Oct. 24, 1939. A. H. AHRNDT 2,177,470

SLICING MACHINE

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FIG. 1.

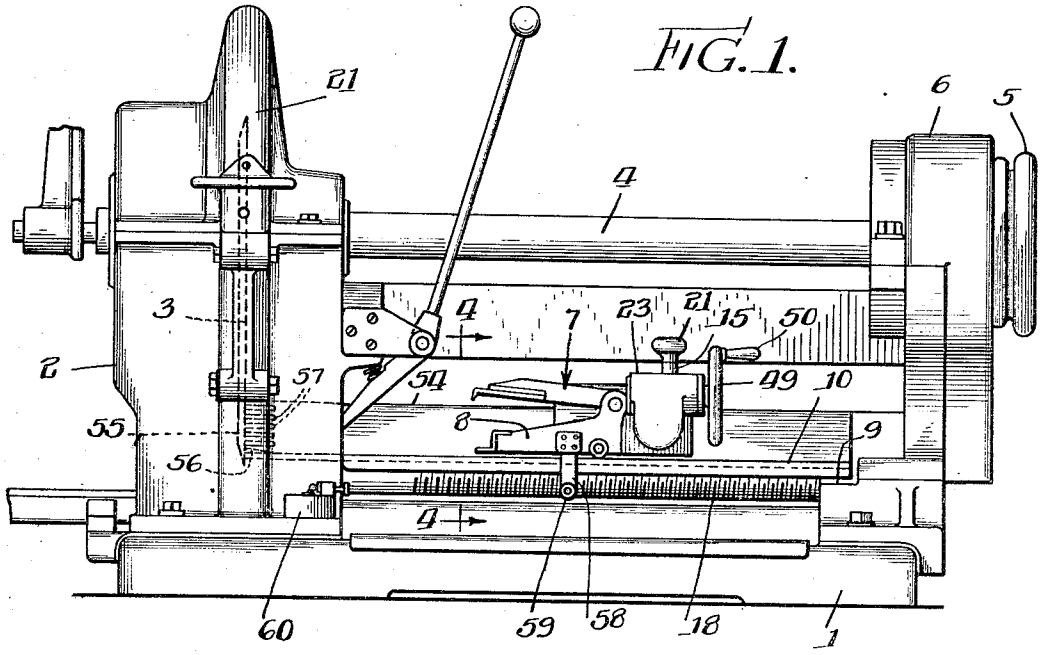
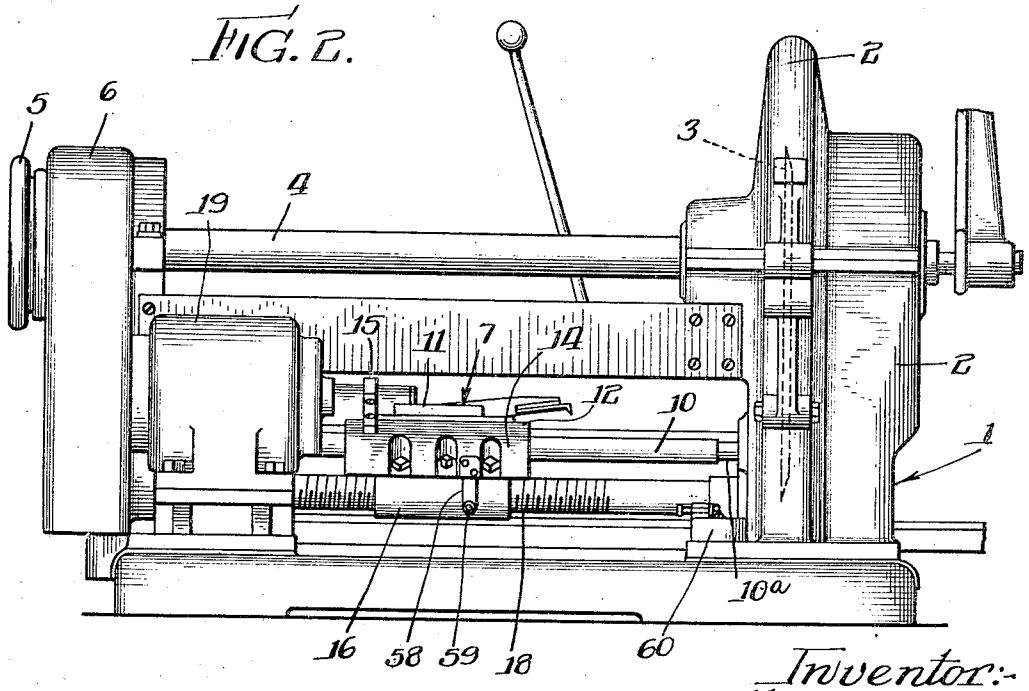


FIG. 2.



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FIG. 3.

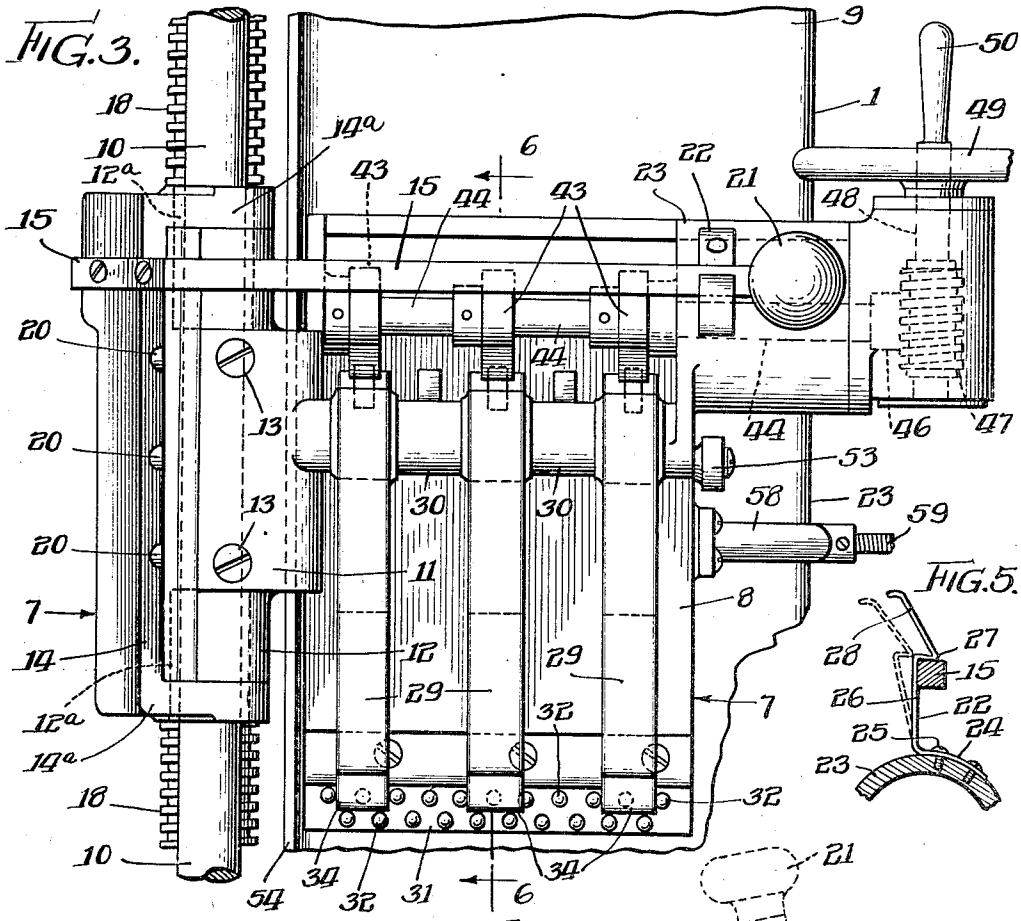
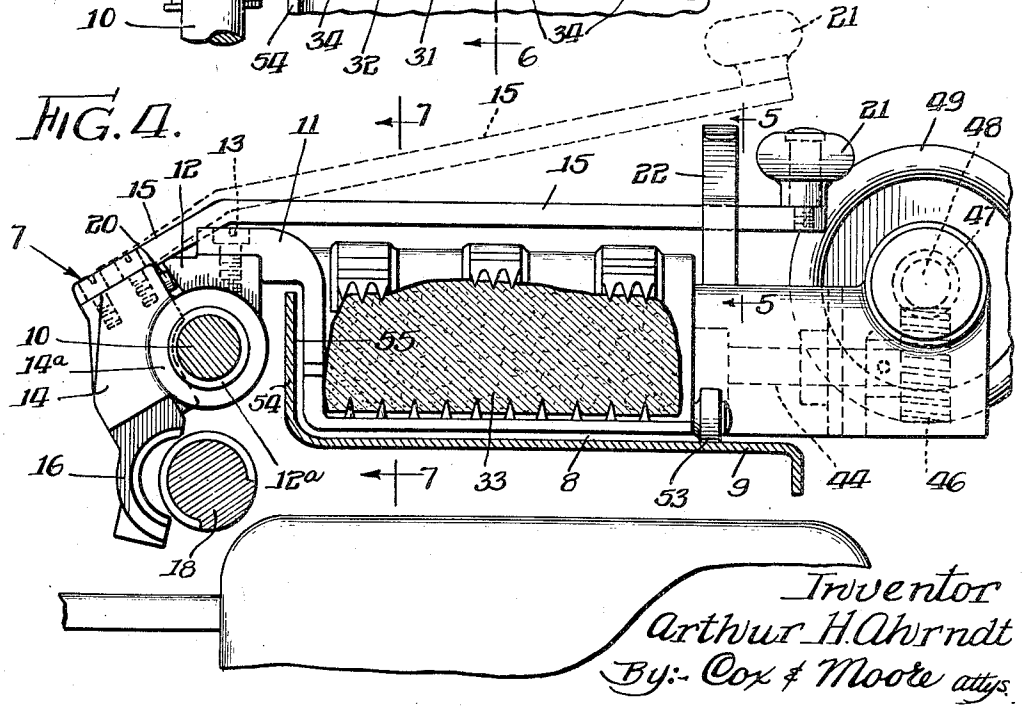


FIG. 5.

FIG. 4.



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FIG. 6.

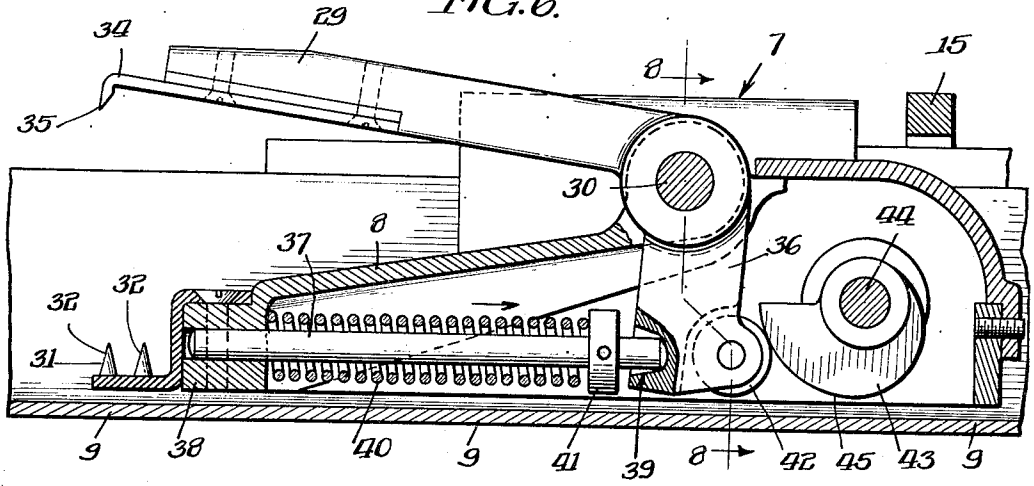


FIG. 7.

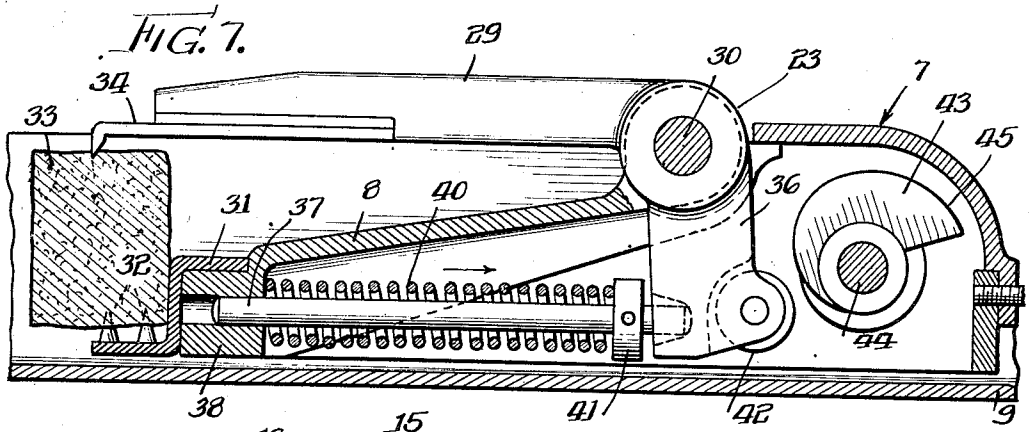
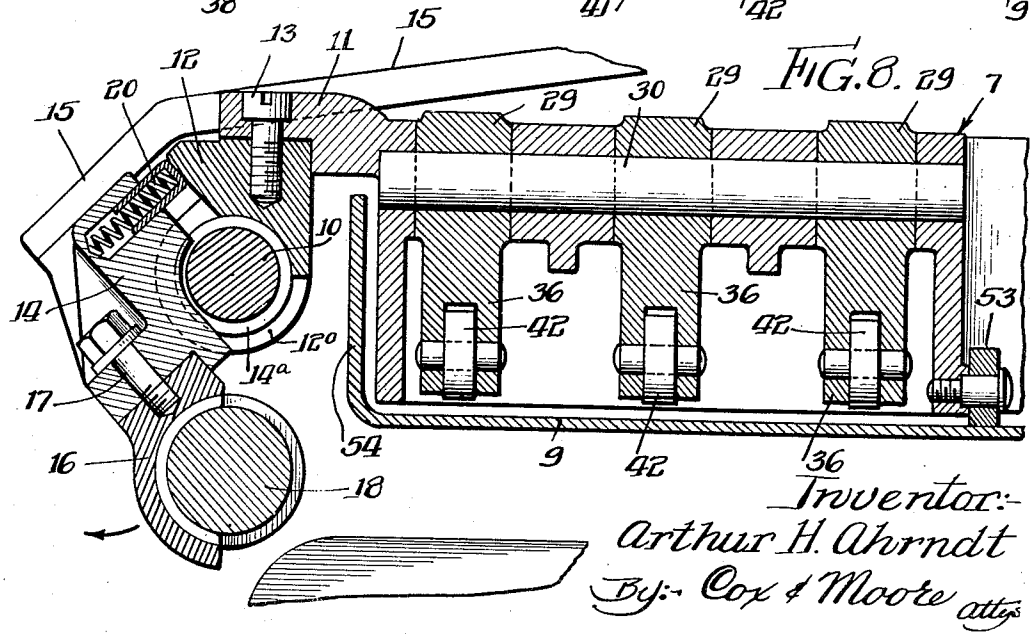


FIG. 8.



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FIG. 9.

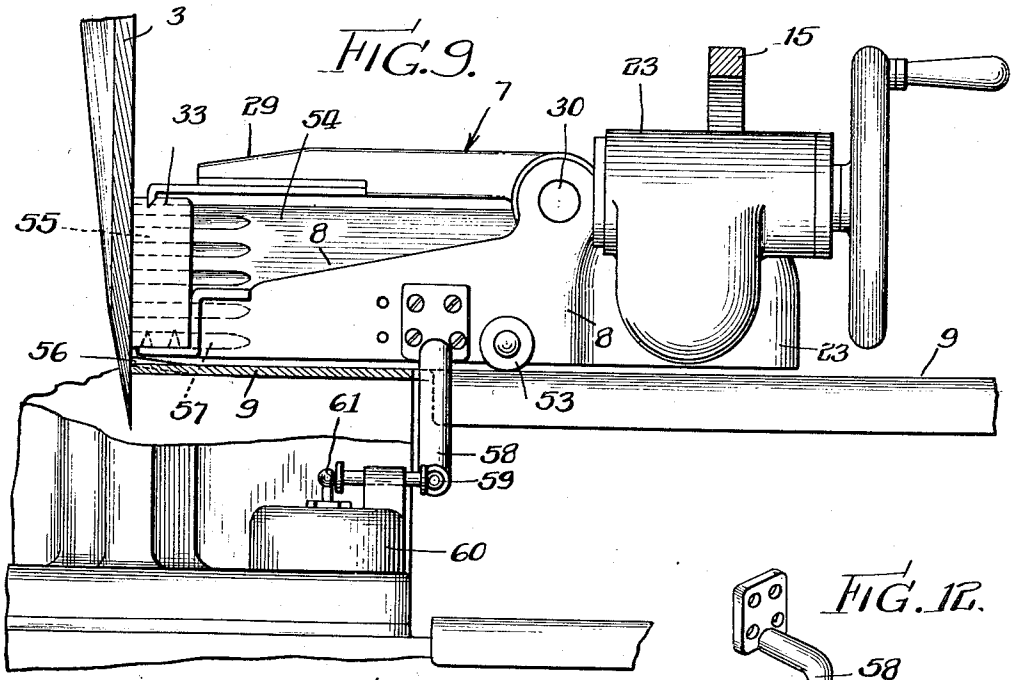


FIG. 12.

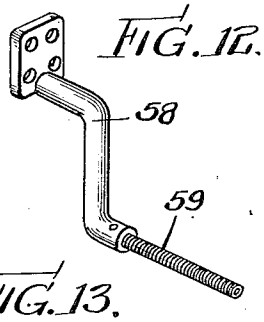


FIG. 10.

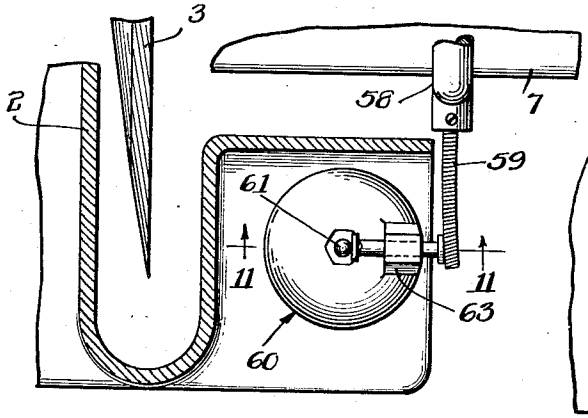


FIG. 13.

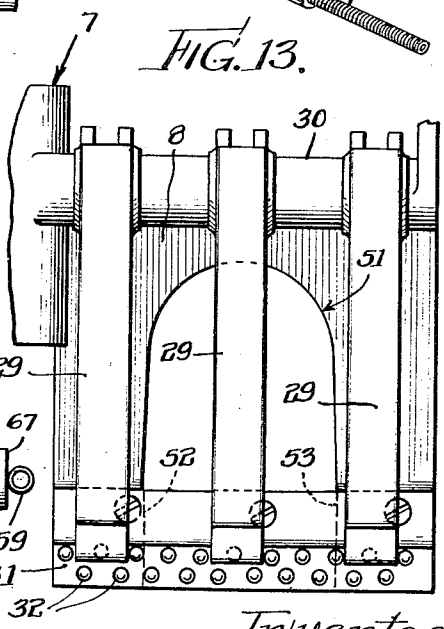
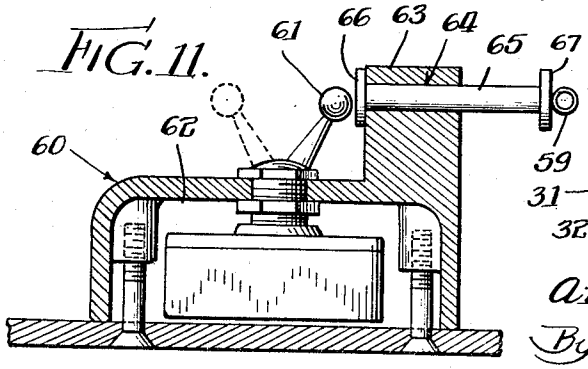


FIG. 11.



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UNITED STATES PATENT OFFICE

2,177,470

SLICING MACHINE

Arthur H. Ahrndt, La Porte, Ind., assignor to U. S. Slicing Machine Company, La Porte, Ind., a corporation of Indiana

Application February 23, 1937, Serial No. 126,980

4 Claims. (Cl. 146—217)

This invention relates to a slicing machine for dried beef and the like, and more particularly to substance clamping means therefor.

Heretofore it has been extremely difficult to clamp the meat such as dried beef with sufficient pressure to hold it firmly because of the irregular contour of the substance, or because of its varying height, and because of the hardness of the substance, particularly the end thereof. The short, tapering, narrowing end of hard dried beef usually has such a varying contour that a single clamping surface, which only clamps at the highest point of the substance, can not sufficiently hold the substance in proper alignment as it is being fed into the cutting plane of the slicing knife. Furthermore, dried beef is very hard and consequently it is very difficult to cut. In the production of what is commonly known as "chipped beef", the slices or cuts are extremely thin, and the material is fed to the knife with great rapidity. In view of the extreme hardness and the irregularities of shape of the substance, clamping devices heretofore used have been insufficient to hold the substance in proper rigid position and in proper alignment with the cutting plane to permit the cutting of even and thin slices.

An object of this invention is the provision of an improved clamping device to clamp dried beef or like substance in such a manner so as to keep the substance in proper alignment relative to the slicing knife to produce thin slices of substantially even thinness.

Another object of the invention is the provision of a new and novel clamping device which is capable of clamping an irregularly shaped piece of substance by applying a resilient pressure to the substance along its contour to securely hold it in proper alignment with respect to the slicing knife.

A further object of the invention is to provide a clamp for clamping the short end of dried beef or like substance by providing the clamp with a plurality of individual gripping fingers each of which are adapted to separately clamp with a firm, positive but resilient pressure regardless of irregularities of shape which the substance may have.

Other objects of the invention are the provision of a slidable clamp which has a plurality of individual spring-urged gripping fingers adapted to grip various parts of a piece of dried beef, or like substance, to securely grip the substance as it is fed into the plane of the slicing knife; the provision of new and improved means to automatically stop the slicing machine after the substance has been fed to a predetermined position; the provision of means co-operating with the slidable clamp for automatically stopping the machine at a predetermined position; and the provision of a flexible shut-off rod mounted on the slidable feed clamp to contact a slide rod on a switch mounted adjacent the knife for automatically stopping the machine when the slide clamp closely approaches the knife so as to prevent the knife from becoming fouled by the advancing clamp, the flexibility of the rod and slide rod causing easy and positive operation but preventing damage of the parts.

Numerous other objects and advantages will more fully appear during the course and progress of the following specification.

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

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

Fig. 2 is a rear view thereof.

Fig. 3 is a detail plan view of the improved clamping means.

Fig. 4 is a sectional view on the line 4—4 of Fig. 1.

Fig. 5 is a sectional view on the line 5—5 of Fig. 4 showing a spring clip holding device.

Fig. 6 is a sectional view on the line 6—6 of Fig. 3 showing the cams holding the clamping fingers in inoperative position.

Fig. 7 is a view similar to Fig. 6 showing the fingers in operative position.

Fig. 8 is a detail sectional view taken on the line 8—8 of Fig. 6.

Fig. 9 is a side view, partly in section, showing the automatic control.

Fig. 10 is a plan view, partly in section, of the detailed automatic shut-off apparatus.

Fig. 11 is a sectional view on the line 11—11 of Fig. 10.

Fig. 12 is a detail perspective view of the flexible shut-off rod and its supporting bracket.

Fig. 13 is a view of a modified form of clamping unit.

The slicing machine herein shown for the purpose of illustration is of the type which is commonly referred to as a "dried beef slicing machine", whereby a rotary knife having planetary motion is provided to slice thin slices from the dried beef substance.

This slicing machine comprises a base or frame 1 having a housing 2 in which there is mounted a rotary knife 3. The knife has planetary motion as well as rotary motion and is connected and operates similar to the knife shown in Pat-

ents Nos. 1,976,823–4–5–6, issued October 16, 1934, and assigned to the present assignee. The knife is rotated by a drive shaft 4 and the thicknesses of slices to be cut is determined by operating a hand wheel 5 which operates mechanism or apparatus arranged in the housing 6.

A substance clamp 7 is arranged for feeding the substance to the cutting plane of the knife and comprises a base portion 8 which is adapted to have slidable movement along the substance support 9 of the slicing machine. A longitudinal rod 10 forms a guide for the clamp 7, and a bracket 11 has fastened thereto a bearing portion or support 12 which carries slide bushing means 12*a* which engages the guide rod 10 to permit the clamp 7 to be slid axially or longitudinally along the rod 10. The rod 10, Fig. 2, has a reduced end 10*a* so as to prevent scraps from caking at that end, the reduced part 10*a* causing the scraps to drop off and not become pressed.

This bearing portion or support 12 is rigidly fastened to the clamp 7 by the fastening means 13 passing through the bracket 11 and the bearing support 12, Fig. 7. A second bearing member 14 is provided with ears 14*a* which extend about and receive the slide means or bushing 12*a*. The bushing 12*a* is pressed into the bearing 12 and projects into the ears 14*a* on the bearing 14. The ears 14*a* of the bearing 14 pivot on the outside of the bushing 12*a* and the inside of the bushing 12*a* rides on the rod 10, Figs. 3 and 4. In the present embodiment shown there is a separate bushing 12*a* in each ear 14*a* at the end of the bearing 14. This bushing means 12*a* provides a long slide bearing for the bearing 12. It also provides a suitable pivot for the bearing 14 and retains the proper relation between the members 12 and 14. If the bushing means 12*a* should wear out, it can be readily exchanged and replaced. The bearing 14 has fastened thereto an operating handle 15, and a nut 16 is rigidly connected to the bearing member 14 through the medium of the fastening means 17. The nut portion 16 is adapted to engage a longitudinal feed screw 18, Fig. 8, which is driven by an electric motor 19, Fig. 2.

A plurality of spring members 20, Figs. 4 and 8, are arranged between the bearing portions 12 and 14 and urge the bearing portion 14 to the left, Fig. 8, to tend to cause the nut 16 to remain in engagement with the feed screw 18. The bearing portion 14 is free to have limited rotation about the guide rod 10 as well as being free to translate along the guide rod 10. Therefore, when the feed nut 16 is in engagement with the feed screw 18, as shown in Fig. 8, the clamp will be forced to translate during rotation of the feed screw 18. When, however, it is desired to disconnect the feed nut 16 from the feed screw 18, the arm 15, having the operating knob or handle 21, is lowered to the full line position shown in Fig. 4, whereby the springs 20 will be compressed against the edge of the bearing 12, as clearly shown in Fig. 4. It is desirable that the feed nut be out of engagement with the feed screw 18 during the loading of the slicing machine as it has been found desirable to permit the continued rotation of the feed screw 18. Therefore, when the clamp is to be translated the handle will assume the position shown in dotted lines in Fig. 4, whereby the said nut will be in engagement with the feed screw.

To maintain the operating arm 15 in an inoperative position, that is, in a downward position as shown in full lines in Fig. 4, the arm 15 is engaged by a spring clip 22 which is fixed to a part of the clamp housing 23, Fig. 5. This spring clip has a leg portion 24 which is fastened to the housing 23 by screws or other fastening means 25. The upstanding portion 26 is bent inwardly to provide a locking ledge 27 under which the arm 15 engages. The upper portion 28 of the clip is inclined so as to permit the handle or arm 15 to be easily dropped in position. The clip 22 is made of spring metal so as to permit movement to unlock the arm 15. Because of the springiness of the clip the clip will always return to its full line position shown in Fig. 5. The dotted line position shown in this latter figure shows the position of the clip when it is moved manually for the purpose of releasing and unlocking the arm 15.

The clamp 7 is made in two parts, the lower portion 8 which is the base, and a plurality of spaced fingers 29 which are rotatably mounted on a transverse shaft 30 journalled in the housing 23 with which the bottom portion 8 may be made integral. The outer portion of the base 8, Figs. 6 and 7, includes a substance engaging portion 31 which carries teeth 32 for biting into the substance 33, Fig. 7. The gripping fingers or arms 29 each carry a substance engaging portion 34 which carries teeth 35 for biting into the substance 33, Fig. 7.

Each arm 29 is in the form of a bell crank, that is, each arm carries a tail piece 36 rigid with the bearing portion and the arm portion 29. Rods 37, Figs. 6 and 7, are journalled in bearing 38 in the base portion 8 and which bearing receive the ends of the rods 37. The other ends of the rods 37 are journalled in bearings 39 in the tail pieces 36. Springs 40 surround each rod 37 and urge the rods in the direction of the directional arrows shown in Figs. 6 and 7, the springs 40 being confined between an edge of the bearing 38 and a collar 41 fixed to each shaft 37. Each tail piece 36 carries a revolubly mounted roller 42 adapted to engage cams 43 fixed to a revolubly mounted shaft 44. Each cam 43 is adapted to have its cam surface 45, Fig. 6, brought into contact and engaging surface with a respective roller 42 to shift the tail piece 36 and consequently move the fingers 29 against the action of the springs 40.

The cam shaft 44 carries a gear 46 which meshes with a gear 47 on an operating shaft 48, Figs. 3 and 4. The shaft 48 is perpendicular to the shaft 44 and operates the shaft 44, the shaft 48 having an operating wheel 49 fastened thereto which carries an operating handle or crank 50. Therefore, when the handle 50 is operated to rotate the wheel 49 the shaft 48 will cause the operation of the gear 47. The gear 47 meshes with the gear 46 on the shaft 44 and therefore turns this cam shaft 44 and consequently the cams on this shaft. The springs 40 constantly urge the cam rollers 42 against the cam surfaces 45 and therefore the position of the fingers 29 is determined upon the relationship of the cam with respect to its cam roller 42. When the cams are in the position shown in Fig. 7 the springs 40 tend to push the fingers 29 downwardly into closed position. During rotative movement of the cam shaft 44 to bring the cams against the cam rollers 42 the fingers will be caused to raise and release the substance, as shown in Fig. 6. Therefore, when the substance 33 is arranged between the open jaws of the upper and lower substance engaging members 31 and 34 and the crank 49 is operated in a clockwise direction, Fig. 6, the

springs 40 will push the tail pieces 36 to the right, Fig. 6, and cause the fingers 29 to drop downwardly.

The springs 40 are relatively stiff and strong and rigid and, therefore, exert a great force which is transmitted to the fingers 29, which force is applied to the substance 33. If the substance is uneven, the individual fingers are free to attain different vertical positions, because if the cams were in the position shown in Fig. 7, the cams would have no more control over the tail pieces and, therefore, the full tension of the springs 40 would be urged against the tail pieces 36, tending to return the fingers to cause downward or closed position, however, the substance prevents the parts 34 and 32 from coming in contact. Therefore, regardless of the shape or contour of the piece of material, a strong spring pressure will be applied to each of the fingers 29. To release the fingers 29 from their grip upon the substance 33 the shaft is rotated in a counter-clockwise direction, Fig. 7, again causing the cams 43 to swing the tail pieces 36 on their pivots in a clockwise direction against the action of the springs 40.

In order to permit the small end of a piece of substance, such as the knuckle end of the dried beef, to extend farther back onto the clamp, the base portion 8 of the clamp may be cut away as indicated at 51, Fig. 13. Furthermore, to permit this arrangement the central fingers 29 may be shifted to one side or the other if desired. Also, the plate may be cut away, if desired, at the points indicated by the dotted lines and designated by the numeral 52, Fig. 13.

The outer end of the clamping apparatus may be carried by one or more rollers 53, Figs. 8 and 9, which ride upon the machine support 9, and to facilitate the holding of the substance in position an apron portion 54, Fig. 4, may be provided. This apron portion 54 is an upwardly extending portion bent from the substance surface 9, and acts as a guide for the substance to prevent it from shifting. The inner surface of the apron portion 54, at a point immediately adjacent the knife and extending rearwardly therefrom, may be provided with longitudinally extending ribs 55, Figs. 1 and 9. Also, the food table or support 9 may be provided with upwardly extending ribs 56 immediately adjacent the cutting edge of the machine. These ribs 56 commence at a point designated generally by the numeral 57, Fig. 9, and extend upwardly a predetermined distance. The ribs are generally parallel and are spaced a predetermined distance apart. The ribs 56 are preferably formed on a separate plate which is fastened to the top of the trough to provide a slightly raised surface over the top of the trough surface so as to cause the material to rise slightly when it runs against these corrugations. The general direction of the draw of the planetary knife motion herein described is in line with the horizontal part of the feeding trough and, therefore, a substance such as soft bacon would tend to be drawn into the corner of the feeding trough, tending to push the material up along the apron side 54 and 55, Fig. 4. Therefore, the projecting ribs on the side wall will prevent the material from crawling up along the apron 54, Fig. 4.

It is preferable that the feed screw 18 be rotated continuously for repeated operation of the machine and, therefore, it is advantageous that when the clamping device arrives at a position immediately close to the knife that the entire apparatus be shut off to prevent any part of the clamp from coming in contact with the knife and fouling or damaging the knife or any other parts. Therefore, automatic means are provided to shut off the motor 19. This automatic means may comprise an arm 58, Figs. 9 and 12, which is fixed to a part of the clamp, as clearly shown in Fig. 9. This arm 58 has a flexible operating finger 59 which may be a coiled spring of relatively rigid formation. The finger 59 is adapted to cause the operation of a switch 60 which is located at a forward position a proper distance from the cutting edge of the knife. The switch 60 is of the snap switch type and has a switch operating finger or lever 61, Figs. 10 and 11, extending through the switch housing 62. The housing 62 may be provided with an upstanding lug 63 having a bore 64 provided therein, Fig. 11. A slidable bar or rod 65 is freely slidable in the bore 64 and has end portions 66 and 67. The flexible finger 59, as it moves toward the cutting plane of the knife, is positioned with respect to the stem 65 to engage the stem 65, Fig. 11, and move the stem to the left, Fig. 11, whereby the end 66 will engage the switch lever 61 to operate the switch and consequently shut off the motor and prevent further operation of the machine. It has been found that by having the flexible finger 59 operate the finger 61 by means of the slidable rod 65, no direct shock will be placed on the switch lever 61 as the ball at the end of the switch lever engages the surface 66. Furthermore, during the translation of the clamp the flexible finger 59 would bend or flex somewhat as it is pushing the switch lever 61 to the left, Fig. 11, and then snap the switch over with a snap or whip movement. This snapping or whipping action of the finger may cause the switch lever 61 or its cooperating head to become dislodged or broken. However, by the use of the slide rod 65 these difficulties are overcome with the result that the switch works positively, easily and definitely without danger of hurting or breaking the switch or any of its component parts. The action of the end 66 of the slide member 65 against the ball 61 is such that the ball is always thrust in a downward direction on the stem portion of the switch lever because the ball always travels in an upward arc and, therefore, the ball 61 can never be forced off from the switch lever handle.

The invention provides a cutting machine for cutting food substances, including dried beef, and includes a novel substance clamping device which firmly holds the material in proper feeding position. The fingers of the clamp, while they are collectively operated, are free to have independent clamping movement. The clamp is translated by a screw member and is free to be disconnected from this screw member. The guide for the material is provided with ribs on its bottom and a side face to assist in holding the substance in proper position relative to the cutting plane of the knife and to assist in preventing shifting of the substance during the cutting operation. The clamp is also provided with resilient means for operating a switch, and the switch is provided with new and novel means to permit operation thereof by the translation of the clamp without danger of injuring the switch.

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.

What I claim is new and desire to secure by Letters Patent of the United States is:

1. A clamping member comprising a plurality of fingers yieldably mounted for self-adjustment to the irregular surface of material to be clamped thereby, a shaft rotatably mounted in a part of said member, cams carried by the shaft and adapted to raise all said fingers simultaneously when the shaft is operated, a gear on the shaft, a second gear meshing with the first gear, a shaft for operating the second gear, and manually operated means for operating the second shaft.

2. A clamping member comprising a plurality of pivotally mounted vertically movable substance engaging members having gripping teeth, said members being yieldably mounted for self-adjustment to the irregular surface of the material to be clamped thereby, and means to limit the downward movement of the members throughout various angles whereby the spring pressure and amount of penetration of the teeth into the material may be varied.

3. A clamping member comprising a plurality of vertically movable substance engaging fingers, spring means yieldably urging the fingers in a downward substance engaging direction, and means operating against the urging action of the spring means to hold the fingers in adjusted position throughout various angles whereby the tension on the material can be adjusted and the depth of penetration of the teeth into the material can be adjusted.

4. A clamping member comprising a shaft, a plurality of fingers yieldably and rotatably mounted on said shaft for self adjustment to the irregular surface of material to be clamped thereby, a second shaft rotatably mounted in a part of said member, a plurality of cams carried by the second shaft and adapted to raise all said fingers simultaneously when the shaft is operated, and means for operating said shaft.

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