F. P. BURKHARDT.

SLICING MACHINE.

APPLICATION FILED JUNE 2, 1906.

945,218. Patented Jan. 4, 1910.

4 SHEETS—SHEET 1.

FIG. 1.

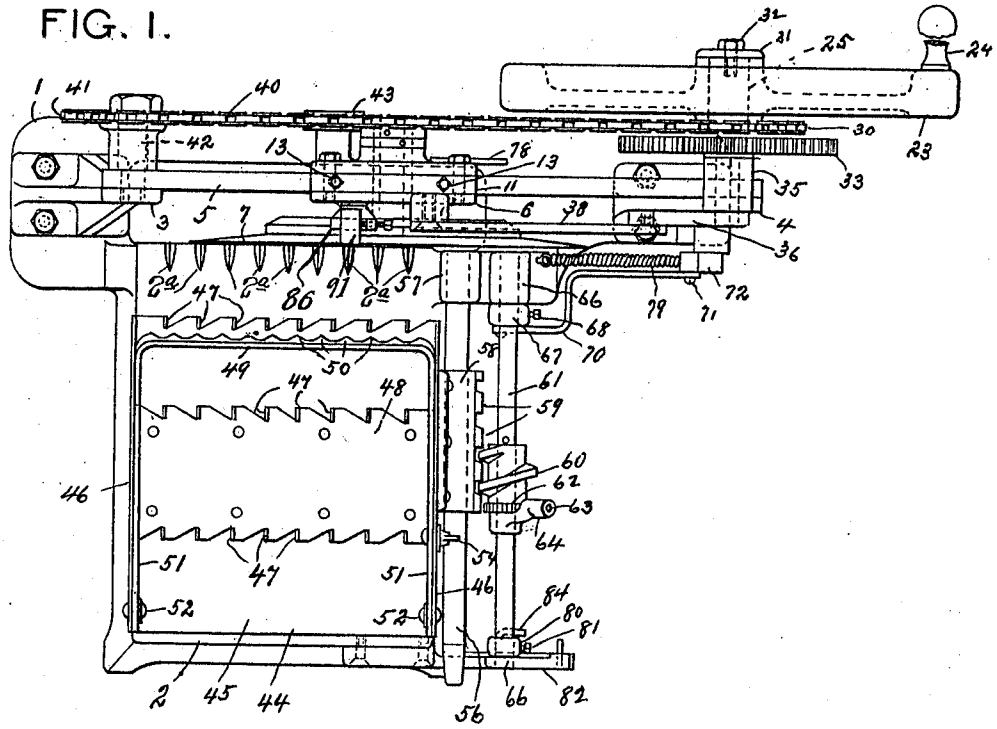
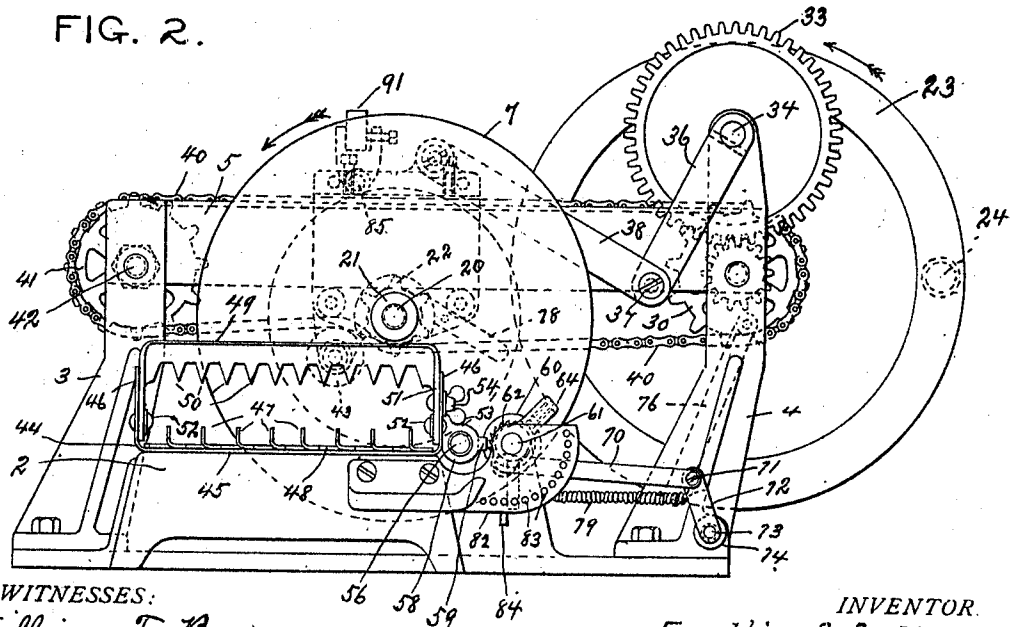


FIG. 2.



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F. P. BURKHARDT.

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4 SHEETS—SHEET 2.

FIG. 3.

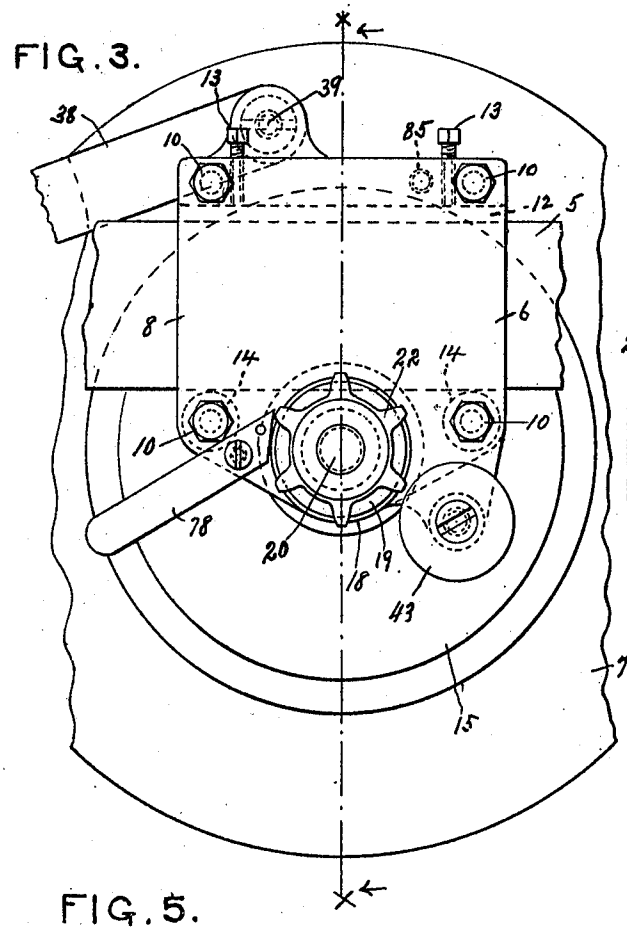


FIG. 4.

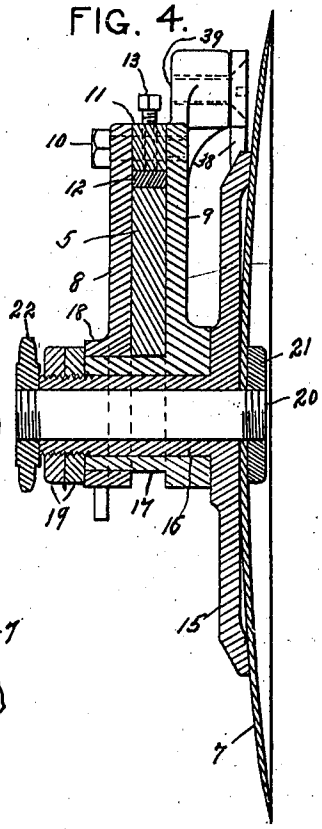


FIG. 5.

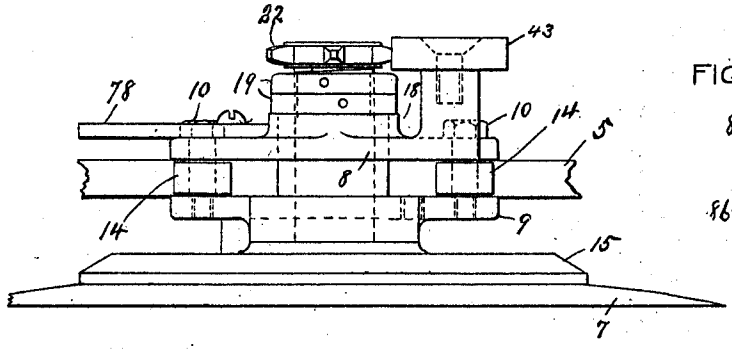


FIG. 6.

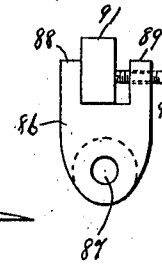
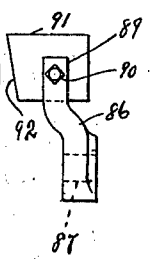


FIG. 7.



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4 SHEETS—SHEET 3.

FIG. 8.

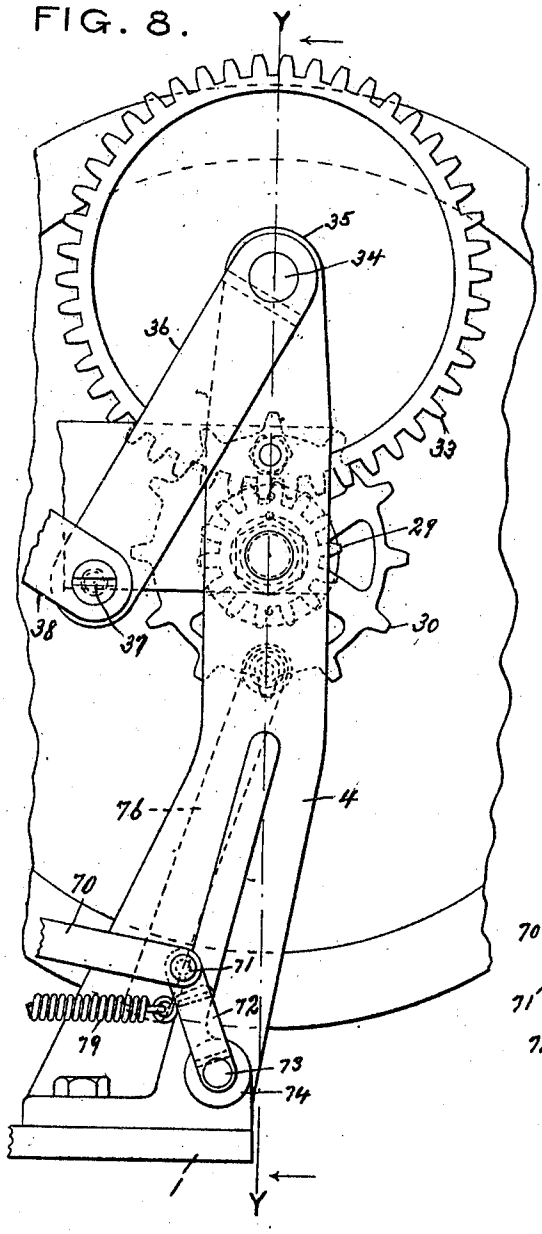
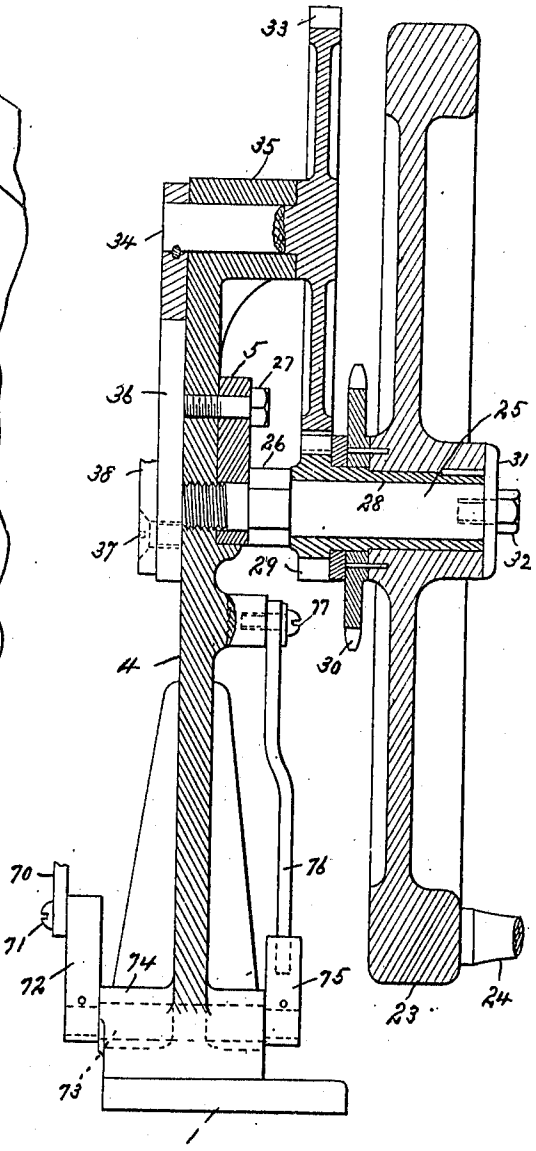


FIG. 9.



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SLICING MACHINE.

APPLICATION FILED JUNE 2, 1906.

945,218. Patented Jan. 4, 1910.

4 SHEETS—SHEET 4.

FIG. 10.

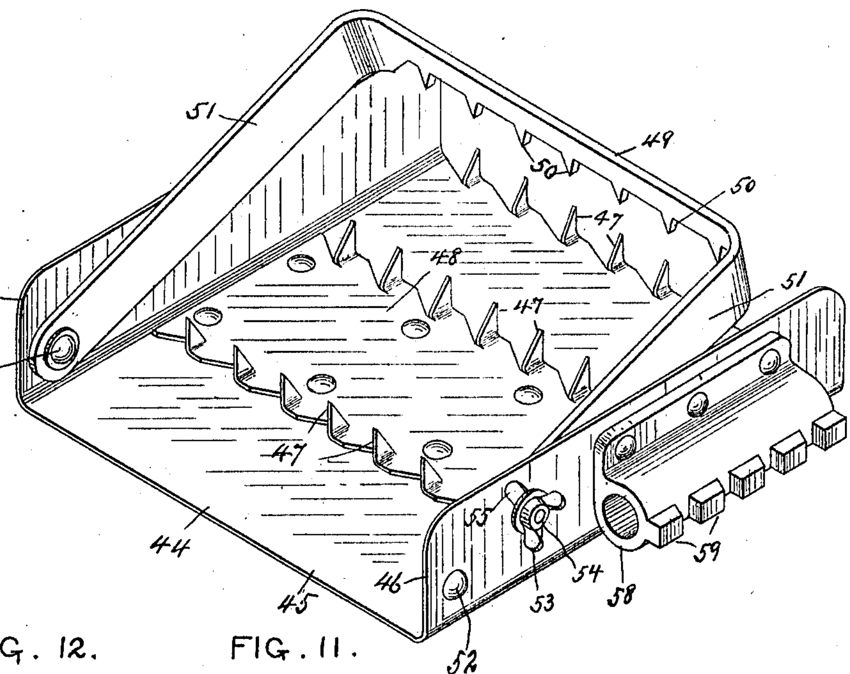


FIG. 12.

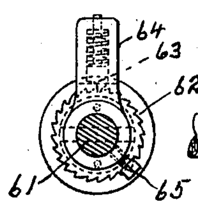


FIG. 11.

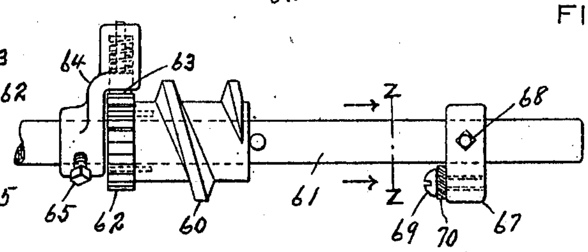


FIG. 13.

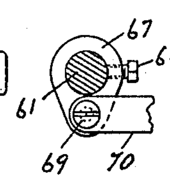


FIG. 15.

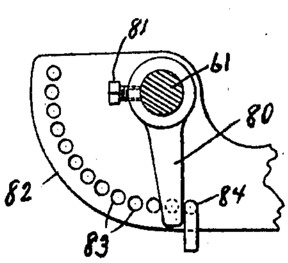


FIG. 14.

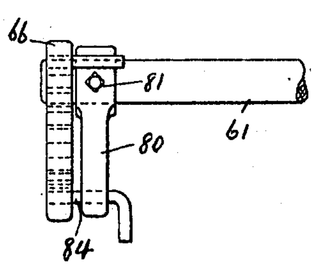


FIG. 16.

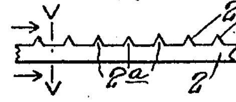
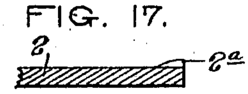


FIG. 17.



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By *[signature]*,

Attorney

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UNITED STATES PATENT OFFICE.

FRANKLIN P. BURKHARDT, OF SPRINGFIELD, OHIO, ASSIGNOR, BY MESNE ASSIGNMENTS, TO THE ANDERSON TOOL COMPANY, OF ANDERSON, INDIANA, A CORPORATION OF INDIANA.

SLICING-MACHINE.

945,218. Specification of Letters Patent. Patented Jan. 4, 1910.

Application filed June 2, 1906. Serial No. 319,888.

To all whom it may concern:

Be it known that I, FRANKLIN P. BURKHARDT, a citizen of the United States, residing at Springfield, in the county of Clark and State of Ohio, have invented certain new and useful Improvements in Slicing-Machines, of which the following is a specification, reference being had therein to the accompanying drawings.

This invention relates to slicing machines, being designed more particularly for use as a machine for slicing meat, although capable of employment in the slicing of other materials and substances.

The invention has for its object to provide an automatic machine whereby a piece of meat may be readily and quickly cut into a plurality of slices of any desired thickness.

To these ends the invention consists in certain novel features which I will now proceed to describe, and will then particularly point out in the claims.

In the accompanying drawings, Figure 1 is a plan view of a machine embodying my invention in one form. Fig. 2 is a rear elevation of the same; Fig. 3 is a front elevation of the cutting disk and its carriage; Fig. 4 is a sectional view, taken on the line *x x* of Fig. 3 and looking in the direction of the arrows; Fig. 5 is an inverted plan view of what is shown in Fig. 3; Figs. 6 and 7 are detail elevations of the sharpener, detached; Fig. 8 is an enlarged detail view of a portion of Fig. 2; Fig. 9 is a sectional view, taken on the line *y y* of Fig. 8 and looking in the direction of the arrows; Fig. 10 is a detail perspective view of the holder, detached; Fig. 11 is a detail view of the feed shaft and its worm and pawl and ratchet mechanism, detached; Fig. 12 is a view looking at the left-hand end of Fig. 11; Fig. 13 is a detail sectional view, taken on the line *z z* of Fig. 11 and looking in the direction of the arrows; Fig. 14 is a detail view of the feed adjusting mechanism, detached; Fig. 15 is a view looking at the right-hand end of Fig. 14; Fig. 16 is a detail front elevation of a portion of the front edge of the table; and Fig. 17 is a detail sectional view, taken on the line *v v* of Fig. 16 and looking in the direction of the arrows.

The structure, in its preferred form, comprises a suitable base having a somewhat elongated portion 1, adjacent to which is an elevated work-supporting table 2. At the ends of the elongated portion 1 there arise standards 3 and 4, to which are secured the ends of a bar 5, which constitutes a guide for the carriage 6 of the cutting disk 7, the machine being organized to employ a positively rotated disk cutter which is reciprocated across the work as it rotates. The carriage 6, in its preferred form, comprises two parallel plates 8 and 9, lying on opposite sides of the guide bar 5, and connected with each other by bolts 10, a spacing block 11 being interposed between the upper ends of said plates, and the upper bolts 10 passing through said spacing block as well as the plates. A bearing strip 12 is located between this spacing block and the top of the guide bar, on which latter it rests, said bearing strip being adjustable by means of adjusting screws 13, which pass down through the spacing block and bear on the upper side of the strip. The lower bolts 10 are provided with bearing rollers 14, mounted on the portions of said bolts which lie between the plates 8 and 9, said rollers bearing on the under side of the guide bar 5, to reduce the friction caused by the pressure of the carriage against the under side of the bar due to the resistance of the material operated on.

The cutter may be constructed and mounted in any suitable manner, but I prefer the construction shown, in which the disk 7 which constitutes the cutter proper is formed of a thin concavo-convex sheet of steel, clamped against a support 15, which latter has a sleeve-like hub 16. The member 9 of the carriage has a bearing sleeve 17, which extends through the other carriage member 8 and terminates flush with a boss or short sleeve 18 forming part of said member 8. The sleeve 16 extends beyond these parts, and this extension is threaded and receives a pair of nuts 19, which bear against the ends of the sleeves 17 and 18 and hold the support 15 in position against the outer face of the member 9. A clamping bolt 20 passes centrally through the sleeve 16, and has at one end a nut 21, which clamps the disk 7 against the holder 15, the other end of said bolt having screwed thereon a sprocket wheel 22, which bears against the end of the sleeve 16, the nut 21 and sprocket wheel 22 acting as clamping nuts which insure the rotation and

unison with each other of the disk, its holder and the sprocket wheel.

Power is applied to reciprocate the carriage 6 and rotate the cutting disk 7 through the medium of a crank wheel 23, provided with a crank handle 24, and preferably of a weight such as to act as a fly wheel to equalize the motion. This crank wheel is supported on a stud shaft 25, which, in the present instance, serves to aid in securing one of the ends of the guide bar 5 to the standard 4. To this end, said stud shaft passes through the guide bar into a threaded aperture in the standard, and is provided with an enlarged wrench grasp 26 adjacent to the bar to clamp the same against the standard. A screw bolt 27 also aids in securing the bar to the standard. The portion of the shaft 25 which lies outward beyond the wrench grasp 26 has mounted to rotate thereon a sleeve 28, which has formed on its inner end a pinion 29. On the outer end of said sleeve there is keyed the hub of the fly wheel 23, and to said fly wheel there is secured, so as to rotate in unison therewith and with the sleeve, a sprocket wheel 30. A washer 31, secured to the outer end of the stud shaft 25 by a screw bolt 32, holds the sleeve and its attached parts on the shaft 25. The pinion 29 meshes with a gear 33, carried by a shaft 34, which is mounted in a bearing 35 on the upper end of the standard 4. The gear 33 is located at one end of said shaft, on one side of the bearing 35, and the shaft projects beyond the other side of the bearing 35 and has secured to it a crank arm 36, to the end of which is pivotally connected at 37 one end of a link 38. The other end of the link 38 is pivotally connected at 39 to the carriage 6, and by this construction a reciprocating motion is given to the carriage and cutting disk longitudinally of the guide bar 5. To impart rotary motion to the disk 7, a sprocket chain 40 is employed, which passes around the sprocket wheel 30 and around a similar sprocket wheel 41, carried by a stud shaft 42 at the other end of the bar 5. The sprocket wheel 22 on the disk-clamping bolt 20 meshes with this sprocket chain, which is held in extended contact with said sprocket wheel 22 by means of an idler 43, supported on the carriage 6. By this means a positive movement of rotation is imparted to the cutting disk, said movement being in the direction of the arrow shown in Fig. 2.

The plane of reciprocation of the cutting disk is immediately adjacent to the forward edge of the work-supporting table 2, on which the holder 44 is supported and on which it is fed. This holder is shown detached in Fig. 10 of the drawings. It comprises a base 45 and vertical lateral flanges 46, the base being provided with gripping teeth 47 projecting upward therefrom. These teeth, so far as those on the central portion of the base are concerned, are formed by slitting the edges of a sheet of metal 48, which is secured to the top of the base, the slits being made at an angle to the edges and the angular portions thus formed being turned up at right angles. The gripping teeth at the forward edge of the holder are formed by similarly slitting the forward edge of the base itself and turning up the points thus formed. The holder is further provided with a gripping device comprising a bar 49, provided with gripping teeth 50, said bar having its ends bent parallel with each other and at right angles to the body of the bar, as indicated at 51, thus forming arms, the ends of which are pivoted to the sides 46 of the holder at the rear end of the holder, as indicated at 52. The gripping bar can thus be lifted up to permit the placing of the meat in the holder, and may then be swung down on the same so that it will be firmly gripped between the teeth 50 and 47. When thus swung down into position, the gripping device may be held in place by means of a thumb nut 53, mounted on a threaded stud or bolt 54, projecting from one of the arms 51 through a slot 55 in one of the side members 46, said thumb nut acting to clamp the arm against the side member and hold the gripping device in adjusted position.

The holder is guided by means of a fixed shaft or guide rod 56, secured at its forward end to a lug 57 on the base, the other end of said guide rod or shaft being free. To the side member 46 which lies adjacent to said guide rod there is secured a sleeve 58 which fits over the guide rod 56 and is adapted to slide along the same. Said sleeve may be readily slipped on and off the guide rod at the unobstructed end of said rod under certain conditions, thereby permitting the ready removal of the holder from the machine and its replacement thereon. The sleeve is also adapted to rotate on the guide rod, so that the holder may be swung up from the table around said rod as an axis. The sleeve is provided, on the side thereof opposite the side which is attached to the holder, with a plurality of rack teeth 59, which, when the holder is resting in working position on the table 2, mesh with a worm 60 on the feed shaft 61. When the holder is swung up from the table in the manner hereinafter referred to, these teeth become disengaged from the worm and the holder can then be withdrawn from the machine by slipping the sleeve off of the guide rod, its replacement being effected in a similar and obvious manner. Furthermore, this construction permits the holder to be disengaged from the worm and slipped back to the initial position of its feed, so that, when the piece of meat or other article is of greater length than the extent of the feed, after the holder has fed forward as far as it can go, it can be slipped

back to its initial position, the piece of meat or other article can be shifted forward on the holder, and the feeding can proceed as before.

The worm 60 is loosely mounted on the feed shaft 61, and is provided with a ratchet wheel 62, with which meshes a spring pawl 63, carried by an arm 64, which latter is secured to the feed shaft by a set screw 65. The feed shaft is given a movement of oscillation by the mechanism hereinafter described, thereby imparting an intermittent rotary motion to the worm 60 through the pawl and ratchet mechanism provided for that purpose. The feed shaft 61 is mounted in bearings 66 on the frame, and is oscillated by the following mechanism. An arm 67 is secured to the feed shaft by a set screw 68, and has pivoted to it at 69 one end of a link 70. The other end of this link is pivoted at 71 to a crank arm 72, secured to one end of a rock-shaft 73, mounted in a bearing 74 in the base of the standard 4. The other end of the rock-shaft 73 has secured thereto an arm or tappet 75, which lies in the path of a lever 76, said lever being pivoted at 77 to the standard 4. The carriage is provided with a projection 78, which, when the carriage approaches the end of its return movement, just prior to starting forward again to make another cut, strikes the lever 76, and causes the same to act upon the tappet 75 and move the rock-shaft 73 in one direction. This movement of the rock-shaft, through the arms 72 and 67 and the connecting link 70, rotates the feed shaft 61 in such a way as to cause the pawl 63 to impart a movement of rotation to the worm 60 through the ratchet wheel 62. The return movement of the parts is effected by a spring 79, connected to the arm 72 and to the base, said spring serving to return the parts to normal position as the projection on the carriage moves forward again. This return movement of the parts does not affect the feeding worm, since the pawl slips over the ratchet wheel when moving in this direction.

Provision is made for controlling the exact amount to which the holder is fed forward after each reciprocation of the cutter, the same comprising a stop arm 80, secured to the feed shaft 61 by means of a set screw 81. A stop plate 82, preferably formed in one piece with the rear bearing 66 of the feed shaft, has formed therein a plurality of apertures 83.

84 represents a stop pin, which may be inserted in any one of the apertures 83, said stop pin lying in the path of the arm 80. The spring 79 acts to bring the stop arm 80 against the stop pin 84 at the end of each oscillation of the feed shaft 61, so that said stop pin defines the initial point of the range of such oscillation. Since the limit of movement of oscillation in the opposite direction is fixed, being determined by the travel of the carriage, which is always uniform, it will be seen that the extent of the oscillation of the feed shaft depends upon the extent of return motion under the influence of the spring 79 and the extent of this return motion is determined in an obvious manner by the position of the stop pin 84. Since the thickness of the slice depends upon the extent of the feed, it is obvious that the machine may be readily set to cut slices of different thickness, as desired.

From the foregoing description, the general operation of the machine will be readily understood. Assuming that a piece of meat, such as a piece of bacon eight inches long, is to be sliced, the gripping device is released and swung up, the holder moved back to the initial position of its feed, the bacon placed on the base of the holder with its front edge alined with the front edge of the table 2, and the gripping device is then brought down on the meat and secured by the thumb nut 53. The stop pin 84 is, of course, set to produce slices of the desired thickness. The crank wheel 23 is then rotated by the operator, and the carriage 6 traverses along the guide 5, carrying the rotating cutter across the end of the piece of bacon. During the last portion of the return movement of each complete reciprocation of the carriage, the holder is fed forward to the desired extent to present the bacon for the next slice, this occurring after the cutter has passed clear of the bacon. During each forward movement of the carriage, the cutter acts to slice off the bacon, cutting not only by its movement of rotation, but also by the forward feed imparted to it by the carriage, the forward edge of the table constituting the support which coöperates with the disk during this operation. This forward feeding of the holder continues until the rack teeth 59 have been fed forward beyond the worm 60, and this occurs before the holder is advanced to an extent sufficient to bring it into the path of the knife. Furthermore, the sleeve 58 and bearing lug 57 are so arranged that the former will come into contact with the latter before the holder can be moved forward to an extent sufficient to cause it to project beyond the edge of the table and into the path of the cutting disk. Assuming, as already stated, that the piece of bacon operated on is eight inches in length and that the feed of the machine is four inches, it will be seen that the holder will have been fed forward as far as it can go when only four inches of the bacon has been sliced. The holder can then be tilted up so as to disengage its rack teeth from the worm, whereupon the holder can be slid back upon its guide rod to its initial position, the bacon shifted forward in the holder, and the feeding operation repeated.

In order to firmly hold the meat or other material against lateral displacement at the plane of cutting, particularly when the holder is well back of said plane, as at the beginning of its feed, the table 2 is provided on its top, at its front margin, immediately adjacent to the path of the cutter, with holding-teeth 2^a, knife-like in form, arranged with their length in the direction of feed of the material, and rising in an incline from the level of the table, their height increasing in the said direction of feed. By reason of this construction, the material is fed forward onto and gradually engaged by these holding teeth, which prevent the lateral displacement of the material by the pressure of the advancing cutter, and thus insure an accurate cut.

Provision is made for sharpening the cutting edge of the disk as it rotates, and to this end the carriage is provided, on the side adjacent to the disk, with a pivot stud 85, shown in dotted lines in Fig. 3, in which view the sharpening block and its support are omitted. 86 indicates the said support, which is apertured at 87 to fit upon the pivot stud 85. Said support has clamping jaws 88 and 89, the latter of which is provided with a clamping screw 90, by means of which the sharpening block 91 may be clamped against the jaw 88. The block is made of any suitable abrasive material, and has its working face inclined to the opposite face thereof, as indicated at 92. By turning the support upon the pivot stud 85, the block may be brought into a position such that its working face bears upon the cutting edge of the disk at the rear thereof, so that said cutting edge will be sharpened as the disk rotates. By moving the support away from this position, the sharpening block may be moved out of contact with the disk, which position is given to the parts when the sharpening device is not in use.

It will be observed that during the outward or working stroke of the carriage and cutter said parts travel in a direction opposite to the direction of travel of the lower portion of the sprocket chain 40, by which the cutter is rotated, so that the disk revolves at a relatively high speed during its working stroke.

I wish it to be understood that I do not desire to be limited to the exact details of construction shown and described, for obvious modifications will occur to a person skilled in the art.

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

1. A slicing machine comprising a table or support for the work, a frame adjacent thereto having upright members, a single guide bar carried by said upright members, a carriage slidably mounted on said guide bar, a bearing extending transversely of said carriage beneath said guide bar, a shaft journaled in said bearing, a cutting disk mounted on said shaft, and means carried by said frame for simultaneously reciprocating said carriage and rotating said disk.

2. A slicing machine comprising a table or support for the work, a frame adjacent thereto having upright members, a guide bar carried by said upright members, a carriage slidably mounted on said guide bar and comprising bearing plates arranged on opposite sides of said guide bar, connected one to the other above and below the same and having a transverse bearing formed therein beneath said guide bar, a shaft journaled in said bearing, a disk mounted on the end of said shaft adjacent to said table, and means for simultaneously reciprocating said carriage and rotating said disk.

3. A slicing machine comprising a table or support for the work, a frame adjacent thereto having upright members, a single guide bar carried by said upright members, a carriage slidably mounted on said guide bar, a cutting disk rotatably mounted on said carriage beneath said guide bar, and means carried by said frame for simultaneously recriprocating said carriage and rotating said disk, in combination, with a work holder mounted on said table or support, means for feeding forward said holder at each reciprocation of said carriage, and means for regulating the extent of movement of said feeding mechanism.

4. A slicing machine comprising a table or support for the work, a single guide bar adjacent thereto, a carriage slidably mounted on said guide bar, a cutting disk rotatably mounted on the carriage, a sprocket wheel rotating with said disk, a sprocket chain engaging said sprocket wheel, other sprocket wheels journaled on fixed supports near the opposite ends of said guide bar and supporting said chain, and means for simultaneously driving one of said other sprocket wheels and reciprocating the carriage.

5. A slicing machine comprising a table or support for the work, a guide adjacent thereto, a carriage mounted on said guide, a cutting disk rotatably mounted on said carriage, a sprocket wheel rotating with said disk, a sprocket chain engaging said sprocket wheel and extending substantially parallel with said guide, other sprocket wheels journaled on fixed supports near the opposite ends of said guide and supporting said chain, means for simultaneously driving one of said other sprocket wheels and reciprocating said carriage, said carriage and cutting disk traveling oppositely to the driving portion of the chain during the working stroke of the cutting disk.

6. A slicing machine comprising a table or support for the work, a guide adjacent there-

to, a carriage mounted to reciprocate in the guide, a cutting disk mounted on the carriage and provided with a sprocket wheel, a driving shaft near one end of said guide provided with a sprocket wheel and pinion, an idle sprocket wheel journaled on a fixed support near the opposite end of said guide, a sprocket chain extending substantially parallel to said guide, passing around the idle and driving sprocket wheels and engaging the sprocket wheel of the cutting disk, a crank shaft provided with a gear meshing with the driving pinion, and a link connecting the crank of said crank shaft with the carriage.

7. A machine for slicing meat and other articles comprising a work holder provided on its side nearest the plane of cut with gripping jaws having gripping teeth, one of said jaws being stationary and the other of said jaws comprising a toothed bar extending substantially parallel to the toothed side of said work holder and having rearwardly extending arms pivotally connected to said work holder.

8. A machine for slicing meat and other articles comprising a holder having a base with upwardly projecting teeth at its forward edge, a gripping bar extending substantially parallel to said toothed edge and having downwardly directed teeth opposed to those of the base, arms extending rearwardly from said gripping bar and pivoted to said holder, and means for locking the gripping bar in position, substantially as described.

9. A machine for slicing meat and other articles comprising a holder having a base and vertical lateral flanges, gripping teeth projecting upward from the body and the forward edge of the base, a gripping bar provided with teeth opposed to those of the forward edge of the base, arms extending rearward from said gripping bar and pivoted to the flanges of the base, and means for locking said gripping bar in adjusted position, substantially as described.

10. In a slicing machine, the combination, with a table or support, and a work bench slidably mounted thereon, of a feed shaft extending parallel with said table and arranged at a point removed therefrom, means for actuating said shaft, a worm rigidly secured to said shaft, a guide rod extending parallel with said feed shaft, arranged between the same and said table and in substantially the same horizontal plane with said feed shaft, said guide rod having its outer end free and unobstructed, a sleeve slidably mounted on said guide rod, freely removable therefrom and rigidly secured to said work holder, said sleeve having teeth arranged in the side thereof opposite said work holder adapted to engage said worm when said work holder is in its normal or horizontal position and to be disengaged from said worm when said work holder has been rocked about said guide rod.

11. A slicing machine comprising a work holder having rack teeth, and means for supporting and guiding said holder, in combination with a feed shaft having a worm and ratchet wheel mounted to rotate in unison thereon, a pawl moving in unison with the feed shaft and engaging the ratchet wheel, and means for oscillating said feed shaft, substantially as described.

12. A slicing machine comprising a work holder having rack teeth, means for supporting and guiding said holder, and a reciprocating carriage provided with a cutter, in combination with a feed shaft, a worm and ratchet wheel mounted to rotate in unison thereon, a pawl moving with the feed shaft and engaging the ratchet wheel, and means actuated by the reciprocating carriage for oscillating said feed shaft, substantially as described.

13. A slicing machine comprising a work holder having rack teeth, means for supporting and guiding said holder, and a reciprocating carriage provided with a cutter, in combination with a feed shaft, a worm and ratchet wheel mounted to rotate in unison thereon, a pawl moving with the feed shaft and engaging the ratchet wheel, and means actuated by the reciprocating carriage for oscillating said feed shaft, said means comprising a part engaged by the carriage near the end of its return stroke, means intermediate said part and the feed shaft to move said shaft in one direction, and a spring moving said parts in the opposite direction, substantially as described.

14. In a slicing machine, an oscillating feed shaft, a reciprocating carriage, a part engaged by said carriage near the end of its return stroke, mechanism intermediate said part and the feed shaft for rotating said shaft in one direction, a spring acting to move said parts in the other direction, and an adjustable stop limiting the extent of the spring-actuated movement, substantially as described.

15. In a slicing machine, the combination, with a reciprocating revolving cutter, of a work-supporting table having holding teeth located on its margin adjacent to the path of the cutter, a work-holder, and means for automatically feeding forward said work-holder to move the work over said table and said teeth, substantially as described.

16. In a slicing machine, the combination, with a reciprocating revolving cutter, of a work-supporting table having elongated holding teeth located on its margin adjacent to the path of the cutter, said teeth extending in the direction of feed of the material and being adapted to hold the material against lateral movement and permit the

forward movement thereof, substantially as described.

17. In a slicing machine, the combination, with a reciprocating revolving cutter, of a work-supporting table having holding teeth located on its margin adjacent to the path of the cutter, said teeth arising in an incline from the surface of the table and extending in the direction of feed of the material and being adapted to hold the material against lateral movement and permit the forward movement thereof, substantially as described.

In testimony whereof, I affix my signature in presence of two witnesses.

FRANKLIN P. BURKHARDT.

Witnesses:

E. O. HAGAN,

HARRIET HAMMAKER.