Jan. 9, 1940. W. A. VAN BERKEL 2,186,565

SLICING MACHINE

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FIG. 1.

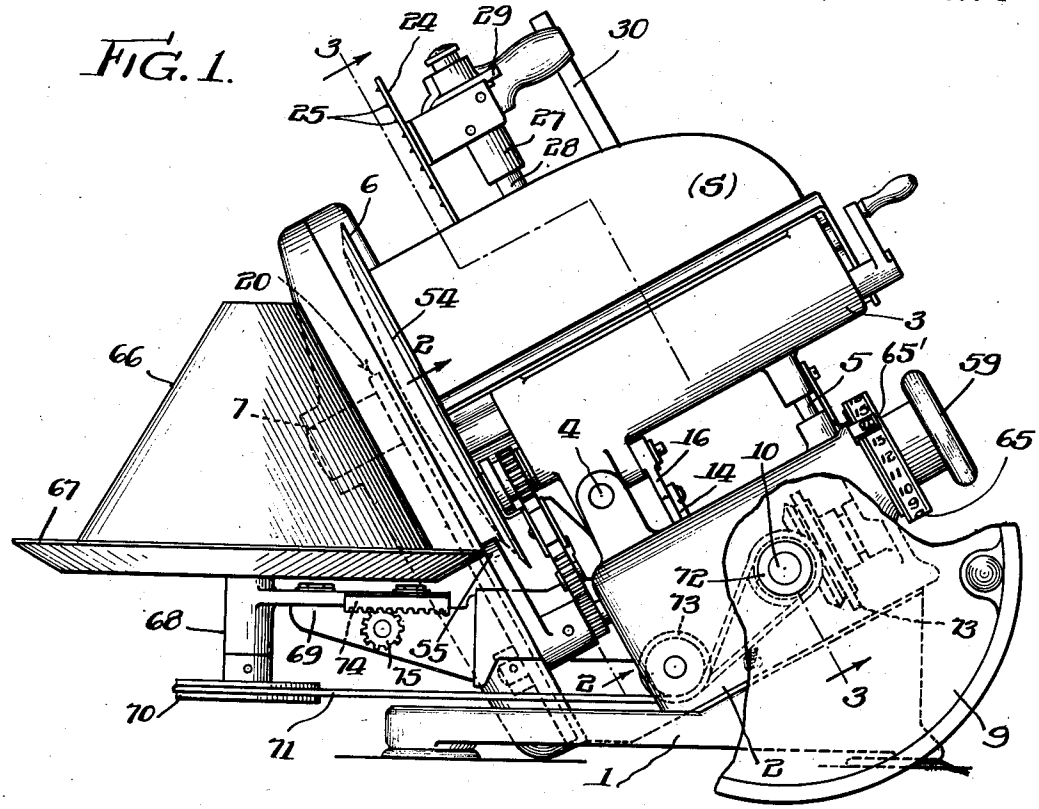
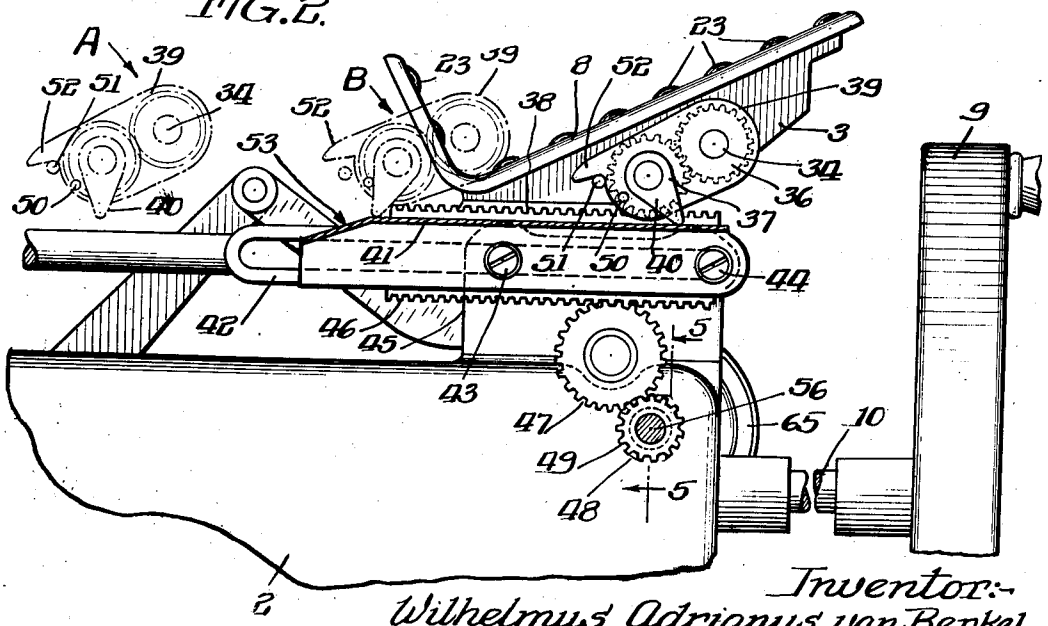


FIG. 2.



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FIG. 3.

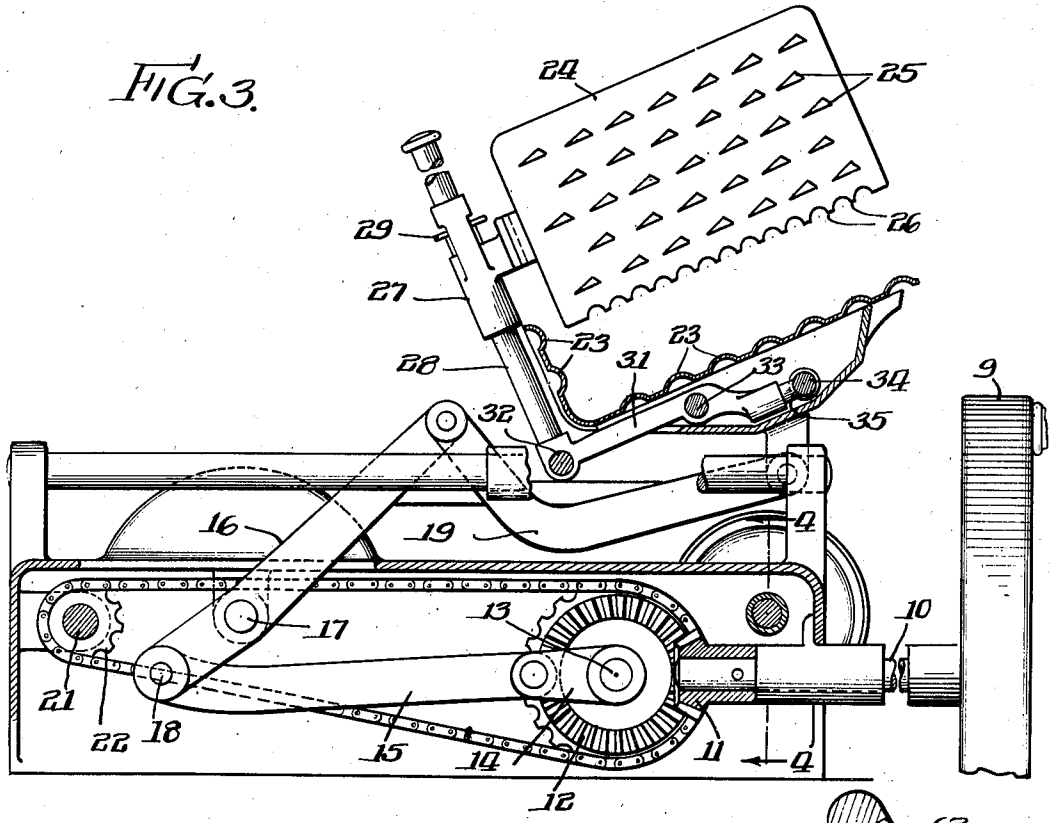


FIG. 4.

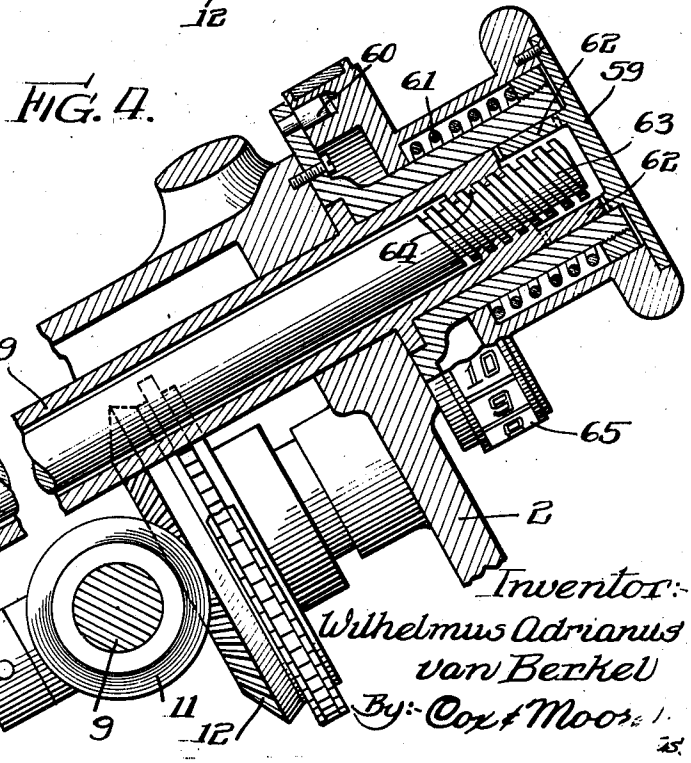
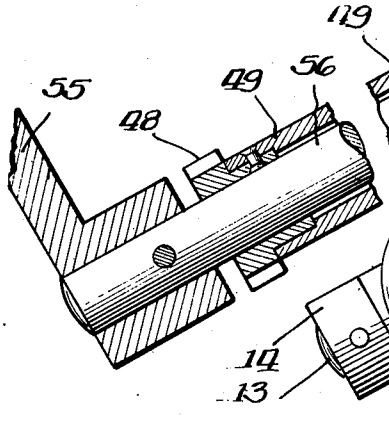


FIG. 5.



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FIG. 6.

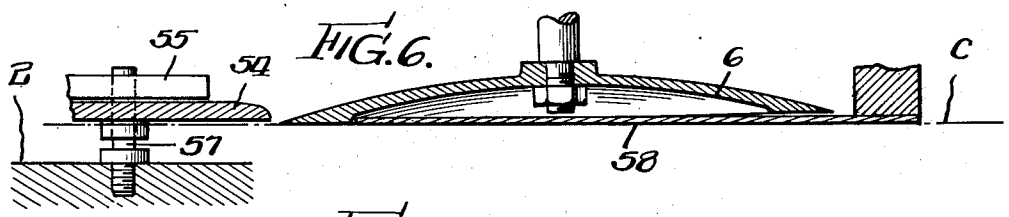


FIG. 7.

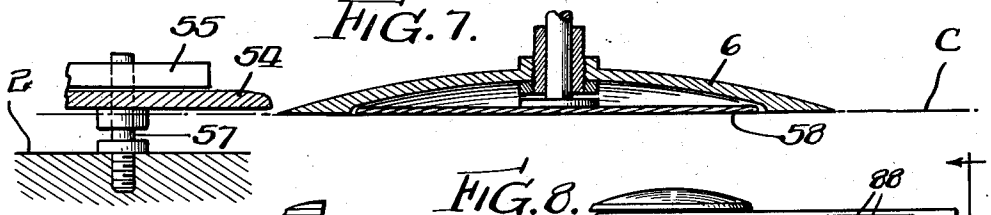


FIG. 8.

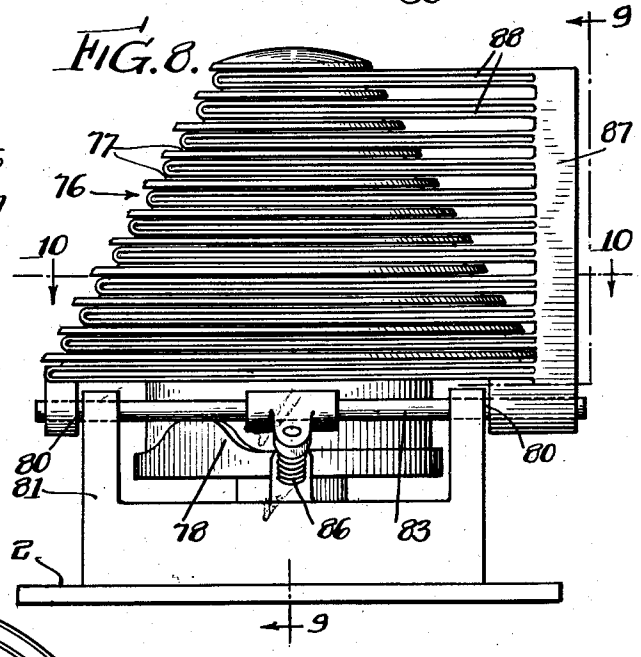
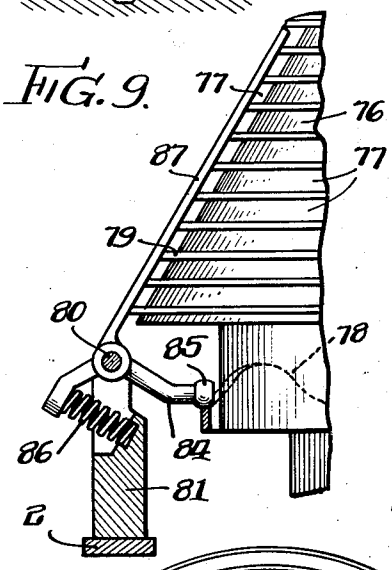


FIG. 9.



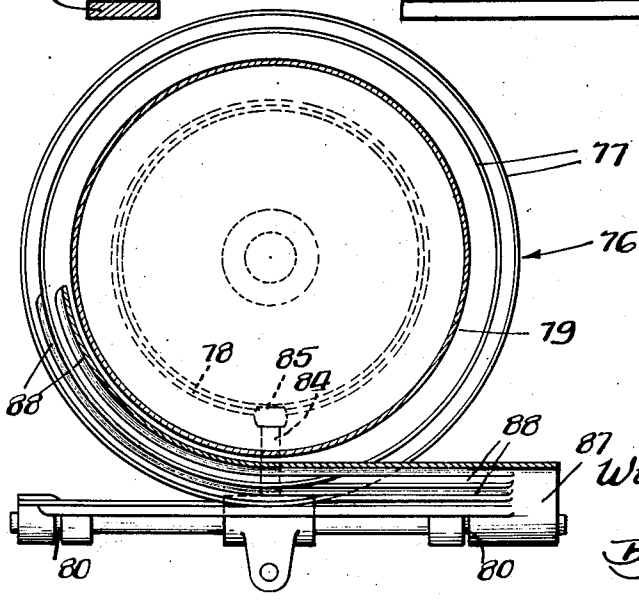


FIG. 10.

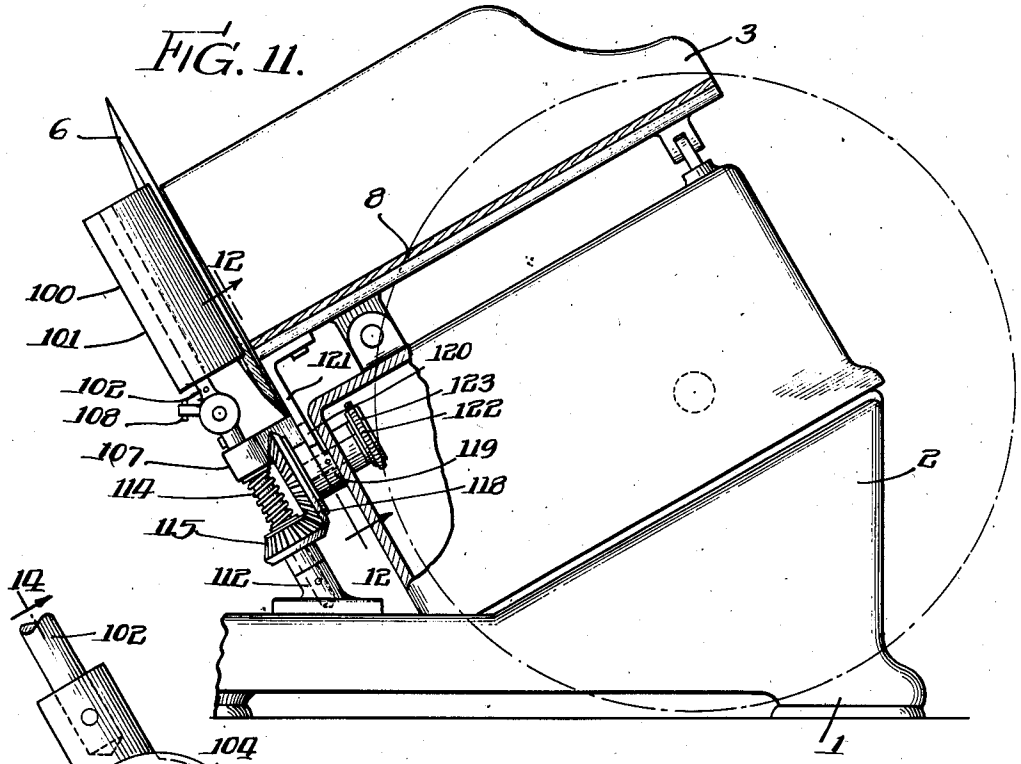
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FIG. 11.



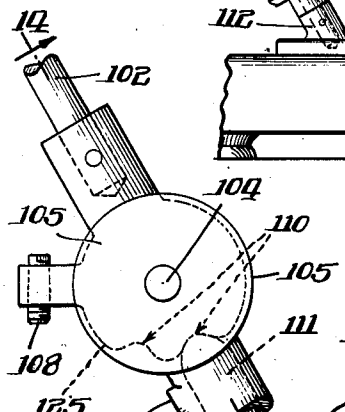


FIG. 13.

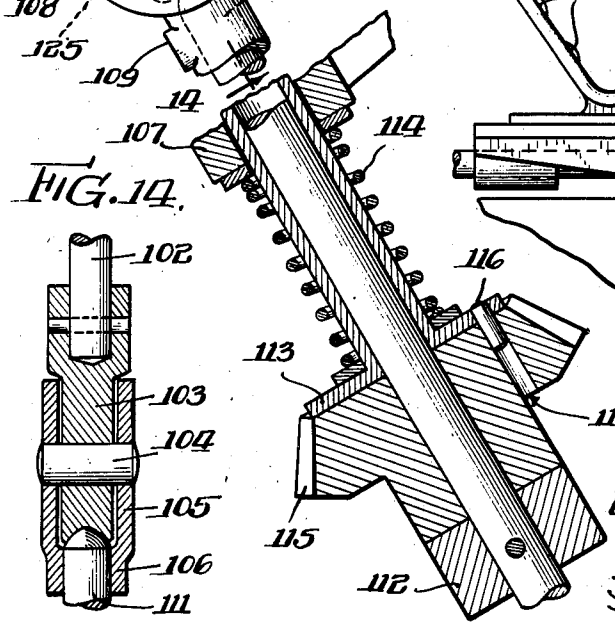


FIG. 12.

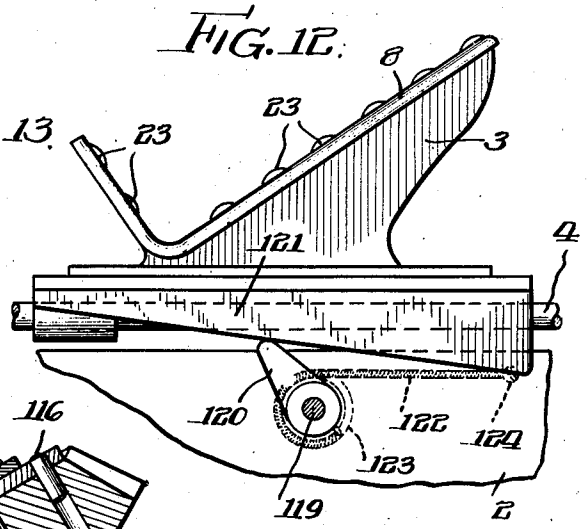


FIG. 14.

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Patented Jan. 9, 1940 2,186,565

UNITED STATES PATENT OFFICE

2,186,565

SLICING MACHINE

Wilhelmus Adrianus van Berkel, Clarens, Switzerland, assignor to U. S. Slicing Machine Company, La Porte, Ind., a corporation of Indiana

Application March 26, 1936, Serial No. 71,033
In Great Britain April 5, 1935

7 Claims. (Cl. 146—94)

This invention relates to slicing machines, and particularly to slicing machines having the cutting knife thereof inclined to the horizontal; more specifically the invention relates to a slicing machine having an inclined carriage and an inclined knife and means for operating said elements.

The primary object of the invention is to provide a slicing machine which is constructed and arranged with an inclined food table, whereby food may be advanced by feed mechanism or fed by gravity to a rotatably mounted knife which is inclined to the horizontal but which has its cutting plane perpendicular to the plane of the carriage, whereby slices of substance cut may be deposited on a slice receiver or stacking element which operates in timed relationship with the operation of the carriage.

Another object of the invention is to provide a slicing machine whereby substance on the carriage may be fed in a new and novel manner and regulated to provide slices of predetermined thicknesses.

Another object of the invention is to provide a new and novel substance support and feeding mechanism whereby substance may be positively fed to the slicing plane of the slicing machine.

Still another object is the provision of a slice-receiving element or slice stacker so constructed and arranged that slices may be arranged thereon in stacked relationship, or in staggered relationship depending upon the movement and adjustment of the slice receiver or stacker.

Another object of the invention consists in the arrangement and construction of parts whereby substance may be fed to the cutting plane of the knife, and when slices are cut therefrom may be stacked or supported in a new and novel manner, there being means provided whereby the substance may be fed to the cutting plane.

Numerous other objects and advantages will be apparent throughout the progress of the following specification.

The accompanying drawings illustrate a selected embodiment of the invention and the views therein are as follows:

Fig. 1 is a detail end elevation of a slicing machine and embodying the invention.

Fig. 2 is a detail sectional view on the line 2—2 of Fig. 1.

Fig. 3 is a detail longitudinal sectional view on the line 3—3 of Fig. 1.

Fig. 4 is a detail sectional view through certain elements controlling the operation of the feeding mechanism, whereby slices of various thicknesses may be cut.

Fig. 5 is a detail perspective view of the gauge plate operating mechanism and operates in proper timed relationship with the mechanism shown in Fig. 4.

Fig. 6 is a detail plan section showing one form of guard plate construction which may be employed in carrying out the objects of the invention.

Fig. 7 is a view similar to Fig. 6 but shows a modified form of knife guard plate.

Fig. 8 is a detail elevational view of one form of stacker mechanism and its cooperating fly.

Fig. 9 is a detail view of the stacker mechanism shown in Fig. 8 and looking in the direction of the arrows 9—9 of Fig. 8.

Fig. 10 is a transverse sectional view on the line 10—10 of Fig. 8.

Fig. 11 is a detail end elevation partly in section, showing one form of slice-receiving mechanism which may be employed.

Fig. 12 is a detail sectional view on the line 12—12 of Fig. 11.

Fig. 13 is a detail sectional view of some of the operating parts of the slice-receiving elements shown in Fig. 11.

Fig. 14 is a detail sectional view on the line 14—14 of Fig. 13.

The slicing machine herein shown for the purpose of illustration comprises a supporting structure 1, which includes an inclined base 2. A carriage 3, which is also inclined as clearly shown in Fig. 1, is adapted to be reciprocated along spaced guides 4 and 5. A circular, revolubly-mounted, rotary knife 6 is properly journaled in a knife-supporting bracket 7 which is secured to the base 2.

The carriage 3 is provided with a substance-engaging face or surface 8, which has an inclination of approximately thirty degrees to the horizontal. The knife is so situated that it is rotatable in a plane at right angles to the inclination of the carriage, that is, the slicing plane of the knife is inclined about sixty degrees to the horizontal, Fig. 1.

The carriage 3 and the knife 6 may be operated in any convenient manner, but are herein shown as being operated by a manually turnable hand wheel 9, which is connected to a shaft 10. The shaft 10 has connected thereto a bevel gear 11, Fig. 3, which in turn meshes with a cooperating bevel gear 12 mounted on a short crankshaft 13. A crank 14, driven by the shaft 13, is operatively connected to and operates a

connecting rod 15. A lever 16 is pivoted to a part of the base 2 as indicated at 17, Fig. 3, and pivotally connected to the connecting rod 15 as indicated at 18, Fig. 3.

The lever 16 is in turn coupled by a link 19 to a bracket on the under side of the carriage 3. The knife shaft is driven through chain and sprocket gearing 20, Fig. 1, from a countershaft 21, Fig. 3, which is driven through chain and sprocket gearing 22 from the crankshaft 13.

The substance-supporting portion 8 of the carriage 3 may be substantially L-shaped and provided with corrugations 23, Figs. 2 and 3. A substance engager 24 is adapted to operate alternately as a clamp or as a pusher. Teeth 25 may be provided on the pushing surface of the substance engager 24 when the same is used as a pusher, while teeth 26 may be formed along one or more edges of the engager 24 when the same is to be used as a clamp. This substance engager 24 is secured to a sleeve 27 which is slidable along a post 28. The substance engager 24 may be locked to the post 27 in any convenient manner, such as by a locking ring 29. An auxiliary post 30 serves to prevent rotation of the sleeve 27 on the main post 28. The posts 28 and 30 are mounted on a support 31, Fig. 3, which is slidable along guide bars 32 and 33 rigid with a part of the carriage 3, Fig. 3. The substance engager is adapted to move substances, Fig. 1, in step-by-step feed movement, deriving this motion from a feed screw 34, Fig. 3, through the intermediary of a feed screw nut 35 which meshes with the screw 34 and which may be withdrawable at will therefrom.

The step-by-step feeding movement of the substance engager 24 is controlled and operated by the mechanism shown principally in Fig. 2 and comprises a gear wheel 36, Fig. 2, which is fixed to the feed screw 34. An idler gear wheel 37 meshes with the gear 36 and has meshing relationship with a rack 38. The idler gear 37 is journaled in a bracket 39 which comprises two spaced plates pivotally mounted on the feed screw 34. The bracket 39 is associated with a tumbler 40 which is journaled on the shaft of the idler gear 37. This tumbler is arranged to cooperate with a cam-like slide 41, Fig. 2, which is secured to a slide bar 42, on which the rack 38 is mounted. The bar 42 is slotted longitudinally to receive pins 43 and 44 screwed in the bracket 45 on the base 2. The bar 42 is provided with another rack 46 which meshes with an idler gear wheel 47 journaled in the base 2. The idler 47 meshes with a gear wheel 48 secured to a manually adjustable tube 49, Figs. 2 and 5. The parts are so constructed and arranged that turning movement of the tube 49 will effect proportionate longitudinal displacement of the rack 46 and the slide 41.

The bracket 39 and the carriage 3 have abutment pins 50 and 51, respectively, Fig. 2, the pin 50 cooperating with the tumbler 40 and the pin 51 cooperating with a projection 52 on the bracket. The parts are so constructed that at the beginning of each slicing stroke of the carriage 3, Fig. 2, the bracket 39 rests upon the pin 51, as shown in solid lines at the right of Fig. 2. During movement of the carriage the tumbler 40 will slide idly upon the slide 41 and the idler 37 will mesh with the rack 38. Feed movement therefore is imparted to the feed screw 34 and thence to the substance engager 24 through the intermediary of the parts constituting the feeding element. The feed period of the substance engager 24 terminates when the idler 37 moves from the rack 38. During movement of the carriage when the same has reached a predetermined position, the bracket 39 and the tumbler 40 will assume the position designated by the letter A, Fig. 2. The tumbler 40 will be off of the slide 41 and will fall by its own weight towards the pin 50 on the bracket 39.

As the carriage 3 approaches the end of its return stroke, the tumbler 40 will engage the slope 53 of the slide 41, Fig. 2. The tumbler, when it engages the slope 53, will lift the bracket 39 a sufficient distance away from the pin 51 to insure that the idler 37 will be free from the rack 38. The parts when assuming this latter position are indicated by the letter B, Fig. 2. During the initial portion of the next forward movement of the carriage 3 to perform the slicing stroke the tumbler 40 will move from the position shown in B to its original position away from the pin 50, there being sufficient frictional engagement between the slide 41 and the tumbler 40 to cause the latter to drag and rotate relative to the bracket 39 from the position B as shown in solid lines at the right of Fig. 2. The bracket 39 then falls upon and is supported by the pin 51 causing the idler gear 37 to again mesh with the rack 38.

In order to assure proper positioning of the substance, and further to insure the proper cutting of the first full slice, a gauge plate 54, Figs. 1, 6, and 7, may be provided. This gauge plate 54 is secured to a bracket 55, which bracket is mounted upon a non-rotatable but longitudinally movable adjusting rod 56, Fig. 5. The adjusting rod passes through the previously mentioned adjustment tube, 49, Fig. 5. The rod 56 cooperates with a guide 57, Figs. 6 and 7, to support the bracket 55 and the gauge plate 54.

The gauge plate 54 cooperates with a knife guard plate 58, Fig. 7, and this guard plate 58 is set in a manner as shown in Fig. 6 where the knife is skewed or inclined from the normal cutting edge. This guard plate 58 masks that portion of the knife edge which is opposite to the portion necessarily exposed for the slicing operation. Where the knife is set parallel to the left-hand edge of the carriage in a line with the stroke of the carriage indicated as C, Fig. 7, the guard plate 58 may be inset within a circular recess bounded by the knife rim, Fig. 7.

The gauge plate 54 serves as a means for positioning the substance preparatory to the slicing operation, as well as being available as an alternative construction for the mechanical feed. The use of the gauge plate is especially useful when the substance is so small or short that it cannot be conveniently clamped by the teeth 26 of the substance-engaging element 24. In this alternative arrangement the substance engager 24 may be lowered and used as a pusher. The gauge plate 54 is adjustable to and from the slicing plane so that slices of desired thickness may be had. The gauge plate 54 is adapted to be controlled by a hand-operated member or wheel 59, Figs. 1, 4, and 5, and this hand-controlled member 59 is provided with control means for setting the feeding mechanism. The hand member 59, Fig. 4, is normally held against rotation by a fixed stop 60, which is fastened to the base 2 but the member 59 can be withdrawn from the stop 60 against the pressure of a spring 61, Fig. 4. Clutch teeth 62 serve to lock the hand member 59 to the adjustment tube 49 so that the hand member and tube are maintained relative-

ly non-rotatable. A screw 63 is formed at the end of the non-rotatable rod and is adapted to engage with an internally screwed portion 64 of the tube 49. The arrangement is such that rotation of the hand member 59 will effect similar rotation of the tube 49. Such rotation is accompanied by a proportionate displacement of the rack 38 and the slide 41 of the feeding mechanism. Lengthwise displacement of the rod 56 causes similar displacement of the gauge plate 54. Therefore it can be readily seen that when the hand member 59 is rotated the internal shaft 56 is translated or moved longitudinally, and such longitudinal movement of the rod 56 causes movement of the gauge plate 54 towards and away from the cutting plane of the slicing machine. A plurality of graduations 65, Figs. 1 and 4, may be provided on the hand wheel 59 to cooperate with a fixed pointer 65', Fig. 1, to form indicating means defining slice thickness.

A slice support or stacker element 66, Fig. 1, is adapted to be located adjacent the knife to receive slices as they are being cut. This slice receiver is preferably conical in shape, that is in the shape of a frustum of a cone, the outer surface of the cone of course being inclined, the inclined surface adjacent the knife having the same inclination as the knife. It has been found that this surface should be at the same inclination as the knife, which is approximately sixty degrees from the horizontal, Fig. 1. This slice support or stacker 66 may be provided with a slice retaining rim 67, Fig. 1. A shaft for the cone stacker 66 is rotatably mounted in a suitable bearing 68, which is attached to a bracket 69 fixed to the base 2. A pulley 70 is fastened to the shaft of the cone stacker and is driven by an elastic belt 71, which belt is driven by a pulley 72 on the shaft 10, Fig. 1. A tightener pulley 73 is provided to take up the slack in the belt 71.

In order that the slice receiver or stacker 66 can be displaced from the knife as the quantity of slices increases on the stacker, an adjustment is provided in the bracket 69. The bracket 69 comprises a footstep bearing slidably arranged on the bracket 69 and includes a rack 74 which meshes with a pinion 75. The shaft of the pinion is journaled in the bracket and this shaft is turnable either manually or mechanically to displace the slice receiver or stacker 66. By the use of an elastic belt, such as an extensible helical spring, the adjustment of the cone stacker 66 with respect to the knife 6 is permitted.

The arrangement of the slice receiver or stacker 66 is such that, during the operation of the slicing machine, the stacker 66 will have imparted to it continuous unidirectional rotation. During the cutting of the slices, each slice cut by the knife will drop from the knife to the rotating conical surface of the stacker without any substantial change in inclination. The rate of rotation of the stacker 66 relatively to the rate of reciprocation of the carriage 3 can be arranged so that all the slices will collect in a single pile or they will be arranged in overlapped, shingled position.

In Figs. 8 to 10, inclusive, there is shown a modified form of stacker which can be substituted for the stacker or slice receiver 66. This modified form of stacker comprises a cone-shaped member 76, Figs. 9 to 10, having a plurality of spaced horizontal grooves 77. This stacker 76 may be rotated in the same manner as the stacker 66 but is provided with a cam 78 which is adapted to operate a fly 79 pivotally mounted at 80 to a part 81 on the base 2. The fly may be mounted on a horizontal rod 83, there being an extension 84 on the fly. The extension 84 carries a roller 85 which is adapted to roll on the camway 78 to move the fly away from the conical surface of the stacker 76. A spring 86 normally holds the roller 85 against the cam and consequently the fly 79 towards the cone with its arm 87 parallel to but slightly spaced from the inclined surface of the cone. A plurality of outwardly extending arms or fingers 88 is connected to the vertical part or member 87 and these fingers 88 vary in length as clearly shown in Fig. 8. The fingers 88 are adapted to lie within the recesses or corrugations 77 of the cone. Therefore when a slice is cut it will fall upon a surface of the cone 76 and as the cone rotates will pass over the fingers 88. When the slices on the cone reach a predetermined position, that is when the cone has rotated a sufficient distance to a predetermined position, the fly will be caused to operate because the roller 85 will be operated by the cam 78. As soon as the slices are discharged from the cone, the roller 85 will be off the camway 78 and the fly will again fall in place, that is the fingers 88 will lie in the corrugations 77. Of course it is practical that the fingers 88 be curved as clearly shown in Fig. 10.

The discharge fly 79 may be operated by the slicing machine mechanism and the arrangement is such that the fly is timed to perform a downward discharging movement about its axis at the instant when the slice is conveyed by the cone 76 into proper registration with the fingers 88. When this latter stacker and fly are provided, a suitable receptacle or tray is stationed adjacent the fly to receive the slices as they are discharged.

In Figs. 11 to 14, inclusive, there is shown a modified form of slicing machine having a slice support 100 which is adapted to act as a slice receiver. This slice receiver 100 consists of a part cylindrical body 101 and is arranged at an inclination as clearly shown in Fig. 11, being adapted to rotate to and fro. The slice support 100 is secured to an inclined shaft 102. The shaft 102 has a disk-shaped base 103, Fig. 14, which is pivotally attached at 104 to the head 105 of a rotatable sleeve 106. The sleeve 106 is journaled into a bearing bracket 107, Figs. 11 and 13, which is mounted on the base 2 of the machine. The base 103 has an adjustable screw stop 108 which cooperates with an abutment 109, Fig. 13, on the sleeve 106. The base 103 has notches 110 in its periphery, which notches are engageable one at a time by the pointed end of a stationary vertical rod 111. This vertical rod 111 is mounted on a footstep bracket 112 and passes through the sleeve 106. The sleeve has a bottom flange 113, Fig. 13, and is urged by a spring 114 in a downward direction towards a driven bevel gear wheel 115. The flange 113 has a driving pin 116 engageable with a hole 117 in the gear wheel 115. The normal working arrangement is such that the gear wheel 115 drives the sleeve 106 and the slice support 100 above it.

The nature of the drive imparted to the gear wheel 115 is such that the slice support 100 receives a to-and-fro movement in unison with that of the carriage 3. The gear wheel 115 meshes with a bevel pinion 118 on a rockshaft 119, Fig. 11, which is journaled in the machine

base 2. The rockshaft 119 has an actuating arm 120, which is arranged to cooperate with an inclined cam 121 on the carriage 3, the arm 120 being displaceable by the cam 121 against the action of a return spring 122. This spring 122 is wound around a pulley 123 secured to the rockshaft and which is anchored at 124, Fig. 12, to the base 2. This arrangement permits reciprocation of the carriage 3, and during reciprocation the driven gear wheel 118 receives corresponding oscillation. This arrangement permits the shaft 102 with the slice support 100 to be displaced a small angle away from the knife 6 until the end of the rod 111 engages with the other of a notch 116. This displacement causes the sleeve 106 to rise and fall slightly but not sufficiently to affect the driving relationship between the slice support and the machine. This displacement makes room for additional slices upon the member 101.

The construction described also permits the slice support to be displaced still further away from the knife to an extent determined by the stops 108 and 109. When the slice support is so displaced it will occupy a substantially horizontal position and the act of displacement forces a raised portion 125, Fig. 13, of the base to ride upon the end of the rod 111, with the result that the sleeve 106 is raised sufficiently to draw the pin 116 out of the hole 117. Thus the slice support is no longer driven, that is it will occupy an inoperative position, and the remoteness of the slice support 100 from the slicing knife 6 will enable the operator to remove the slices in a convenient manner free from danger.

The present invention is applicable to machines of the so-called push-and-pull class wherein the stroke may be varied at the will of the operator. The knife may be driven by an electric motor, or the machine may be operated by a crank and connecting rod, or the whole apparatus may be electrically operated. However, the invention relates primarily to a substance carrier or stacker which has an inclined surface adapted to receive slices cut from a knife which is inclined to the horizontal. In cooperation with this mechanism, a gravity feed means may be provided for the substance, or the substance may be mechanically fed, spring fed, or hand fed.

The invention provides relatively simply constructed machine of few parts, whereby the inclined knife, cooperating with the inclined surface of the stacker, permits the slices to assume practically the position they assume when being cut from the substance.

Changes may be made in the form, construction and arrangement of the parts without departing from the spirit of the invention or sacrificing any of its advantages, and the right is hereby reserved to make all such changes as fairly fall within the scope of the following claims.

The invention is hereby claimed as follows:

1. A slicing machine comprising an inclined substance supporting carriage, a slicing knife inclined to the horizontal adjacent the carriage and substantially perpendicular to the inclined plane of the carriage, a slice receiving element having a surface inclined at an angle substantially equal to the angle of inclination of said knife, said slice receiving element being adjacent said knife and being angularly shiftable about an axis transverse to the axis of the slicing knife and movable toward and from the cutting plane of said knife, means for moving the substance supporting carriage relative to the slicing knife, means operable in timed relation to the movement of the carriage for shifting said slice receiving element about its axis transverse to the axis of the knife to receive and properly stack thereon slices cut by said knife, and means for causing the slice receiving element to move under the action of gravity away from the cutting plane of the knife as the slices accumulate thereon.

2. A slicing machine comprising a base, a substance supporting carriage reciprocable upon the base, and means for feeding the substance transversely of the carriage, said means comprising a feed screw carried by said carriage, driven means carried by said carriage and movable relative thereto for operating said feed screw, driving means on said base for moving said driven means relative to the carriage, and cam means including an element adjustably mounted on the base and an element mounted on the carriage for connecting said driving means to said driven means upon initial movement of the carriage in one direction and for disconnecting the driving and driven means upon movement of the carriage a predetermined distance in said direction.

3. A slicing machine comprising a base, a substance supporting carriage reciprocable upon the base, and means for feeding the substance transversely of the carriage, said means comprising a feed screw carried by said carriage, a gear shiftably mounted on said carriage and connected to said feed screw, a rack adjustably mounted on said base, and means for shifting said gear into and out of engagement with said rack whereby to move the feed screw a predetermined distance upon movement of the carriage.

4. A slicing machine comprising a base, a substance supporting carriage reciprocable upon the base, and means for feeding the substance transversely of the carriage, said means comprising a feed screw carried by said carriage, a gear shiftably mounted on said carriage and connected to said feed screw, a rack adjustably mounted on said base, and interengaging cam means associated with said rack and said gear for moving said gear into and out of engagement with said rack upon movement of said carriage.

5. A slicing machine comprising a substance supporting carriage, a slicing knife adjacent the carriage, a slice receiving element adjacent the knife, said slice receiving element being oscillatable about an axis transverse to the axis of the slicing knife, and means for oscillating said slice receiving element about its axis transverse to the axis of the knife to receive and properly stack thereon slices cut by said knife, said means comprising an actuating lever connected to the slice receiving element and an inclined cam carried by the carriage.

6. A slicing machine comprising an inclined substance supporting carriage, a slicing knife inclined to the horizontal adjacent the carriage and substantially perpendicular to the inclined plane of the carriage, a semi-cylindrical slice receiving element, said slice receiving element being bodily shiftable toward and from the cutting plane of the knife about a substantially horizontal axis and being oscillatable about an axis transverse to said last mentioned axis, an actuating lever connected to said slice receiving element, and an inclined cam carried by the substance supporting carriage for operating said lever in timed relation to the movement of the carriage for oscillating said slice receiving element about the transverse axis, and means for causing bodily move-

ment of said slice receiving element about said horizontal axis as the slices accumulate thereon.

7. A slicing machine comprising a substance supporting carriage, a slicing knife adjacent the carriage and substantially perpendicular to the inclined plane of the carriage, a slice receiving element, said slice receiving element being bodily shiftable toward and from the cutting plane of the knife about a substantially horizontal axis and being oscillatable about an axis transverse to said last mentioned axis, an actuating lever connected to said slice receiving element, and an inclined cam carried by the substance supporting carriage for operating said lever in timed relation to the movement of the carriage for oscillating said slice receiving element about the transverse axis, and means for causing bodily movement of said slice receiving element about said horizontal axis as the slices accumulate thereon.

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