July 9, 1935. S. SINGER 2,007,219

SLICING MACHINE

Filed Oct. 7, 1929 6 Sheets-Sheet 1

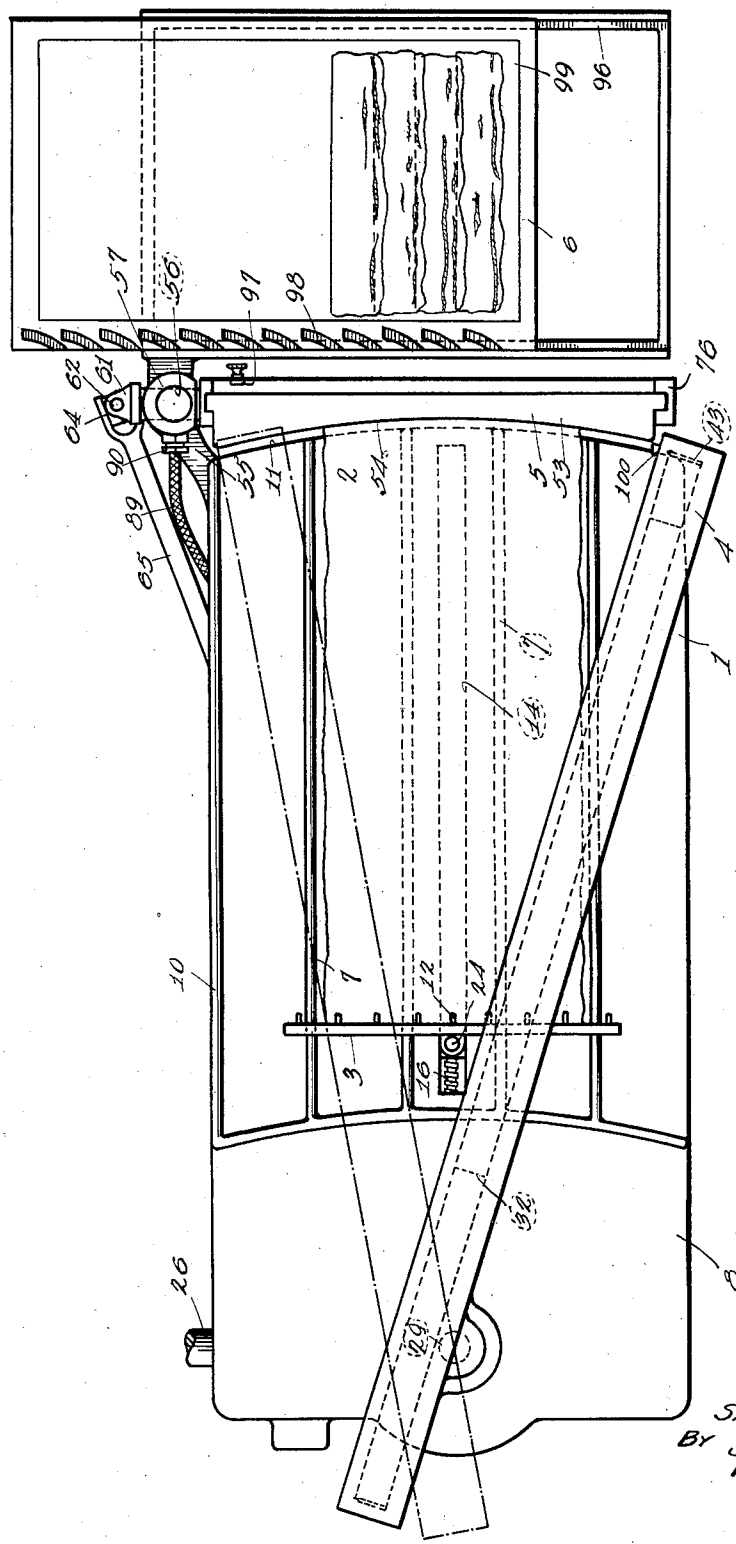


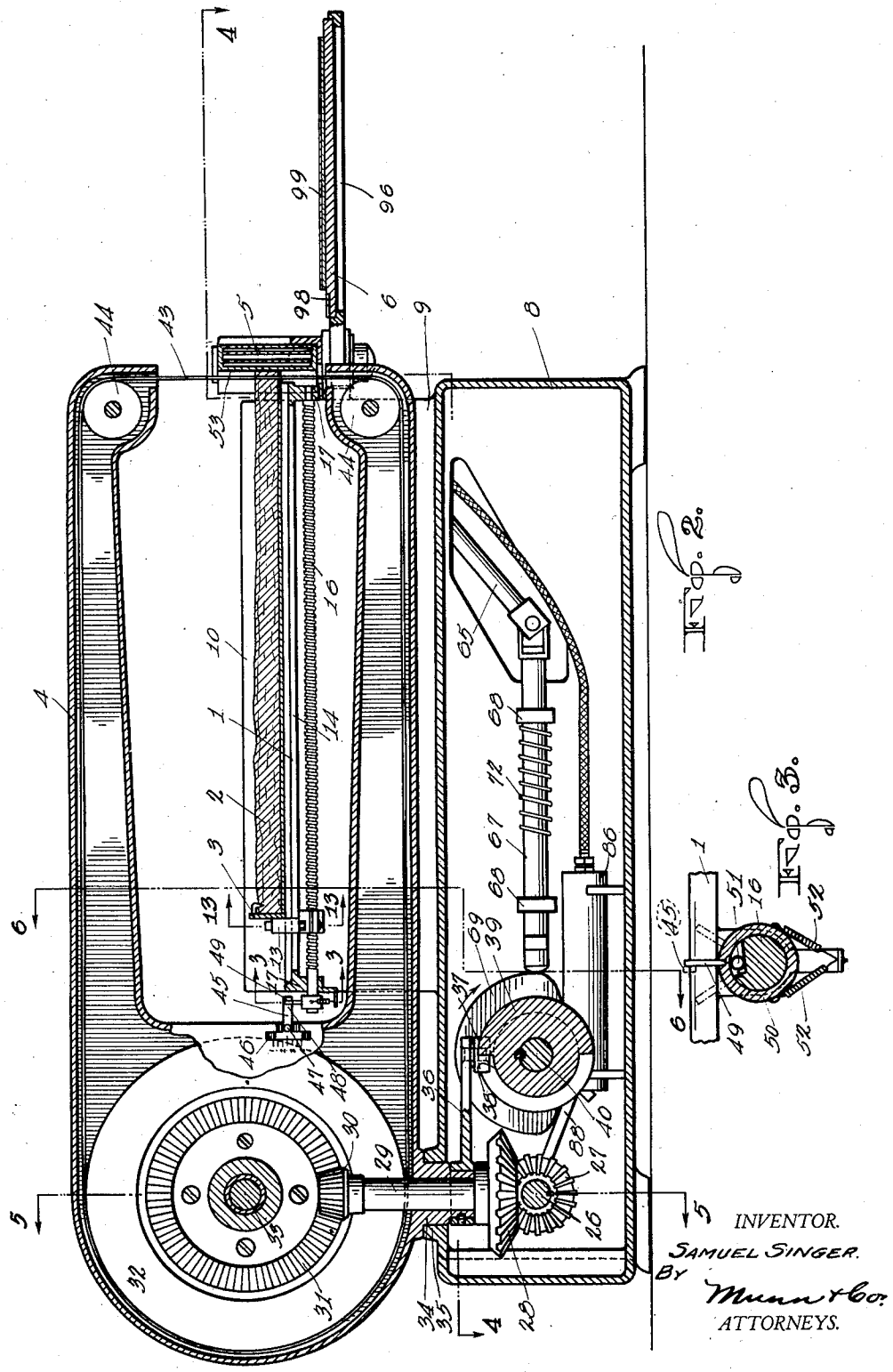
Fig. 1.

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SLICING MACHINE

Filed Oct. 7, 1929 6 Sheets-Sheet 3

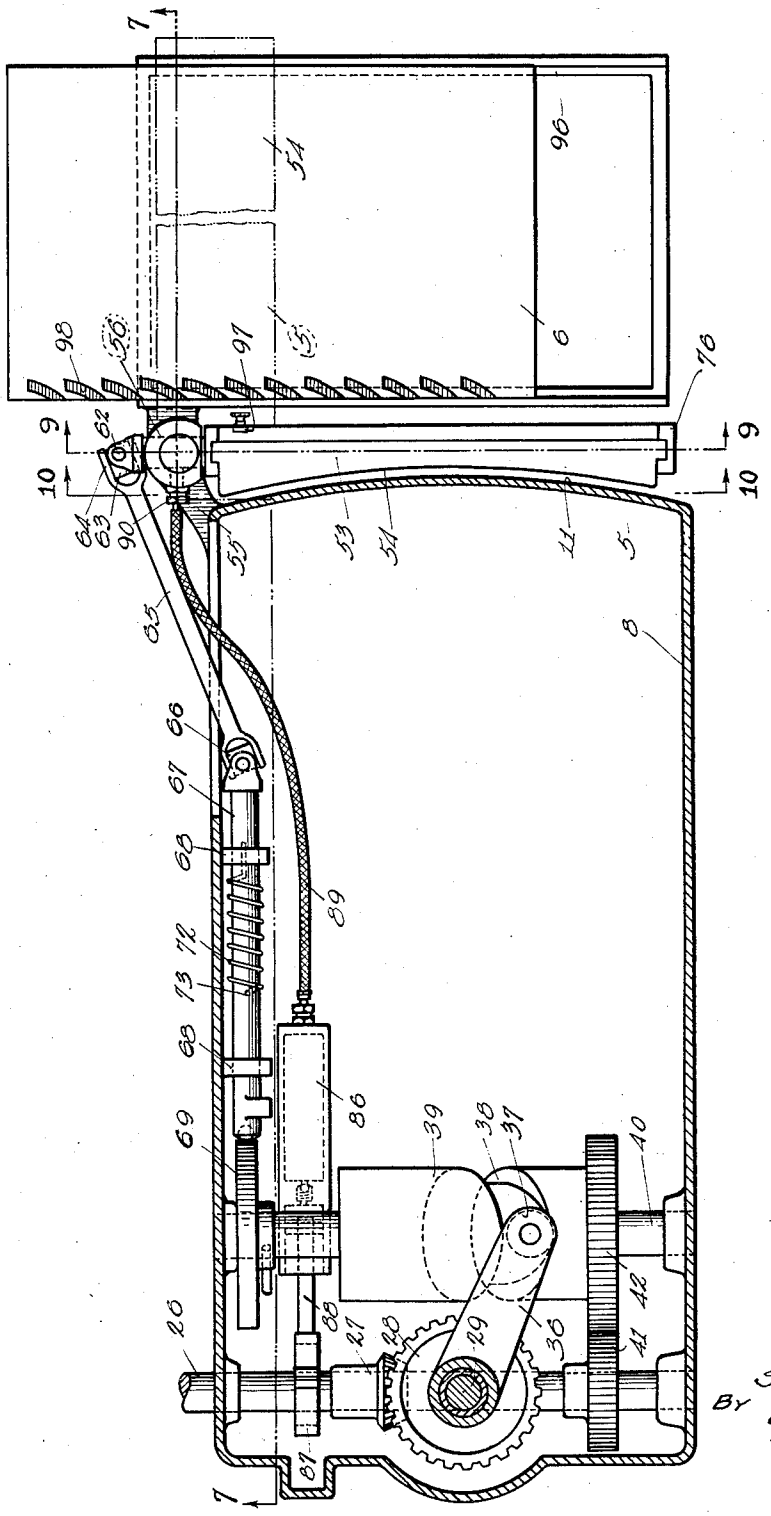


Fig. 4.

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SLICING MACHINE

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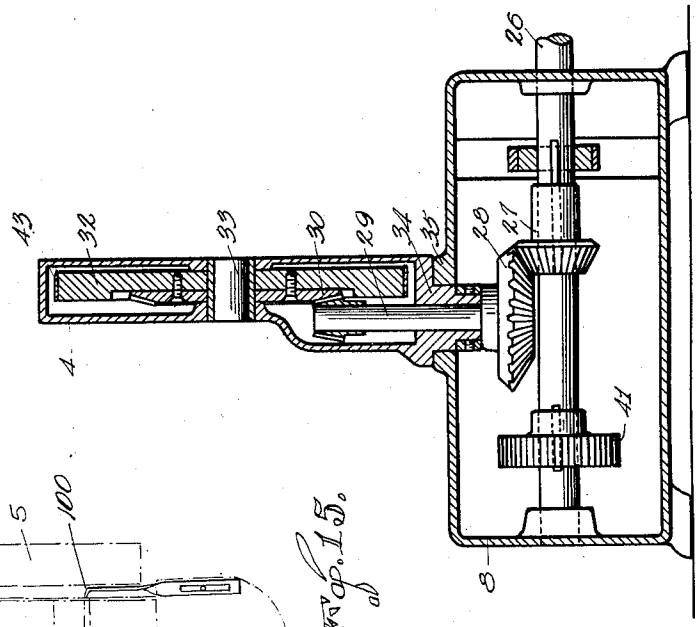


Fig. 5.

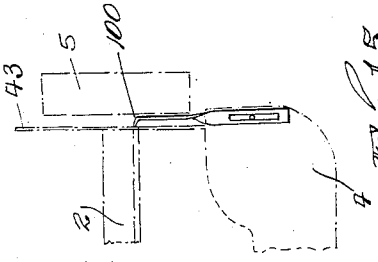


Fig. 1.

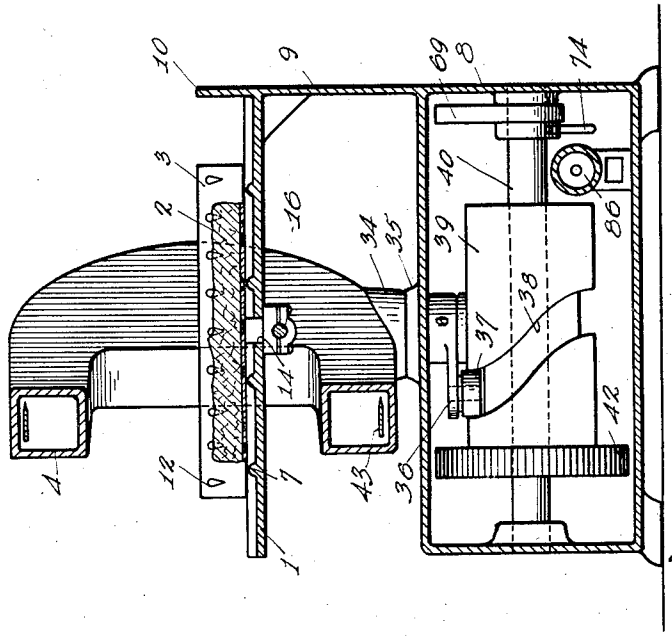


Fig. 2.

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SLICING MACHINE

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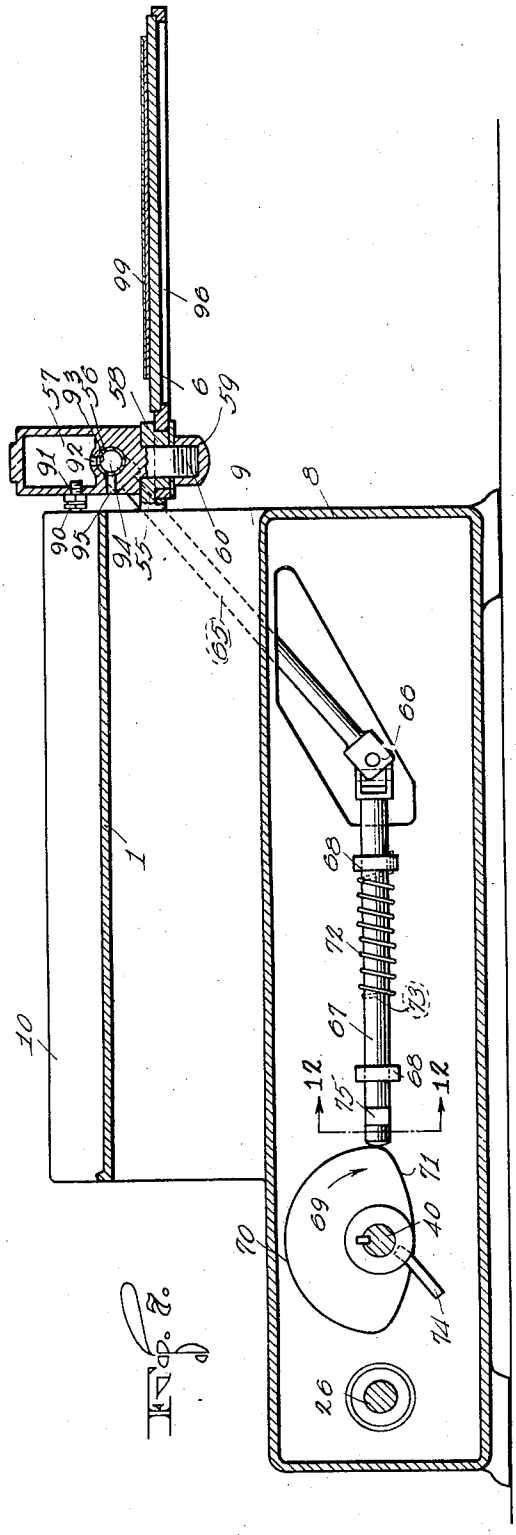


Fig. 8.

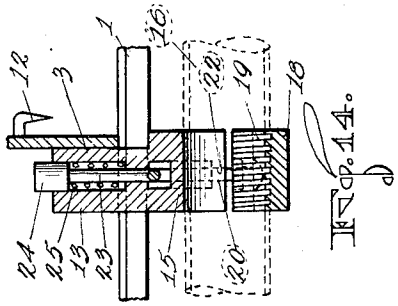


Fig. 14.

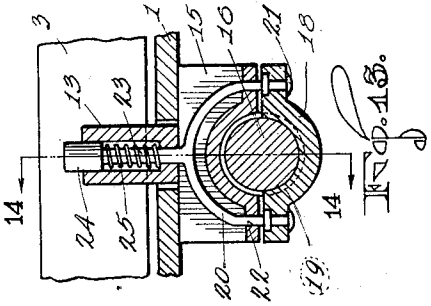


Fig. 13.

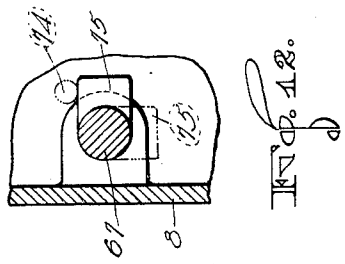


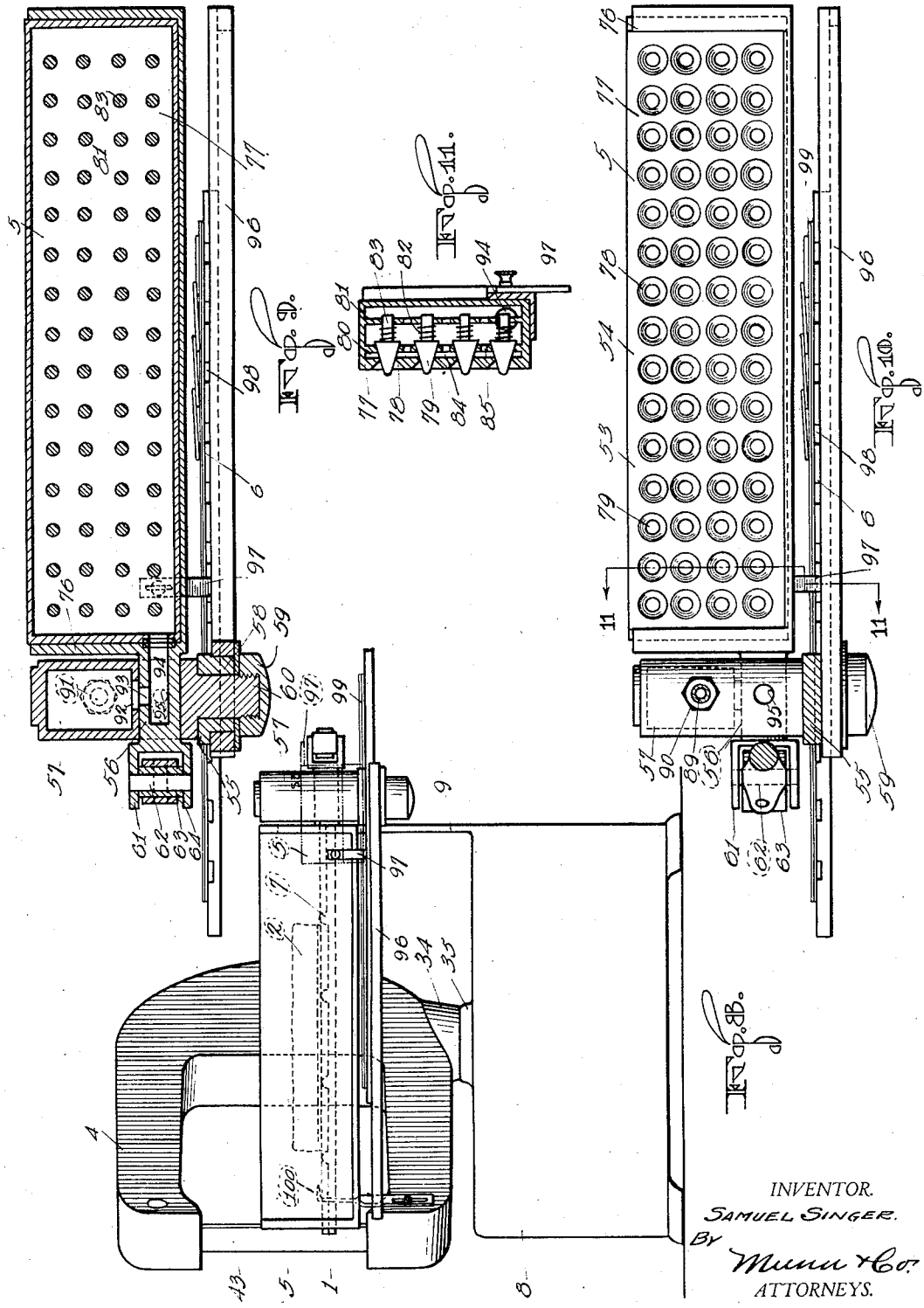
Fig. 12.

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SLICING MACHINE

Filed Oct. 7, 1929 6 Sheets-Sheet 6



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Patented July 9, 1935

2,007,219

UNITED STATES PATENT OFFICE

2,007,219

SLICING MACHINE

Samuel Singer, San Francisco, Calif.

Application October 7, 1929, Serial No. 398,067

10 Claims. (Cl. 146—88)

The present invention relates to improvements in a slicing machine, and its principal object is to provide an improved slicing machine intended principally for slicing meat and bacon, although the principles involved may be found useful in different connections.

A further object of the invention is to provide a slicing machine of the character described that is simple in construction and economic in operation.

A further object of the invention is to provide a slicing machine which allows of the use of an endless band blade as contra-distinguished from conventional slicers used at the present time which use rotary disc blades.

A further object of the invention is to provide certain improvements in connection with the feeding of the object to be cut to the knife, and in certain adjustments determining the thickness of the slices cut.

A further object of the invention, and one of the most important ones, is to provide a novel means for holding the object to be sliced in place, it being intended to use for this purpose a means active on the slicing face of the object.

More particularly it is proposed in the present invention to use a suction means for holding the object in place, the suction means applying to the slicing face of the object.

It is further proposed in the present invention to provide a means for holding the slices after they have been cut and for successively carrying the slices away from the object and delivering the same on a tray in predetermined order.

A further object of the invention is to provide in combination with a slicing machine of the character described, means for stacking the separated slices in a predetermined arrangement and in overlapping relation, an arrangement that is being rapidly adopted in stores for exhibiting slices of bacon, for instance.

Further objects and advantages of my invention will appear as the specification proceeds.

The preferred form of my invention is illustrated in the accompanying drawings in which

Figure 1 shows a top plan view of my device;

Figure 2 a longitudinal vertical section through the same, with the position of the blade carrier shifted to the center line;

Figure 3 a section taken along line 3—3 of Figure 2;

Figure 4 a horizontal section taken along line 4—4 of Figure 2;

Figure 5 a transverse vertical section taken along line 5—5 of Figure 2;

Figure 6 a transverse vertical section taken along line 6—6 of Figure 2;

Figure 7 a vertical section taken along line 7—7 of Figure 4;

Figure 8 an end elevation as seen from the right of Figure 1;

Figure 9 a vertical transverse section taken on line 9—9 of Figure 4;

Figure 10 a vertical transverse section taken along line 10—10 of Figure 4;

Figure 11 a vertical section taken along line 11—11 of Figure 10;

Figure 12 an enlarged detail section taken along line 12—12 of Figure 7;

Figure 13 a transverse vertical section taken along line 13—13 of Figure 2;

Figure 14 a section taken along line 14—14 of Figure 13; and

Figure 15 a diagrammatic view illustrating the knife which I employ for separating the rind from the body of the bacon or the like.

While I have shown only the preferred form of the invention, I wish to have it understood that various changes or modifications may be made within the scope of the claims hereto attached without departing from the spirit of the invention.

Referring to the drawings in detail, my slicing machine which in this particular description is illustrated as being used for slicing a side of bacon, contains as its principal parts a table 1 on which the side of bacon 2 may be placed, a pusher 3 for advancing the bacon, a blade carrier 4, and operating mechanism for the same, a suction holder 5 adapted to lie against the slicing face of the bacon for holding the same in place, and for carrying the separated slices away from the main body, and a tray 6 adapted to have the slices of bacon stacked thereon in overlapping relation, and having means for stepwise advancing the same.

The table 1, the surface of which is provided with a number of longitudinal ribs 7, is mounted over the base 8 and supported by means of a side wall 9 rising from the base in such a manner that considerable space is provided between the table and the base. The side member 9 extends upwardly beyond the height of the table to form a flange 10. The front edge 11 of the table is curved to form an arc drawn on the center of the blade movement as will be described hereinafter.

This table serves as a support for the side of bacon 2 which may be placed thereon in such a manner that the slicing end of the bacon projects slightly beyond the front edge 11. The rear end

of the bacon is acted on by the pusher 3 consisting of a vertical plate (see Figures 13 and 14) extending transversely over the table, and having a plurality of hooks 12 projecting therefrom for engagement with the bacon. This plate is fastened to a cylinder 13 adapted to ride in a slot 14 formed in the table and forming part of an upper bearing member 15 adapted to ride on a threaded rod 16 extending lengthwise underneath the table and supported in bearings 17. A lower bearing member 18 which is threaded internally as shown at 19 is held in engagement with the rod 16 by means of a fork 20 fastened to the lower member as shown at 21, and extending through the upper bearing with freedom of sliding motion as at 22, and having a stem 23 extending into the cylinder 13, the stem terminating in a head 24 normally urged upward by a spring 25 that encircles the stem. As long as the different parts are in the position shown in Figures 13 and 14, rotary movement of the threaded rod 16 causes the pusher 3 to advance. When the operator desires to advance the pusher more quickly, or to return the same to an initial position, he depresses the head 24 which releases the lower bearing member 18 from the threaded rod 16 and allows the pusher to be freely moved in either direction, the upper bearing member not being threaded.

For turning the rod 16 I provide the following mechanism, parts of which are utilized for driving the other elements of my slicing machine. A shaft 26 extends transversely through the base 8 near the rear edge thereof, and is connected to any suitable source of power, such as an electrical motor not shown in the drawings. This shaft has a bevel pinion 27 mounted thereon, which latter meshes with a bevel gear 28 at the lower end of a short vertical shaft 29 having a pinion 30 at its upper end meshing with a ring gear 31 having a disc 32 (see Figures 2 and 5) fastened thereto, the ring gear and the disc being mounted on a shaft 33 supported transversely in the blade carrier 4, which latter is pivotally supported over the rear end of the base by means of a bushing 34, resting on and extending through a bearing 35, formed in the top member of the base 8. The bushing 34 has an arm 36 extending therefrom, and a roller 37 at the end of said arm rides in a groove 38 in a drum 39 mounted on the transverse shaft 40, to which latter rotary motion is transmitted from the shaft 26 through the gears 41 and 42, the groove 38 being shaped to cause the arm 36 to swing back and forth as the drum 39 revolves.

In this manner the arm 36 and with it the blade carrier 4 are made to swing back and forth in a horizontal plane. The blade carrier is made in the form of a yoke, and is mounted in the bearing 35 in such a manner that one arm extends above the table 1, and one arm below the table 1, while the front ends of the arms are arranged relative to the front edge of the table in such a manner that an endless blade 43 mounted in the blade holder on the disc 32 previously described, and two sheaves 44, passes along the front edge of the table for cutting off a projecting piece of bacon.

The blade holder has mounted on one side thereof a T-shaped member 45, adjustably seated in a somewhat larger T-shaped recess 46, the member being fastened by means of a set screw 47, and adapted for up and down adjustment. The stem 48 of the T-shaped member projects beyond the inner edge of the blade carrier and strikes a pin 49 extending from a ring 50 rotatably mounted on the end of the threaded rod 16. The ring is connected to the rod 16 by means of the conventional clutch arrangement 51 shown in Figure 3 by means of which turning motion is transmitted in one direction but not in the other. As the blade carrier swings back and forth, the stem 48 strikes the pin 49 and thereby turns the rod 16 while advancing in one direction for causing a slight advance of the pusher 3. On the return movement the stem 48 strikes the pin 49 but this movement is not transmitted to the rod due to the clutch arrangement. Two springs 52 automatically return the pin 49 to an initial vertical position after each excursion.

For slicing the side of bacon, the latter is placed on the table so that one end slightly projects beyond the front edge of the table and the pusher is adjusted for engagement with the opposite end of the bacon. To hold the front end in place, I provide the suction holder 5 comprising in its general features a suction chamber 53 of a length substantially corresponding to the width of the table, and presenting a curved face 54 in parallel relation and slightly spaced from the front edge of the table when the suction holder occupies the position shown in Figures 1 and 4. The suction holder is pivoted in a bracket 55 extending from the side wall 9 so that it may be swung from the position shown in Figure 1 outwardly to a position at right angles thereto.

The mounting means for the suction holder also includes means for tilting the suction holder so that its gripping face 54 is presented in vertical position when confronting the front edge of the table, and in horizontal position when turned ninety degrees. The mounting means is shown in detail in Figures 9 and 10, and includes a horizontal journal 56, extending from one end of the suction holder, and revolvably held in the lower solid portion of a cylinder 57, which latter is revolvably mounted in a bearing 58 provided on the bracket 55 by means of a nut 59 threaded on the reduced end 60 of the cylinder. The journal 56 extends beyond its bearing and is forked as shown at 61 to support the pin 62 having a block 63 thereon, which latter is engaged by the forked end 64 of a rod 65, the other end of which is engaged through the universal joint 66 by a horizontal shaft 67 mounted within the base and supported by bearings 68. This shaft is free to slide longitudinally, and is acted on by a cam 69 mounted on the shaft 40 previously mentioned. The cam is shown in detail in Figure 7 and includes a substantially circular section 70 occupying about one-half thereof, and a flattened section 71 occupying the other half. In the situation shown in Figure 7 the shaft 67 is in its most advanced position, and holds the suction holder 54 in confronting relation to the front edge of the table. As the shaft turns in the direction of the arrow, the suction holder is retained in the same position during a complete one-half of a revolution. Thereupon the shaft 67 enters upon the flat portion of the cam, and during the next quarter of the revolution is allowed to retract under the influence of the spring 72 fastened at one end to one of the bearings 68 and at the other end to the shaft as at 73 so that the suction holder is thrown outward into the dotted line position of Figure 4. During the next quarter of a revolution, the shaft 67 is again urged outward for

swinging the suction holder back to its initial position.

The tilting motion of the suction holder during its outward movement is produced by engagement of a pin 74 associated with the cam 69, which strikes a lug 75 extending from the shaft 67 during the third quarter of the revolution of the cam, this engagement taking place well toward the end of the outward movement. When the pin strikes the lug 75 the shaft 67 is revolved through a quarter of a turn, and since at the end of the outward movement the shaft 67, the rod 65, and the suction holder are substantially alined, this tilting motion is transferred through the universal joints to the suction holder so that the latter turns its face downward at the end of the outward movement. As soon as the pin 74 passes the lug 75 the shaft 67 swings back to its original position under the influence of the spring 72.

The suction holder itself is shown in detail in Figures 1 and 10, and comprises a frame 76 adapted to slidably receive the suction chamber 77, the front face 54 of which is provided with a plurality of tapered perforations 78 in each one of which is mounted a conical valve 79 guided in two partitions 80 and 81, springs 82 on the valve stems 83 serving to normally seat the valves which are shaped to project slightly beyond the surface of the suction chamber as shown in Figure 11. The partition 80 is spaced slightly from the front wall of the suction chamber so as to provide a small intervening space 84, and the head of each valve 79 is sufficiently long to fit in both the front wall and the partition 80. When a vacuum is created in the suction chamber, the vacuum extends through perforations 85 into the space 84.

As the suction chamber is swung toward the projecting face of the bacon, a plurality of valves 79 will come in contact with the bacon, and become unseated by the impact so as to allow the suction to become active on the face of the bacon for holding the same in place. It should be noted that only those valves coming within the area of the exposed face of the bacon are affected while all the other valves remain closed.

For producing a vacuum in the suction chamber, I use a vacuum pump 86 (see Figures 2 and 4) which may be of any suitable construction, and is operated from the shaft 26 through an eccentric 87 and a connecting rod 88. The pump is connected through a flexible hose 89 and a fitting 90 with a port 91 in the cylinder 57, which latter communicates through a port 92 in its bottom, and a port 93 in the journal 56 with a bore 94 in said journal, which latter bore leads to the suction chamber so that as long as the suction chamber is presented with its suction face in a vertical position, there is free communication between the suction pump and the suction chamber for creating and maintaining a vacuum in the latter. As the suction chamber is tilted when approaching the end of its outward movement, the port 93 in the journal 56 moves out of registry with the port 92 and into registry with a port 95 leading to the atmosphere so that the suction is released.

Adjacent the front edge of the table there is mounted a shelf 96 on which the tray 6 is supported with freedom of sliding motion. This tray is step-wise advanced as the suction holder swings back and forth by utilizing the tilting movement of the suction holder, which latter has a short bar 97 extending downwardly therefrom. This bar, when the suction holder tilts back into vertical position, enters one of the recesses 98 provided in the tray and by striking the wall of the recess advances the tray. The recesses as will be seen from the drawings are curved on an arc drawn on the center of the swinging movement of the suction holder so that when the latter swings back toward the front of the table, the bar 97 rides out of the recess.

The operation of my machine is as follows: A side of bacon to be sliced is placed on the table 1 with its front or slicing end slightly projecting beyond the front edge of the table. The pusher is moved along the rod 16 after depression of the head 24 until it engages with the rear end of the bacon whereupon the head 24 is released, which allows the lower bearing 18 to engage with the thread on the rod 16. Now the motor is started. The blade carrier at this time is in a position indicated in Figure 1, and the suction holder lies against the face of the bacon, the valves within the area of the face of the bacon being forced inwardly so that the vacuum which may be assumed to be in the suction chamber from the last operation, becomes active upon the front or slicing face of the bacon, and firmly holds the same in position. As the motor starts the shaft 26 is turned and causes the beveled gears 27 and 30 to transmit rotary motion to the ring gear 31, whereby the disc 32 is made to revolve for imparting endwise motion to the knife blade 43. At the same time rotary motion is transmitted from the shaft 26 to the shaft 40 through the gears 41 and 42, and the drum 39 causes the arm 36 and through the latter the blade carrier 4 to swing across the table so that the blade 43 cuts off the projecting piece of bacon which adheres to the suction holder. During this movement the suction holder is held to the face of the bacon since the cam face 70 holds the shaft 67 in advance position through fully a half revolution. The vacuum chamber during this part of the operation is subject to the pumping action of the pump 86 so that the vacuum is maintained or increased.

After the blade carrier has reached the end of its movement, it starts on its return movement across the table. The cam 69 now is in a position to start on its third quarter which allows the spring 72 to retract the shaft 67 for swinging the suction holder away from the front edge of the table, and while this swinging action is executed and the suction holder approaches the end of its outward movement, the pin 74 on the cam 69 strikes the lug 75 and causes the shaft 67 to turn for tilting the suction holder so that the same lies practically flat above the tray. The tilting movement of the suction holder causes the port 93 of the journal 56 to move out of registry with the port 92 and into registry with the port 95 leading to the atmosphere so that the suction is released and the slice of bacon carried by the suction holder is dropped on the tray 6.

After the pin 74 has passed the lug 75, the suction holder snaps back into vertical position due to the action of the spring 72 and advances the tray by one step through the bar 97 entering one of the recesses 98. The return of the suction holder to vertical position reverses the arrangement of the ports so as to again connect the suction chamber to the suction pump.

As the cam 69 goes through the fourth quarter of its revolution, the shaft 67 is advanced whereby the suction holder is swung back into its ini-

tial position, and takes a new hold of the slicing face of the bacon, which latter has been advanced in the meantime through engagement of the stem 48 of the T-shaped member 45 with the pin 49 extending from the ring 50 on the threaded rod 16.

It will be seen that in this manner the bacon is urged to successive slicing operations and that each slice is automatically deposited on the tray in overlapping relation with the preceding slice in the manner indicated in Figure 1. It should be understood that a stack of paper sheets shown at 99 may be placed on the tray so that after one layer of bacon slices has been deposited it may be removed on the paper sheet as a unit. It should also be noted that the blade carrier may be provided with a small steel blade 100, which may cut between the bacon and the rind for separating the latter from the former.

I claim:

1. In a slicing machine, a table, means for positioning an object thereon having a rind so as to project beyond an edge of the table, a blade, a blade carrier adapted to guide the blade along the edge of the table for removing a slice from the object, means for gripping and supporting the slice during the cutting operation and a cutter attached to the blade carrier and mounted for passing between the slice and the gripping means for cutting the rind from the object.

2. In a slicing machine, a table, means for positioning an object thereon having a rind so as to project beyond an edge of the table, a blade, a blade carrier adapted to guide the blade along the edge of the table for removing a slice from the object, means for gripping and supporting the slice during the cutting operation, and a cutter attached to the leading edge of the blade carrier and mounted for passing between the slice and the gripping means for severing the rind from the object prior to the removing of the slice by the blade.

3. In a slicer of the character described, a base, a frame having a sleeve pivotally supported in the base and having spaced arms projecting therefrom, a disc revolvable in the frame and rollers revolvable in the arm extremities, a band blade movable on the disc and the rollers, a ring gear on the disc, a shaft extending through the sleeve and having a pinion in driving relation with the ring gear for imparting movement to the band blade, a transverse shaft in the base, a driving connection between the two shafts, a third shaft mounted parallel to the second shaft and having a cam thereon, a driving connection between the second and third shafts, an arm extending from the sleeve and being engaged by the cam for operation thereby whereby the frame with its blade is made to swing back and forth, a table for holding an object mounted within the confines of the arms and with its front edge in operative proximity to the band blade, a pusher for advancing the object, a screw for advancing the pusher and means actuated by the swinging frame for operating the screw.

4. In a slicer of the character described, a base, a frame having a sleeve pivotally supported in the base and having spaced arms projecting therefrom, a disc revolvable in the frame and rollers revolvable in the arm extremities, a band blade movable on the disc and the rollers, a ring gear on the disc, a shaft extending through the sleeve and having a pinion in driving relation with the ring gear for imparting movement to the band blade, a transverse shaft in the base, a driving connection between the two shafts, a third shaft mounted parallel to the second shaft and having a cam thereon, a driving connection between the second and third shafts, an arm extending from the sleeve and being engaged by the cam for operation thereby whereby the frame with its blade is made to swing back and forth, a table for holding an object mounted within the confines of the arms and with its front edge in operative proximity to the band blade, and means for advancing the object actuated by the swinging frame.

5. In a slicer of the character described, a base, a frame having a sleeve pivotally supported in the base and having spaced arms projecting therefrom, a disc revolvable in the frame and rollers revolvable in the arm extremities, a band blade movable on the disc and the rollers, a ring gear on the disc, a shaft extending through the sleeve and having a pinion in driving relation with the ring gear for imparting movement to the band blade, a transverse shaft in the base, a driving connection between the two shafts, a third shaft mounted parallel to the second shaft and having a cam thereon, a driving connection between the second and third shafts, an arm extending from the sleeve and being engaged by the cam, for operation thereby whereby the frame with its blade is made to swing back and forth, and means for fixedly supporting an object in the path of the swinging blade.

6. In a slicer of the character described, a base, a frame having a sleeve pivotally supported in the base and having spaced arms projecting therefrom, a disc revolvable in the frame and rollers revolvable in the arm extremities, a band blade movable on the disc and the rollers, a ring gear on the disc, a shaft extending through the sleeve and having a pinion in driving relation with the ring gear for imparting movement to the band blade, a transverse shaft in the base, a driving connection between the two shafts, a third shaft mounted parallel to the second shaft and having a cam thereon, a driving connection between the second and third shafts, an arm extending from the sleeve and being engaged by the cam for operation thereby whereby the frame with its blade is made to swing back and forth.

7. In a slicer of the character described, a base, a frame having a sleeve pivotally supported in the base and having spaced arms projecting therefrom, means for movably supporting a band blade in the frame and the arms with a section exposed between the arms, a shaft extending through the sleeve and having driving connection with the latter means for moving the blade, a transverse shaft in the base having driving connection with the first shaft, a third shaft mounted parallel to the second shaft and having a cam thereon, a driving connection between the second and third shafts and an arm extending from the sleeve and in engagement with the cam for operation thereby whereby the frame is made to swing back and forth.

8. In a slicing machine, a table, means for positioning an object thereon so as to project beyond one edge, an endless blade, a yoke-shaped frame pivoted to straddle the table between the arms thereof and having the endless blade mounted therein with an exposed portion of said blade in operative relation to a table edge, means for imparting endwise motion to the blade, means for swinging the frame back and forth, a screw for advancing the object, a finger projecting from the screw and a member extending from the frame

adapted to strike the finger when the frame swings for actuating the screw.

9. In a slicing machine, a table, means for positioning an object thereon so as to project beyond one edge, an endless blade, a yoke-shaped frame pivoted to straddle the table between the arms thereof and having the endless blade mounted therein with an exposed portion of said blade in operative relation to a table edge, means for imparting endwise motion to the blade, means for swinging the frame back and forth, a screw for advancing the object, a finger projecting from the screw and a member extending from the frame adapted to strike the finger when the frame swings for actuating the screw, the finger having a clutch connection with the screw whereby it is free to rotate in one direction.

10. In a slicing machine, a table, means for positioning an object thereon so as to project beyond one edge, an endless blade, a yoke-shaped frame pivoted to straddle the table between the arms thereof and having the endless blade mounted therein with an exposed portion of said blade in operative relation to a table edge, means for imparting endwise motion to the blade, means for swinging the frame back and forth, a screw for advancing the object, a finger projecting from the screw and a member extending from the frame adapted to strike the finger when the frame swings for actuating the screw, the said member being adjustable on the frame lengthwise of the finger whereby the extent of the screw movement may be adjusted.

SAMUEL SINGER.