July 25, 1939. W. A. VAN BERKEL 2,167,095

SLICING MACHINE

Filed Dec. 24, 1936 5 Sheets-Sheet 1

FIG. 1.

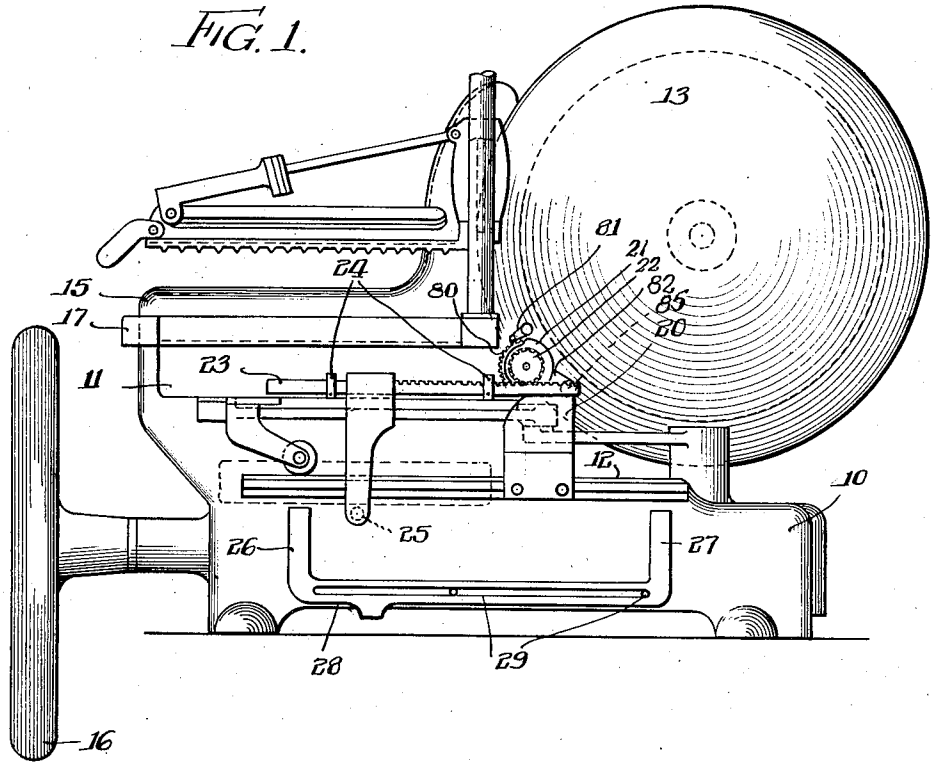

FIG. 2.

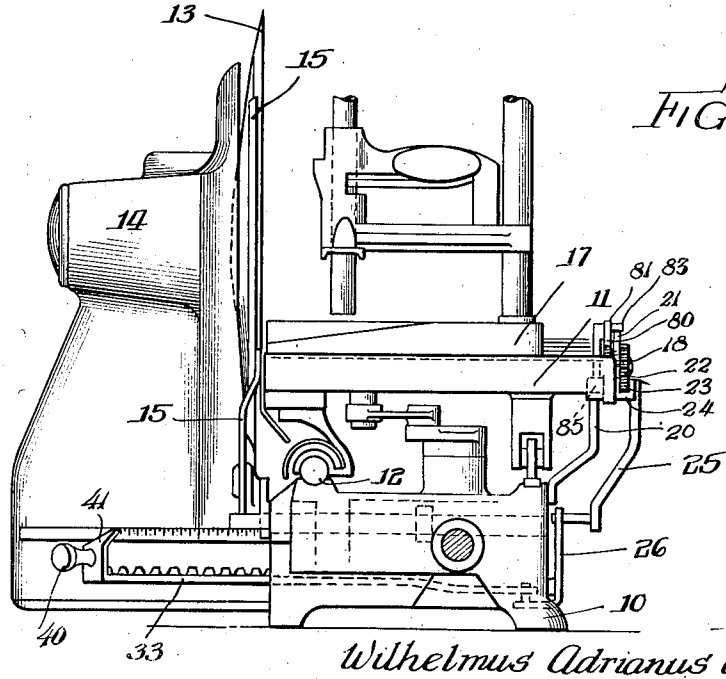

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FIG. 3.

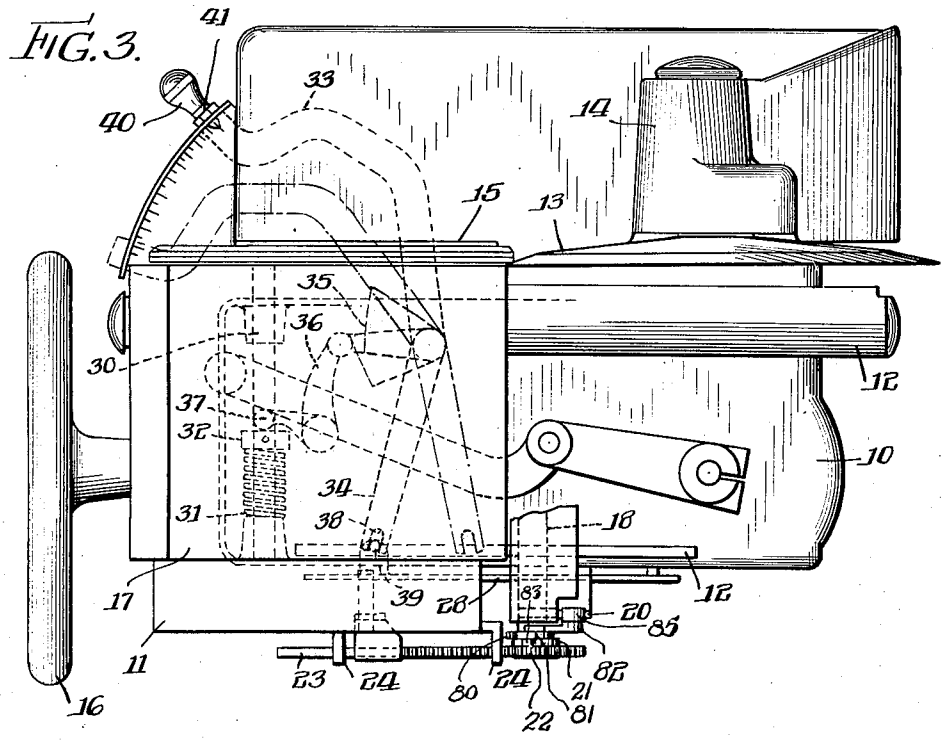

FIG. 4.

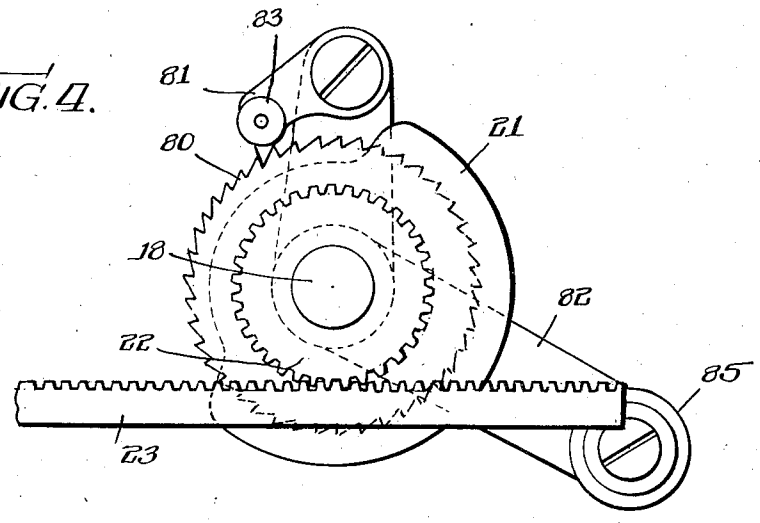

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FIG. 5.

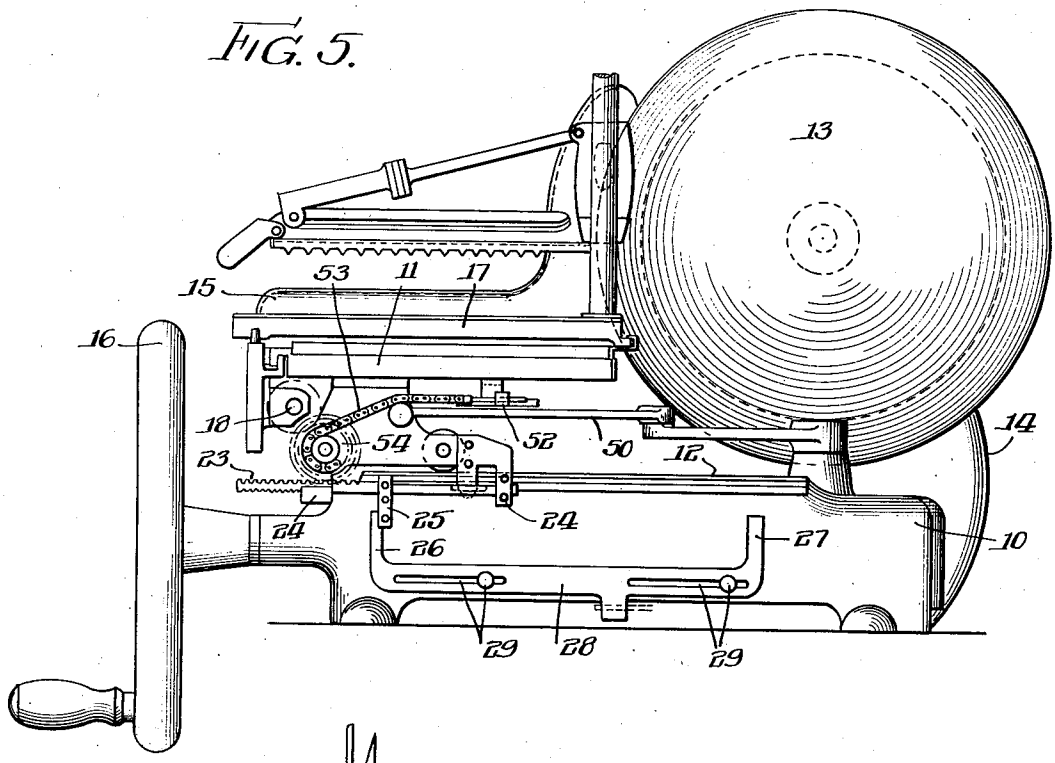
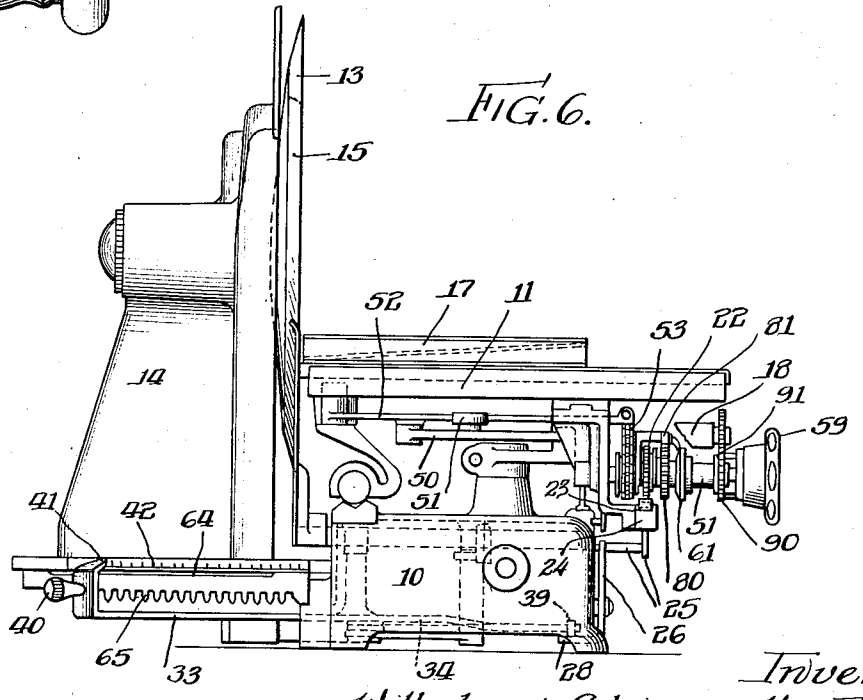


FIG. 6.



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SLICING MACHINE

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FIG. 7.

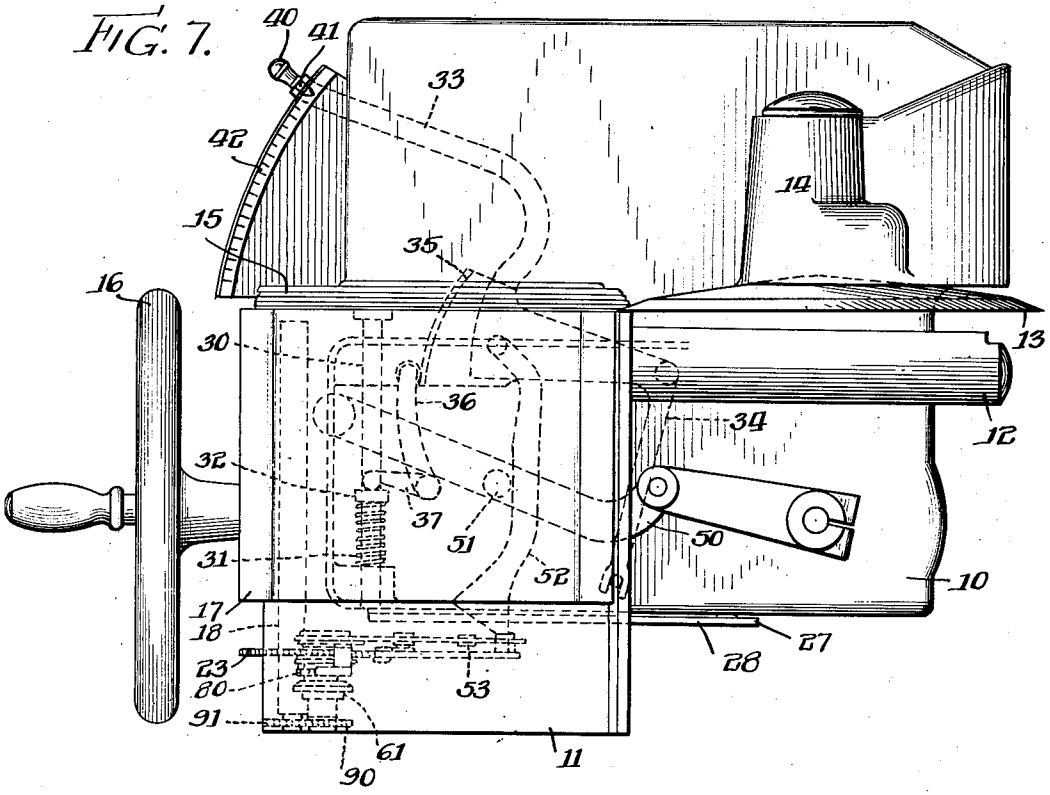
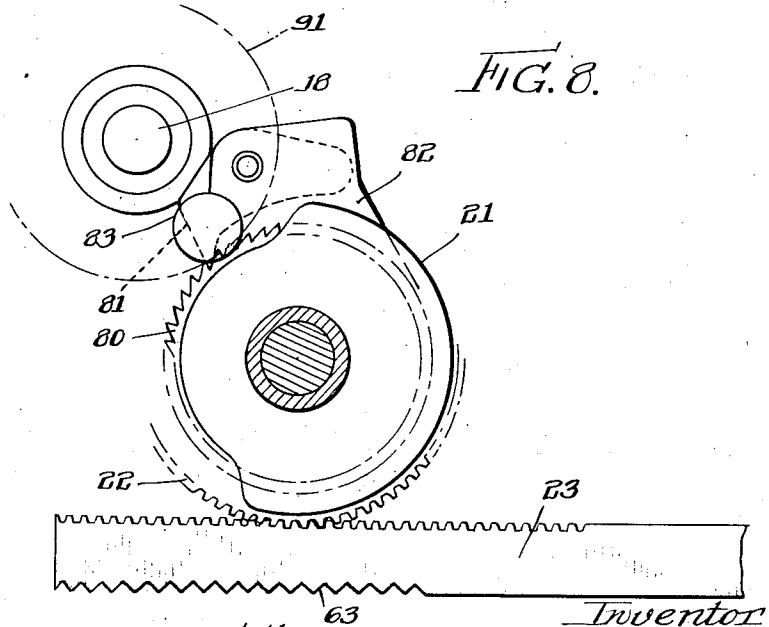


FIG. 8.



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SLICING MACHINE

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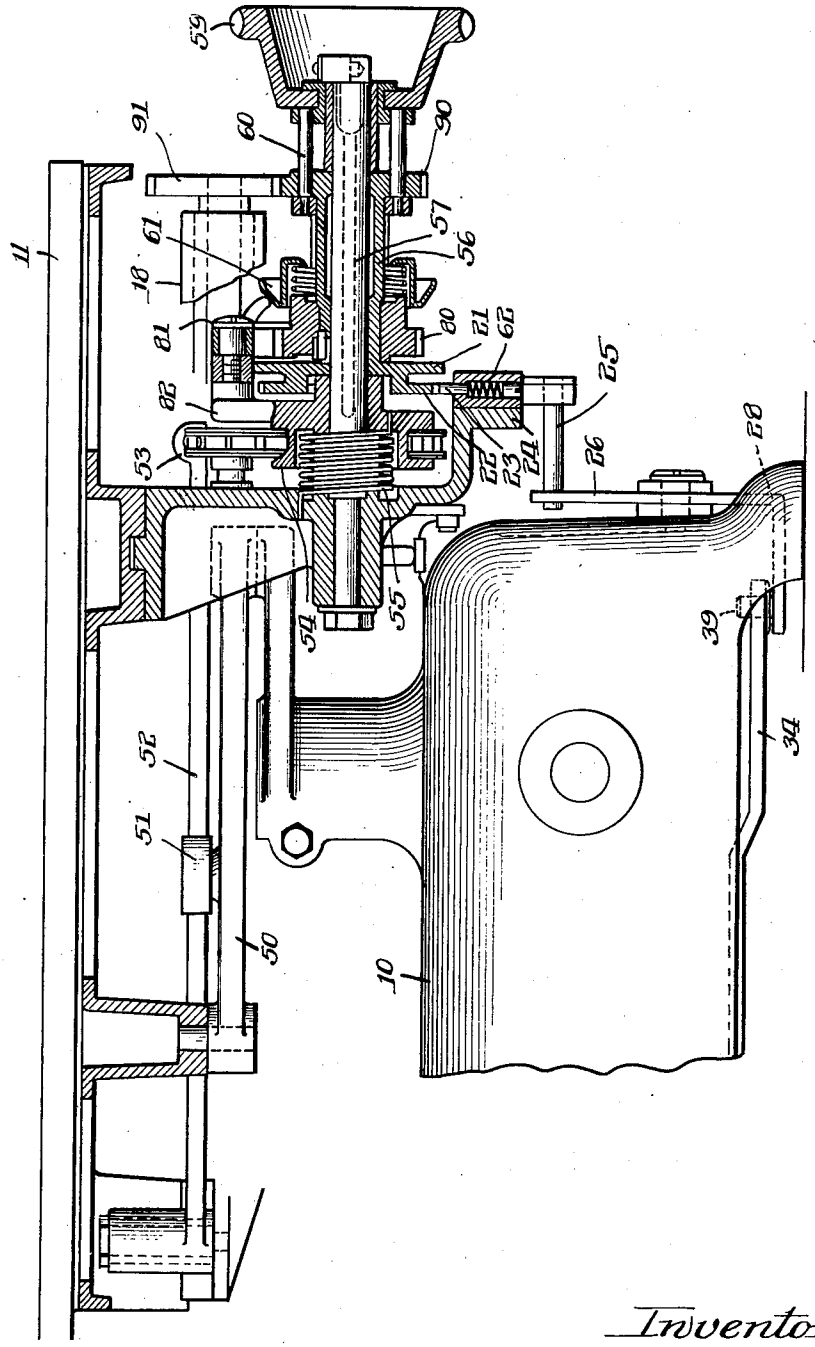

FIG. 9.

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UNITED STATES PATENT OFFICE

2,167,095

SLICING MACHINE

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

Application December 24, 1936, Serial No. 117,472
In Great Britain January 7, 1936

6 Claims. (Cl. 146—102)

This invention relates to slicing machines, and particularly to a feed mechanism therefor. More specifically, the invention relates to slicing whereby the substance is positively fed by means of a feed screw.

Heretofore in slicing machines of this type the feed of the substance-carrying table has been set for a predetermined slice thickness, but it has been found that in the absence of an abutment or gauge-plate, the first slice of the substance to be cut is not uniform with the predetermined slice thickness of the feeding mechanism.

The primary object of the invention is to provide a novel and efficient slicing machine having a fixed but revolvably mounted knife and a manually reciprocated carriage, a feed screw substance-feeding mechanism, the amount of slice thickness being determined by an accurately positioned gauge-plate which, in cooperation with the substance-feeding mechanism, will assure a uniform feeding and cutting from the first instance.

A further object of the invention is the provision of a slicing machine having a gauge plate correlated with a substance feed screw whereby upon movement of the carriage slices of predetermined thicknesses may be cut, the gauge plate cooperating with the feed screw, assuring a first full slice as well as subsequent slices of even thicknesses; the means for accomplishing this result including a rack member, the position of which is controlled by the position of the carriage, and means operating in timed relationship therewith whereby the elements operate properly simultaneously in accordance with a predetermined setting.

Another object of the invention is the provision of the feeding mechanism controlled by the position of the slidably mounted, manually operated carriage, which feeding mechanism is operated by a cam which operates a feed lever for progressively turning a feed screw.

A further object of the invention is the provision of the feed plate which is progressively moved toward the cutting plane of the knife by a feed screw having a ratchet and pawl feeding mechanism, the ratchet being controlled, or its feeding movement being regulated, by means of a cam, means comprising a rack and pinion which operates a feed screw lever for controlling the operation of the feed pawl, and consequently, the ratchet.

A further object of the invention is to provide a feeding mechanism, the adjustment of which is controlled by displacement of a gauge plate.

A further object of the invention is to provide a gauge plate which is set for a predetermined slice thickness in order to have a uniform slicing throughout.

A further object of the invention is the provision of means for regulating the gauge plate and ratchet feed mechanism together to selectively operate the feed screw progressively so that slices of various thicknesses may be cut.

A further object of the invention is the provision of a feeding mechanism which shall be of improved construction and operation.

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

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

Fig. 1 is a side elevation of the improved slicing machine embodying the invention.

Fig. 2 is a side elevation at right angles to Fig. 1, the hand wheel being omitted.

Fig. 3 is a plan view of the improved slicing machine.

Fig. 4 is a detailed view, drawn to a larger scale, of the pawl and ratchet mechanism.

Figs. 5 to 8 are views, of a modified form, corresponding respectively to Figs. 1 to 4.

Fig. 9 is a sectional view of Fig. 6, drawn to a larger scale.

The improved slicing machine herein shown for the purposes of illustration, referring specifically to Figs. 1 to 4, comprises a stationary frame or base 10, upon which is mounted a substance-supporting carriage 11. The carriage is reciprocated along guides 12 on the frame 10. A rotary knife 13 is journaled in a bracket 14 secured to the frame 10. A hand-wheel 16, the rotation of which reciprocates the carriage 11, rotates the knife 13. The requisite driving power is transmitted to the parts 11 and 13 through mechanism which is well-known and conventional (and which therefore is not completely shown). A stationary but adjustable gauge plate 15 is arranged beyond but parallel to the plane of the knife 13 and is secured to a guide rod 30. The rod 30 is slidably mounted in the machine frame 10. This guide rod 30 is constantly urged by a helical spring 31 to slide towards a limit position in which the gauge plate 15 is furthest from the slicing plane; i. e., the position giving the maximum slice thickness. The spring 31 encircles the guide rod 30 and presses against the collar 32 secured on the rod 30. The gauge plate 15 is set to a predetermined slice thickness against the pressure of the spring 31 by a handle 40. A sta-

tionary, but adjustable, lever 33, extending from the handle 40, is fulcrumed to the frame. The lever 33 acts upon the guide rod 30 through the medium of a cam plate 35 secured to the arm 33. This cam plate may be adjustable if desired. A bell-crank lever, comprising the arms 36 and 37, is fulcrumed on the frame 10, the arm 36 of the bell-crank functioning as a follower for the cam 35, and the other arm 37 bearing upon the collar 32 of the guide rod 30. The cam arm 36 is provided with a roller to bear against the cam plate 35.

The handle 40 has a pointer 41 which cooperates with a graduated scale 42. The scale 42 has markings or notches which represent different slice thicknesses for setting the gauge plate 15. The handle 40 may have a spring or other catch to maintain it in the position to which it is set. The setting of the handle 40 for a predetermined slice thickness is such that there is an angular displacement of the controlling lever 33 which provides a proportional displacement, through the medium of the cam 35 and bell-crank arms 36–37, of the guide rod 30, and consequently the gauge plate 15 mounted thereon. This displacement of the gauge plate 15 is against the action of the spring 31. The cam 35, bell-crank arms 36–37 positively prevent displacement of the gauge plate 15 under the pressure of the substance to be cut.

In conjunction with the setting of the handle 40 and the gauge plate 15 for a predetermined slice thickness, the lever 33 has at its end a slot 38 to contact a pin 39. The pin 39 is secured to an inwardly extending bent portion of a bar 28. A rack slide bar 23 is mounted in brackets 24 on the carriage 11. An abutment or striker arm 25 (Fig. 1) is integral with the rack 23. Below the rack bar 23 and mounted on the frame 10 is the bar 28 and this bar has spaced stops 26 and 27. The stops 26 and 27 are rigidly secured to the opposite ends of the bar 28, said bar having a pin and slot connection 29, for mounting the bar to the frame 10 of the slicing machine. On the reciprocal carriage 11 is a food or substance plate 17 which cooperates with a feed screw 18 for transverse movement toward the plane of the knife 13. For reciprocation of the substance-carrying plae 17 to feed the material progressively toward the knife 13 upon each reciprocation of the carriage 11, there is a fixed cam 20 which is integral with the frame 10. Mounted on the reciprocal carriage 11 is a pawl and ratchet mechanism, the ratchet being denoted by 80, the pawl by 81 and the crank arm or pawl-carrying lever by 82. The pawl and ratchet mechanism is provided with an adjustable or regulating cam or shroud 21 (Fig. 4). Also attached to the regulating cam 21 is a pinion 22. Upon setting the handle 40 and the gauge plate 15 for a predetermined thickness, the lever 33 at the same time, moves the bar 28 to set the stops 26 and 27 in position to act against the striker arm 25. Upon reciprocation of the carriage 11, the rack bar 23 is moved relative to the carriage by one of the stops 26 and 27, as hereinafter described, to effect a new setting of the regulating cam or shroud relative to the pawl 81 and ratchet 80.

The pawl lever 82, when it contacts the fixed cam 20 is rotated thereby to cause the pawl 81 to engage and drive the ratchet 80 and thereby rotate the feed screw 18. The feed screw 18 feeds the substance carrying table 17 transversely to the plane of the knife a distance equal to the slice thickness predetermined by the setting of the regulating cam or shroud 21, as hereinafter described. The pawl lever 82 rotates or oscillates upon each reciprocation of the carriage, being rotated in a counter-clockwise direction (Fig. 4) when the carriage moves to the left (Figs. 1 and 3) and being rotated in a clockwise direction when the carriage moves to the right (Figs. 1 and 3). The angular distance through which the pawl 81 moves after its roller 83 disengages the cam 21 determines the degree of movement of the ratchet 80 with the feed screw 18. This angular distance through which the pawl 81 rotates the ratchet and feed screw may be varied by moving the rack 23 relative to the carriage 11 so that the cam 21 releases the roller 83 at an earlier or later instant and in effect exposes more or less of the ratchet teeth to the action of the pawl 81. Any tendency for the shroud 21 and rack 23 to move relative to the carriage 11 when the pawl roller 83 engages the cam or shroud 21 is prevented by the frictional engagement of the rack 23 with its guides 24.

During operation, the handle 40 is set to a predetermined slice thickness. The angular displacement of the handle 40 actuates the lever 33 to set the guage plate 15 and the bar 28. As shown in Fig. 1, the bar 28 has been adjusted to increase the thickness of the slices. Upon subsequent reciprocation of the substance carrying table 17, the striker arm 25 will engage the stop 27, causing the rack to move relative to the table and the feed screw 18. This relative movement of the rack 23 causes the pinion 22 and the attached cam 21 to rotate in a clockwise direction, as seen in Fig. 4, to increase the number of teeth of the ratchet 80 exposed to the action of the pawl 81. Upon the following return stroke of the substance carrying table 17, the lever 82 will be operated by the stationary cam 20 to cause the pawl 81 to advance the ratchet and rotate the feed screw in a direction to move the substance carrying table toward the plane of the slicing knife. The rack 23 having been shifted relative to the substance carrying table by the stop 27 in a direction toward the stop 26, the completion of the return stroke of the substance table will find the striker arm 25 lightly touching the stop 26. As long as this adjustment remains unvaried, the striker arm 25 will operate upon the stops 26 and 27, the striker arm lightly touching but not being moved by said stops upon each return stroke of the table. However, the pawl 81 will be operated upon the completion of each return stroke to rotate the ratchet and feed screw through the angular distance determined by the previous setting of the cam 21.

If the handle 40 is now adjusted to decrease the thickness of the slice to be cut, the carriage 11 being aligned with the gauge plate and the striker arm 25 lightly touching the stop 26, the bar 28 will be moved relative to the base 10 and the striker arm 25 will be simultaneously moved by the stop 26 to cause the rack 23 to be moved to the right in Fig. 1 relative to the substance carrying table 17. This movement of the rack 23 causes counter-clockwise rotation of the cam 21 (as seen in Fig. 4) thereby to decrease the number of teeth of the ratchet exposed to the action of the pawl 81.

Consequently, upon the subsequent return strokes of the substance table 17, the pawl 81 will rotate the ratchet 80 and feed screw 18 through a lesser angular degree than previously.

If the carriage is in its extreme forward position with the striker arm 25 in engagement with the

stop 27 at the time that the handle 40 is adjusted in a direction to increase the thickness of the slices, the stop 27 will move the rack bar 23 to the left (Figs. 1, 3 and 4). This movement of the rack bar causes a clockwise rotation of the regulating cam 21, as seen in Fig. 4, and increases the number of ratchet teeth exposed to the action of the pawl.

Of course, if the adjustment of the handle 40 to decrease the thickness of the slice to be cut is effected when the food table is not in alignment with the gauge plate and the striker arm 25 is not in engagement with the abutment 26, the bar 23 will not be simultaneously moved with the bar 28 but when the carriage approaches the end of its next return stroke, the striker arm 25 will engage the abutment 26 and the rack bar will consequently be moved thereby relative to the carriage. Similarly, if the bar 28 is adjusted to increase the thickness of the slice to be cut when the striker arm 25 is not in engagement with the abutment 27, the rack bar 23 will not be simultaneously moved with the bar 28 but when the carriage approaches the end of its next forward stroke, the striker arm 25 will engage the abutment 27 and move the rack bar to the left relative to the carriage.

In the modification shown in Figs. 5 to 9, inclusive, the slicing machine structure differs from the preferred embodiment chiefly in that the pawl carrier 82 receives the required rocking motion from a connecting rod 50 on the carriage drive. This motion is transmitted through the following parts: A lever 52 is fulcrumed at one end of the carriage 11 and is rocked upon a roller 51 mounted on the connecting rod 50, as the connecting rod swings back and forth. A chain 53 ties the end of the lever 52 to a chain-wheel 54. The chain-wheel 54 is rigid with the pawl-carrying lever 82. The chain and chain-wheel are adapted to rotate the pawl-carrier in one direction. In Fig. 9 a torsion spring 55 serves to turn the pawl-carrying lever 82 in an opposite direction, said spring also serving to maintain the chain 53 taut. On the brackets 24 which support the slide bar 23 there is a spring-urged catch 62 (Fig. 9) which is adapted to engage between the teeth 63 on the underside of the bar 23, (Fig. 8) in order to maintain the bar in its position adjustment. Likewise, the bracket 64 (Fig. 6) which has the markings 42 is provided on its underside with notches 65. The notches 65 are engaged by a spring-urged catch (not shown) on the handle 40, in order to maintain the handle 40 and the lever 33 in a positive position of adjustment. It will be seen that in the modified structure that the regulating cam 21, with which the feed mechanism is equipped, and the stationary gauge 15, are both operated from the handle lever 33 for adjusting them to give a predetermined slice thickness. Also, the cam 21 is adjustable to vary the slice thickness through a cooperation with the striking means 25 on the bar 23 and stops 26—27 which are integral with the bar 28, the gauge plate 15 and the stops 26—27 being operatively connected with and adjustable by the lever 33.

The feed mechanism also contains a number of different and additional features which will now be described. The ratchet 80 is mounted on the sleeve 56 (Fig. 9), which is journaled in the shaft 57 and is geared to the feed screw 18 through the gear wheels 90 and 91. The pawl 81 is adapted for silent operation. The arrangement is such that the pawl lifts clear of the ratchet teeth on each return motion of the pawl-carrying lever 82. The hand-wheel 59 for turning the feed screw 18 independently of the feed mechanism is arranged to act through pins 60. The pins 60 extend slidably through the gear wheel 90 (Fig. 9). The hand-wheel 59 acts upon a ring 61, which is spring-urged, to lift the pawl 81. The construction is such that in order to utilize the hand-wheel 59 to turn the feed screw independently, the hand-wheel 59 must first be pushed toward the slicing plane of the knife 13, the feed mechanism being disconnected from the feed screw by lifting of the pawl 81.

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.

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

1. In a slicing machine having a reciprocable carriage and a slicing knife, a food table carried by the carriage and movable transversely relative thereto, a gauge plate adjustably mounted on the machine for movement toward and from the cutting plane of the slicing knife, a feed mechanism for said food table, said feed mechanism comprising a pawl and ratchet for moving said food table step by step transversely of the carriage, a regulating cam adapted to be adjusted to control the degree of movement imparted to said ratchet by said pawl, manually operable means for adjusting the gauge plate to predetermined positions relative to the cutting plane of the slicing knife, and means responsive to the movement of said adjusting means for adjusting said regulating cam in accordance with the adjustments of said gauge plate, said last mentioned means comprising a member shiftably mounted on said carriage for movement relative thereto and connected to said regulating cam, and a stationary adjustable stop member engageable with said shiftable member when said carriage is in its extreme positions or is approaching said extreme positions.

2. A slicing machine comprising a slicing knife, a reciprocal carriage, a food table slidably mounted on the carriage for movement transversely to the path of movement of the carriage, an adjustable gauge plate, feed mechanism for intermittently operating the food table to feed the substance to be sliced toward the gauge plate, a regulating cam carried by the carriage and adjustable relative to the feed mechanism for determining the extent of movement of said feed mechanism and thereby determine the thickness of the slices to be cut, means mounted on the carriage and operatively associated with the regulating cam to operate said cam, manually adjustable means mounted on a stationary portion of the slicing machine and adapted to engage said cam operating means during reciprocation of the carriage to adjust said cam relative to the feed mechanism and means operatively associated with said adjusting means for simultaneously adjusting the gauge plate.

3. A slicing machine comprising a slicing knife, a reciprocal carriage, a food table shiftably mounted on the carriage for movement transversely to the path of movement of the carriage, feeding means on the carriage for moving the food table toward the cutting plane of the slicing knife, said means comprising a pawl element and a ratchet element and means for intermittently operating one of said elements, an adjustable

regulating cam on the carriage for controlling the operation of the pawl and ratchet, a rack and pinion mounted on the carriage, said rack being provided with a laterally extending striker arm and said pinion being connected to said regulating cam, a bar adjustably mounted on a stationary portion of the machine and having opposed abutments between which the striker arm moves upon reciprocation of the carriage, and means for adjusting said bar in accordance with the desired slice thickness to cause movement of said rack and pinion relative to said carriage whereby to adjust said regulating cam in accordance with said desired slice thickness.

4. A slicing machine comprising a slicing knife, a reciprocal carriage, driving means for reciprocating the carriage parallel to the cutting plane of the slicing knife, a food table shiftably mounted on the carriage for movement transversely to the path of movement of the reciprocal carriage, a gauge plate, means for adjusting said plate to determine the setting of said plate in relation to the cutting plane of the slicing knife, a rack bar shiftably mounted on the carriage and having a laterally extending arm, feed mechanism for moving the food table toward the gauge plate, said means comprising a feed screw, a pawl, a ratchet and an operating cam mounted on a stationary portion of the machine for operating the pawl, a regulating cam on the carriage and operatively associated with the pawl and ratchet for determining the extent of each movement of the feed screw, means operatively connecting the rack bar to the regulating cam, and means on the stationary portion of the machine and operatively assocated with the gauge plate adjusting means for engaging the laterally extending arm of the rack bar to shift said bar relative to the carriage and thereby effect a setting of the regulating cam in accordance with the setting of the gauge plate.

5. In a slicing machine having a reciprocal carriage and slicing knife, a food table carried by the carriage and movable transversely relative thereto, a feed mechanism for said food table, said feed mechanism comprising a pawl and ratchet for moving said food table step by step transversely of the carriage, a regulating cam mounted on the carriage and adapted to be adjusted relative to the pawl and ratchet to control the degree of movement imparted to said ratchet by said pawl, and manually operable means for adjusting said regulating cam in accordance with the desired slice thickness, said manually operable means comprising a member shiftably mounted on said carriage for movement relative thereto and connected to said regulating cam, and a manually adjustable stationary stop member engageable with said shiftable member when said carriage is in its extreme positions or is approaching said extreme positions.

6. A slicing machine comprising a slicing knife, a reciprocal carriage, driving means for reciprocating the carriage parallel to the cutting plane of the slicing knife, a food table shiftably mounted on the carriage for movement transversely to the path of movement of the reciprocal carriage, a gauge plate, means for adjusting said plate to determine the setting of said plate in relation to the cutting plane of the slicing knife, a rack bar shiftably mounted on the carriage and having a laterally extending arm, feed mechanism for moving the food table toward the gauge plate, said means comprising a feed screw, a pawl, a ratchet and means operatively controlled by the carriage driving means for operating the pawl, a regulating cam on the carriage and operatively associated with the pawl and ratchet for determining the extent of each movement of the feed screw, means operatively connecting the rack bar to the regulating cam, and means on a stationary portion of the machine and operatively associated with the gauge plate adjusting means for engaging the laterally extending arm of the rack bar to shift said bar relative to the carriage and thereby effect a setting of the regulating cam in accordance with the setting of the gauge plate.

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