DRIVE MECHANISM AND SLICING APPARATUS FOR FOOD SLICING MACHINE

BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention relates generally to food processing machines, and more specifically to machines that slice food products.

2. Description of the Related Art

It is known that a carriage, in which one or more food products, such as a sausage, can be reciprocated through a path that includes a slicing blade. U.S. Pat. No. 3,760,715 and U.S. Pat. No. 4,230,007 disclose such devices and are incorporated herein by reference. Such machines form slices and permit the slices to fall by gravity toward a conveyor belt beneath the machine. Thus, the slices can be dropped onto substrates, such as pizza crusts, sandwich buns and plates, as the substrates are conveyed beneath parts of the machine.

Typical drive mechanisms for the aforementioned machines include a rotary motor (such as hydraulic, pneumatic or electric) that rotates a belt or chain around a pulley or gear that is connected to the carriage, and linear prime movers, such as hydraulic or pneumatic rams. The drive mechanism commonly extends across a central region of the machine and attaches centrally to the carriage. This prior art configuration has the disadvantage that such drive mechanisms create contaminants, such as dust and lubricant drops, that can fall into the food. In order to avoid this, the drive mechanism must have shields around it. However, such shielding provides numerous horizontal surfaces in the zone above the food substrates and/or slices to collect dust, food particles and other residue of the food processing facility. All surfaces must be cleaned frequently to avoid residue from building up and dropping into the food, but access to the shielded areas is not easily obtained.

The prior art, as exemplified by U.S. Pat. No. 6,044,741, which is incorporated by reference, also teaches to slice food products using a pair of aligned pulleys, one of which is driven by a motor, around which a blade is wound and driven in the manner of a band saw. The apparatus consists of a motor mounted to one side of a food slicing machine, and an idler pulley mounted on the opposite side of the machine. The blade extends around the pulleys and is tightened and tracked by a mechanism that also provides many horizontal surfaces upon which food particles can collect.

Additionally, the blade extends through a blade guide which mounts to the machine's frame and which has a slot through which the blade extends. The blade guide must be adjusted so that its slot is almost perfectly flat in order to obtain uniform slice quality and thickness, and to prevent substantial wear of the blade driven rapidly therethrough. However, adjustment of the blade guide is typically accomplished using shims between two surfaces, which is difficult for anyone other than an accomplished technician to achieve, and is time-consuming even for skilled technicians. Maintaining blade guide configuration throughout the useful life of the machine, which will include numerous blade guide changes, must be achievable without high skill level and time consumption.

Still further, the slicing apparatuses of food slicing machines are often similar along an entire food slicing product line, but must be individually designed for each different food slicing machine.

Therefore, the need exists for a new food slicing machine with an improved drive mechanism, better slicing apparatus, better adjustment of the blade guide and band blade, and fewer surfaces upon which contaminants can collect.

BRIEF SUMMARY OF THE INVENTION

The invention is a food slicing machine having a frame to which a carriage is mounted to hold a food product. The carriage is reciprocatably mounted to move the food product through a slicing path that includes a blade. A linear motor is mounted to the frame near a first side of the carriage, and the motor is drivingly linked to the carriage for drivingly reciprocating the carriage longitudinally relative to the frame. A first horizontal support roller is mounted between the carriage and the frame at a second side of the carriage for restricting lateral movement of the carriage. A first vertical support roller is mounted between the frame and the first side of the carriage. A second vertical support roller is mounted between the frame and a second, opposite side of the carriage. In a preferred embodiment, there are plural horizontal support rollers in pairs on opposite sides of a rib that extends upwardly from the frame.

The invention also contemplates a modular slicing apparatus that can be mounted in the food slicing machine. The slicing apparatus comprises a bearing plate having a first leg member joined to a second leg member by a base, where the leg members and base are all integral in the bearing plate. A rotary motor is mounted to one of the leg members, and a first pulley is drivingly linked to the rotary motor. A second pulley is rotatably mounted to the other leg member. An elongated blade guide is mounted at a first end to the first leg member and at a second end to the second leg member. The blade guide has a longitudinal slot for retaining a continuous loop blade that extends around the first and second pulleys and through the slot in the blade guide. In a preferred embodiment, the bearing plate, the first and second pulleys, the motor, the blade and the blade guide are connected as an operable unit, thereby permitting the slicing apparatus to be attached to or removed from a slicing machine without disassembly of the components of the slicing apparatus.

In a preferred embodiment, the blade guide is adjustable using a mechanism having a first finger member interposed between the first end of the blade guide and the first leg member of the bearing plate. A first shaft, such as a threaded screw shaft, extends from the first leg member to the first finger member. An adjustment shaft extends from the first leg member through an aperture in the first finger member. A cam nut rotatably mounted on the adjustment shaft has an offset lobe inserted into the aperture. The lobe seats against an aperture sidewall and exerts a force against the sidewall upon rotation of the cam nut about the adjustment shaft for rotating the first finger member about the first shaft in order to adjust the straightness of the blade guide.

In a preferred embodiment, the band blade's tension and tracking are adjustable. The second pulley is mounted to an axle that is pivotably mounted to a longitudinally displaceable rod. This axle permits pivoting of the second pulley about a pivot point, which is preferably a screw extending through the axle and the elongated rod. A block is mounted to the bearing plate and has an opening through which the rod extends for limiting lateral movement of the rod. The invention also includes means for displacing the rod longitudinally for adjusting blade tension, and this preferably includes a threaded shaft mounted to a hand-grippable handle. The invention also includes means for pivoting the axle for adjust-