Oct. 12, 1943. R. W. LUNDQUIST 2,331,406

MACHINE FOR SLICING VEGETABLES

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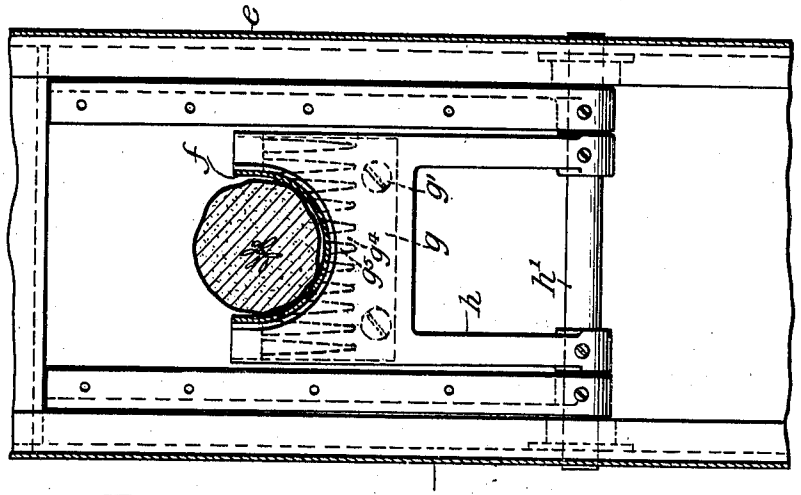


FIG. 2

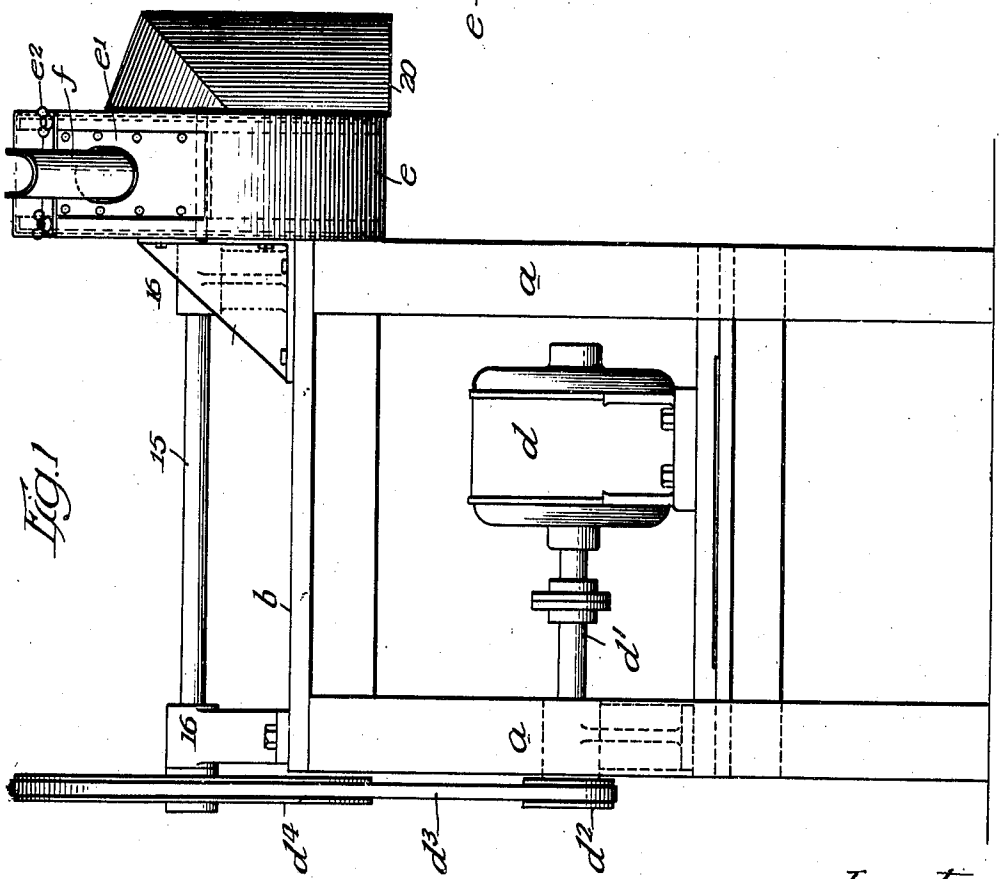


FIG. 1

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Fig. 3

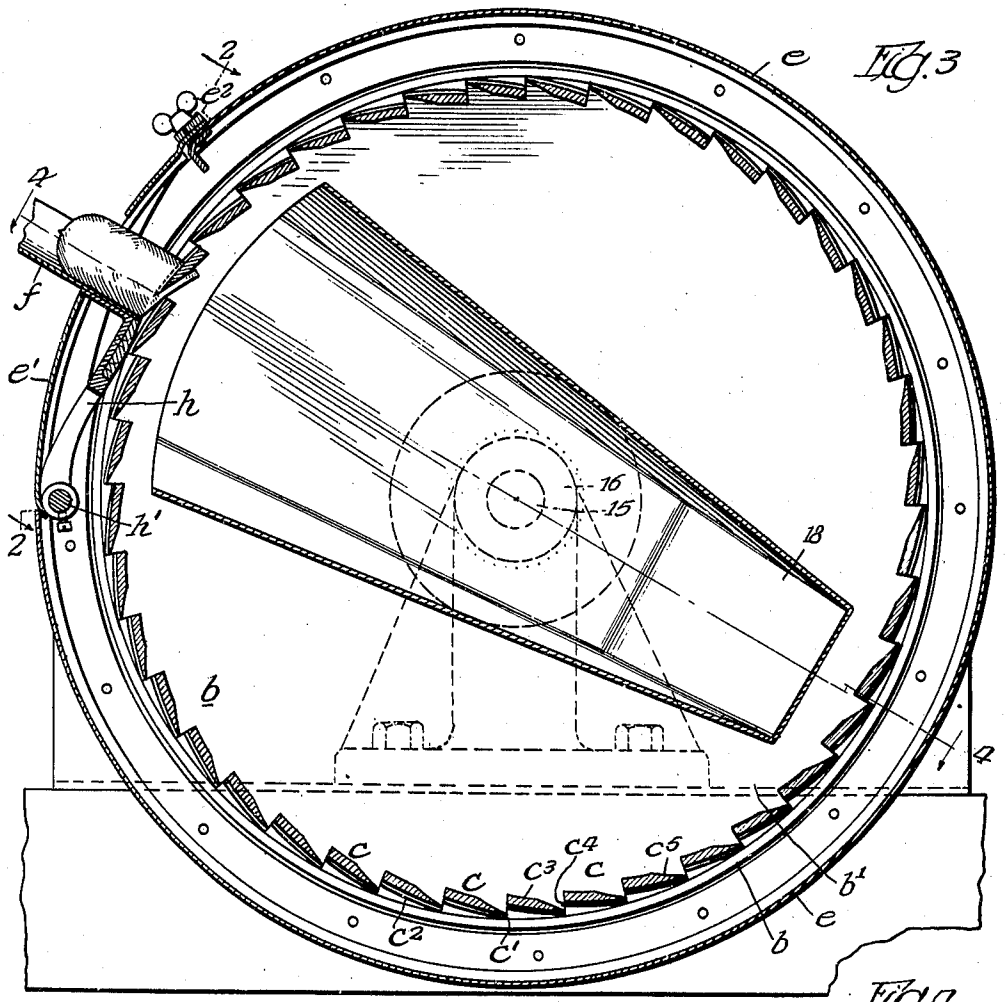
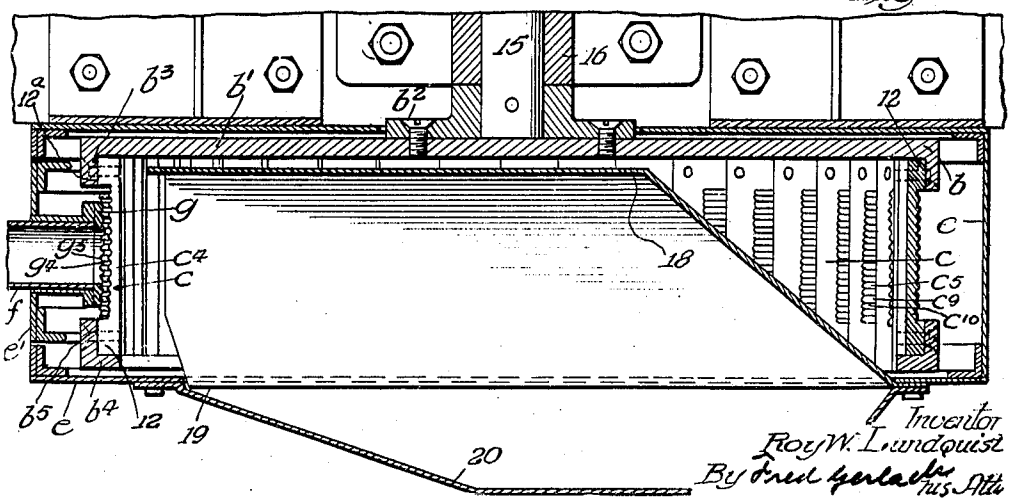


Fig. 4

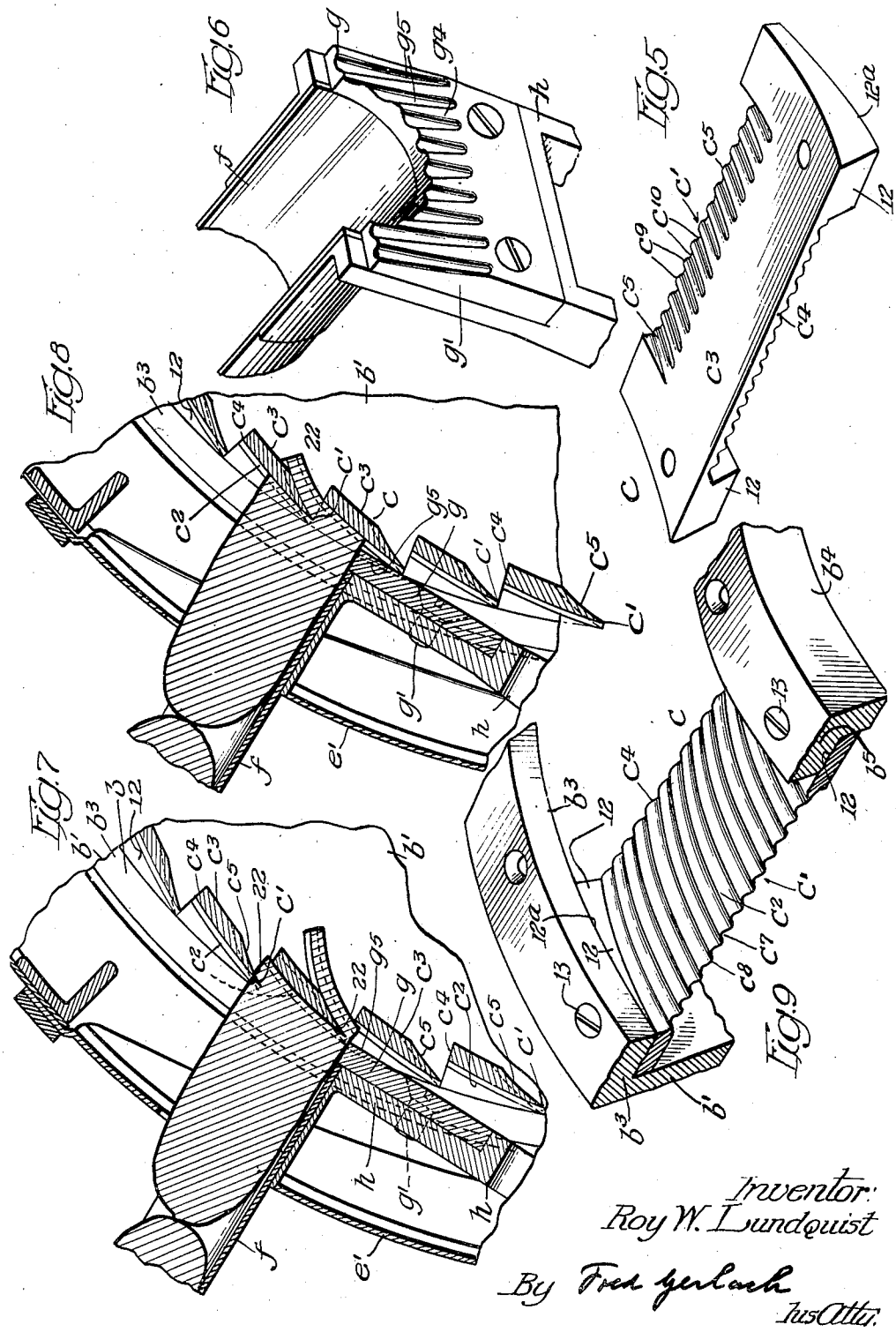


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Patented Oct. 12, 1943 2,331,406

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2,331,406

MACHINE FOR SLICING VEGETABLES

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Application July 14, 1941, Serial No. 402,267

4 Claims. (Cl. 146—89)

The invention relates to vegetable slicing machines.

One object of the invention is to provide a vegetable slicing machine of the drum type in which the knife-blades are arranged in circumferential succession for continuously cutting slices from the vegetables.

Another object of the invention is to provide a vegetable slicing machine of this type in which a vegetable, such as a cucumber, will be automatically fed to the knives by their action in cutting the slices therefrom.

Another object of the invention is to provide an improved slicing machine of the drum type for cutting corrugated slices from the vegetables.

A still further object of the invention is to provide a machine of this type of high capacity for use in commercial cutting of vegetables, which is efficient in operation and is adapted to cleanly cut slices of uniform thickness.

Other objects of the invention will appear from the detailed description.

The invention consists in the several novel features which are hereinafter set forth and are more particularly defined by claims at the conclusion hereof.

In the drawings: Fig. 1 is a side elevation of a machine embodying the invention. Fig. 2 is a section taken on line 2—2 of Fig. 3. Fig. 3 is a transverse section through the drum and its casing. Fig. 4 is a section taken on line 4—4 of Fig. 3. Fig. 5 is a perspective of a knife-blade illustrating its inner peripheral surface. Fig. 6 is a perspective of the abutment-plate and a portion of the feed-chute. Fig. 7 is a view on an enlarged scale illustrating the action of the blades as the cut of one slice is being completed and the cutting of the succeeding slice has been initiated. Fig. 8 is a section similar to Fig. 7 illustrating a knife-blade while cutting at the middle of a slice. Fig. 9 is a perspective illustrating the manner of securing the knife-blades to the rotatable head and the ring at the open side of the drum.

The invention is exemplified in a machine comprising a suitable frame a for supporting the several portions of the machine and a drum b fixed to a shaft 15 which is suitably journaled in bearings 16 mounted on the top of frame a. The drum comprises a head or side-wall b' which supports the drum on the shaft for rotation therewith and is fixed by screws b^2 to a flange on shaft 15. Head b' has a laterally projecting rim-flange b^3 to which the knife-blades are secured. The drum also comprises a ring b^4 which forms the open side of the drum through which the slices are discharged. Ring b^4 comprises a flange b^5 and is supported from the head b' by the knife-blades, as hereinafter described. The drum is continuously driven by mechanism comprising an electric motor d which is mounted on a frame a; a shaft d' driven by the motor; a pulley d^2 fixed to shaft d'; a belt d^3 driven by pulley d^2; and a belt-pulley d^4 fixed to the drum-shaft 15 and driven by belt d^4. In practice, the drum may be driven at a high speed, for example, 300 R. P. M., so the vegetable will be sliced at a high rate of speed. A casing e is fixedly supported by the frame a in any suitable manner and forms a housing around the drum.

The peripheral portion of the drum is formed by a series of knife-blades c which are arranged in continuous circumferential succession for continuously cutting slices from the vegetables. Each knife-blade c extends between and connects the head b' and the ring b^4. Each knife-blade has a cutting edge c' extending across its leading end; an outer curved peripheral face c^2; an inner curved peripheral face; and a trailing end c^4. The trailing end c^4 of each blade is substantially continuous circumferentially or radially aligned with the leading edge of the succeeding blade for continuous cutting action by the knives and to continuously support the end of the vegetable during the rotation of the drum. The outer peripheral face c^2 of each blade is curved between its cutting edge c' and its trailing end c^4 on a radius which is eccentric to and substantially equal to the radius of the path of rotation of the cutting edge c' so that the end of a vegetable will be supported across its entire face during the cutting of the slice and so that its trailing end will be spaced radially from the cutting edge of the succeeding blade for the discharge of the slice after completion of the cuts. The portion c^5 of the inner peripheral face of each blade is concavely curved from the cutting edge on a radius substantially equal to the radius of the path of rotation of the cutting edge c' on an arc of greater eccentricity than the outer peripheral face c^2, to bend the slice inwardly during each cut and to draw the face of the unsliced portion of the vegetable against the outer peripheral face. By forming the outer face c^2 on an arc of equal radius of the circular path of the cutting edges and eccentric thereto and forming the inner peripheral face-portion c^5 as described, the vegetable will be continuously held against outer face c^2 without sub-

stantially longitudinal compression and so that the vegetable will not be vibrated.

Vegetables, such as cucumbers, are guided through the casing *e* to the periphery of the drum by a chute *f* which is inclined so successive vegetables will slide by gravity to the periphery of the drum.

The inner peripheries of flange b^3 on head *b'* and flange b^5 on ring b^4 are cylindrical. The blades *c* are formed with integral projecting portions 12 having arcuate seats 12^a which conform to the inner peripheries of flanges b^3, b^5. The ends of the blades *c* fit between the inner faces of head *b'* and ring b^4. Each blade is secured by screws 13 to flanges b^3 and b^5. The ring b^4 at the outer side of the drum is supported entirely by the knife-blades. The portions 12 of the blade *c* abut circumferentially so that the blades form the entire peripheral portion of the drum. Longitudinally extending supports or connecting members between the knives are eliminated for continuous cutting of the slices by the successive blades.

A stationary plate *g* is fixedly supported adjacent the circular path of the cutting edges *c'* and functions as an abutment for supporting the vegetable against transverse movement while the slices are being severed. Plate *g* is disposed between the chute *f* and the outer periphery of the drum. In the operation of the machine for slicing of the vegetables, the abutment-plate is subjected to wear and must be maintained in correct predetermined relation to the cutting edges of the knife-blades to prevent ragged edges on the slices. For this purpose the plate *g* is preferably formed of plastic material, such as Bakelite, which is non-corrosive, and is removably secured by screws *g'* to a support *h*. The inner end of chute *f* is also fixed to the support *h*. The casing *e* is provided with a panel *e'* which closes an opening in the housing adjacent the chute *f* for access to the drum adjacent its cutting zone. The panel *e'* and support *h* are fixedly secured to a shaft *h'* which is pivotally supported by the suporting frame *a* so that the chute *f*, support *h*, and plate *g* may be swung away from the drum so the plate will be accessible from the outside of the casing when its replacement is necessary. Panel *e'* at its upper end is removably secured by screws e^2 to the housing *e*.

A deflector 18 is fixedly supported from the outer side of the housing *e* for directing the slices through an opening 19 in the outer side of the drum and ring b^4 to a discharge chute 20 which directs the slices downwardly, usually onto a suitable conveyor or receptacle (not shown).

The blades illustrated are adapted for cutting corrugated slices. For this purpose the outer peripheral faces c^2 are formed with alternating ribs c^7 and grooves c^8 which extend circumferentially from end to end of each blade. The portion c^5 of the inner periphery c^3 of each blade is ribbed, as at c^9, and grooved, as at c^{10}. The ribbed and grooved inner and outer peripheral faces c^2, c^5 merge to form the corrugated cutting edge *c'*. In order to support the vegetable conformably to the cutting path of the corrugated cutting edge, the inner face of abutment-plate *g* is provided with alternate ribs g^4 and grooves g^5, which conform to the corrugated cutting edge *c'* to support a vegetable, such as a cucumber, to the cutting line and assist in preventing ragged or irregular edges on the slices.

In operation, the drum *a* will be continuously rotated at a high speed, for example 300 R. P. M. When a vegetable, such as a cucumber, is advanced in chute *f*, its leading end will rest against the outer peripheral face c^2 of a knife-blade. As the cutting edge *c'* of the first blade in its rotation reaches the vegetable, it will commence to cut a slice, as indicated at 22 in Fig. 7. As the cut is continued the inner peripheral curved face-portion c^5 will, through its pull on the uncut portion, draw the end of the vegetable against the outer peripheral face c^2 of the blade and this will continue until the slice has been completely severed. The curvature of the outer peripheral face c^2 of the knife permits the vegetable to pass across the plane of rotation of the cutting edges of the knives during the cutting of each slice. In practice, it has been found that when the radius of the curve is equal and eccentric to the radius of the plane of rotation of the cutting edge and the inner peripheral portion c^5 is of the same radius and of greater eccentricity, the vegetable will be positively fed by the action of the knife-blades themselves so the face on the vegetable left by the last slice will be snugly held against the outer periphery c^2 of the blade until the succeeding blade enters the vegetable, without producing any chattering and without excessive pressure, which is undesirable. This results in automatically and positively feeding the vegetable against the outer peripheries of the knives. The knife-blades are arranged in substantially continuous circumferential succession or so that the trailing end of one knife-blade is radially aligned with the cutting edge of the succeeding blade for producing substantially continuous cutting by the blades. The blades are circumferentially dimensioned between their leading and trailing ends so that before one slice has been completely severed and while the vegetable is under the influence of the pulling action of one inner peripheral face the succeeding knife will commence to cut a slice, as illustrated in Fig. 7. This effects a continuous cutting action by the annular series of knives and the automatic and positive feeding of the vegetable for high speed operation for the commercial production of sliced vegetables. The slices are discharged between the trailing ends of one knife-blade and the cutting edge of the succeeding knife-blade and are forcibly projected into the deflector 18 from which they are rapidly discharged through the chute.

The invention exemplifies a vegetable slicing machine in which the slices are cut in continuous succession from a vegetable; in which the vegetable is automatically pulled against the outer peripheral faces of the knives to automatically and positively feed the vegetables to the cutting edges of the drum without chattering or excessive compression of the vegetable; in which the knife-blades are formed in circumferential continuous succession and the outer peripheral faces of the knives terminate radially in alignment with the cutting edge of the succeeding knife; in which the entire periphery of the drum is composed of knife-blades and the ring at the outer side of the drum is supported entirely from the head at the other side; in which provision is made for replacement of the stationary abutment-plate; and in which the abutment-plate and knives are adapted for cutting corrugated slices.

The invention is not to be understood as restricted to the details set forth, since these may be modified within the scope of the appended

claims, without departing from the spirit and scope of the invention.

Having thus described the invention, what I claim as new and desire to secure by Letters Patent is:

1. In a machine for slicing cucumbers and the like, the combination of a rotatable drum, a chute for slidably and controllably guiding vegetables individually to the drum, a circumferential series of blades on the drum having corrugated knife edges extending across their leading ends, corrugated circumferentially curved outer peripheral faces sloping inwardly from the knife edges to the trailing ends, and inner curved corrugated peripheral faces adapted to flex the slices inwardly from the cutting edge and to draw the end-face of the vegetable at the cut against the drum, an abutment between the chute and the drum, over which the vegetables are slidable, having a corrugated coacting cutting edge meeting and conforming to the corrugated knife-edges, the abutment being adapted to support the vegetable to the corrugated cutting line until the slices have been completely severed, and mechanism for rotating the drum.

2. In a machine for slicing cucumbers and the like, the combination of a rotatable drum, a chute adapted for slidably and controllably guiding vegetables individually to the drum, a circumferential series of blades on the drum having corrugated knife edges extending across their leading ends, corrugated circumferentially curved outer peripheral faces sloping inwardly from the knife edges to the trailing ends, and inner curved corrugated peripheral faces adapted to flex the slices inwardly from the cutting edge and to draw the end-face of the vegetable at the cut against the drum, an abutment between the chute and the drum, having an arcuate edge over which the vegetables are slidable and by which they are confined against transverse movement relatively to the blades, and a corrugated face meeting and conforming to the corrugated knife edges, the edge of the abutment being adapted to support the vegetable to the corrugated cutting line until the slices have been completely severed, and mechanism for rotating the drum.

3. In a machine for slicing cucumbers and the like, the combination of a rotatable drum, a chute adapted for slidably and controllably guiding vegetables individually to the drum, a circumferential series of blades on the drum having corrugated knife edges extending across their leading ends, corrugated circumferentially curved outer peripheral faces sloping inwardly from the knife edges to the trailing ends and inner curved corrugated peripheral faces adapted to flex the slices inwardly from the cutting edge and to draw the end-face of the vegetable at the cut against the periphery of the drum, the blades being of such length that they will start one cut before the preceding cut has been completed, an abutment between the chute and the drum, an arcuate coacting cutting edge over which the vegetables are slidable and by which they are confined against transverse movement relatively to the blades, and a corrugated face extending peripherally from the arcuate edge and conforming to the corrugated knife edges, the coacting edge being adapted to support the vegetable to the corrugated cutting line until the slices have been completely severed, and mechanism for rotating the drum.

4. In a machine for slicing cucumbers and the like, the combination of a rotatable drum, a chute adapted for slidably and controllably guiding vegetables individually to the drum, a circumferential series of blades on the drum having corrugated knife edges extending across their leading ends, corrugated circumferentially curved outer peripheral faces sloping inwardly from the knife edges to the trailing ends and inner curved corrugated peripheral faces adapted to flex the slices inwardly from the cutting edge and to draw the end-face of the vegetable at the cut against the periphery of the drum, an abutment between the chute and the drum, having an arcuate upper coacting cutting edge over which the vegetables are slidable and by which they are confined against transverse movement relatively to the blades, and a corrugated face extending peripherally from said upper edge, and conforming to the corrugated knife edges and of gradually decreasing depth, the arcuate cutting edge being adapted to support the vegetable to the cutting line until the slices have been completely severed, and mechanism for rotating the drum.

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