

April 2, 1940.

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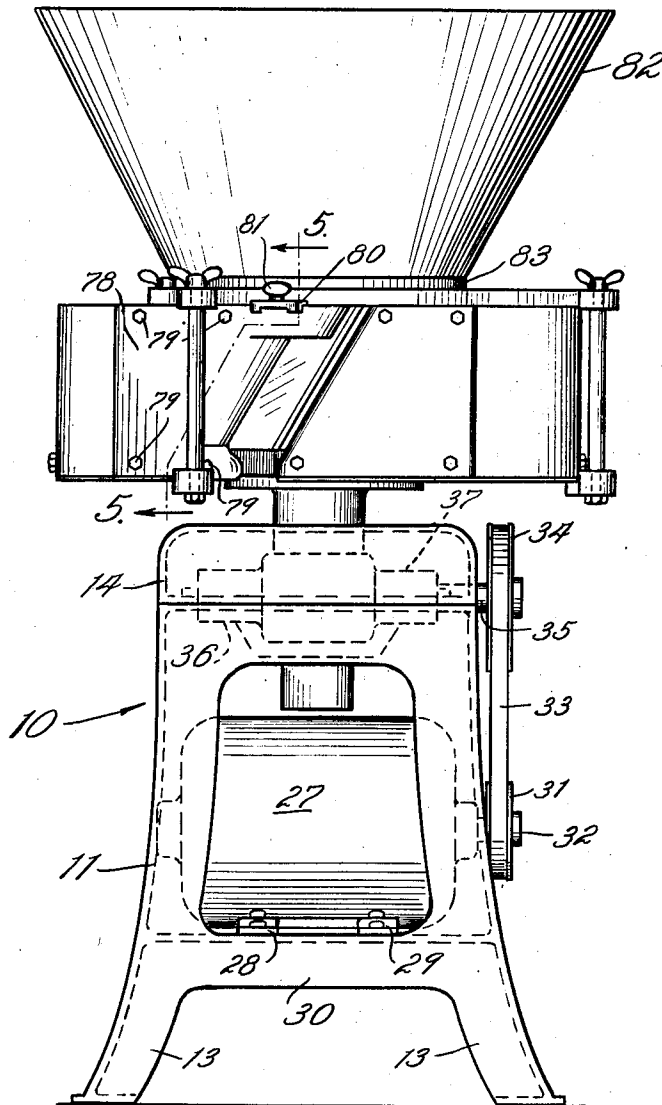
2,195,879

SLICING MACHINE

Filed Dec. 22, 1937

3 Sheets-Sheet 1

Fig. 1.



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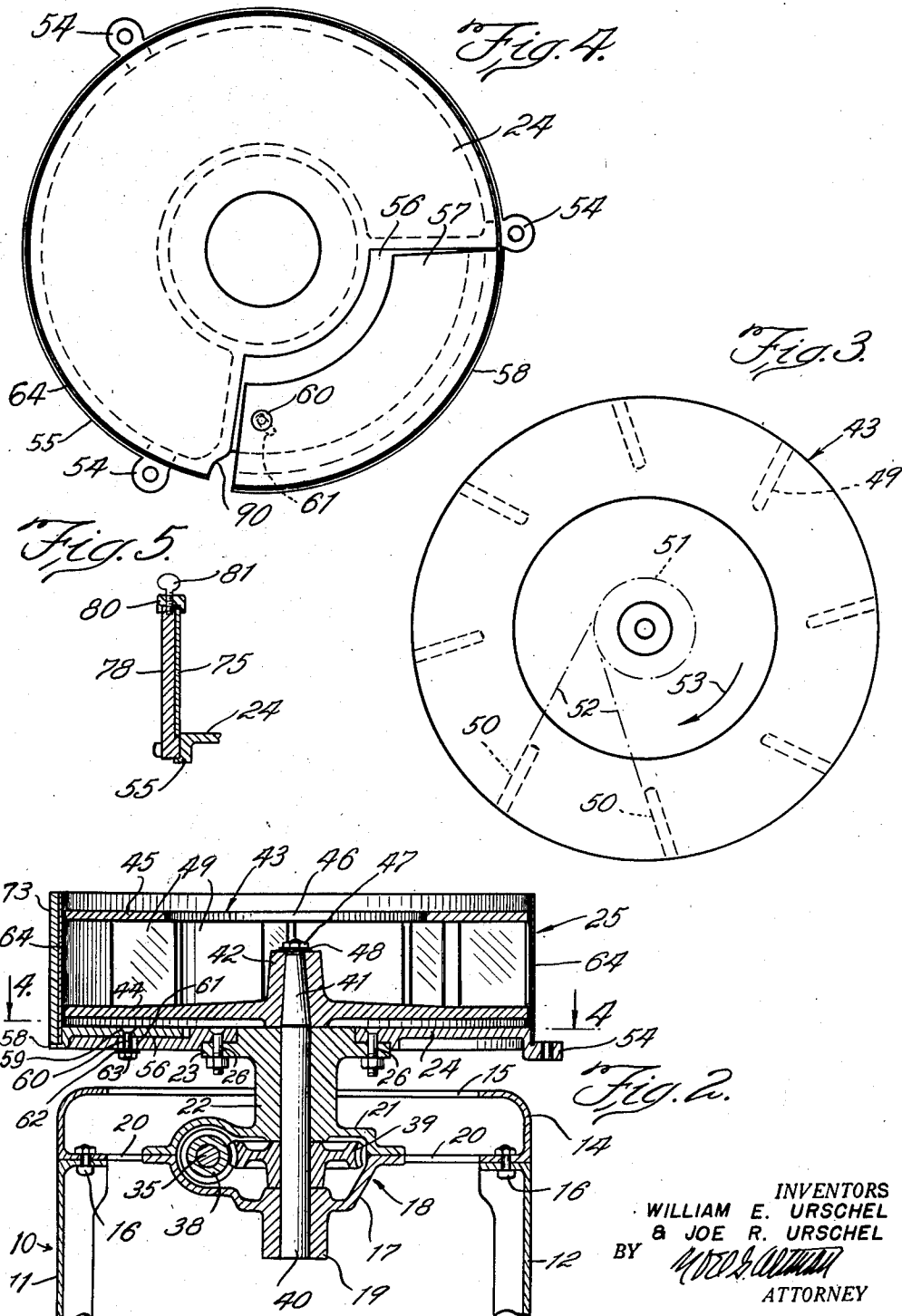
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Fig. 6.

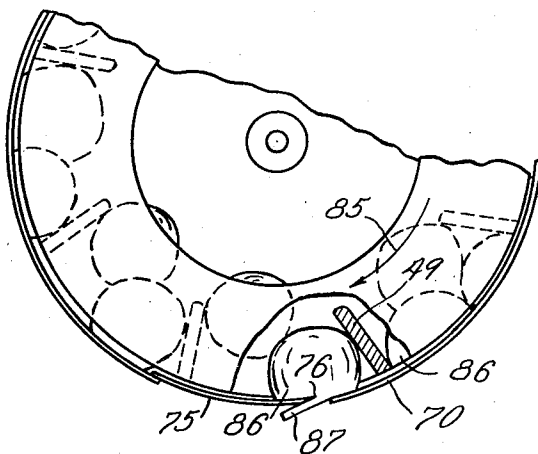
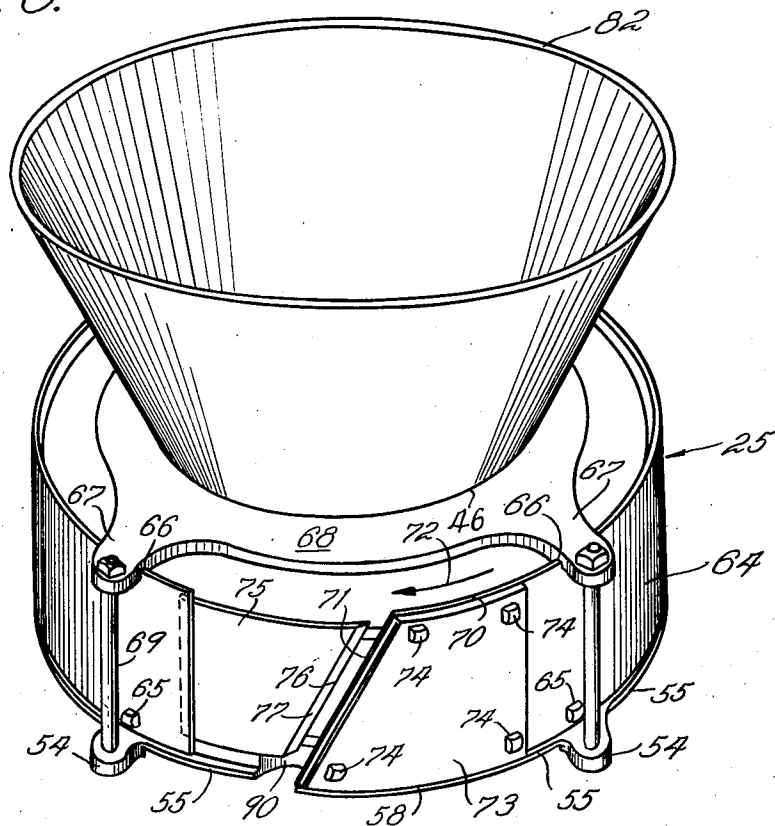


Fig. 7.

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SLICING MACHINE

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9 Claims. (Cl. 146-165)

This invention relates to machines of the character for slicing fruit or vegetables and the like, and has to do particularly with such a machine of the centrifugal type.

- 5 Persons as those engaged in the canning industry and who frequently prepare agricultural products by cutting them into smaller pieces in the form of strips, cubes or slices prefer that the pieces shall be geometrically regular. That is, if the processor cuts the articles of a product into strips he prefers that each of the strips shall be uniform in cross-section throughout its length; if the articles are diced it is desirable that each of the resulting fragments shall be in the shape of a true cube of the same dimensions as the others; and likewise, if the articles are sliced the finished product will be of a fancier grade if the slices are equal in thickness and each slice is uniform in thickness.
- 10 Slices that are wedge-shape or thicker near one edge than another are known in the trade as chips. Chips are undesirable.

- Although many slicing machines have been built heretofore, some of which are elaborate in parts, none has satisfactorily minimized the percentage of chips occurring in the finished product. It has been found that this shortcoming of prior machines is present in part at least because of their failure to hold the articles with sufficient firmness during the slicing operation, and the further failure to prevent shifting or rolling of the articles relatively to the cutting instrumentality within the times between severance of successive slices. It is, therefore, an object of the present invention to provide an improved slicing machine which is operable to maintain articles treated thereby in the proper position with respect to a slicing knife during the entire period slices are being removed and thus insure the production of slices uniform in thickness throughout.

- A further object of the present invention is the provision of a novel slicing machine that is simple in design while at the same time embodying principles of mechanics which lend to a machine adapted to operate efficiently upon articles fed therinto and without becoming clogged or jammed.

- The above and other desirable objects will appear hereinafter in the description of the invention with reference to the accompanying three sheets of drawings hereby made a part of this specification, and wherein:

- Fig. 1 is a side elevation of a machine constructed according to the present invention;

Fig. 2 is a fragmentary sectional view taken axially through the article receiving chamber and driving gear housing of the machine shown in Fig. 1;

Fig. 3 is a plan view of the rotor employed in the illustrated machine;

Fig. 4 is a sectional view taken on the line 4-4 of Fig. 2;

Fig. 5 is a sectional view of a knife blade and holder therefore, taken substantially on the line 5-5 of Fig. 1;

Fig. 6 is a perspective view of the hopper and article receiving chamber of the illustrated machine; and

Fig. 7 is a fragmentary plan view of the article receiving chamber and rotor of the illustrated machine.

The same reference characters are used for designating similar parts where shown in various figures of the drawings and described hereinafter.

Reference should first be had to Figs. 1 and 2 which show a bench 10 in support of the machine. Said bench 10 includes like side members 11 and 12 each of which is provided with legs 13.

The side members 11 and 12 are joined together in spaced relation at their upper ends by a cap 14 which has a central opening 15. Bolts 16 are used for securing the cap 14 to the bench or frame side members 11 and 12. The cap 14 has integral therewith the lower part 17 of a gear housing 18 and a bearing 19. Said gear housing 18 and bearing 19 are supported within the cap 14 by radially extending arms 20.

The upper part 21 of the gear housing 18 includes a bearing 22 which is in axial alignment with the bearing 19. The bearing 22 is provided with a flange 23 near its upper end, said flange being in support of a substantially circular plate 24 which constitutes the lower end or bottom of an article receiving chamber generally designated 25. Bolts 26 are used for securing the bottom plate 24 to the flange 23.

A motor 27, which provides driving power for the machine, is supported by and contained within the bench 10. Said motor is supported upon two transverse bars 28 and 29 of which the opposite ends rest upon and are secured to sections 30 of the side members 11 and 12. A pulley 31 is secured to the drive shaft 32 of the motor 27 and a driving belt 33 which is driven by the pulley 31 transmits driving force to a pulley 34 upon a shaft 35 which is journaled in bearings 36 and 37 of the gear housing 18. The shaft 35 will be seen in Fig. 2 to have a worm 38 non-rotatively secured thereto for driving a worm 39

wheel 39 which is keyed or otherwise suitably secured non-rotatively to a vertical shaft 40. Shaft 40 is journaled in bearings 19 and 22. The upper end of the shaft 40 has a tapered section 41 extending into the hub 42 of a rotor or impeller 43. A connection is established between the shaft 40 and the hub 42 by a nut 47 turned onto the reduced and threaded upper end of said shaft. A washer 48 is inserted between the nut 47 and the upper end of the hub 42. Axial movement of the shaft 40 is thus precluded relatively to the hub 42 which rests upon the upper end of bearing 22.

The rotor 43 comprises a circular bottom plate 44 integral with the hub 42 and an annular top plate 45 containing a large opening 46. It may be seen in Figs. 2 and 3 that the rotor 43 comprises a plurality of paddles or impeller members 49 of which the outer edges align with the outer peripheries of the lower and upper plates 44 and 45. Said paddles 49 are spaced equidistantly from one another and their leading faces 50 are disposed within vertical planes arranged tangentially of a circle 51 shown as a dot-dash line co-axial with the impeller 43. The tangential planes are indicated by straight dot-dash lines 52. Paddles 49 are disposed in such an angular relation within the rotor 43 so as to resist unwanted displacement of articles treated by the machine as will be fully explained hereinafter. When the machine is set in motion the rotor 43 is driven in the direction indicated by the arrow 53, Fig. 3.

Rotor 43 is encased within the herein above mentioned chamber 25. A plan view of the bottom or lower end wall 24 of the chamber 25 is shown in Fig. 4. Said lower end wall 24 is provided with apertured ears 54 and has a flange 55 extending approximately 270° about its periphery. A segmental recess 56 is formed within the upper face of said lower end wall, and a segmental plate 57 is slidably disposed within said recess, said plate 57 having a flange 58 which aligns with the flange 55 upon the end wall 24. Segmental plate 57 is apertured at 59 for receiving a plow bolt 60. The bolt 60 extends downwardly through an elongated curved aperture 61 within the recessed section of said end wall 24. A washer 62 and a nut 63 are provided upon the end of the bolt 60 beneath said end wall 24 and cooperate with said bolt for clamping the segmental plate 57 in selected position against said end wall. A notch 90 in the end wall 24 enables the machine to discharge (without cutting) such articles or parts thereof that are tenacious or which are otherwise of a character making them unadapted for treatment in the present machine.

The flanges 55 and 58 respectively upon the end wall 24 and the segmental plate 57 serve as retaining and guide means for a flexible side wall member 64 of the chamber 25. Said side wall member is secured along its lower edge to the end plate 24 by means of bolts 65 and is held in the desired substantially cylindrical formation along its upper edge by groove seats 66 within the lower face of ears 67 of a plate 68. After the side wall 64 has been assembled with the machine, the ears 67 which are apertured and which register with the ears 54 upon the end plate 24 are secured to the ears 54 by means of bolts 69.

It will be noted the flexible metal strip from which the side wall 64 of the article receiving chamber is formed is of such a length that the end sections thereof are disposed in spaced-apart

opposed relation when assembled upon the machine. One end section designated 70, Fig. 6, of the side wall 64 is cut diagonally so the end 71 thereof extends downwardly and forwardly in the direction of rotation of the rotor 43 indicated by the arrow 72. End section 70 of the side wall 64 is reinforced by a plate 73 which is secured to such end section by bolt 74. The opposite end of the side wall 64 is provided with a blade 75 having a cutting edge 76 extending in parallelism with the side wall edge 71 diagonally of the axial elements within said wall. In Fig. 6 it will be seen that the bevel 77 of the cutting edge 76 of blade 75 is disposed exteriorly of the chamber 25 so the apex of the cutting edge coincides with the inner face of said blade. The blade 75 is retained in conformity with the cylindrical inner periphery of the chamber side wall 64 by a curved plate 78 which is secured to the side wall 64 by bolts 79. A clamp member 80 shown in Figs. 1 and 5 and provided with a thumb screw 81 may be employed for securing the blade 75 against the curved inner face of the plate 78. The blade 75 is also pressed against the inner face of the plate 78 by the outer edge of end wall 24 against which the blade 75 is clamped by the plate 76.

When the side wall opening is considered with reference to the direction in which the rotor 43 is propelled, the edge thereof bounded by the blade 75 is the advanced edge. Such advanced edge is also the upper edge since it overlies the opposite or under edge designated 71.

Because of the flexibility of the side wall 64, its end section 70 may be moved outwardly or inwardly radially of the chamber 25 to adjust the inner face of such wall section laterally with respect to the cutting edge 76 of blade 75. The segmental plate 57 which is secured to the wall section 70 by means of the lower of the bolts 74 is moved incident to this radial movement of the wall section, the nut 63 upon the bolt 60 being loosened at the time of such movement or adjustment and being tightened subsequent to the adjustment so that the same may be maintained. Adjustment of the wall section 70 radially of the chamber 25 is limited by the length of the elongated aperture 61 within the end wall 24.

A hopper 82 is used for holding and guiding articles to be operated upon by the machine into the article receiving chamber 25. Said hopper 82 has about its lower end a flange 83 which fits into a large circular opening 46 within the collar or plate 68.

Operation of the machine

The machine is set in motion by the driving motor 27 which, through the pulley 31, driving belt 33, pulley 34, shaft 35, worm 38, worm wheel 39 and the vertical shaft 40 causes rotation of the rotor 43 in the direction of the arrows 72 and 85 respectively shown in Figs. 6 and 7. Articles such as vegetables designated 86 in Fig. 7 and which have been fed into the machine through the hopper 82 are moved by the paddles 49 in the direction of arrow 85. Centrifugal force acting upon the articles 86 will cause them to impinge against the substantially circular wall 64 and when the articles are carried against the cutting edge 76 of the blade 75 slices 87 will be removed therefrom as illustrated in Fig. 7. When the machine is operated at normal speed the inertia of the slices will cause them to precipitate outwardly through the side wall opening where they may be caught upon a conveyor or in a suitable re-

ceptacle. The thickness of the slices 87 will depend upon the adjustment of the wall section 70 radially of the chamber 25; that is, by loosening the nut upon the plow bolt 60 the segmental plate 57 and the wall section 70 may be moved radially inwardly or outwardly incident to flexing the wall 64 at a transverse section slightly to the right of the plate 73 as viewed in Fig. 6. After the desired adjustment has been made it can be maintained by tightening the nut 63 of plow bolt 60. Since the side wall 64 is bent but slightly when the side wall section 70 is adjusted, said side wall remains substantially cylindrical and thus avoid sharp wall deflections which if present would cause injury to the rapidly moving articles pressed thereagainst by centrifugal force.

Ordinarily it will be desirable that the thickness of the slices obtained from articles treated by the present machine will be uniform throughout and to this end the paddles 49 are arranged angularly of the chamber side wall 64 as hereinabove described with reference to the dot-dash lines 51 and 52 shown in Fig. 3. When the paddles or impeller members 49 are arranged in this manner, they will exert a component of force that urges the trailing parts of the articles engaged thereby against the chamber wall 64 and thus prevent such article from rotating while being forced into the blade 75. Subsequent to the knife entering an article as it is forced therepast said knife has the effect of augmenting the tendency of the paddles to hold the article firmly against the side wall 64, and this tendency obtains since the bevel 77 is disposed exteriorly of the blade 75 and thus deflects radially outwardly of the chamber 25 that portion of the article being severed as a slice. The unsevered portion of the slice serves as a ligature through which the deflected severed portion of the slice exerts force upon the main body of the article.

Should there become lodged upon the cutting edge of the blade 75 a foreign object or an exceptionally tough article peel or the like that resists slicing, such object or peel will be struck by succeeding articles, and thus advanced forwardly and downwardly and eventually discharged outwardly of the machine through the opening formed by the notch 90. The machine therefore has the advantage of automatically clearing itself of debris, thus enabling it to remain in constant operation without the intervention of an attendant.

A further advantage gained by slanting the knife edge 76 downwardly and forwardly in the direction indicated by arrow 72, Fig. 6, is that the articles, when striking such knife edge, are crowded downwardly into firm engagement with the floor of chamber 25. This crowding action upon the articles also offers resistance to their displacement other than movement with the paddles 49, so after a substantially flat face has been effected upon an article by the removal of a slice, that face will remain flatly against the interior of the chamber side wall. We have, therefore, taken advantage of gravitational force, centrifugal force and the force exerted by a diagonally disposed knife to maintain articles in a selected position with respect to the knife cutting edge at the time slices are removed, and in so doing have devised a simple machine adapted to operate in a much more efficacious manner than comparatively complicated machines heretofore provided for the same purpose.

We claim:

1. In a fruit or vegetable slicing machine of

the character wherein adhesive, atmospheric and centrifugal forces are employed for resisting unwanted movement of fruit or vegetable articles operated upon thereby, a receiving chamber for articles to be sliced by said machine, said chamber comprising a frame and a flexible sheet having forward and back end sections, said sheet being bent substantially into the shape of a cylinder to effect a substantially continuous vertical slide wall for said chamber and said frame embracing said sheet to maintain the same in its bent condition with the end sections thereof in opposed spaced relation, a knife holder member secured exteriorly to the forward of said end sections and projecting beyond the end thereof toward the back end section, a knife having substantially the same curvature as said cylinder wall secured to the inner side of the projecting portion of said knife holder member, the knife presenting its cutting edge in opposed spaced relation with the end of the back end section to provide a discharge opening for the chamber, a reinforcing plate secured upon the outer face of said back end section, said back end section and a section adjacent thereto being unsecured in the frame to enable said back end section to be adjusted radially of the chamber incident to flexing said adjacent section, a member operably connected with said back end section of the sheet and movable therewith radially of the chamber, means cooperable with said member for securing said back end section in selected radial positions, an impeller in said chamber rotatable coaxially of the cylindrical wall, said impeller including paddle members disposed for sweeping closely about the cylindrical chamber wall during such rotation, and means for rotating the impeller in the direction to cause the paddles to sweep consecutively past said back end section, said knife and said forward end section in the order named.

2. The combination set forth in claim 1 and wherein the edge of the back end section of the flexible sheet is formed diagonally to effect an advanced lower end thereof with respect to the upper end of such edge, wherein the knife cutting edge is disposed diagonally of the cylindrical chamber wall in opposed parallelism with said diagonal edge of the sheet and thus presents the lower end of said cutting edge in a more advanced position circumferentially of the cylinder than the upper end of said cutting edge, and wherein there is a chamber bottom member having a cut-away section in registry with the advanced end of the knife.

3. The combination set forth in claim 1 wherein there is a chamber end wall presenting a flat horizontal face, and wherein the member connected with said back end section has a curvilinear edge portion substantially coextensive with said back end section circumferentially of the chamber, the curvilinear portion of said member being engaged substantially throughout its length with said back end section and being secured thereto as bracing means therefor, said member also having a broad flat horizontal face flatly bearing upon the face of said end wall and slidable thereon during radial adjustment of said back end section, and the means for securing said back end section in selected radial positions being adapted to clamp said flat faces of said member and of the chamber end wall flatly together to prevent sliding movement therebetween and to brace said member against tilting.

4. In a fruit or vegetable slicing machine, an article holding chamber comprising a substan-

tially cylindrical side wall and an end wall, said machine being of the character wherein adhesive, atmospheric and centrifugal forces are employed for holding juice-laden articles against said side

5 wall and for resisting unwanted movement of said articles relatively to said wall during operation of the machine, impeller means for advancing such articles circumferentially about the inner periphery of said side wall, said side wall having therein a narrow opening provided with an
10 advanced sharpened edge and an edge opposed thereto and including a knife member bearing such sharpened edge, the inner periphery of said wall being smooth in its entire reach about the chamber from said knife member to said opposed
15 edge of the narrow opening, the section of said wall bearing said opposed edge and a section of said wall adjacent to but spaced from said wall section being comparatively rigid, said adjacent
20 rigid wall section being fixed upon the chamber, and there being, between and interconnecting said rigid wall sections, a bendable wall section to provide for adjustment of the first of said rigid
25 wall sections and of the opposed edge thereon radially of said chamber without incurring a sharp break in the wall curvature.

5. In a fruit or vegetable slicing machine, an article holding chamber comprising a substantially cylindrical side wall and an end wall, said
30 machine being of the character wherein adhesive, atmospheric and centrifugal forces are employed for holding juice-laden articles against said side wall and for resisting unwanted movement of said articles relatively to said wall during
35 operation of the machine, impeller means for advancing such articles circumferentially about the inner periphery of said side wall, said side wall having therein a narrow opening provided with an advanced sharpened edge and an
40 edge opposed thereto and including a knife member bearing such sharpened edge, the inner periphery of said wall being smooth in its entire reach about the chamber from said knife member to said opposed edge of the narrow opening,
45 the section of said wall bearing one of said edges and a section of said wall adjacent to but spaced from said wall section being comparatively rigid, said adjacent rigid wall section being fixed upon the chamber, and there being, between and
50 interconnecting said rigid wall sections, a bendable wall section to provide for adjustment of the first of said rigid wall sections and of the edge thereon radially of said chamber without incurring a sharp break in the wall curvature.

6. In a centrifugal slicing machine, a receiving chamber for articles to be sliced by said
55 machine, said chamber comprising a substantially cylindrical side wall having an elongated opening extending diagonally of the axial elements of said wall and thus providing an advanced edge bounding one side of the opening and an advanced
60 end of such opening circumferentially of said wall, impeller means for advancing said articles circumferentially about the inner periphery of said side wall, said advanced edge of the opening being sharpened, said advanced end
65 of the opening being unclosed to accommodate the sliding of uncuttable material endwise from

said sharpened edge, and said chamber having a discharge opening for said uncuttable material in registry with the advanced end of the knife axially of the chamber.

7. In a centrifugal slicing machine, a receiving
5 chamber for articles to be sliced by said machine, said chamber comprising a bottom end wall and a substantially cylindrical vertical side wall having a slit-like opening therein provided with an open lower end and extending diagonally of the axial
10 elements of said side wall thus providing an advanced upper edge and a lower edge bounding opposite sides of the opening, impeller means for advancing said articles circumferentially about the inner periphery of said side wall, the advanced
15 upper edge of said slit-like opening being sharpened to effect a cutting edge, the lower edge of said opening being off-set with respect to said cutting edge radially outwardly of the side wall, and there being in said bottom wall a refuse discharge
20 opening below and in registry with the lower open end of the slit-like opening.

8. In a fruit or vegetable slicing machine, an article holding chamber comprising an end wall
25 and a substantially cylindrical side wall, said machine being of the character wherein adhesive, atmospheric and centrifugal forces are employed for holding juice-laden skin-bearing articles against said wall and for resisting unwanted movement thereof relatively to said wall during
30 operation of the machine, impeller means for advancing said articles circumferentially about the inner periphery of said wall, said side wall having therein a narrow opening provided with an advanced sharpened edge and an edge opposed
35 thereto and directed diagonally of the axial elements in said side wall, said opening being unclosed at its end adjacent to said end wall, and said end wall having a refuse discharge opening communicative with the unclosed end of said
40 narrow side wall opening and in registry with the adjacent end of said sharpened edge axially of said chamber.

9. In a fruit or vegetable slicing machine of the character wherein adhesive, atmospheric and
45 centrifugal forces are employed for resisting unwanted movement of fruit or vegetable articles operated upon thereby, an article holding chamber comprising a bottom wall and a substantially vertical cylindrical side wall, said side wall having therein a narrow opening directed diagonally
50 of the axial elements in said side wall, said diagonal opening being provided with an upper advanced sharpened edge, a lower opposed edge and an advanced unclosed lower end adjacent to said
55 bottom wall, said bottom wall having a refuse discharge opening below and communicative with the unclosed end of said diagonal opening, the section of said wall bearing one of said edges and a section of said wall adjacent to but spaced from
60 said wall section being comparatively rigid, the second of said rigid wall sections being fixed upon said chamber, and there being, between said wall sections, a bendable wall section to provide for adjustment of the first named wall section and
65 of the edge thereon radially of said chamber.

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