

Sept. 23, 1952

H. E. FARMER
SLICING MACHINE

2,611,408

Filed April 16, 1948

3 Sheets-Sheet 1

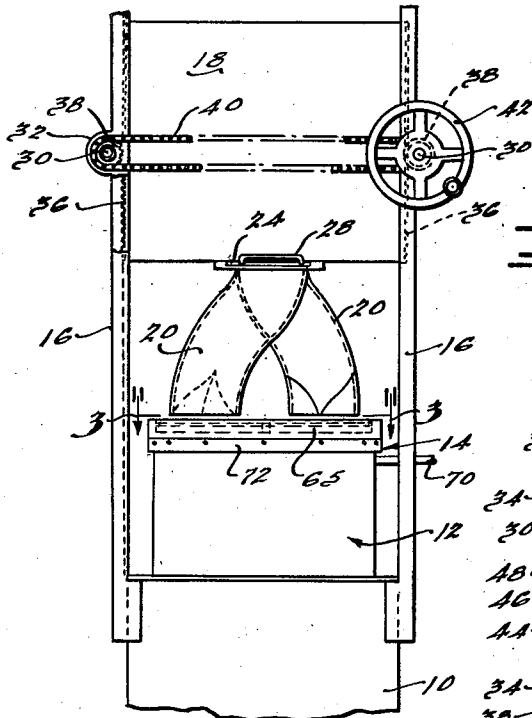


FIG. 1.

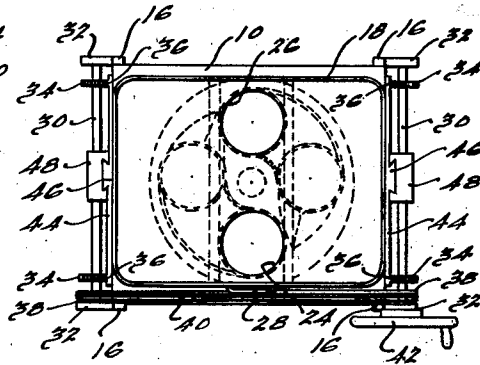


FIG. 2.

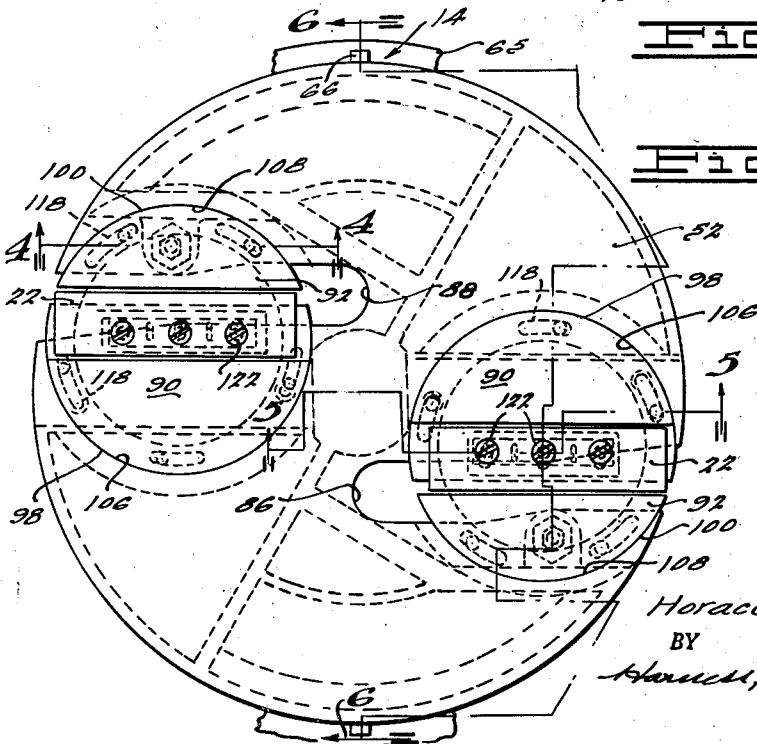


FIG. 3.

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3 Sheets-Sheet 2

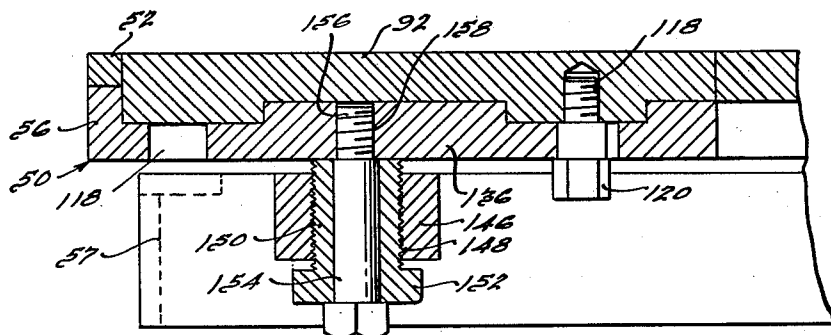


FIG. 4.

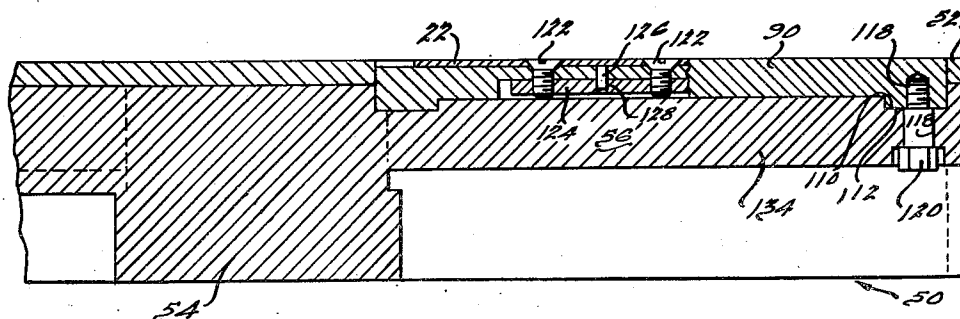


FIG. 5.

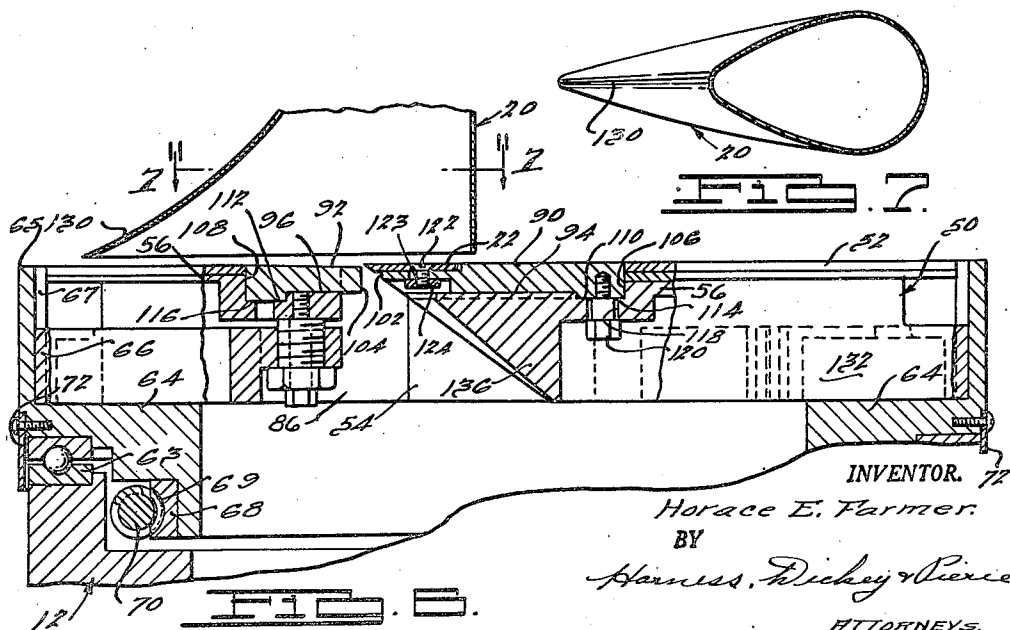


FIG. 7.

FIG. 6.

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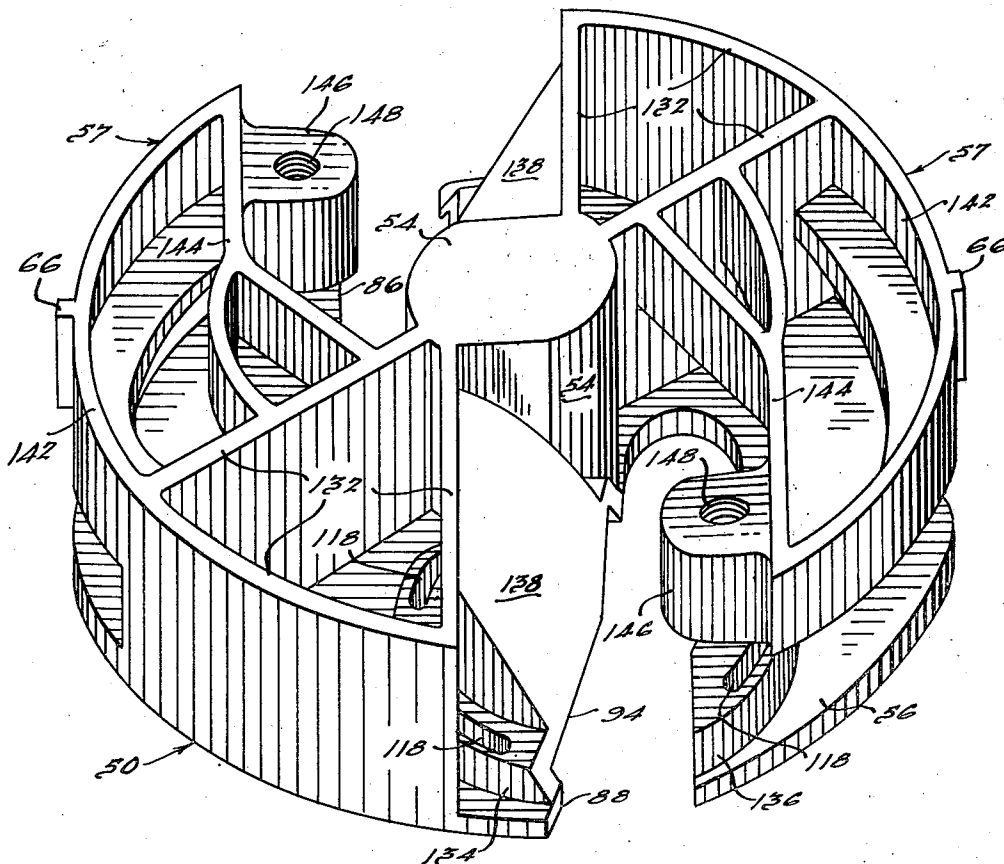


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2,611,408

SLICING MACHINE

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This invention relates broadly to vegetable slicing machines and more particularly to a machine of this character which is primarily adapted to and pre-eminently suited for cutting potatoes into thin slices suitable for making potato chips.

In conventional practice, the potatoes to be sliced are fed onto a rotary table having one or more slicing knives; and, as the table rotates, the knives cut thin slices from the potatoes. In order to provide a product suitable for potato chips, the slices must be cut cleanly from the potato; however, the operation of the slicing machine and the suitability of the slices varies considerably depending upon the characteristics of the potatoes being sliced. Difficulty arises in that the cutting characteristics of potatoes are not standard and apparently vary according to their age, the climatic and soil conditions, the season of the year at which they mature, etc. As a result, conventional slicing machines do not produce slices of uniform quality.

I have now discovered that variations in the slicing characteristics of potatoes can be offset to a large extent by properly adjusting the cutting angle of each knife on the rotary table of the machine. By adjusting the knives from time to time as the slicing characteristics of potatoes vary, a markedly improved operation is obtained, smoother operation of the machine results and a more uniform product is produced.

An important object of the present invention is to provide a vegetable slicing machine in which the slicing knives are adjustable to compensate for variations in slicing characteristics of the vegetables.

Another object of the present invention is to provide a slicing machine in which the knives are easily and quickly adjustable.

Yet another object of the invention is to provide a slicing machine having a novel adjustment for varying the thickness of slices cut from the vegetables.

A further object of the invention is to provide a slicing machine of the above-mentioned character that is simple in construction, efficient in operation, and relatively inexpensive to manufacture.

Other objects and advantages of the invention will be apparent during the course of the following description.

In the drawings forming a part of the specification and wherein like numerals are employed to designate like parts throughout the same,

Fig. 1 is a fragmentary, front elevational view of a slicing machine embodying the invention;

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Fig. 2 is a top plan view thereof;

Fig. 3 is an enlarged, top plan view of the rotary table embodying a part of the invention;

Fig. 4 is an enlarged, fragmentary, vertical sectional view taken on the line 4—4 of Fig. 3;

Fig. 5 is an enlarged, fragmentary, vertical sectional view taken on the line 5—5 of Fig. 3;

Fig. 6 is an enlarged, fragmentary, vertical sectional view taken on the line 6—6 of Fig. 3;

Fig. 7 is a horizontal sectional view taken on the line 7—7 of Fig. 6; and

Fig. 8 is a bottom perspective view of a casting forming a part of a rotary table.

In this specification the slicing machine is described as adapted to cut thin slices from potatoes, but it is to be understood that the machine can be used to cut or slice other vegetables or in any other capacity where a device of this character has utility.

Considered in certain of its broader aspects the slicing machine comprises a support 10 for the base 12 which mounts the rotary table 14. The support 10 is substantially rectangular in plan, and at each of its four corners is an upright standard 16. These standards 16 collectively support a vertically movable hopper 18 above the table 14. The hopper 18 is adapted to receive potatoes to be sliced and is equipped with a pair of depending chutes 20 which deliver the potatoes onto the rotary table 14 in the path of slicing knives 22. Movement of the potatoes into chutes 20 is controlled by a slidable panel or gate 24 which extends horizontally across the upper or inlet ends 26 thereof (Figs. 1 and 2). A handle 28 is provided on one end of the gate 24 and, as best shown in Fig. 2, the latter can be partially withdrawn to open one of the chutes 20 or entirely withdrawn to open both of the chutes.

It is desirable to adjust the hopper 18 and its appendages vertically from time to time in order to provide ready access to the rotary table 14. According to the present invention, this operation is accomplished by mounting parallel shafts 30 in bearings 32 which are provided on opposite pairs of the standards 16. Each shaft 30 carries a pair of spaced pinions 34 which mesh with vertical racks 36 on the confronting side of hopper 18, and the two shafts 30 also carry fixed gears 38 disposed laterally of the hopper and connected for mutual operation by an endless chain or belt 40. One of the shafts 30 carries a handwheel 42, and it will be readily apparent that actuation of the latter simultaneously rotates the shafts to raise or lower the hopper 18.

In order to locate the hopper 18 between stand-

ards 16 and to guide its vertical movement, the two racks 36 in each pair are connected by an integral transverse member 44, and the two members 44 are provided substantially centrally thereof with vertical guides 46 which operate in guide blocks 48 loosely mounted on the shafts 30.

By reason of the above construction and arrangement of parts, the hopper 18, together with the attached chutes 20, can be raised quickly from the rotary table 14 whenever it is necessary to remove the latter or for cleaning or adjusting the slicing knives 22. Also, by making the hopper 18 vertically adjustable in the manner described, it is possible easily and quickly to obtain a desired initial adjustment between the chutes 20 and the rotary table 14.

The operation first referred to in connection with the vertical adjustment is particularly significant, since it is contemplated that the rotary table 14 be easily removable from the base 12; and, in order to effect such removal, it is necessary to raise the hopper 18 from the position which it normally assumes in operation (Fig. 1). By making the rotary table 14 removable and providing several tables for each machine, one table can be substituted for the other, and it is necessary for the machine to be idle for only a few minutes while the substitution is being made. As suggested, the tables 14 must be removed from time to time for cleaning and whenever it is necessary to vary the cutting angle of slicing knives 22. Heretofore, slicing machines of this type have been constructed in such manner that they necessarily were out of service for considerable lengths of time whenever it was necessary to remove or to make any adjustment on the rotary table 14.

It is believed that the construction and mounting of the rotary table 14 is an important feature of this invention, and a detailed description of the same is now given. The table comprises a casting 50 to which is welded or otherwise fastened a highly polished top plate 52.

Attention is now directed to Fig. 8 which shows the casting 50 in perspective and upside down to more clearly illustrate its construction. It will be observed that the casting 50 has a central hub portion 54 which is formed integrally at its upper end with a radially extending disk-shaped top supporting portion 56 and at its lower end with rigid arms 57. While the element 50 is referred to herein as a casting, it is to be understood that it may be fabricated from a plurality of parts which are welded together to have the form illustrated.

The base 12 supports a ball bearing 63 on which a carriage 64 is supported for rotation. A cylindrical flange 65 extends upwardly at the periphery of the carriage to provide a recess for the reception of the casting 50, the latter having a plurality of projecting ribs 66 which mate in slots 67 provided in the inner face of the flange 65. A worm ring gear 68 is secured to the carriage 64, disposed in mesh with a worm 69 driven from a shaft 70 by driving means, not herein illustrated. A cylindrical ring 72 is secured to the carriage 64 to rotate therewith and to form a skirt which extends down over the bearing 63 to protect it against dirt and grime. It will be noted that not only may the casting 50 be lifted from the carriage 64 without the removal of a nut, bolt and the like, but the entire central area of the carriage is open, preventing the accumulation of potato particles therewithin.

The top plate 52 and the top supporting por-

tion 56 of the casting 50 are provided with aligned and identically shaped slots 86 and 88 which open through the edges thereof and extend inwardly therefrom at opposite sides of the hub 54. Each slot 86, 88 extends substantially half way through the table 14. In this connection it is to be understood that separate slots 86, 88 are provided for each slicing knife 22. In the form of the invention here shown by way of illustration, the table is equipped with two slicing knives, and two slots 86, 88 therefor are provided.

As suggested, the slicing knives 22 are mounted on the rotary table 14, and each is rotatably adjustable so that its cutting angle can be adjusted to obtain maximum efficiency. The slicing knives 22 are identical in construction and are mounted identically on the table 14; therefore, to clarify and simplify the disclosure, a detailed description of but one will be given.

According to the present invention, the slicing knife 22 is associated with a pair of discrete plate elements 90 and 92 which are set into recesses 94 and 96 provided in the top surface of the table at opposite sides of the slot 86, 88. These two plate elements extend flush with the top of the table 14 (Fig. 6), and they have arcuate peripheral edges 98 and 100 disposed about a common center. However, the adjacent edges 102 and 104 of the plate elements 90 and 92 are rectilinear and disposed in spaced relation above the slot 86, 88. The recesses 94 and 96 have arcuate, vertical walls 106 and 108 respectively, which complement and snugly fit the peripheries of plate elements 90 and 92, and the bottom surfaces thereof are provided with shallow arcuate grooves 110 and 112 which snugly receive correspondingly shaped arcuate ribs 114 and 116 on the plate elements. Thus, the plate elements 90 and 92 are rotatably adjustable in their respective recesses, and the arcuate grooves 110 and 112 guide and locate the elements during such adjustment so that the adjacent edges thereof can be maintained in fixed spaced relation and exactly parallel at all times.

In order to hold the two plate elements 90 and 92 in a selected adjusted position, the top supporting portion 56 is formed with elongated arcuate slots 118 at spaced points along the grooves 110 and 112, and setscrews 120 extend through these slots into the plate elements. It will be readily apparent that when setscrews 120 are loosened, the plate elements 90 and 92 can be rotatably adjusted within the limits of slots 118 and that the setscrews can be tightened to hold the plate elements in the adjusted position.

Slicing knife 22 is carried by the plate element 90 and, as shown in Fig. 6, it projects across the gap between the two plate elements and is arranged with the cutting edge thereof parallel and in slight spaced relation to the edge 104 of plate element 92. In this connection, however, it will be observed that the slicing knife is fastened to the plate element 90 by a plurality of countersunk flat-head screws 122 which extend through elongated slots 123 in the plate element and are screwed into a clamping bar 124 disposed below the latter. When screws 122 are loosened, the slicing knife 22 can be adjusted relative to plate element 92 and, in order to guide the knife during such adjustment, it is provided with depending pins 126 (Fig. 5) which operate in and snugly fit elongated grooves 128 in plate element 90 and clamping bar 124.

Thus, potatoes in the chutes 20 drop onto the

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rotary table 14 in the path of the rotating slicing knives 22. As the latter pass under the chutes, they cut relatively thin slices from the potatoes, which slices pass under the knives, fall through the slots 86, 88, and are collected in a suitable receptacle (not shown) according to conventional practice.

In this connection it will be observed that the chutes 20 are formed with tapered extensions 130 (Figs. 6 and 7) which project laterally ahead of the slicing knives 22. Thus, as the knives sweep under the chutes 20, they force the potatoes against the tapered extensions 130 which react to press them solidly against the table. As slices are removed progressively from the potatoes, the remaining uncut portions are advanced against the tapered extensions 130, and the tapered shape of the latter holds the potatoes so that knives 22 can slice the entire potato cleanly and effectively.

In order that slices of varying thickness may be cut from the potatoes, provision is made for flexing the top supporting portion 56 which carry the plate elements 92 in a direction normal to the plane of knives 22. For a detailed description of this feature of the invention, attention is again directed to Fig. 8. At the under side of casting 50 are opposed, triangularly shaped webs 132 which are formed integrally with hub 54 and top supporting portion 56. Also, it will be observed that the top supporting portion 56 is formed with embossments 134 and 136 at opposite sides of the slots 88 which provide a sufficient thickness of metal for recesses 94 and 96 respectively. Moreover, it will be observed that one of the webs 132 in each triangular supporting section extends across a respective embossment 134 and that relatively massive integral metallic portions 138 extend from the bottom edge of the webs to the slotted edges of recesses 94 and from the hub portion 54 substantially to the edge of embossments 134. The massive portions 138 cooperate with the webs 132 to strengthen and make relatively rigid and inflexible the supporting portion 56 which underlies and supports the knife-carrying plate sections 90.

Each set of webs 132 carries a respective one of the rigid arms 57 and, as suggested, the latter underlie and are spaced from the portions of the top supporting portion 56 which carry plate elements 92. Each of the arms 57 preferably comprises an outer angle portion 142 which follows the contour of the top supporting portion 56, and an inner Y-shaped portion 144 which extends along a chord between webs 132 and the distal end of the outer portion 142. The open arm structure thus provided is exceedingly rigid, but relatively light in weight. At the ends of arms 57 are integral, lateral extensions 146 which underlie the embossments 136. Extensions 146 are provided with internally threaded holes 148 which receive externally threaded sleeves 150. As best shown in Fig. 4, the sleeves 150 are provided at the lower ends thereof with heads 152 and the upper ends thereof project from the extensions 148 and abut against the embossments 136. Extending axially through sleeves 150 are cap screws 154, and these screws have threaded terminal shank portions 156 which enter internally threaded openings 158 in the embossments.

Thus, the cap screws 154 can be tightened to flex the superjacent portions of top supporting portion 56 downwardly against the ends of sleeves 150. Manifestly, flexure of the top plate 56 in this manner adjusts the vertical distance between

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the edges 104 of plate elements 92 and slicing knives 22. Since plate elements 92 are disposed ahead of the slicing knives, and since the potatoes to be sliced move across these plates toward the slicing knives, this adjustment regulates the thickness of slice cut therefrom. Sleeves 150 and cap screws 154 hold the flexed portions of the top supporting portion 56 solidly in the selected adjusted position. Moreover, the adjustment can be made easily and quickly and with conventional tools.

Thus, it will be seen that the rotary table 14 can be removed quickly and easily from the machine merely by lifting it from the recess formed by the flange 65. A second table 14 can be substituted for the removed table and the entire operation can be performed in a matter of minutes.

After the rotary table 14 has been removed from the machine, the cutting angle of the knives can be readily adjusted merely by loosening the setscrews 120. Preferably, all of the setscrews 120 are loosened simultaneously so that the plate elements 90 and 92 can be adjusted at the same time to maintain proper relationship between the slicing knives 22 and plate elements 92. Also, the slicing knives can be quickly adjusted relative to plate elements 92 or removed for cleaning or sharpening merely by loosening flat head screws 122.

It is to be understood that the form of the invention herewith shown and described is to be taken as a preferred example of the same and that various changes in the size, shape and arrangement of parts can be resorted to without departing from the spirit of the invention or the scope of the appended claims.

What is claimed is:

1. In a slicing machine, a table mounted for rotation about a central axis, said table having a circular recess at one side of said axis, plate means mounted in said recess for angular adjustment therein, and a slicing knife carried by said plate means.

2. In a slicing machine, a table mounted for rotation about a central axis, said table having a circular recess at one side of said axis, a pair of spaced arcuate plates secured in said recess for individual angular adjustment therein, and a slicing knife secured to one of said plates.

3. In a slicing machine, a table mounted for rotation about a central axis, said table having a circular recess at one side of said axis, a pair of spaced arcuate plates secured in said recess for individual angular adjustment therein, a slicing knife secured to one of said plates, and means for adjusting the other said plate out of the plane of said first plate.

4. In a slicing machine, a table mounted for rotation about a central axis, said table having a pair of circular recesses spaced from each other and said axis, a pair of spaced arcuate plates secured in each said recess for individual angular adjustment therein, and a slicing knife carried by one of said plates in each said recess.

5. In a slicing machine, a table mounted for rotation about a central axis, said table having a pair of circular recesses spaced from each other and said axis, a pair of spaced arcuate plates secured in each said recess for individual angular adjustment therein, a slicing knife carried by one of said plates in each said recess, and means for adjusting the other said plate in each said recess out of the plane of said first plate therein.

6. In a slicing machine, a rotary table; means for feeding objects to be sliced onto said table; a slicing knife mounted on said table and rotatable therewith; means for adjusting said knife to vary the angle of its cutting edge with respect to the object being sliced; a support mounted on the table ahead of the knife for angular adjustment; and means for adjusting said support in a direction normal to the plane of the knife.

7. In a slicing machine, a rotary table; a slicing knife; a plate carrying said knife supported by and fastened to the table, said plate rotatably adjustable on the table to vary the cutting angle of the knife, and a vertically and rotatably adjustable support mounted on the table ahead of the knife.

8. In a slicing machine, a rotary table; a slicing knife; a plate carrying said knife supported by and fastened to the table, said plate rotatably adjustable on the table to vary the cutting angle of the knife; and a support mounted on the plate ahead of the knife, said support adapted to underlie objects to be sliced by the knife and adjustable relative to the latter to regulate the thickness of the slice.

9. In a slicing machine, a rotary table having separate sections, one of said sections being relatively rigid and the other of said sections being relatively flexible in a direction normal to the plane of said rigid section; laterally spaced, rotatably adjustable plate elements mounted on respective sections of said table; a slicing knife carried by the plate element associated with said relatively rigid table section, said knife arranged with its cutting edge disposed in proximity to the other of said plate elements; and means coactive with said relatively flexible section for adjusting the interplanar distance between the plate elements.

10. In a slicing machine, a rotary table having a top portion provided with a slot which opens through and extends inwardly from the edge thereof, the section of the table at one side of said slot being relatively rigid and the section of the table at the other side of said slot being relatively flexible; a slicing knife; separate plate elements mounted in opposed relation on respective sections of the table, one of said plate elements carrying the slicing knife and both of said plate elements being rotatably adjustable on the table.

11. In a slicing machine, a rotary table having a top portion provided with a slot which opens through and extends inwardly from the edge

thereof, the section of the table at one side of said slot being relatively rigid and the section of the table at the other side of said slot being relatively flexible; a slicing knife; separate plate elements mounted in opposed relation on respective sections of the table, one of said plate elements carrying the slicing knife and both of said plate elements being rotatably adjustable on the table, the parts so constructed and arranged that the cutting edge of the knife is disposed along and above said slot in proximity and adjacent to a substantially parallel edge of the plate element disposed in opposition thereto; and means for adjusting the relatively flexible section of the table whereby to move the plate element carried thereby vertically with respect to the cutting edge of the knife.

12. In a slicing machine, a rotary table having a top portion provided with a slot which opens through and extends inwardly from the edge thereof, the section of the table at one side of said slot being relatively rigid and the section of the table at the other side of said slot being relatively flexible, said table further provided with a rigid arm below and spaced from said relatively flexible section; a slicing knife; separate plate elements mounted in opposed relation on respective sections of the table, one of said plate elements carrying the slicing knife and both of said plate elements being rotatably adjustable on the table, the parts so constructed and arranged that the cutting edge of the knife is disposed along and above said slot in proximity and adjacent to a substantially parallel edge of the plate element disposed in opposition thereto; and means connecting said rigid arm to said relatively flexible section adapted to adjust the same relative to each other whereby to vary the vertical distance between the knife and said opposed plate element.

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