United States Patent Application Publication 20250262786
Kind Code A1
Publication Date August 21, 2025
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FOOD PRODUCT SLICER AND ASSOCIATED GAUGE PLATE PLANE ADJUSTMENT ASSEMBLY

Abstract

A food product slicer includes a base, a knife mounted for rotation relative to the base and a carriage assembly mounted to the base for movement back and forth past a cutting edge of the knife. A gauge plate is mounted for movement between a closed position that prevents slicing and multiple open positions that permit slicing at respective thicknesses. A gauge plate movement system is provided for moving the gauge plate between the closed position and the multiple open positions. The gauge plate movement system includes a movable index component having a portion that projects upwardly through an opening in the base and that is connected to a lower portion of the gauge plate by a gauge plate adjustment assembly that is accessible via a gap between an upper surface portion of the base and the lower portion of the gauge plate.

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Family ID: **1000008463187**

Appl. No.: **19/048272**

Filed: **February 07, 2025**

Related U.S. Application Data

us-provisional-application US 63555679 20240220

Publication Classification

Int. Cl.: **B26D7/01** (20060101); **B26D7/22** (20060101)

U.S. Cl.:

Background/Summary

TECHNICAL FIELD

[0001] This application relates generally to food product slicers of the type commonly used to slice bulk food products and, more specifically, to a gauge plate plane adjustment assembly in such a food product slicer.

BACKGROUND

[0002] Typical reciprocating food slicers have a rotatable, circular or disc-like slicing blade, an adjustable gauge plate for varying the thickness of the slice and a carriage for supporting the food as it is moved back and forth past the cutting edge of the knife during slicing. A drive motor may be linked to drive the carriage back and forth during an automatic slicing operation carried out by a controller of the slicer. The gauge plate is situated along the edge of the knife toward the front of a slicing stroke and is movable with respect to the knife for varying the thickness of the slices to be cut. A rotatable indexing knob is provided for manually setting a spacing between the plane of the gauge plate surface and the plane of the knife edge for the purpose of slicing so that operators can select a thickness of slices to be produced. Properly locating an edge of the gauge plate at a desired distance from the slicer knife and/or aligning, or substantially aligning, the plane of the gauge plate slide surface with the plane of the knife edge has presented challenges.

[0003] U.S. Pat. No. 5,970,840 discloses a gauge plate adjustment assembly in which four set screws act as the adjustment set screws for defining the gauge plate orientation. To adjust the plane of the gauge plate, the clamping screws or bolts are first loosened. The gauge plate can then be shifted around, and the set screws can adjust the relative height at each location. Once the position of the gauge plate is correct, the clamping screws or bolts can then be tightened. In practice, 4 set screws over-define the adjustment/assembly (i.e., only 3 set screws can possibly touch the gauge plate at one time—one will always be not touching the gauge plate), and the entire set up may shift when the clamping screws or bolts are tightened. This arrangement also allows for many degrees of freedom. The gauge plate can shift left/right, up/down, and twist a bit relative to these directions. The set screws also allow the gauge plate to rotate in 2 different directions. U.S. Pat. No. 7,832,317 discloses a gauge plate adjustment system that is above the slicer, but connects to an upper portion at the back side of gauge plate. This adjustment system was not very robust and, thus, proved to be less effective than desired.

[0004] Accordingly, it would be desirable to provide a slicer with an improved gauge plate assembly that is robust, yet simple and intuitive.

SUMMARY

[0005] In one aspect, a food product slicer includes a base, a knife mounted for rotation relative to the base and a carriage assembly mounted to the base for movement back and forth past a cutting edge of the knife. A gauge plate is mounted for movement between a closed position that prevents slicing and multiple open positions that permit slicing at respective thicknesses. A gauge plate movement system is provided for moving the gauge plate between the closed position and the multiple open positions. The gauge plate movement system includes a movable index component having a portion that projects upwardly through an opening in the base and that is connected to a lower portion of the gauge plate by a gauge plate adjustment assembly that is accessible via a gap between an upper surface portion of the base and the lower portion of the gauge plate.

[0006] In implementations of the foregoing aspect, the slicer includes a seal assembly between the opening in the base and the lower portion of the gauge plate, wherein the gauge plate adjustment assembly is surrounded by the seal assembly such that the seal assembly must be moved out of a

sealing position to provide access to the gauge plate adjustment assembly to enable gauge plate adjustment via the gauge plate adjustment assembly.
[0007] In implementations of the foregoing aspect, the gauge plate adjustment assembly includes a first set of fasteners by which a gauge plate plane of the gauge plate can be adjusted about a rotational degree of freedom and a second set of fasteners by which the gauge plate can be adjusted along a linear degree of freedom, wherein the first set of fasteners and the second set of fasteners are located in an upper region of the gap.
[0008] In implementations of the foregoing aspect, the gauge plate adjustment assembly includes an adjustment block connected to the gauge plate by first fasteners, each of the first fasteners passing through respective elongated slots on the adjustment block and engaged in threaded openings of the lower portion of the gauge plate such that, when the fasteners are in a loosened condition, movement of the adjustment block linearly relative to the fasteners provides a translational degree of freedom for adjustment of the gauge plate.
[0009] In implementations of the foregoing aspect, the adjustment block includes an upwardly facing recess, a clamp nut positioned in the recess of the adjustment block, second fasteners that connect the clamp nut to the movable index component, and third fasteners that position the adjustment block relative to the clamp nut, wherein adjustment of the third fasteners enables a pivoting movement of the adjustment block relative to the clamp nut to provide a rotational degree of freedom for adjustment of the gauge plate.
[0010] In implementations of the foregoing aspect, wherein the second fasteners pass through slots of the adjustment block to engage the clamp nut.
[0011] In implementations of the foregoing aspect, at least one mating rib and slot feature is provided between the adjustment block and the portion of the movable index component.
[0012] In implementations of the foregoing aspect, wherein the adjustment block includes multiple elongated ribs, the lower portion of the gauge plate include multiple elongated slots, each of the elongate ribs seated within a respective one of the elongated slots, wherein a length of each elongated rib is shorter than a length of the respective one of the elongated slots in which the elongated rib is seated.
[0013] In another aspect, a food product slicer includes a base, a knife mounted for rotation relative to the base and a carriage assembly mounted to the base for movement back and forth past a cutting edge of the knife. A gauge plate is mounted for movement between a closed position that prevents slicing and multiple open positions that permit slicing at respective thicknesses. A gauge plate movement system is provided for moving the gauge plate between the closed position and the multiple open positions, the gauge plate movement system including a movable index component. A gauge plate adjustment assembly interconnects the movable index component to the gauge plate, wherein the gauge plate adjustment assembly includes a first set of fasteners by which a gauge plate plane of the gauge plate can be adjusted about a rotational degree of freedom and a second set of fasteners by which the gauge plate can be adjusted along a linear degree of freedom, wherein the first set of fasteners and the second set of fasteners are located internally of a seal assembly that includes a first end sealed against the base and a second end sealed against the gauge plate.
[0014] In a further aspect, a food product slicer includes a base, a knife mounted for rotation relative to the base and a carriage assembly mounted to the base for movement back and forth past a cutting edge of the knife. A gauge plate is mounted for movement between a closed position that prevents slicing and multiple open positions that permit slicing at respective thicknesses, the gauge plate including a main body defining a food slide surface, and a foot portion extending from the main body. A gauge plate movement system is provided for moving the gauge plate between the closed position and the multiple open positions, the gauge plate movement system including a movable index component that is connected to the foot portion by a gauge plate adjustment assembly that includes: an adjustment block connected to the foot portion, the adjustment block having a recess; and a clamp nut positioned in the recess and at least one fastener connecting the

clamp nut to the movable index component, wherein an orientation of the adjustment block, and thus the gauge plate, relative to the clamp nut is adjustable by set screws that are engaged in threaded openings of the adjustment block and that contact side portions of the clamp nut.
[0015] The details of one or more embodiments are set forth in the accompanying drawings and the description below. Other features, objects, and advantages will be apparent from the description and drawings, and from the claims.

Description

BRIEF DESCRIPTION OF DRAWINGS
[0016] FIGS. **1** and **2** show a food product slicer;
[0017] FIGS. **3-6** show views of gauge plate mount and gauge plate adjustment assembly;
[0018] FIGS. **7-10** show portions of the gauge plate adjustment assembly;
[0019] FIGS. **11-12** show portions of the gauge plate adjustment assembly connected to the gauge plate;
[0020] FIG. **13** shows a cross-section view of the gauge plate adjustment assembly;
[0021] FIGS. **14** and **15** show partial right side views and front side views of the slicer;
[0022] FIG. **16** shows a cross-section view of the slicer through the gauge plate adjustment assembly; and
[0023] FIG. **17** shows a partial perspective view of the slicer with seal removed.
DETAILED DESCRIPTION
[0024] Referring to FIGS. **1-2**, a food product slicer **10** includes a base **12** (e.g., housing and/or frame) and a circular, motor-driven slicing knife **14** that is mounted to the base for rotation about an axis **16**. The left side of FIG. **1**, where the controls are located, is generally referred to as the front side of the slicer (which is where an operator stands for slicing), the right side of FIG. **2** is generally referred to as the rear side of the slicer. A food product can be supported on a manually operable (or motor driven) food carriage **20** which moves the food product to be sliced past the peripheral cutting edge **14***a* of the rotating slicing knife **14**. The food carriage **20** reciprocates from left to right relative to FIG. **2**, along a linear carriage path so that the lower end of the bulk food product slides along the surface of a gauge plate **22**, is cut by the knife **14** and then slides along a knife cover plate **24**. Food carriage **20** includes a tray mounted on a tray arm **26** that orients the food carriage tray at the appropriate angle (typically perpendicular) to the knife cutting-edge plane. The food carriage arm reciprocates in a slot **28** at a lower portion of the base **12**. The carriage **20** can be moved manually (e.g., by a handle) and/or the carriage **20** may also be automatically driven (e.g., as by an internal motor **30** that drives a belt that is linked internally to the arm **26**).
[0025] The gauge plate **22** includes a main body plate **22***b* and a lower foot portion **22***a* extending from the main body plate.
[0026] A gauge plate positioning system includes a rotatable knob **40** (connected to an opening in the base **12**) that includes a grip part **40***a* and a cam part **40***b*. The cam part **40***b* includes an axially facing spiral cam slot **40***b***1** that receives a follower pin **42** of a follower **44** that is part of an assembly **46** that is linked to move the gauge plate.
[0027] The follower **44** (aka index slider) is clamped to and rides on a slide rail **50** that is mounted in a fixed position within the base. An engagement of the follower **44** with the slide rail **50** is configured to allow sliding movement of the follower along an axis **52** of the slide rail while preventing rotation of the follower about the axis of the slide rail. An upwardly projecting portion **44***a* of the follower provides a location to which the gauge plate is attachable. In use, the portion **44***a* is surrounded by a gasket/seal **60**.
[0028] An upper surface **62** of portion **44***a* of the follower receives an adjustment block **64**. The upper surface **62** includes a concave arcuate curvature portion **62***a* and slot **68** that corresponds to a

convex arcuate curvature **72***a* and rib **70** at the bottom surface **72** of the block **64**. The rib **70** seats within the slot **68** and prevents small twisting/slop between the adjustment block **64** and the follower **44**. The adjustment block **64** is connected to the underside of the gauge plate **24** (e.g., via fasteners **74** that pass through slots **64***a* of the adjustment block **64**). The upper side of the adjustment block **64** includes rib features **76** that seat into and mate with slots **78** in a foot portion **22***a* of the gauge plate **22** to ensure the gauge plate cannot rotate relative to the adjustment block **64**, but allows for some sliding movement along the slots (e.g., when the fasteners **74** are loosened), providing a linear degree of freedom in the adjustment system (toward or away from the knife edge per **85**).

[0029] A recess **80** at the upper side of the adjustment block **64** holds a clamp nut **82** by fasteners **66** that pass through slots **84** in the block **64** and threadedly engage openings **83** of the clamp nut **82** to clamp the position of the adjustment block **64** onto portion **44***a* of the indexing component when the fasteners are tightened. The recess **80** defines a concave arcuate surface portion **80***a* that mates with a convex arcuate surface portion **82***a* at the bottom side of the clamp nut **82**.

[0030] The clamp nut **82** is held in position relative to the adjustment block **64** via set screws/bolts **90**, which when adjusted allow for some rotation and sliding of the clamp nut **82** relative to the adjustment block **64**. The adjustment set screws **90** can be used to push the clamp nut **82** relative to the adjustment block **64**, providing a rotational degree of freedom (e.g., per angle β). The design gives the operator significant control over the exact angle position of the gauge plate plane relative to the slicer knife plane.

[0031] The entire system can be adjusted “above the slicer” (e.g., without accessing the space internal of the base **12**, such as by temporarily pushing the gasket **60** downward to access the fasteners **74** and the set screws **90**). In one embodiment, the gasket **60** is a unitary piece capable of sufficient movement (e.g., a bellows style gasket/seal). In another embodiment, the gasket **60** is formed by a stiffer lower component **60***b* and a more flexible upper component **60***a* that is movable relative to the lower component **60***b* (e.g., component **60***a* movable downward relative to component **60***b*) to enable operator access to the screws **74** and the screws **90**.

[0032] The gauge plate can be set and then tightened in two operations. This allows for the operator to adjust the gauge plate while being able to see the gauge plate relative to the knife. Most other adjustment methods occur underneath the slicer and require the slicer to be put up on its side. This design allows for only two degrees of freedom, which greatly simplifies what the operator needs to adjust.

[0033] The described design is very operator intuitive. There are only two adjustable degrees of freedom. One set of fasteners provides adjustment of a linear degree of freedom, and another set of fasteners provides adjustment of a rotational degree of freedom, enabling independent adjustment of the two degrees of freedom.

[0034] Thus, in the described embodiment, a food product slicer **10** includes a base **12**, a knife **14** mounted for rotation relative to the base and a carriage assembly **20** mounted to the base for movement back and forth past a cutting edge **14***a* of the knife. A gauge plate **22** is mounted for movement between a closed position that prevents slicing and multiple open positions that permit slicing at respective thicknesses. A gauge plate movement system (e.g., knob **40** connected to move index component **44**) is provided for moving the gauge plate between the closed position and the multiple open positions. The gauge plate movement system includes a movable index component **44** having a portion **44***a* that projects upwardly through an opening **13** in the base **112** and that is connected to a lower portion **22***a* of the gauge plate by a gauge plate adjustment assembly **65** that is accessible via a gap **15** between an upper surface portion of the base and the lower portion of the gauge plate.

[0035] In implementations, the slicer includes a seal assembly **60** between the opening in the base and the lower portion **22***a* of the gauge plate, wherein the gauge plate adjustment assembly **65** is surrounded by the seal assembly **66** such that the seal assembly must be moved out of a sealing

position to provide access to the gauge plate adjustment assembly **65** to enable gauge plate adjustment via the gauge plate adjustment assembly.
[0036] In implementations of the foregoing aspect, the gauge plate adjustment assembly **65** includes a first set of fasteners **90** by which a gauge plate plane of the gauge plate can be adjusted about a rotational degree of freedom (e.g., adjusting angle β) and a second set of fasteners **74** by which the gauge plate can be adjusted along a linear degree of freedom **85**, wherein the first set of fasteners and the second set of fasteners are located in an upper region of the gap **15**.
[0037] In implementations, the gauge plate adjustment assembly **65** includes an adjustment block **64** connected to the gauge plate by first fasteners **74**, each of the first fasteners passing through respective elongated slots **64***a* on the adjustment block and engaged in threaded openings **79** of the lower portion **22***a* of the gauge plate such that, when the fasteners are in a loosened condition, movement of the adjustment block linearly relative to the fasteners provides a translational degree of freedom **85** for adjustment of the gauge plate.
[0038] In implementations, the adjustment block **64** includes an upwardly facing recess **80**, a clamp nut **82** positioned in the recess of the adjustment block, second fasteners **66** that connect the clamp nut **82** to the movable index component **44**, and third fasteners **90** that position the adjustment block **64** relative to the clamp nut **82**, wherein adjustment of the third fasteners **90** enables a pivoting movement of the adjustment block relative to the clamp nut to provide a rotational degree of freedom for adjustment of the gauge plate (e.g., adjusting angle β).
[0039] In implementations, the second fasteners **66** pass through slots **84** of the adjustment block **64** to engage the clamp nut **82**.
[0040] In implementations, at least one mating rib **70** and slot **68** feature is provided between the adjustment block and the portion of the movable index component.
[0041] In implementations, the adjustment block **64** includes multiple elongated ribs **76**, the lower portion of the gauge plate include multiple elongated slots **78**, each of the elongate ribs **76** seated within a respective one of the elongated slots **78**, and a length of each elongated rib **76** is shorter than a length of the respective one of the elongated slots **78** in which the elongated rib is seated.
[0042] It is to be clearly understood that the above description is intended by way of illustration and example only and is not intended to be taken by way of limitation. Variations are possible.

Claims

1. A food product slicer, comprising: a base; a knife mounted for rotation relative to the base; a carriage assembly mounted to the base for movement back and forth past a cutting edge of the knife; a gauge plate mounted for movement between a closed position that prevents slicing and multiple open positions that permit slicing at respective thicknesses; a gauge plate movement system for moving the gauge plate between the closed position and the multiple open positions, the gauge plate movement system including a movable index component having a portion that projects upwardly through an opening in the base and that is connected to a lower portion of the gauge plate by a gauge plate adjustment assembly that is accessible via a gap between an upper surface portion of the base and the lower portion of the gauge plate.
2. The food product slicer of claim 1, further comprising a seal assembly between the opening in the base and the lower portion of the gauge plate, wherein the gauge plate adjustment assembly is surrounded by the seal assembly such that the seal assembly must be moved out of a sealing position to provide access to the gauge plate adjustment assembly to enable gauge plate adjustment via the gauge plate adjustment assembly.
3. The food product slicer of claim 1, wherein the gauge plate adjustment assembly includes a first set of fasteners by which a gauge plate plane of the gauge plate can be adjusted about a rotational degree of freedom and a second set of fasteners by which the gauge plate can be adjusted along a linear degree of freedom, wherein the first set of fasteners and the second set of fasteners are

located in an upper region of the gap.

4. The food product slicer of claim 1, wherein the gauge plate adjustment assembly includes an adjustment block connected to the gauge plate by first fasteners, each of the first fasteners passing through respective elongated slots on the adjustment block and engaged in threaded openings of the lower portion of the gauge plate such that, when the fasteners are in a loosened condition, movement of the adjustment block linearly relative to the fasteners provides a translational degree of freedom for adjustment of the gauge plate.

5. The food product slicer of claim 4, wherein the adjustment block includes an upwardly facing recess, a clamp nut positioned in the recess of the adjustment block, second fasteners that connect the clamp nut to the movable index component, and third fasteners that position the adjustment block relative to the clamp nut, wherein adjustment of the third fasteners enables a pivoting movement of the adjustment block relative to the clamp nut to provide a rotational degree of freedom for adjustment of the gauge plate.

6. The food product slicer of claim 5, wherein the second fasteners pass through slots of the adjustment block to engage the clamp nut.

7. The food product slicer of claim 5, wherein at least one mating rib and slot feature is provided between the adjustment block and the portion of the movable index component.

8. The food product slicer of claim 4, wherein the adjustment block includes multiple elongated ribs, the lower portion of the gauge plate include multiple elongated slots, each of the elongate ribs seated within a respective one of the elongated slots, wherein a length of each elongated rib is shorter than a length of the respective one of the elongated slots in which the elongated rib is seated.

9. A food product slicer, comprising: a base; a knife mounted for rotation relative to the base; a carriage assembly mounted to the base for movement back and forth past a cutting edge of the knife; a gauge plate mounted for movement between a closed position that prevents slicing and multiple open positions that permit slicing at respective thicknesses; a gauge plate movement system for moving the gauge plate between the closed position and the multiple open positions, the gauge plate movement system including a movable index component; a gauge plate adjustment assembly interconnecting the movable index component to the gauge plate, wherein the gauge plate adjustment assembly includes a first set of fasteners by which a gauge plate plane of the gauge plate can be adjusted about a rotational degree of freedom and a second set of fasteners by which the gauge plate can be adjusted along a linear degree of freedom, wherein the first set of fasteners and the second set of fasteners are located internally of a seal assembly that includes a first end sealed against the base and a second end sealed against the gauge plate.

10. The food product slicer of claim 9, wherein the seal assembly must be moved out of a sealing position to provide access to the first set of fasteners and the second set of fasteners.

11. A food product slicer, comprising: a base; a knife mounted for rotation relative to the base; a carriage assembly mounted to the base for movement back and forth past a cutting edge of the knife; a gauge plate mounted for movement between a closed position that prevents slicing and multiple open positions that permit slicing at respective thicknesses, the gauge plate including a main body defining a food slide surface, and a foot portion extending from the main body; a gauge plate movement system for moving the gauge plate between the closed position and the multiple open positions, the gauge plate movement system including a movable index component that is connected to the foot portion by a gauge plate adjustment assembly that includes: an adjustment block connected to the foot portion, the adjustment block having a recess; a clamp nut positioned in the recess and at least one fastener connecting the clamp nut to the movable index component, wherein an orientation of the adjustment block, and thus the gauge plate, relative to the clamp nut is adjustable by set screws that are engaged in threaded openings of the adjustment block and that contact side portions of the clamp nut.

12. The food product slicer of claim 11, wherein the adjustment block, clamp nut and the set screws

are located in a gap between an upper surface portion of the base and the bottom of the foot portion.

13. The food product slicer of claim 12, wherein a seal assembly is disposed in the gap to enclose that gauge plate adjustment assembly.

14. The food product slicer of claim 13, wherein the seal assembly must be moved out of a sealing position to provide access to the set screws.