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POTATO SLICING KNIFE CONSTRUCTION

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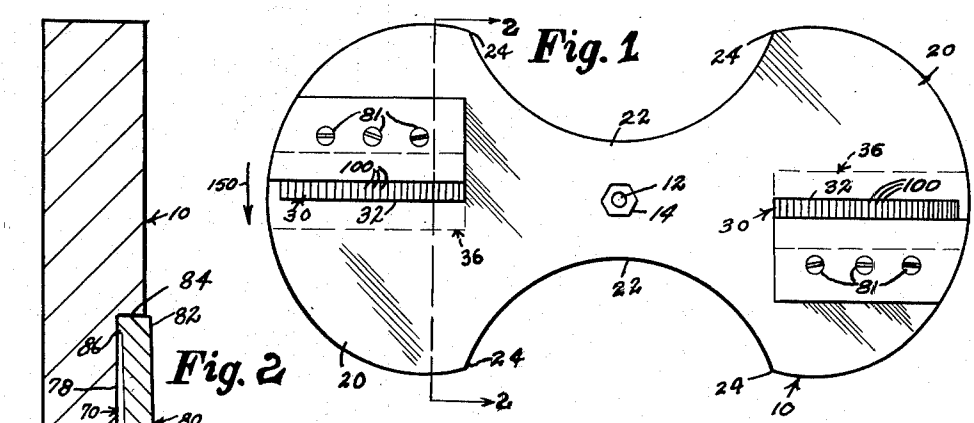


Fig. 1

Fig. 2

Fig. 3

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POTATO SLICING KNIFE CONSTRUCTION

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1 Claim. (Cl. 146—106)

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This invention relates to potato chip machines and more particularly it is an object of the invention to provide an improved knife blade and blade mounting construction for cutting potatoes to more uniform thickness than heretofore.

It is necessary that potato chips be extremely uniform to avoid the overcooking of some and the undercooking of others. It is almost inconceivable to anyone not experienced in the business just how uniform chip thickness must be. If it is desired to hold chip thickness to a 45/1000 of an inch thickness, for example, it is necessary that the thickness of the chips vary not more than 1½/1000 of an inch for good cooking results.

It was very inobvious that so small a thing as the angle of the knife blade should have as great an effect on the potato as it was found to have after many machines were already being sold. Whereas it was known that the product was not as uniformly good as would be desired, it was, nevertheless, difficult to ascertain which of the many adjustments and features of the machine needed change. It was still more inobvious to conceive that the knife should be bent.

It was already known that a knife having a slight angle was impractical because it was impossible to hold the same in place on the carrying member, the weakness of the necessarily thin knife holding blade being too critical a factor.

Every minute difference in method of cutting is extremely important because of the nature of the product. When one attempts to cause the intersection of two sets of grooves in a chip so thin as this, the adjustments are extremely critical and can be measured only in terms of thousandths of an inch and only with delicate precision instruments.

An abrupt angle on the knife would spin the potato in the chute rather than cut the potato because the knife is coming at a side angle rather than down vertically, therefore greater waste of potatoes would result.

The holder plate would have to be too long and thin for structural strength if the knife is at a slight angle. The problem seemed unsurmountable for months.

A cutting knife having a nose bent toward the knife carrier was at last found to be the solution. Although it now may seem obvious as all solutions do in retrospect, nevertheless many months went by while this problem had me defeated. Finally, after a number of machines were already on the market and in use, the bent nose knife was conceived.

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It is, therefore, an object of this invention to provide a knife of this kind.

Another object of the invention is to provide a knife of this kind having its nose bent at an angle of approximately ten degrees with respect to its rearward portion.

Any flexing of the cutting blade destroys chip uniformity, producing over- and undercooked chips. Nevertheless, a corrugated blade has to be very thin for the purpose of properly forming the corrugations desired. Thin blades of this kind flex very easily and for this reason they cannot be supported by crude means such as bolts extending through the blade within the plane of the blade carrier.

I have found it to be necessary that a holding plate be placed against the outer side of the blade, such holding plate preferably having a thin protruding portion extending toward the cutting edge of the blade as far as is possible so as to hold the blade as stiff as possible. It is an object of this invention to provide such a plate in improved form.

It must be further understood that the holding plate cannot project outwardly from the knife carrier beyond a certain point or it will bump the potato, scrape the same and destroy the thickness of the next slice, producing overcooked and undercooked chips.

The adjustment is so delicate that I had great trouble with a wedge shaped holding plate. The greater thickness of the rearward end of such a plate tended to hold the rearward edge of the blade down more firmly than the forward edge. This caused the blade to be held at an effective bend point or flex point farther rearward from its cutting edge than is satisfactory for the production of a worthwhile product; too much flexing was evident.

After long experience and much experiment, and after a number of machines were already in daily use, I finally conceived the idea of providing a projection at the heel of the blade holder whereby the latter holds the heel of the blade holder away from the knife carriage so that the forward end of the blade holder bears against the knife to a greater extent, for eliminating excessive flexing of the knife. The provision of such a projection is an object of this invention.

Yet another object of the invention is to provide a device for the purpose described which is sturdy and durable in construction, reliable and efficient in operation, and relatively simple and inexpensive to manufacture, assemble and utilize.

A still further object of the invention is to provide a machine having the walls of its knife car-

rier slots so slanted as to eliminate the great percentage of broken chips which have resulted from machines constructed in accordance with the prior art.

Other and still further objects and advantages of the invention will become apparent from the following detailed description of a preferred embodiment thereof.

In the drawings:

Figure 1 is a frontal elevation of a knife carrier such as described in the Goodman Patent No. 2,024,353, previously mentioned; the carrier being provided with knives and knife holder plates constructed in accordance with this invention.

Figure 2 is an enlarged view-in-section taken along the line 2—2 of Figure 1.

Figure 3 is an enlarged detail of the cutting end portion of a knife, adjacent portions of the carrier, and adjacent end portions of the knife holder and a potato, the latter being shown in reverse section similar to Fig. 2 further enlarged, the potato being in the position prior to a cutting by the blade shown and being provided with ridges and furrows transversely disposed to the ridges and furrows being made by the knife shown.

The rotating knife potato slicing machines of the type described in the applicant's co-pending patent application titled "Eccentric Potato Slicer" filed June 28, 1948, Serial No. 35,611, now Pat. No. 2,567,248, issued September 11, 1951, are construced generally in a manner having two rotating knife carriers of the type shown at 10 in Figure 1.

These knife carriers rotate in the same plane on independent parallel spaced apart axes, one of which is illustrated at 12 in Figure 1. The carriers 10 are held to the axes 12 by means of nuts 14. The knife carriers are sometimes referred to as "paddles," as in the patent issued to G. F. Goodman, Jr., titled "Machine for Making Potato Chips," Patent No. 2,024,353 issued December 17, 1935. The carriers are provided with convexially rounded end surfaces 20.

The carriers are further provided with two concavely rounded side surfaces 22. The surfaces 22 are disposed on opposite sides of the axis or axle 12 and join the convex surfaces 20, forming sharp points 24.

Each knife carrier 10 is provided with one or more and preferably two oppositely disposed cutting knives 30 on opposite ends thereof. The cutting knives 30 are corrugated, having alternate ridges and furrows on both that front face thereof which is disposed away from the carrier 10 and that back face thereof which is disposed toward the carrier 10. The knives 30 are provided with forward cutting edges 32 which project outwardly of slots 36, the latter being elongated and radially disposed in opposite ends of the knife carrier 20.

Each slot 36 is wider on that side thereof which is disposed away from the cutting knives 30. Each slot 36 is bounded by two slanted walls 40 and 42 which diverge away from each other the farther they extend from the knives 30.

The walls 40 and 42 are substantially straight although the wall 40 which is disposed on the opposite side of the slot 36 from the knife 30 is provided with a cut-back portion 48 which latter is disposed transversely to the portion 40 and is disposed at an angle of 45 degrees with respect to the plane of rotation of the knife carrier as best seen in Figure 3 in which the knife side of

the carrier 10 is represented by a line 50. The knife blades are each provided with a straight main body portion 60 which is secured to the knife carrier 10 by means later described. Each knife is further provided with an end portion 62 adjacent the corrugated cutting edge 32, the end portion 62 being bent at an angle of approximately ten degrees with respect to the plane of the main body portion 60 of the knife as best seen at 66 in Figure 3. The cutting end portion 62 is at a lesser angle with respect to the plane of rotation of the carrier 10 than is the remainder 60 of the knife, and is disposed in the order of three to five degrees relative to such plane.

The remainder 60 of the main body portion of the knife 30 is received in a recess in the adjacent side of the carrier 10, said recess being generally indicated in Figure 3 at 70.

The recess 70 is disposed on the other side of the wall portion 42 from the wider portion of the slot 36.

As best seen in Figure 2, the recess 70 is provided with a bottom wall having a portion 76 inclined at an angle of approximately thirteen to fifteen degrees with respect to the plane of rotation of the carrier 10. The portion 76 is disposed forwardly in the direction of rotation of the carrier 10 with respect to the rearward or remaining portion 78 of the bottom wall. The bottom wall of the recess 70 is step-cut and the portions 76 to 78 are joined by a transverse portion 79 which provides a bearing shoulder for receiving the rearward end of a cutting knife 30. A blade holder 80 is provided, being secured to the carrier 10 by screws 81 and disposed with its rearward end 82 against the shoulder 84 which forms a rearward side of the recess 70.

The end 82 is provided with a projection 86 which protrudes outwardly on the carrier side of the end 82 for spacing adjacent and also forward portions of the holder 80 away from the carrier 10.

The blade holder 80 is tapered from a thicker rearward end to a thinner forward end 88. The underside of the forward end 88 is provided with a bearing surface 90 bearing against the front face of the knife 30. The bearing surface 90 is inclinedly disposed with respect to the substantially straight outer surface of the holder 80 and is disposed in use at an inclination in parallelism with the adjacent front face of the knife 30 and is disposed in further parallelism with the inclined recess wall 76.

It will be seen that the projection 86 and the holder 80, or similarly the holder itself alone if a projection is not used, are or is preferably so shaped as to cause the holder 80 to be spaced apart from the carrier 10 between the bearing surface 90 and rearward end 82.

The knives 30 are provided with alternate ridges 100 as best seen in Figure 1.

Referring to Figure 3, a potato is shown at 110, the latter having been cut on its forward edge for providing a plurality of alternate ridges 111 and furrows 112. As illustrated in Figure 3, the ridges and furrows shown were cut by another knife carrier, previously, and the knife of Figure 3 is in the process of cutting through the potato 110 transversely to the previously formed ridge 111 for forming a chip.

It will be seen that the furrows cut by the knife in Figure 3 will intersect with the furrows 112 already cut, thereby forming perforations.

The carrier of Figure 1 is adapted to rotate in the direction of the arrow 150. The cutting

edges 32 of the knife blades are disposed forwardly of the remainder thereof with respect to the direction of rotation of the carrier.

The walls 40 and 42 of the slot 36 are approximately radially disposed with respect to the axis 12. The walls 40 and 42 are transversely disposed with respect to each other and are each disposed at an angle of approximately forty-five degrees with respect to the plane of rotation of the carrier 10. The wall 42 is disposed with that side thereof which is closest to the knife disposed forwardly of the remainder of the wall 42 with respect to the direction of rotation.

The wall 40 is disposed with that side thereof, which is closest the knife edge 32, rearwardly of the remainder of the wall 40 with respect to the direction of rotation.

The walls 40 and 42 are so formed because a chip passing under the edge 32 of the knife first strikes the wall 42. If the wall 42 were not so slanted many chips would break. The inclinations of the walls 40 and 42 can vary considerably, as long as this purpose is fulfilled. The chip then curls back upon itself until it strikes the wall 40. If the wall 40 were not slanted as shown, a certain percentage of chips would break. At the high speed necessary, these factors are of extreme importance.

This invention has provided a knife construction and a knife holder construction for potato chip machines which make possible a more evenly cooked product of more uniform thickness, a factor of great importance on the market.

From the foregoing description, it is thought to be obvious that a potato slicing knife construction constructed in accordance with my invention is particularly well adapted for use, by reason of the convenience and facility with which it may be assembled and operated, and it will also be obvious that my invention is susceptible of some change and modification without departing from the principles and spirit thereof, and for this reason I do not wish to be understood as limiting myself to the precise arrangement and formation of the several parts herein shown in carrying out my invention in practice, except as claimed.

I claim:

In a slicing machine, a knife carrier member mounted for slicing movement and having first and second sides, a knife blade secured to said first side of said knife carrier member and disposed to slice chips off a sliceable object upon movement of said carrier member in a slicing direction, said blade comprising a thin corrugated sheet of material having front and back corrugated faces, said blade having an outer corrugated cutting end portion and a remainder corrugated mounting portion, said outer corrugated cutting end portion being disposed at an angle of approximately 10 degrees with respect to the plane of said remainder corrugated mounting portion, said outer corrugated cutting portion having a corrugated cutting edge, said carrier member having a slot extending from said first side to said second side, said slot defined by first and second side walls providing a slot entrance for said sliced chips next adjacent the back face of said outer corrugated cutting end portion of said blade and a slot exit for said

sliced chips on said second side of said carrier member, said carrier member having on said first side thereof a recess with a bottom wall to receive said remainder corrugated mounting portion of the blade, said bottom wall being disposed at an angle of approximately fifteen degrees with respect to said first side of said carrier member, said bottom wall and said first side wall of said slot both being inclinedly disposed with respect to said first side of said carrier member and both extending convergingly toward each other and defining a tapering back-up section pointing in a direction the same as said slicing direction, a blade holder engaging the front face of said remainder corrugated mounting portion of the blade and holding same against said bottom wall of the recess at an outwardly extending inclination with respect to said first side of said carrier member, said outer corrugated cutting end portion of said blade being supported solely by said remainder corrugated mounting portion and extending inclinedly outwardly from the first side of the carrier member at an angle in the order of five degrees and at a lesser inclination than the plane of the remainder corrugated mounting portion, said first side wall of said slot being inclinedly disposed with respect to the back face of said blade and meeting therewith to form a surface against which sliced chips may engage as they pass through said slot, said bottom wall being step-cut and having a rearward portion of lesser depth for providing a shoulder to receive the rearward end of a knife blade, said blade holder disposed partially in said rearward portion of said recess and disposed overlapping said remainder corrugated mounting portion of said blade, said blade holder being tapered from a thicker rearward end to a thinner forward end, the forward end of said holder having a surface for bearing against said remainder corrugated mounting portion of said knife blade, said bearing surface being inclined outwardly of said carrier at such an inclination as to be parallel to the adjacent portion of said knife blade when bearing thereagainst, the rearward end of said holder being provided with a projection extending from the underside thereof toward said carrier member, and said projection and holder being of such size and shape as to cause said holder to be spaced apart from said carrier member between said bearing surface and said projection, and means for securing said holder to said carrier.

References Cited in the file of this patent

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