food product (108) is formed for each slab peak (142) and slab trough (144).

13. A method of making a cut food product (108) from a starting food product (141), comprising:

a) cutting the starting food product (141) into at least one slab (140) by passing the starting food product (141) through at least one pair of wave-shaped blades (130), characterized in that:

each wave-shaped blade (110) comprises an alternating arrangement of at least one blade peak (114) and at least one blade trough (116) adjacent the at least one blade
peak (114), each wave-shaped blade (110) extending along a central axis (112), wherein the blade peaks (114) are located on one side of the central axis (112) and the blade troughs (116) are located on an opposing side of the central axis (112), wherein the blade peaks (114) have a substantially identical shape to the blade troughs (116), wherein each wave-shaped blade (110) further comprises an intermediate portion (122) located between the maximum (118) and the minimum (120) of each adjacent blade peak (114) and blade trough (116), wherein each intermediate portion (122) comprises a central portion (126) defining a mid-point, wherein the mid-point is located at an intersection of the central portion (126) with the central axis (112), the slab (140) comprising:

i) at least one slab peak (142) and at least one slab trough (144), the slab peak (142) having a slab peak maximum (143), and the slab trough (144) having a slab trough minimum (145), and

ii) an intermediate slab portion (147) between the slab peak maximum (143) and the slab trough minimum (145); and

b) cutting the slab (140) at the intermediate slab portion (147) by passing the slab (140) through a sectioning blade (150) positioned transversely to the pair of wave-shaped blades (130), such that one cut food product (108) is formed from each slab peak (142) and another substantially identical cut food product (108) is formed for each slab trough (144), wherein a plane defined by the sectioning blade (150) intersects the pair of wave-shaped blades (130) at one of their midpoints.

14. The method of claim 13, wherein each intermediate slab portion (147) comprises a central slab portion (149), the central slab portion (149) having a length that is one third of the length of the intermediate slab portion (147), and step (b) comprises cutting the slab (140) at the central slab portion (149).

Patentansprüche

1. Klingenanordnung (104), umfassend:

a) ein Trägerbauteil (134);
b) zumindest ein Paar wellenförmiger Klingen (130), die am Trägerbauteil (134) befestigt und im Wesentlichen parallel zueinander angeordnet sind, wobei das zumindest eine Paar wellenförmiger Klingen (130) quer voneinander be- standet ist, sich jede wellenförmige Klinge (110) entlang einer Mittelachse (112) erstreckt, dadurch gekennzeichnet, dass:

i) zumindest einen Klingengipfelpunkt (114) und zumindest einen Klingentiefpunkt (116) in einer abwechselnden Anordnung, wobei jeder Klingengipfelpunkt (114) ein Maximum (118) und jeder Klingentiefpunkt (116) ein Minimum (120) aufweist, wobei sich die Klingengipfelpunkte (114) auf einer Seite der Mittelachse (112) befinden und sich die Klingentiefpunkte (116) auf einer Gegenseite der Mittelachse (112) befinden, wobei die Klingengipfelpunkte (114) im Wesentlichen eine mit den Klingentiefpunkten (116) identische Form aufweisen; und

ii) einen Zwischenteil (122), der sich zwischen dem Maximum (118) und dem Minimum (120) jedes benachbarten Klingengipfelpunkts (114) und Klingentiefpunkts (116) befindet, wobei jeder Zwischenteil (122) einen zentralen Teil (126) umfasst, wobei der zentrale Teil (126) einen Mittelpunkt definiert, wobei sich der Mittelpunkt an einer Schnittstelle des zentralen Teils (126) mit der Mittelachse (112) befindet; und

c) zumindest eine Trennklinge (150), die am Trägerbauteil (134) befestigt und im Wesentlichen quer zu den wellenförmigen Klingen (110) angeordnet ist, wobei die oder jede Trennklinge (150) mit dem Zwischenteil (122) der wellenförmigen Klingen (110) derart ausgerichtet ist, dass eine von der Trennklinge (150) definierte Ebene die wellenförmigen Klingen (110) an einem ihrer Mittelpunkte schneidet.

2. Klingenanordnung (104) nach Anspruch 1, wobei der zentrale Teil (126) ein Drittel einer Länge des Zwischenteils (122) umfasst.

3. Klingenanordnung (104) nach einem beliebigen der Ansprüche 1-2, wobei jeder zentrale Teil (126) gerade ist.

4. Klingenanordnung (104) nach einem beliebigen der Ansprüche 1-3, wobei die Trennklingen (150) gerade sind.
5. Klingenanordnung (104) nach Anspruch 4, wobei sich die oder jede Trennklinge (150) in einem Winkel von zwischen 45 Grad und 135 Grad zur Mittelachse (112) erstreckt.

6. Klingenanordnung (104) nach einem beliebigen der Ansprüche 1-5, die weiter eine Vielheit der Trägerbauteile (134) zum Stützen der wellenförmigen Klingen (110) und der oder jeder Trennklinge (150) umfasst.

7. Klingenanordnung (104) nach einem beliebigen der Ansprüche 1-6, die eine Vielheit der besagten Paare von wellenförmigen Klingen (130) umfasst, wobei die Paare in Längsrichtung beabstandet sind.

8. Klingenanordnung (104) nach einem beliebigen der Ansprüche 1-7, wobei eine Mittelachse (112) der oder jeder Trennklinge (150) von der Mittelachse (112) jeder wellenförmigen Klinge (110) in der Längsrichtung beabstandet ist.


10. Klingenanordnung (104) nach einem beliebigen der Ansprüche 1-9, wobei die Klingenanordnung (104) zur Herstellung eines geschnittenen Lebensmittelprodukts (108) aus einem Ausgangslebensmittelprodukt (141) konfiguriert ist, wobei das geschnittene Lebensmittelprodukt (108) zumindest eine Scheibe (140) umfasst, wobei das zumindest eine Paar wellenförmiger Klingen (110) eine abwechselnde Anordnung von zumindest einem Klingengipfelpunkt (114) und zumindest einem Klingentiefpunkt (116) angrenzend an den zumindest einen Klingengipfelpunkt (114) umfasst, wobei sich jede wellenförmige Klinge (110) entlang einer Mittelachse (112) erstreckt, wobei sich die Klingengipfelpunkte (114) auf einer Seite der Mittelachse (112) befinden und sich die Klingentiefpunkte (116) auf einer Gegenseite der Mittelachse (112) befinden, wobei die Klingengipfelpunkte (114) eine im Wentslichen identische Form aufweisen, wobei jede wellenförmige Klinge (110) weiter einen Zwischenteil (122) umfasst, der sich zwischen dem Maximum (118) und dem Minimum (120) jedes angrenzenden Klingengipfelpunkts (114) und Klingentiefpunkts (116) befindet, wobei jeder Zwischenteil (122) einen zentralen Teil (126) umfasst, der zentrale Teil (126) einen Mittelpunkt definiert, wobei sich der Mittelpunkt an einer Schnittstelle des zentralen Teils (126) mit der Mittelachse (112) befindet, wobei die Scheibe (140) umfasst:

   i) zumindest einen Scheibengipfelpunkt (142) und zumindest einen Scheibentiefpunkt (144), wobei der Scheibengipfelpunkt (142) ein Scheiben-Gipfelpunkt-Maximum (143) aufweist und der Scheibentiefpunkt (144) ein Scheiben-Tiefpunkt-Minimum (145) aufweist, und

   ii) einen Zwischenscheibenteil (147) zwischen dem Scheibengipfelpunkt-Maximum (143) und dem Scheibentiefpunkt-Minimum (145); und

11. Klingenanordnung (104) nach Anspruch 10, wobei das Paar wellenförmiger Klingen (130) konfiguriert ist, das Anfangslebensmittelprodukt (141) in die Scheibe (140) zu schneiden, wobei die Scheibe (140) eine Vielheit von Scheibengipfelpunkten (142) und eine Vielheit von Scheibentiefpunkten (144) aufweist.

12. Klingenanordnung (104) nach Anspruch 10 oder 11, wobei die Klingenanordnung (104) eine Vielheit der Trennklingen (150) umfasst, die positioniert sind, die
scheibenteil (147), indem die Scheibe (140) eine Trennklinge (150) durchläuft, die quer zum Paar wellenförmiger Klingen (130) derart positioniert ist, dass ein geschnittenes Lebensmittelprodukt (108) aus jedem Scheibengipfelpunkt (142) gebildet wird und ein weiteres im Wesentlichen identisch geschnittenes Lebensmittelprodukt (108) für jeden Scheibentiefpunkt (144) gebildet wird, wobei eine durch die Trennklinge (150) definierte Ebene das Paar wellenförmiger Klingen (130) an einem ihrer Mittelpunkte schneidet.

14. Verfahren nach Anspruch 13, wobei jeder Zwischen- scheibenteil (147) einen zentralen Scheibenteil (149) umfasst, der zentrale Scheibenteil (149) eine Länge aufweist, die ein Drittel der Länge des Zwischenscheibenteils (147) ist, und Schritt (b) das Schneiden der Scheibe (140) am zentralen Scheibenteil (149) umfasst.

Revendications

1. Ensemble lame (104) comportant:

   a) un support (134);

   b) au moins deux lames de forme ondulée (130) fixées au support (134) et disposées de façon essentiellement parallèle l’une par rapport à l’autre, ces lames de forme ondulée (130), en nombre minimum de deux, étant écartées latéralement l’une de l’autre, et chaque lame de forme ondulée (110) s’étendant le long d’un axe central (112), caractérisé en ce que:

   chaque lame de forme ondulée (110) comporte:

   i) au moins un pic de lame (114) et au moins un creux de lame (116) alternant les uns avec les autres, chaque pic de lame (114) ayant un maximum (118) et chaque creux de lame (116) ayant un minimum (120), caractérisées en ce que les pics de lame (114) sont situés sur un côté de l’axe central (112) et en ce que les creux de lame (116) sont situés sur un côté opposé de l’axe central (112), et caractérisées en ce que les pics de lame (114) ont une forme essentiellement identique à celle des creux de lame (116); et

   ii) une partie intermédiaire (122) située entre le maximum (118) et le minimum (120) de chacun des pics de lame (114) et creux de lame (116) adjacents, caractérisée en ce que chaque partie intermédiaire (122) comprend une partie centrale (126), cette partie centrale (126) définissant un point milieu, caractérisé en ce que le point milieu se trouve à l’intersection de la partie centrale (126) et de l’axe central (112); et

   c) au moins une lame de sectionnement (150) fixée au support (134) et disposée de façon essentiellement transversale par rapport aux lames de forme ondulée (110), la lame de sectionnement (150) ou chacune des lames de sectionnement (150) se trouvant alignée avec la partie intermédiaire (122) des lames de forme ondulée (110) de sorte qu’un plan défini par la lame de sectionnement (150) coupe les lames de forme ondulée (110) au niveau de l’un de leurs points milieu.

2. Ensemble lame (104) selon la revendication 1, caractérisé en ce que la partie centrale (126) s’étend sur un tiers de la longueur de la partie intermédiaire (122).

3. Ensemble lame (104) selon l’une quelconque des revendications 1 - 2, caractérisé en ce que chaque partie centrale (126) est rectiligne.

4. Ensemble lame (104) selon l’une quelconque des revendications 1 - 3, caractérisé en ce que les lames de sectionnement (150) sont rectilignes.

5. Ensemble lame (104) selon la revendication 4, caractérisé en ce que chaque lame de sectionnement (150) s’étend à un angle compris entre 45 degrés et 135 degrés par rapport à l’axe central (112).

6. Ensemble lame (104) selon l’une quelconque des revendications 1 - 5, comportant par ailleurs une pluralité de supports (134) servant à soutenir les lames de forme ondulée (110) ainsi que la lame de sectionnement (150) ou chacune des lames de sectionnement (150).

7. Ensemble lame (104) selon l’une quelconque des revendications 1 - 6, comportant une pluralité de ces paires de lames de forme ondulée (130), caractérisé en ce que les paires de lames sont écartées longitudinalment les unes des autres.

8. Ensemble lame (104) selon l’une quelconque des revendications 1 - 7, caractérisé en ce qu’un axe central (112) de la lame de sectionnement (150) ou de chacune des lames de sectionnement (150) est écarté longitudinalment de l’axe central (112) de chaque lame de forme ondulée (110).

9. Ensemble lame (104) selon l’une quelconque des revendications 1 - 9, caractérisé en ce que les la-
mes de forme ondulée (110) ne comportent ni cornes ni coins.

10. Ensemble lame (104) selon l’une quelconque des revendications 1 - 9, caractérisé en ce que l’ensemble lame (104) est configuré pour fabriquer un produit alimentaire découpé (108) à partir d’un produit alimentaire d’origine (141), le produit alimentaire découpé (108) comportant au moins un pavé (140), caractérisé en ce qu’au moins une paire des lames de forme ondulée (130) est configurée pour découper le produit alimentaire d’origine (141) en au moins un pavé (140) ayant au moins un pic (142) de pavé et au moins un creux (144) de pavé adjacent à ce pic (142) de pavé.

caractérisé en ce que la lame de sectionnement (150) est configurée pour découper le pavé (140) de manière à ce qu’un premier produit alimentaire découpé (108) soit formé à partir du pic (142) de pavé et à ce qu’un deuxième produit alimentaire découpé (108) soit formé à partir du creux (144) de pavé.

11. Ensemble lame (104) selon la revendication 10, caractérisé en ce que la paire de lames de forme ondulée (130) est configurée de manière à découper le produit alimentaire d’origine (141) pour en faire le pavé (140), caractérisés en ce que le pavé (140) comporte une pluralité de pics (142) de pavé et une pluralité de creux (144) de pavé.

12. Ensemble lame (104) selon la revendication 10 ou 11, caractérisé en ce que l’ensemble lame (104) comporte une pluralité de lames de sectionnement (150) positionnées de manière à découper le pavé (140) de sorte que le produit alimentaire découpé (108) est formé pour chaque pic (142) de pavé et creux (144) de pavé.

13. Procédé de fabrication d’un produit alimentaire découpé (108) à partir d’un produit alimentaire d’origine (141), comportant les étapes qui consistent:

a) à découper le produit alimentaire d’origine (141) en au moins un pavé (140) en faisant passer le produit alimentaire d’origine (141) à travers au moins une paire de lames de forme ondulée (130), caractérisé en ce que:

chaque lame de forme ondulée (110) peut être disposée de manière différente à savoir: au moins un pic de lame (114) et au moins un creux de lame (116) adjacent à ce pic de lame (114), chaque lame de forme ondulée (110) s’étendant le long d’un axe central (112), caractérisé en ce que les pics de lame (114) sont situés sur un côté de l’axe central (112) et en ce que les creux de lame (116) sont situés sur un côté opposé de l’axe central (112), et caractérisées en ce que les pics de lame (114) ont une forme essentiellement identique à celle des creux de lame (116), caractérisées en ce que chaque lame de forme ondulée (110) comporte par ailleurs une partie intermédiaire (122) située entre le maximum (118) et le minimum (120) de chacun des pics de lame (114) et creux de lame (116) adjacents, caractérisée en ce que chaque partie intermédiaire (122) comprend une partie centrale (126), cette partie centrale (126) définissant un point milieu, caractérisé en ce que le point milieu se trouve à l’intersection de la partie centrale (126) et de l’axe central (112), le pavé (140) comportant :

i) au moins un pic de pavé (142) et au moins un creux de pavé (144), le pic de pavé (142) ayant un maximum de pic de pavé (143) et le creux de pavé (144) ayant un minimum de creux de pavé (145), et

ii) une portion intermédiaire de pavé (147) entre le maximum de pic de pavé (143) et le minimum de creux de pavé (145); et

b) à découper le pavé (140) à la portion de pavé intermédiaire (147) en faisant passer le pavé (140) à travers une lame de sectionnement (150) disposée transversalement par rapport aux deux lames de forme ondulée (130), de manière à ce qu’un premier produit alimentaire découpé (108) soit formé à partir de chaque pic de pavé (142) et à ce qu’un deuxième produit alimentaire découpé (108) essentiellement similaire soit formé pour chaque creux de pavé (144), caractérisé en ce qu’un plan défini par la lame de sectionnement (150) coupe la paire de lames de forme ondulée (130) en l’un de leurs points milieu.

14. Procédé de fabrication selon la revendication 13, caractérisé en ce que chaque portion de pavé intermédiaire (147) comprend une portion de pavé centrale (149), la portion de pavé centrale (149) étant d’une longueur égale au tiers de la longueur de la portion de pavé intermédiaire (147), et en ce que l’étape (b) consiste entre autres à découper le pavé (140) à la portion de pavé centrale (149).
FIG. 4
REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description