Aug. 8, 1944. W. A. VAN BERKEL 2,355,487

SLICING MACHINE

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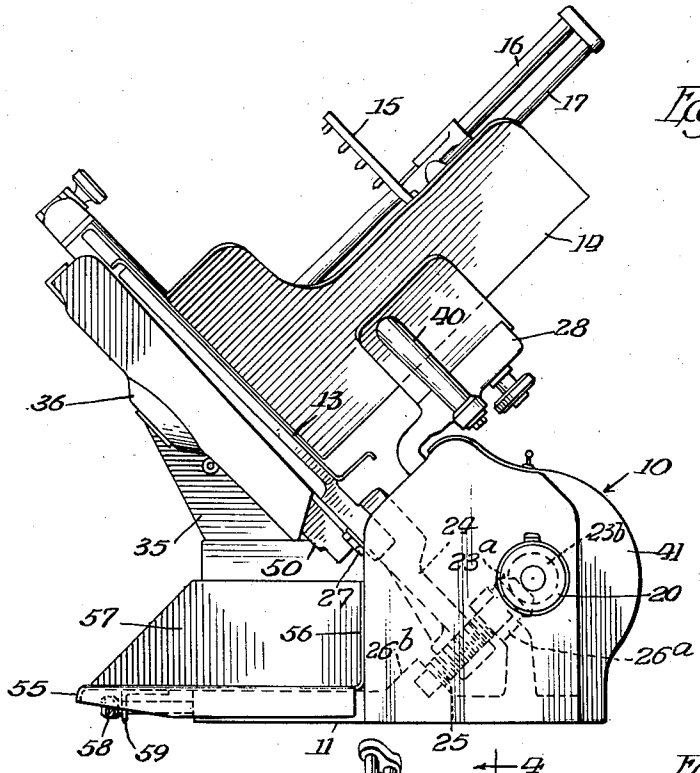


Fig. 1

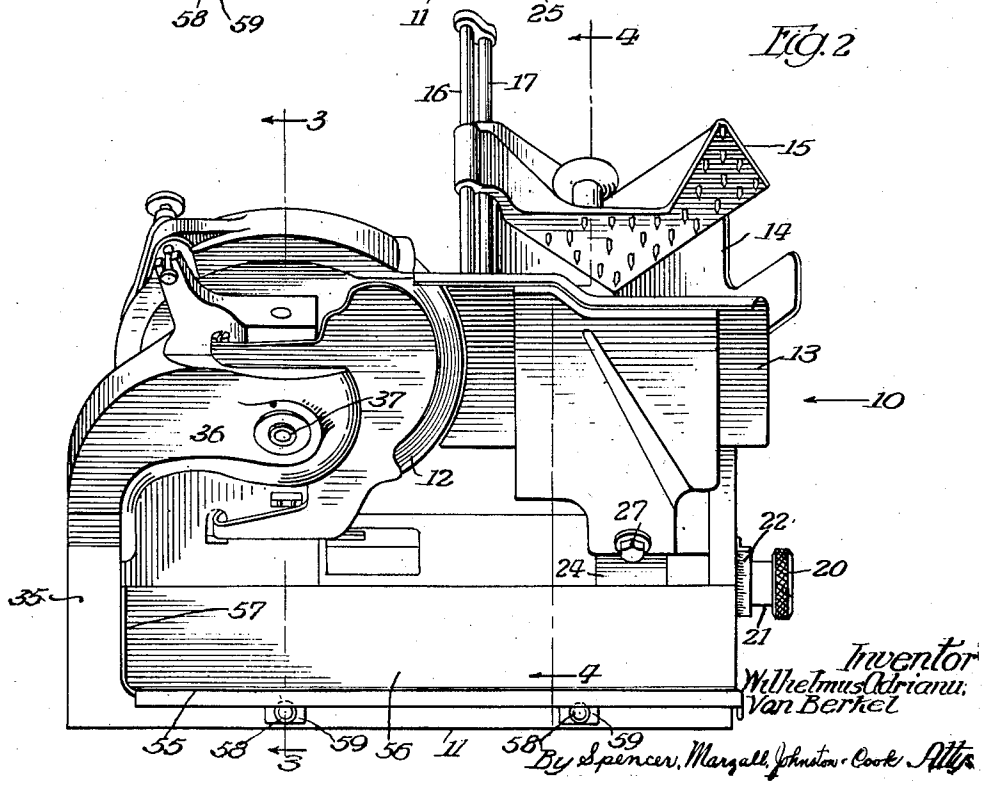


Fig. 2

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Fig. 3

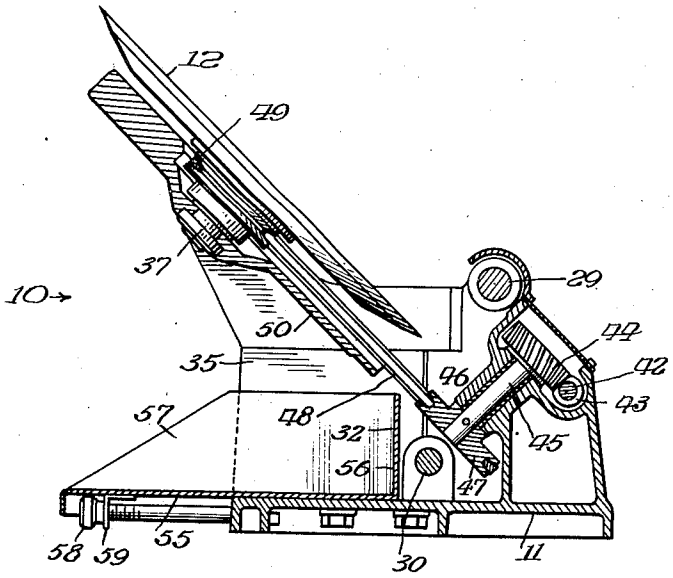
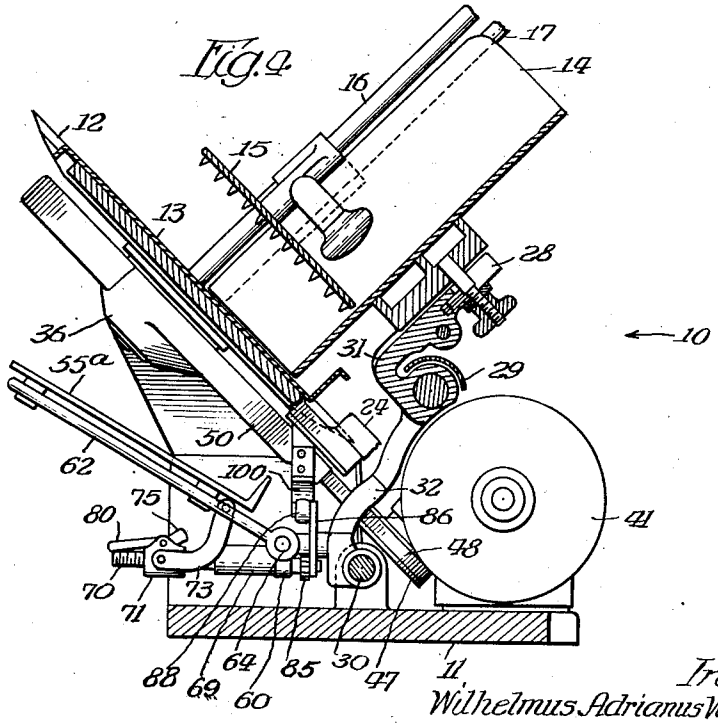


Fig. 4



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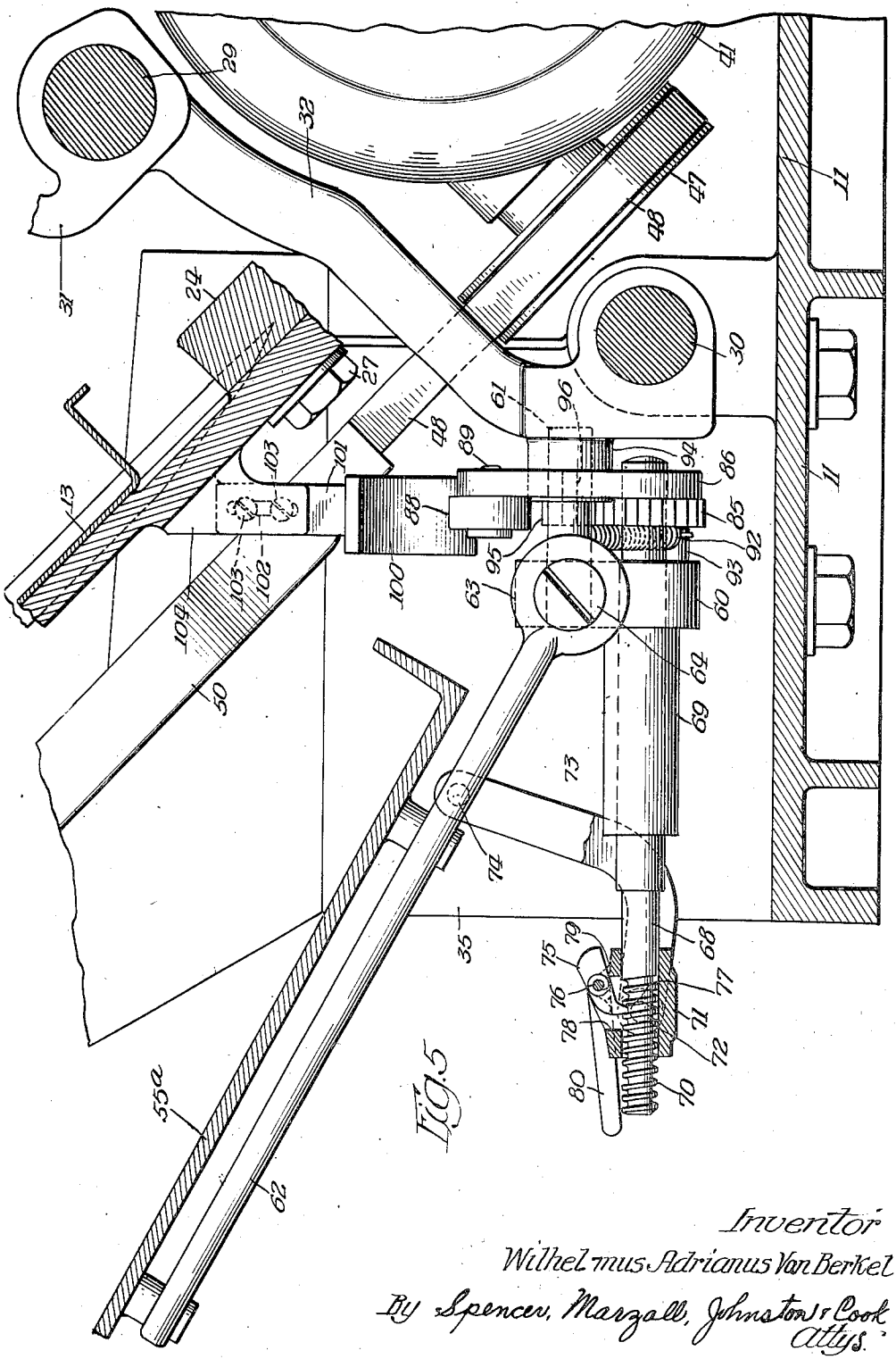


FIG. 5

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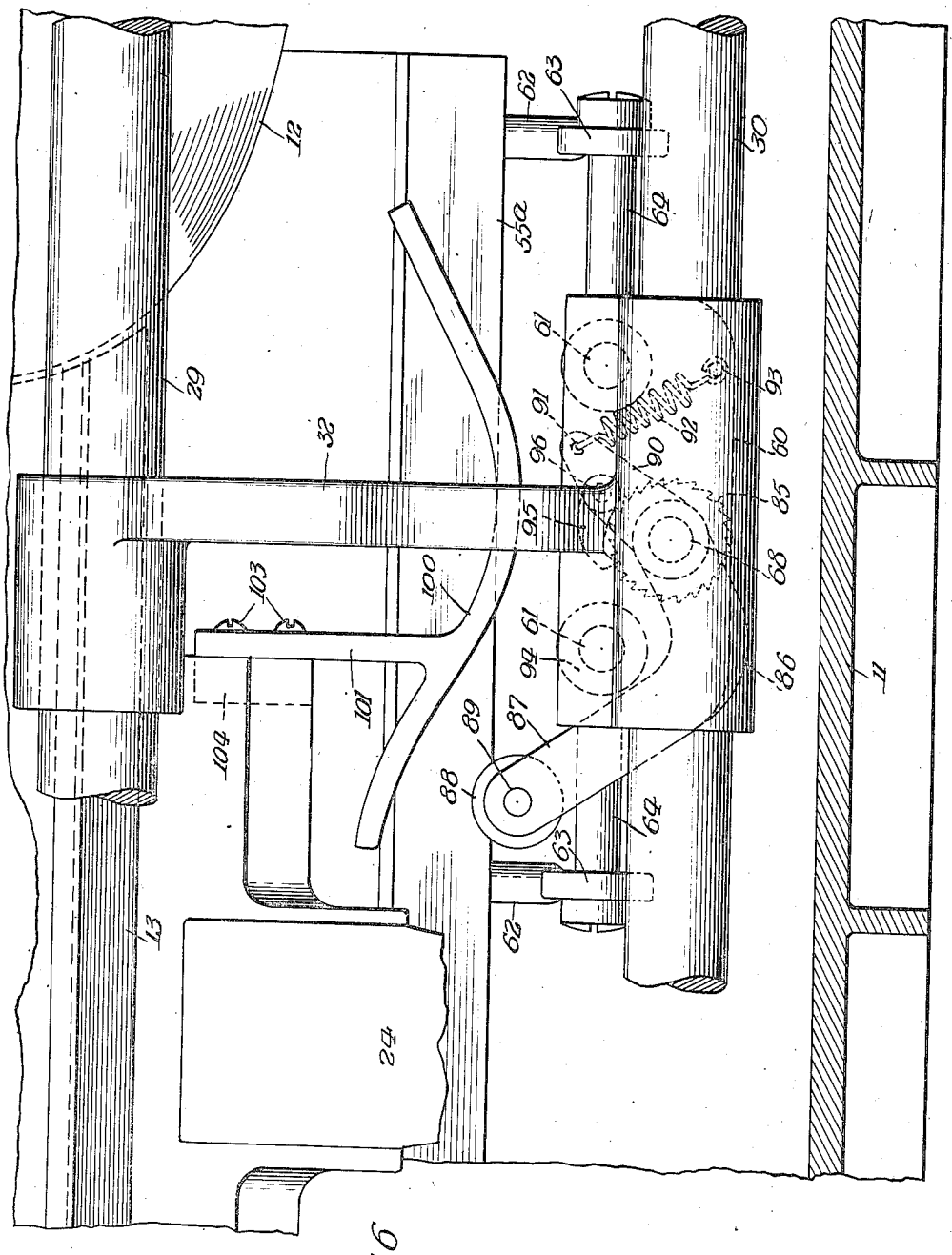


FIG. 6

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UNITED STATES PATENT OFFICE

2,355,487

SLICING MACHINE

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Application September 17, 1941, Serial No. 411,228
In Great Britain December 2, 1939

9 Claims. (Cl. 146—102)

This invention relates to slicing machines, and more particularly to a slicing machine having an inclined rotary slicing knife, an adjustable gauge plate for determining thickness of slice, a reciprocal substance table or support provided with an inclined surface along which a substance such as meat to be sliced is fed towards the gauge plate by the aid of gravity, and a slice receiving tray upon which cut slices are stacked.

In slicing machine of this character, as heretofore provided, it has been customary to fasten a stationary slice receiving tray to the base of the machine adjacent the gauge plate and on the side thereof opposite to the reciprocal substance table. In such machines, however, the slice receiving tray has been of only relatively short length in the direction of movement of the substance carrier since the length of the receiver has been limited by the supporting structure for the knife and the motor for driving the knife. The amount of area available for stacking slices on the slice receiver has thus been limited and is inconveniently located with respect to the slicing knife for manually stacking slices thereon.

In such slicing machines, furthermore, it has also been customary to catch each slice as it is being severed by the knife upon a small plate held in the hand of the operator and to use this plate to lay the cut slices in a stack. The structure for supporting and driving the knife, however, greatly interferes with the proper use of such plates for catching the slices and it has been very difficult to catch and hold the entire slice, particularly in the case of large slices, without touching the slice by the fingers or hand of the operator.

It has also been impractical, in the conventional machine, to provide a slice receiving tray which is carried by the substance support and reciprocal therewith into a position beneath the inclined knife and knife shaft for receiving the slices in stack formation since the supporting and driving structure of the inclined knife has interfered with the movement of the receiving tray.

It is, accordingly, a primary object of the present invention to provide a slicing machine having an improved structure for supporting and driving a rotary slicing knife in a manner which does not interfere with a slice receiving tray and which provides for freely and easily catching an entire cut slice upon a small hand plate or the like without the necessity for touching the slice by hand and for quickly and readily depositing the slices in a desired number of stacks on a conveniently located tray.

A further object is the provision of such slicing machine structure in which either a stationary or movable slice receiving tray is adapted to be received beneath an inclined rotary knife and to extend across substantially the entire diameter of the knife so as to be in position for more readily receiving cut slices thereon.

A further object is the provision of an improved slicing machine structure having an inclined rotary knife, an inclined reciprocal substance support, and a slice receiving tray movable with the substance support into a position beneath the knife and the knife shaft for receiving slices in stack formation as they are being cut.

Another object is the provision of an improved slicing machine structure having provision for receiving a slice receiving tray beneath an inclined slicing knife and in which the tray is mounted for movement away from the cutting plane of the knife upon each cutting stroke of a movable carrier.

A further object is the provision of such slicing machine structure in which the tray is operated by a movement of the substance carrier.

A still further object is the provision of a slicing machine in which a tray movable away from the slicing plane upon each cutting operation provides for receiving the cut slices and an adjustable means carried by the gauge plate provides for controlling movement of the tray in accordance with the adjustment of the gauge plate and the thickness of slice being cut.

These and other objects will be apparent from the following description, the appended claims, and the accompanying drawings, in which:

Fig. 1 is an end view of a slicing machine constructed in accordance with the present invention;

Fig. 2 is a side view of the machine illustrated in Fig. 1;

Fig. 3 is a sectional view taken on the line 3—3 of Fig. 2;

Fig. 4 is a sectional view taken on the line 4—4 of Fig. 2 but showing a modified slice receiving tray structure;

Fig. 5 is an enlarged view showing a portion of the structure of Fig. 4; and

Fig. 6 is a sectional view looking from the right hand side of Fig. 5.

Referring to the drawings which illustrate selected embodiments of the invention the slicing machine is designated generally by the reference numeral 10 and comprises a base 11, a rotary slicing knife 12, an adjustable gauge plate 13, and a reciprocal substance carrier 14. The substance carrier 14 preferably is V-shaped in trans-

verse cross section and is inclined so as to feed the substance to be sliced towards the gauge plate 13 and the cutting plane of the knife 12 under aid of gravity. The supporting surfaces of the carrier 14 preferably extend substantially at right angles to the cutting plane of the knife 12. A pusher means 15 may be slidably supported on rods 16 and 17 to assist in feeding the material to be sliced towards the gauge plate 13 and the cutting plane of the knife.

The gauge plate 13 is suitably mounted for the usual adjustable movement towards and away from the cutting plane of the knife 12 to vary the thickness of the slice cut by the knife. The gauge plate is adjustable by means of a knob 20 and a shaft 21 which extends outwardly of one end of the machine as indicated in Fig. 2 and is provided with an index 22 for indicating thickness of slice. Any suitable means may be provided for moving the gauge plate in accordance with rotation of the shaft 21. One such means is illustrated in Fig. 1 wherein a pair of bevel gears 23*a* and 23*b* rotated by the shaft 21 operates a gauge plate supporting bracket 24 through a worm shaft 25 suitably mounted on the base 11 by bearing lugs 26*a* and 26*b*. The bracket 24 is attached to a depending portion of gauge plate 13 by means of the bolt 27, and the shaft 25 is inclined at the same angle as the knife shaft 37 so as to cause the gauge plate to be maintained in a plane substantially parallel with the cutting plane of the knife upon adjusting movement.

The substance carrier 14 is adjustably mounted on a supporting holder 28 as best shown in Fig. 4, and is reciprocal with respect to the slicing knife 12 on stationary guide rods 29 and 30 suitably supported on the base 11. The holder 28 is slidably supported upon the guides 29 and 30 by means of a pair of arms 31 and 32, see Fig. 4, which are integrally attached to the holder 28 and are provided with bearings for slidably receiving the rods 29 and 30.

In accordance with the present invention the inclined slicing knife 12 is rotatably mounted on the base 11 by means of a supporting structure which rigidly supports the knife in proper inclined cutting position and at the same time provides an unobstructed space of substantial size extending across substantially the entire width of the knife beneath the inclined knife and above the base for receiving a slice receiving tray therein. For this purpose a bracket member 35 is attached to the end of the base 11 adjacent the slicing knife 12 and extends vertically upwardly therefrom. A horizontal arm 36 extends inwardly of the base 11 at the top of the bracket member 35 and provides for rotatably supporting the shaft 37 of the slicing knife 12. The shaft 37 is so located in the arm 36 that the vertically upstanding portion of the bracket member 35 is positioned substantially entirely outside of the projected area of the knife 12, and the arm 36 is so spaced above the base 11 that there is a substantial clearance space between the arm and base, thereby providing a rigid support for the slicing knife and also a space of substantial size beneath the knife 12 and above the base 11 as above described.

The machine as illustrated is of the manually operable push-pull type and for this purpose is provided with a handle 40 for reciprocating the substance carrier 14 with respect to the slicing knife 12. The knife 12 is independently rotated by means of a small motor 41 which is mounted on the base 11 in a position so as not to obstruct the previously described space between the inclined slicing knife and the base. As best shown in Fig. 4 this motor 41 is positioned beneath the reciprocal carrier 14 and is provided with a horizontally extending shaft 42, Fig. 3, upon which is mounted a worm 43. A gear 44 meshes with the worm 43 and is attached to a shaft 45 extending substantially parallel to the inclined shaft 37 of the slicing knife and suitably supported in a bearing 46 carried by the base 11. A pulley 47 is attached to the other end of the shaft 45 and rotatably drives the knife 12 through a V-shaped belt 48 engaging around the pulley 47 and a pulley 49 attached to the knife shaft 37.

The belt 48 for driving the knife 12 thus extends in a plane substantially parallel to the cutting plane of the knife and is positioned closely adjacent the outer side of the knife. The drive means for the knife 12, accordingly, does not obstruct the space between the inclined knife and the base 11 in any substantial manner. A housing 50 carried by the bracket arm 36 and extending parallel to the cutting plane of the knife 12 closely adjacent to the knife provides a guard member for the drive belt 48.

The unobstructed angular space between the slicing knife 12 and the base 11 provides for receiving a slice receiving tray beneath the inclined slicing knife and in a position to readily and conveniently receive slices in stack formation as they are being severed. In the embodiment of the invention illustrated in Figs. 1 through 3 a stationary slice receiving tray 55 is provided which extends substantially the entire length of the base 11 and across substantially the entire width of the knife 12 beneath the shaft 37 thereof. The tray 55 which may be made of any suitable material having a rust preventing surface is provided with an upwardly extending longitudinal wall 56 and an upstanding end wall 57 adjacent the bracket member 35. The tray is fixedly but removably attached to the base 11 by means of bolts 58 which thread into the base 11 and engage members 59 provided on the under side of the tray. An elongated tray having ample space for stacking slices in any desired number of piles thereon is thus provided and a portion of the tray extends directly beneath the slicing knife in a position to conveniently and quickly receive cut slices in stack formation thereon. The supporting and driving structure for the knife 12 is also such that a small hand operated plate may be moved along with the carrier 14 to receive slices as they are being cut and deposited the same on a conveniently located tray without interference from the knife supporting and driving means.

In Figs. 4 through 6 of the drawings there is shown an embodiment of the invention in which a tray adapted to be received within the space between the inclined knife and the base is carried by the movable substance carrier for reciprocal movement therewith and is also mounted for movement away from the cutting plane of the slicing knife as each successive slice is cut to thereby provide for properly receiving the next slice in stack formation. As shown in these figures a plate 60 is rigidly attached to the carrier arm 32 by means of a pair of bolts 61. A slice receiver tray 55A is pivotally mounted on the plate 60 by means of a frame 62 having bearing lugs 63 rotatably mounted on a pair of bolts 64 carried by the plate 60 and extending from opposite sides thereof with their axes substantially parallel to the cutting plane of the slicing knife.

To provide for supporting the tray 55A in

proper slice receiving position and for also moving the tray away from the slicing knife upon each slicing operation, a spindle 68 is rotatably mounted in a hub 69 on the plate 60 and is provided with screw threads 70 at its outer end as best shown in Fig. 5. A sleeve 71 is slidably mounted on the spindle 68 and is pivotally connected at 72 to the forked ends of a lever 73 pivotally connected to the frame 62 at 74. A pawl 75 is pivotally mounted on the sleeve 71 at 76 and has a nose portion 77 adapted to extend through a slot 78 provided with the sleeve into engagement with the thread 70 of the spindle 68. The sleeve 71 operating through the lever 73 thus provides for determining the angular position of the tray 55A with respect to its pivotal axis, and the nose portion 77 of the pawl 75 acts as a nut for advancing the sleeve 71 in accordance with rotation of the spindle 68. A spring 79 carried by the sleeve 71 normally urges the pawl 75 into engagement with the thread 70, and an arm 80 attached to the pawl provides for lifting the pawl against the action of spring 79 to disengage the nose 77 from the threads 70.

A step by step rotation of the spindle 68 to effect step by step lowering of the tray 55A is accomplished by means of a ratchet and pawl mechanism carried by the plate 60 and operated by movement of the substance carrier. Referring to Figs. 5 and 6 a ratchet wheel 85 is attached to the shaft of spindle 68 inwardly of the plate 60 and a lever 86 is loosely mounted on the spindle shaft outwardly of the ratchet wheel. The lever 86 is substantially L-shaped, Fig. 6, and has an upstanding arm 87 which carries a roller 88 rotatably mounted in the arm at 89. A second arm 90 of the lever 86 extends upwardly on the opposite side of the spindle 68 and is connected at 91 to a coil spring 92. The spring 92 is connected at its opposite end to a pin 93 carried by plate 60 and tends to move the lever 86 in a clockwise direction, as seen in Fig. 6, about the axis of spindle 68 to move the roller 88 in an upward direction. This clockwise rotation of the lever 86 under action of spring 92 is limited by a boss 94 provided on the arm 32 around the bolt 61. A pawl 95 is pivotally mounted on the arm 90 at 96 and provides for rotating the spindle 68 in a counter-clockwise direction, Fig. 6, upon downward movement of roller 88 and counter-clockwise movement of lever 86. The amount of rotation of the spindle 68 under action of lever 86 and pawl 95 is controlled by the downward displacement of the roller 88 upon each operation of the ratchet and pawl mechanism, and the threads 70 on the spindle 68 are so arranged as to move the sleeve 71 outwardly on the spindle in response to rotation thereof. The tray 55A is thus lowered a predetermined amount upon each rotation of spindle 68 in response to downward displacement of the roller 88.

The roller 88 is moved downwardly to effect rotation of the spindle 68 and lowering of the tray 55A upon each slicing operation by means of a striker bar 100 which is carried by the gauge plate and extends into the path of movement of the roller 88. The striker bar 100 is of curved shape as shown in Fig. 6 and provides a cam surface for engaging and depressing the roller 88 upon reciprocal movement of the plate 60 and tray 55A in response to reciprocal movement of the carrier 14 to effect a slicing operation. The tray 55A is thus lowered a predetermined amount depending upon the vertical positioning of the striker bar 100 upon each cutting operation of the reciprocal carrier.

To provide for adjusting the downward movement of the tray 55A in response to a slicing operation the striker bar 100 is adjustably carried by the gauge plate. For this purpose the striker bar is provided with an upwardly extending arm 101 which, as shown in Fig. 5, is provided with a vertically extending slot 102. A pair of clamping bolts 103 extend through the slot 102 and are threadably received within a downwardly extending arm 104 provided on the gauge plate 13. The striker bar 100 is thus adjustably clamped to the gauge plate by means of the clamping bolts 103.

The arrangement as above described also provides for automatically varying the degree of movement of the slice receiving tray 55A in accordance with the thickness of the slice being cut. Since the gauge plate 13 is inclined in accordance with the inclination of the cutting knife 12, it is evident that the gauge plate is moved vertically with respect to the base as well as laterally with respect to the knife upon slice thickness adjustment thereof. The striker bar 100 which is carried by the gauge plate thus has a vertical component of movement upon adjustable movement of the gauge plate which is proportional to the adjustable movement of the gauge plate. Since the degree of movement of the tray 55A about its pivotal axis depends upon the vertical movement of the roller 88, which in turn depends upon the vertical position of the striker bar 100, it follows that the amount of movement of the tray 55A is automatically adjusted in accordance with the movement of the gauge plate. A very simple and automatically operable means is thus provided for varying the movement of the slice receiving tray in accordance with the thickness of the slices being cut to thereby provide for properly receiving the severed slices in stack formation.

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 of the character described comprising a base, an inclined rotary slicing knife, a reciprocal carrier having an inclined substance supporting surface for feeding substance towards the cutting plane of said knife under aid of gravity, an adjustable gauge plate for determining thickness of slice, means for rotatably supporting said knife on said base providing a space of substantial size beneath the inclined knife and above the base, striker means carried by said gauge plate, means operable adjustably to move said plate, said striker means being arranged in angular relation with said gauge plate whereby to provide for movement of said striker means in a predetermined direction and to an extent corresponding to the extent of movement of said gauge plate as the means for adjustably moving the said gauge plate is operated, slice receiver tray means movably carried by said carrier, and means operated by said striker means for effecting movement of said tray means away from the cutting plane of said knife upon each slicing operation of the carrier in accordance with adjustment of said gauge plate and positioning of said striker means.

2. A slicing machine of the character described

comprising a base, an inclined rotary slicing knife, a reciprocal carrier having an inclined substance supporting surface for feeding substance towards the cutting plane of said knife under aid of gravity, an adjustable gauge plate for determining thickness of slice, means for rotatably supporting said knife on said base providing an unobstructed space of substantial size extending across substantially the entire width of the knife beneath the inclined knife and above the base, striker means carried by said gauge plate, means operable adjustably to move said plate, said striker means being arranged in angular relation with said gauge plate whereby to provide for movement of said striker means in a predetermined direction and to an extent corresponding to the extent of movement of said gauge plate as the means for adjustably moving the said gauge plate is operated, slice receiver tray means movably carried by said carrier, means operated by said striker means for effecting movement of said tray means away from the cutting plane of said knife upon each slicing operation of the carrier in accordance with adjustment of said gauge plate and positioning of said striker means, and means for adjustably mounting said striker means on said gauge plate.

3. A slicing machine of the character described comprising a base, an inclined rotary slicing knife, a reciprocal carrier having an inclined substance supporting surface for feeding substance towards the cutting plane of said knife under aid of gravity, an adjustable gauge plate for determining thickness of slice, means for rotatably supporting said knife on said base, a slice receiving tray carried by said carrier and pivotally mounted thereon for movement away from the cutting plane of said knife, ratchet operated means for effecting step by step movement of said tray, and striker means for effecting variable operation of said ratchet means, said striker means being adjustably mounted on said gauge plate in angular relation therewith and including a member having vertical movement in accordance with adjustable movement of said gauge plate, and said ratchet means having a member intermittently engageable with said striker means upon each operating stroke of said carrier.

4. A slicing machine of the character described comprising a base, an inclined rotary slicing knife, a reciprocal carrier having an inclined substance supporting surface for feeding substance towards the cutting plane of said knife under aid of gravity, an adjustable gauge plate for determining thickness of slice, a knife support comprising a bracket attached to the end of said base adjacent said knife and including a vertically extending portion positioned substantially entirely outside of the projected area of the knife, said vertically extending portion of the bracket being inclined outwardly at an upper portion thereof to project outwardly from a side of the base in the direction of inclination of said knife, a substantially horizontal, substantially flat and inclined arm forming an extension of said vertically extending portion of the bracket at its upper end and extending inwardly of the said end of the base in a position providing a substantial vertical clearance space between the arm and base, a relatively shallow bearing for said rotatable knife mounted in said arm, a guard member carried by said arm and including a downwardly extending shield positioned closely adjacent the knife and substantially parallel therewith, a motor mounted on said base in a position to underlie said carrier and on the inner side of said knife, and drive means covered by said downwardly extending shield for operatively connecting said knife and motor, said knife support, said drive means and said base thereby providing a substantially unobstructed angular space of substantial size extending across substantially the entire width of the knife beneath the inclined sides thereof and above the base for receiving a slice receiving tray therein.

5. A slicing machine of the character described comprising a base, an inclined rotary slicing knife, a reciprocal carrier having an inclined substance supporting surface for feeding substance towards the cutting plane of said knife under aid of gravity, an adjustable gauge plate for determining thickness of slice, a knife support comprising bracket attached to the end of said base adjacent said knife and including a vertically extending portion positioned substantially entirely outside of the projected area of the knife, said vertically extending portion of the bracket being inclined outwardly from a upper portion thereof to project outwardly from a side of the base in the direction of inclination of said knife, a substantially horizontal, substantially flat and inclined arm forming an extension of said vertically extending portion of the bracket at its upper end and extending inwardly of the said end of the base in a position providing a substantial vertical clearance space between the arm and base, a relatively shallow bearing for said rotatable knife mounted in said arm, a guard member carried by said arm and including a downwardly extending shield positioned closely adjacent the knife and substantially parallel therewith, a motor mounted on said base in a position to underlie said carrier and on the inner side of said knife, drive means covered by said downwardly extending shield for operatively connecting said knife and motor, said knife support, said drive means and said base thereby providing a substantially unobstructed angular space of substantial size extending across substantially the entire width of the knife beneath the inclined sides thereof and above the base for receiving a slice receiving tray therein, a slice receiving tray pivotally mounted for movement about an axis substantially parallel with the direction of movement of said carrier and having a portion adapted to be received within said substantially unobstructed angular space, drive means for positively effecting step-by-step movement of said tray about said pivotal axis, and means for causing operation of said drive means upon each stroke of said carrier.

6. A slicing machine of the character described comprising a base, an inclined rotary slicing knife, a reciprocal carrier having an inclined substance supporting surface for feeding substance towards the cutting plane of said knife under aid of gravity, an adjustable gauge plate for determining thickness of slice, a knife support comprising a bracket attached to the end of said base adjacent said knife and including a vertically extending portion positioned substantially entirely outside of the projected area of the knife, said vertically extending portion of the bracket being inclined outwardly at an upper portion thereof to project outwardly from a side of the base in the direction of inclination of said knife, a substantially horizontal, substantially flat and inclined arm forming an extension of said vertically extending portion of the bracket

at its upper end and extending inwardly of the said end of the base in a position providing a substantial vertical clearance space between the arm and base, a relatively shallow bearing for said rotatable knife mounted in said arm, a guard member carried by said arm and including a downwardly extending shield positioned closely adjacent the knife and substantially parallel therewith, a motor mounted on said base in a position to underlie said carrier and on the inner side of said knife, drive means covered by said downwardly extending shield for operatively connecting said knife and motor, said knife support, said drive means and said base thereby providing a substantially unobstructed angular space of substantial size extending across substantially the entire width of the knife beneath the inclined sides thereof and above the base for receiving a slice receiving tray therein, a slice receiving tray pivotally mounted on said reciprocal carrier for movement about an axis substantially parallel with the direction of movement of said carrier and having a portion adapted to be received within said substantially unobstructed angular space, drive means for positively effecting step-by-step movement of said tray about said pivotal axis, and means for causing operation of said drive means upon each stroke of said carrier.

7. A slicing machine of the character described comprising a base, an inclined rotary slicing knife, a reciprocal carrier having an inclined substance supporting surface for feeding substance towards the cutting plane of said knife under aid of gravity, an adjustable gauge plate for determining thickness of slice, means for rotatably supporting said knife on said base providing a space of substantial size beneath the inclined knife and above the base, striker means carried by said gauge plate, means for adjustably moving said gauge plate providing for vertical movement of said striker means, slice receiver tray means movably carried by said carrier, and means operated by said striker means for effecting movement of said tray means away from the cutting plane of said knife upon each slicing operation of the carrier in accordance with adjustment of said gauge plate and vertical positioning of said striker means.

8. A slicing machine of the character described comprising a base, an inclined rotary slicing knife, a reciprocal carrier having an inclined substance supporting surface for feeding substance towards the cutting plane of said knife under aid of gravity, an adjustable gauge plate for determining thickness of slice, means for rotatably supporting said knife on said base providing a space of substantial size beneath the inclined knife and above the base, striker means adjustably mounted on said gauge plate, means operable adjustably to move said gauge plate, said striker means being arranged in angular relation with said gauge plate whereby to provide for vertical movement of said striker means correspondingly with the movement of said gauge plate, slice receiver tray means movably carried by said carrier, and means operated by said striker means for effecting movement of said tray means away from the cutting plane of said knife upon each slicing operation of the carrier in accordance with adjustment of said gauge plate and vertical positioning of said striker means.

9. A slicing machine of the character described comprising a base, an inclined rotary slicing knife, an inclined substance support for feeding substance towards the cutting plane of said knife under aid of gravity, an adjustable gauge plate for determining thickness of slice, means including a movable carrier for supporting said knife and said substance support for relative movement with respect to each other to effect a slicing operation, said supporting means providing a space of substantial size for receiving a slice receiving tray beneath the cutting plane of the knife and above the base, striker means adjustably mounted on said gauge plate, means operable adjustably to move said gauge plate, said striker means being arranged in angular relation with said gauge plate whereby to provide for vertical movement of said striker means correspondingly with the movement of said gauge plate, slice receiver tray means movably carried by said carrier, and means operated by said striker means for effecting movement of said tray means away from the cutting plane of said knife upon each slicing operation of the carrier in accordance with adjustment of said gauge plate and vertical positioning of said striker means.

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