April 4, 1939. S. J. BELL 2,153,407

VEGETABLE DICING, SLICING, AND SHREDDING MACHINE

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Fig. 1.

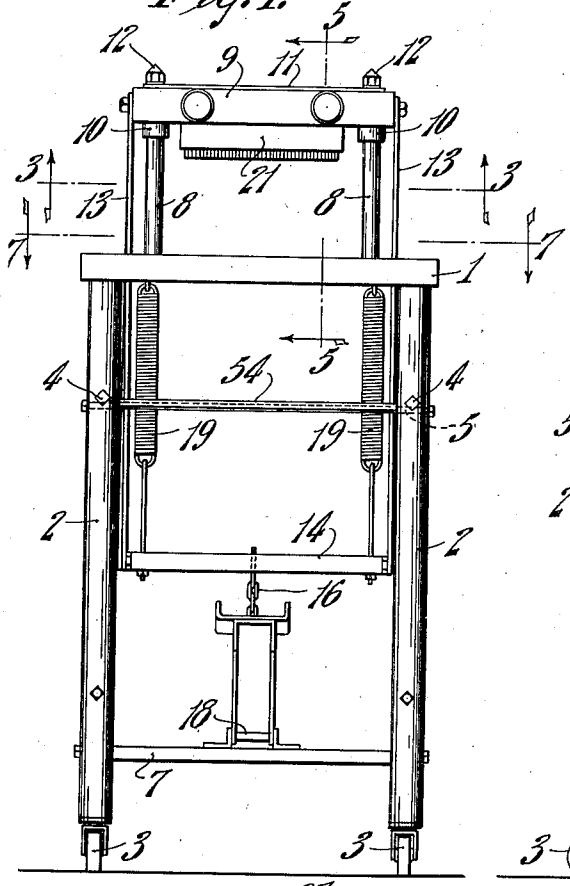
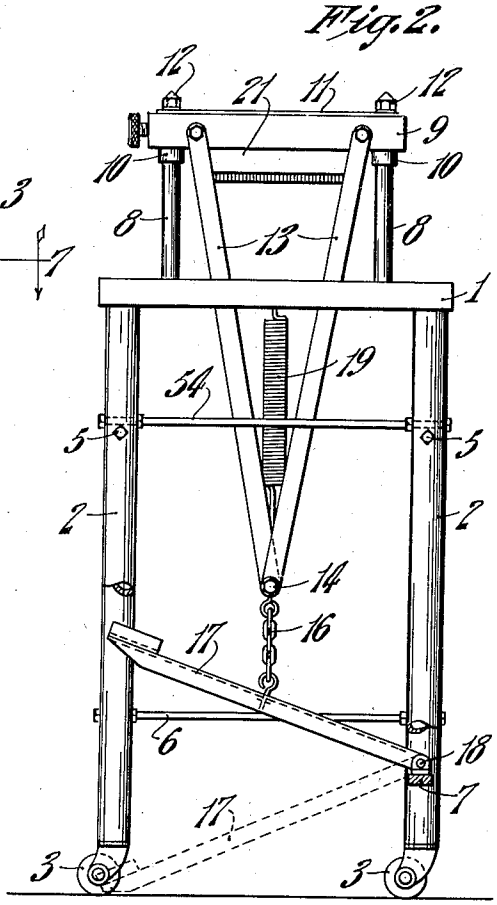


Fig. 2.



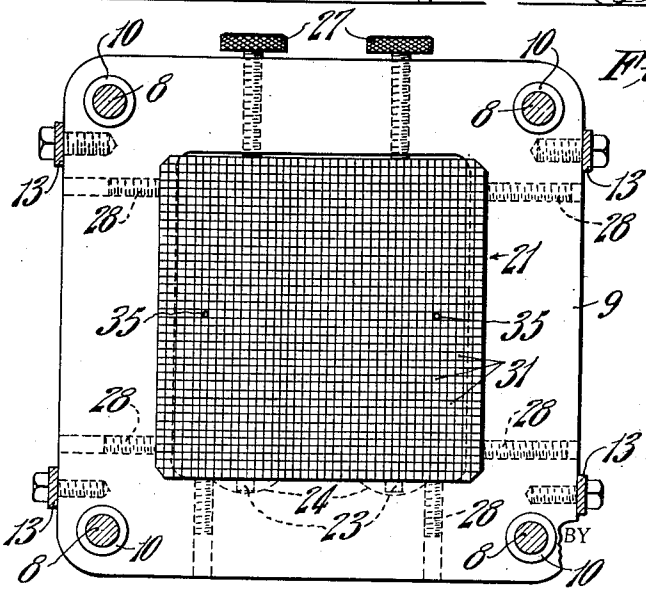
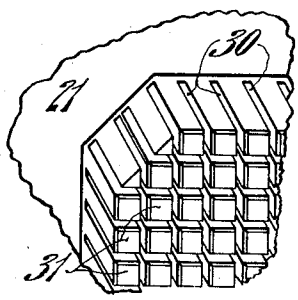


Fig. 3.

Fig. 4.



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VEGETABLE DICING, SLICING, AND SHREDDING MACHINE

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Fig. 5.

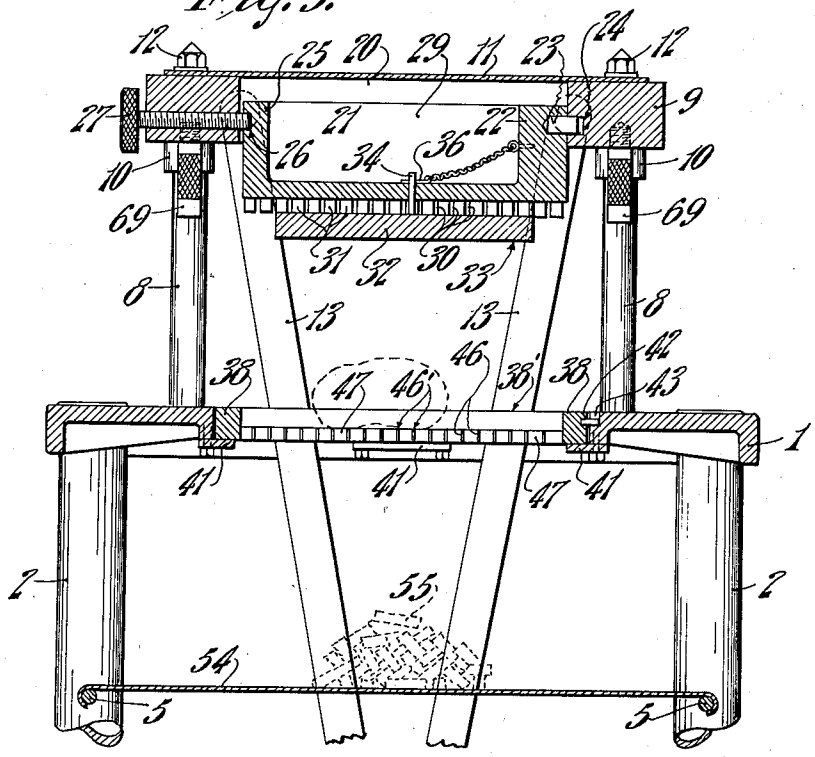
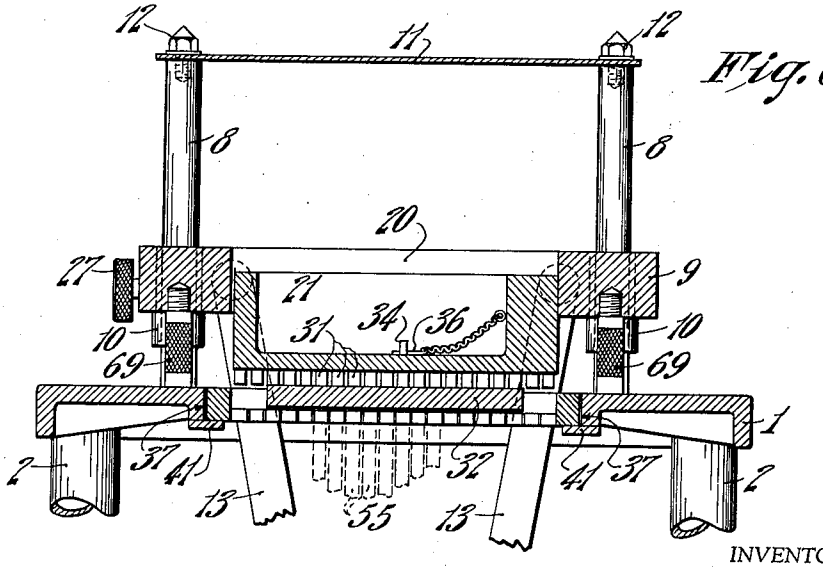


Fig. 6.



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VEGETABLE DICING, SLICING, AND SHREDDING MACHINE

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Fig. 7.

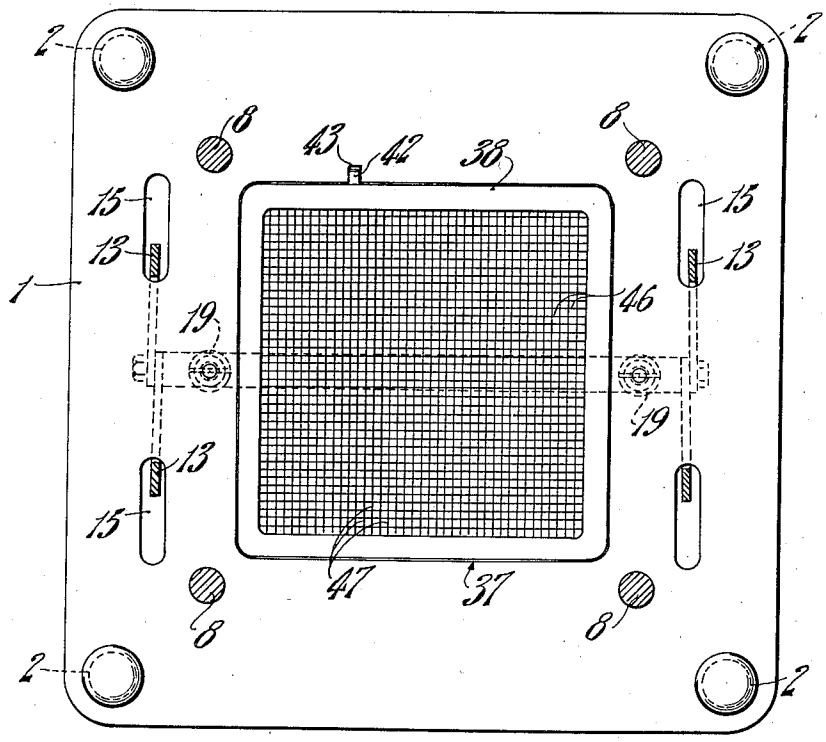


Fig. 8.

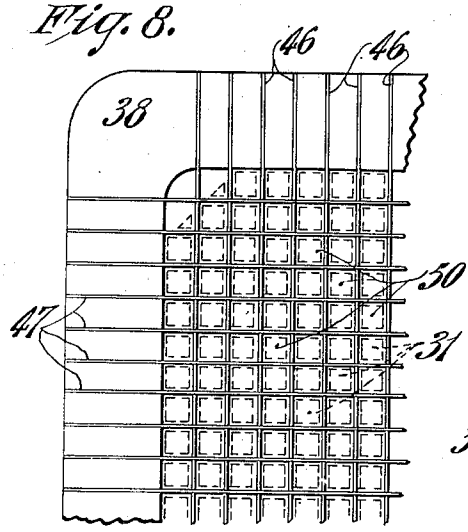
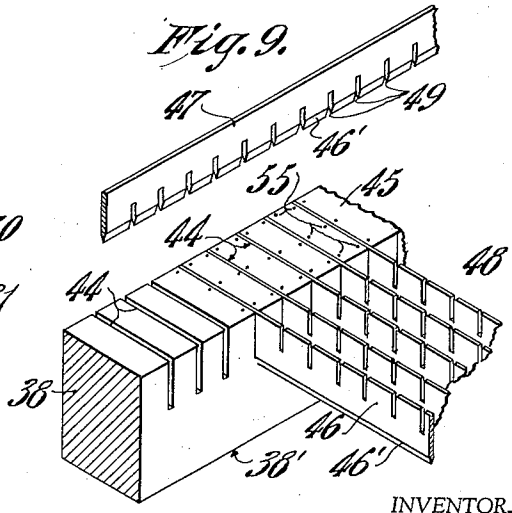


Fig. 9.



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VEGETABLE DICING, SLICING, AND SHREDDING MACHINE

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Fig. 10.

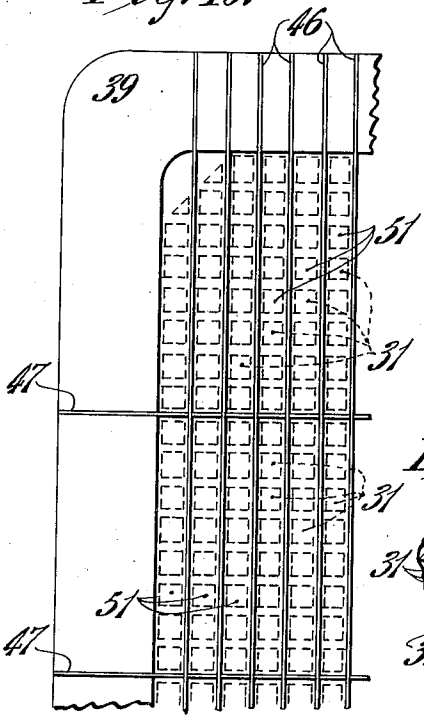


Fig. 11.

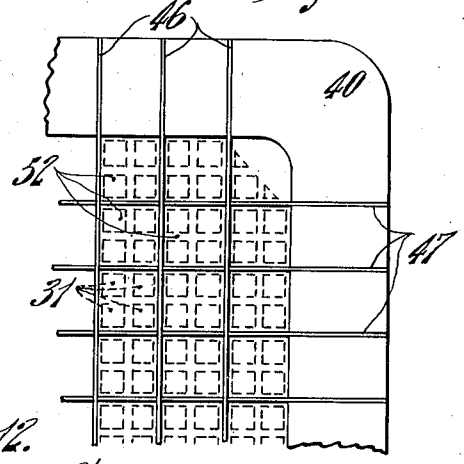


Fig. 12.

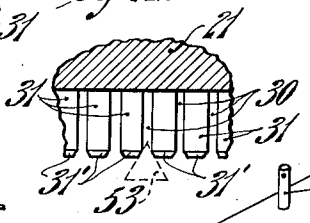


Fig. 13.

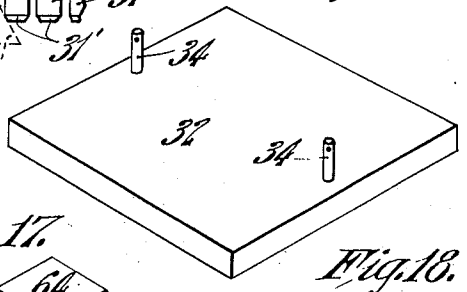


Fig. 14.

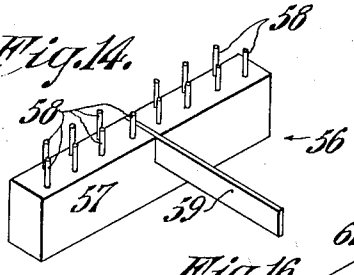


Fig. 17.

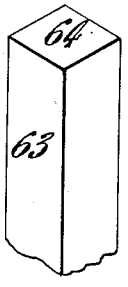


Fig. 18.

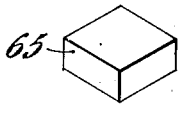


Fig. 16.

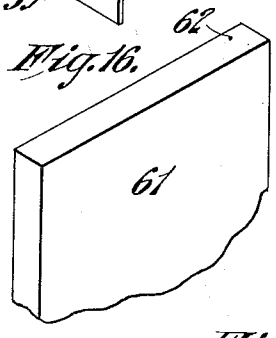


Fig. 15.

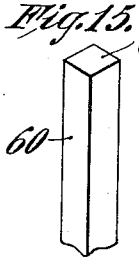


Fig. 19.

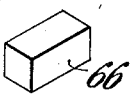
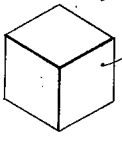


Fig. 20.



Fig. 21.



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Patented Apr. 4, 1939

2,153,407

UNITED STATES PATENT OFFICE

2,153,407

VEGETABLE DICING, SLICING, AND SHREDDING MACHINE

Samuel J. Bell, Springfield, Mass., assignor to Arthur S. Hall, Springfield, Mass.

Application October 20, 1936, Serial No. 106,604

4 Claims. (Cl. 146—169)

This invention relates to improvements in vegetable dicing, slicing, and shredding machines.

An object of this invention is to provide, in a vegetable dicing, slicing, and shredding machine, a removable die or punch block and a plurality of removable and interchangeable knife frames.

A further object of this invention is to provide, in a machine of the class described, interchangeable knife frames, each of which is equipped with a plurality of spaced, intersecting knife blades arranged in the same plane and in a distinctive pattern.

Another object of the invention is to provide, in such a machine, a die or punch block adjustably supported in a movable frame, a knife frame freely supported in a stationary table or base, and means for moving the die block into engagement with the knives in the knife frame.

A still further object of this invention is to provide, in a vegetable dicing, slicing, and shredding machine, a knife frame, a die block movably supported above the knife frame, means for moving the die block downwardly toward the knife frame, a secondary block removably secured on the die block and having a smooth under surface, and stop means for limiting the downward movement of the die block, whereby the secondary block may be brought into close proximity to the knife blades but will be prevented by the stop means from actual engagement with the knife blades.

These, and other objects and advantages of this invention, will be more completely described and disclosed in the following specification, the accompanying drawings, and the appended claims.

Broadly, this invention comprises a table or base member provided with a well, leg members supporting the table, a plurality of knife frames having knife blades therein, the knife blades in each frame being arranged in a distinctive pattern relative to the other frames, means for freely supporting any one of the frames in the well in the table, a die frame movably supported above the table for vertical movement relative to the table, means for moving the die frame, a die block removably supported and adjustable in the die frame, the die block being provided with a plurality of punches arranged to cooperate with any of the knife blade patterns in the interchangeable knife frames, a secondary die block having a smooth under surface removably secured on the under surface of the punches, and stop means for regulating the movement of the die frame and die blocks.

A preferred embodiment of this invention is illustrated in the accompanying drawings, in which—

Fig. 1 is a front elevational view of the machine,

Fig. 2 is a side view,

Fig. 3 is an underside plan of the die frame and block, taken on the line 3—3 of Fig. 1,

Fig. 4 is a perspective view of a part of the punch portion of the die block,

Fig. 5 is a cross sectional view, taken on the line 5—5 of Fig. 1,

Fig. 6 is a view similar to Fig. 5, but indicating a different arrangement of parts,

Fig. 7 is a plan view of the table with one of the knife frames in place taken on the line 7—7 of Fig. 1,

Fig. 8 is a partial underside view of a knife frame,

Fig. 9 is a perspective view illustrating the construction of the knife frames,

Fig. 10 is a view similar to Fig. 8, illustrating a different arrangement of the knife blades,

Fig. 11 is a view similar to Fig. 8 and Fig. 10, illustrating another arrangement of knife blades,

Fig. 12 is a partial sectional view of the die block,

Fig. 13 is a perspective view of the secondary die block,

Fig. 14 is a perspective view of a cleaning rake for cleaning the slots between the punches,

Figs. 15–21 inclusive are diagrammatic views illustrating possible shapes which may be cut on this machine.

Referring now to the drawings in detail, in which like numerals refer to like parts throughout:

A table or base member 1 is supported on leg members 2, which may be provided with castors 3 to facilitate movement of the machine. The leg members 2 are braced by means of tie rods 4, 5, and 6, and a spacer bar 7. Posts 8 secured in the table 1 slidably support a die frame 9, which is provided with bushings 10 slidably engaged on the posts 8. A cap plate 11 secured on the top of the posts 8 by means of cap screws 12, serves as a spacer for the top of the posts 8, and also as a cover for the die frame 9 in its normal raised position. Link members 13 secured on either side of the die frame 9 at one end, and at the opposite end to a transverse shaft 14, move through slots 15 formed in the table 1. A shaft 14 is connected by means of a chain 16 to a foot pedal 17 which is pivotally supported at 18 on the bar 7. Tension springs 19, secured at one end on the shaft 14, and at the opposite end on

the underside of the table 1, serve to normally hold the die frame 9 in its raised position as indicated in Figs. 1 and 2. Downward movement of the pedal 17 will, through cooperation of the pedal 17, chain 16, shaft 14, and link members 13, move the die frame 9 downwardly toward the table 1. The die frame 9 is formed with a centrally disposed opening 20, in which a die block 21 is removably and adjustably supported.

The die block 21 is provided at one side 22 with pins or studs 23 which are engaged in sockets 24 formed in the frame 9. The opposite side 25 of the die block 21 is provided with slots 26 in which may be engaged clamping screws 27. Thus, the die block 21 is supported in the die frame 9 by cooperation of the studs 23, sockets 24, screws 27, and slots 26. Adjusting screws 28 in the die frame 9 provide means for adjustably locating the die block 21 in the opening 20. The die block 21 is formed with a well 29, which, in cooperation with the cover 11 provides a convenient compartment for the storage of tools or other accessories. The bottom surface of the die block 21 is divided by intersecting slots 30 into a plurality of punches 31 which are uniform in size and shape.

A secondary block 32, having a smooth under surface 33 is removably supported on the underside of the punches 31 by means of studs 34 which project upwardly through openings 31 in the die block 21, and are engaged by pins 36 secured in the well 29. Removal of the pins 36 from the studs 34 will permit the block 32 to be removed from the die block 21.

The table 1 is provided with a central opening 37, in which any one of a plurality of interchangeable knife frames 38, 39, and 40 may be freely supported, resting on shelf plates 41 secured on the underside of the table 1. The frames 38, 39, and 40 are provided with an outwardly extending stud 42 which is engaged in a slot 43 formed in the table 1. Stud 42, cooperating with the slot 43 serves to locate the frame 38, 39, or 40 in proper relation to the die block 21. The construction of the knife frames 38, 39, and 40 is the same except for the spacing of the knife blades. The knife frames are provided with slots 44 extending upwardly from the under surface 45, and knife blades 46 and 47 are pressed into the slots 44. As indicated in Fig. 9, the blades 46 are slotted on the lower half at 48, and the blades 47 are slotted on the upper half at 49, so that in assembling the blades 46 and 47 may be assembled in intersecting relation with all of the blades in the same plane. After the knife blades are assembled in the frame, the assembled frame is dipped in a solder bath which provides a solid unitary structure with the blades permanently fixed to each other and to the frame. Figs. 8, 10, and 11 illustrate the adaptability of this construction to variable patterns and shapes. In Fig. 8, the blades 46 and 47 are arranged to provide small square openings 50, each of which is adapted to receive one of the punches 31 as indicated by dotted lines. In Fig. 10, the knife blades 46 and 47 are arranged to provide longitudinal slots 51, each of which is of a proper size to receive a plurality of the punches 31 in single line. In Fig. 11, the blades 46 and 47 are arranged to provide square openings 52 which are of a size and shape to receive four of the punches 31. It will be readily understood by those skilled in the art, from the examples illustrated, that many varieties and shapes of openings in the knife frames 38, 39, and 40 may be provided by spacing the knife blades 46 and 47 in multiples of the unit punch 31 in either direction; and that the die block 21 will cooperate with any such arrangement. I have therefore provided a construction in which a single die block may be used in cooperation with interchangeable knife frames, providing a variety of shapes and sizes of openings. The slots 30 between the punches 31 are sufficiently wide to allow for a slight variation in the position of the knife blades 46 and 47, thereby permitting for a free support of the knife frame in the opening 37 of the table 1. This adaptability permits the knife frames 38, 39, or 40 to be dropped into place and lifted out without manipulation of any clamping screws, bolts, or fastening means. The ends 31' of the punches 31 are slightly beveled with a three-cornered file 53 to provide a lead for entering the spaces between the knife blades.

An important feature of this invention is the construction of the knife frames. It is necessary to the efficient operation of the machine that the knife blades be assembled in the frames straight and true, without buckling or warping, and that they remain in this condition after assembly and during the working life of the knife frame. To accomplish this object, I make the knife frame of bronze, which expands much more slowly under heat than steel. The blades are made of hardened steel. The blades 46 and 47 are assembled in the slots 44 in the frame 38, and lightly held in place by prickpunching along the side of the slots 44, as indicated at 55 in Fig. 9. When the assembled frame is dipped in a hot solder bath, the blades expand much more rapidly than the frame, resulting in an outward "crawl" of the ends of the blades in the slots 44. In this expanded condition, the blades are fixed in the frames by setting of the solder, and when the blades cool, a tensional stress is set up within the blades which keeps them taut and straight.

As indicated in Figs. 5, 6 and 9, the plane of the cutting edges 48' of the blades 46 and 47 is recessed below the top or upper surface 38' of the knife frame. This construction provides a recess or well for confining the materials placed on the knife blades. It also provides protection for the cutting edges of the knife blades, and prevents accidental marring or dulling of the blades by an object laid or tossed onto the table 1. This construction also provides protection to an operator by preventing, to a large extent, accidental cutting of the fingers, or hands by contact with the cutting edges of the blades, as it is difficult and requires an unnatural movement to drop the fingers or hands into the space between the top of the table 1 and the plane of the cutting edges of the knife blades during the operation of pushing or placing material on the knife blades.

The plate 54, supported on the tie rods 5, provides a support for materials 55 which may be pushed through the knives 46 and 47 by the block 32 or punches 31.

The grooves 30, between the punches 31, may be cleaned with the use of a rake 56, which comprises a bar 57 provided with a plurality of pins or pegs 58, spaced to register with the grooves 30. A strip 59, secured on the bar 57, acts as a guide to maintain the pins 58 in proper alignment with the grooves 30.

Figs. 15 to 21 inclusive illustrate, in a diagrammatic way, typical shapes which may be formed on this machine. Fig. 15 illustrates a unit of material 60, as it would appear after being pushed through the knives in the frame 38. This unit 60 has a square end 60' derived from an opening 50.

By forcing material through the knives illustrated in Fig. 10, units 61, having the approximate shape shown in Fig. 16, are formed, the end 62 of the unit 61 having a shape corresponding to an opening 51 in the frame 39. The figure, or shape, illustrated in Fig. 17, is the product of the construction illustrated in Fig. 11. A unit 63 is formed having an end 64 shaped by the openings 52, which is four times the area of the end 60' of the piece 60. Fig. 18 illustrates a unit 65 which is the product of two operations; first, forming units 61 by using the frame 39, then cutting the units 61 into units 65 by substituting the frame 40 for the frame 39, and laying the units 61 flat on the knives in the frame 40. This unit 65 has a thickness equal to the thickness of the unit 61, and an end equal to the end 64 of the unit 63. Fig. 19 illustrates a unit 66 which is the product of two operations involving the frame 40 first and the frame 38 second. The unit 63, after being formed from the frame 40, is placed on the frame 38, resulting in the unit 66 which has a length equal to a side of an opening 52 in the frame 40 and an end equal in size to an opening 50 in the frame 38. Fig. 20 illustrates a unit developed from the unit 61, laid on the knives in the frame 38. This unit 67 is a cube having sides equal to an opening 50 in the frame 38. Fig. 21 illustrates a unit 68 which is the result of a double operation on the frame 40. Units 63 are first formed on the frame 40, then, these units are again laid flat on the frame 40 and cut into the cubes shown in Fig. 21. From these examples, it will be readily apparent to those skilled in the art that a great many separate shapes and sizes of units may be produced on this machine with the use of a very few interchangeable knife frames. Whereas, I have illustrated in Figs. 13 to 21 inclusive the products of this machine as being solid shapes, it must be understood that other results may be the natural product of operation, due to the nature of the material operated upon. For instance, in the case of laminated, or leafy vegetables, such as onions or cabbage, the units forced through the knives will fall apart into other shapes, due to their laminated structure. Advantage of this natural tendency may be taken by, for example, either shredding or dicing an onion on the same set of knives, depending upon the position in which the article is placed on the knives. If the onion is placed on the knives with its natural axis in a vertical position, the onion will be shredded. If halved on its natural axis and placed on the knives with its halved surfaces on the knives, the onion will be diced, as the units forced through the knives will fall apart, due to their laminated structure.

For continuous operation, I prefer to use the secondary block 32, as each downward movement of the block 32 will force material through the knives, without bringing any part of the machine into contact with, or close proximity to the knives. With the block 32 in operating position, stop members 69, removably secured on the die frame 9, engage the top of the table 1 to prevent the block 32 from touching the knives 46 and 47, as illustrated in Fig. 6. The use of the block 32 also prevents contact of the punches 31 with the material being forced through the knives, and thereby keeps the die block 21 and punches 31 clean, and prevents clogging of the grooves 30. This use of a plain surfaced block, such as the block 32, adds materially to the production time of the machine, as no time is required for cleaning the block 21. When a batch of material has been run through the machine, the knives may be cleared by removing the block 32 and stops 69; then one operation of the pedal 17 will force the punches 31 through the openings between the knives, thus clearing the knives of material remaining in these openings. The bushings 10 act in the same manner as the stops 69 to prevent contact of the cutting edges of the knives with the bottom of the grooves 30, by engagement of the bushings 10 on the top of the table 1.

Whereas, I have described this machine and its operation as being applied to vegetables, it is equally adaptable in the processing of fruits and other materials. Various stoneless fruits, and also fruits which have had the stones removed, have been prepared on this machine for fruit cocktails, shortcakes, and other purposes. The machine is also efficient in the preparation of butter pats in the shape illustrated in Fig. 18. An advantage of the use of this machine in the preparation of butter pats is the uniform size and bulk of the pat, providing an equal distribution to those served, and an accurate predetermination of the number served—from a pound, or other unit of butter.

Thus, I have provided, in this invention, a vegetable slicing, dicing, and shredding machine incorporating an adjustable and removable die block having a plurality of punches, interchangeable knife frames affording a variety of patterns and cooperating with the single die block, and a secondary die block having a smooth surface and capable of cooperation with the first block and with the interchangeable knife frames.

What I claim is:

1. In a vegetable slicing, dicing, and shredding machine, a table provided with a rectangular opening, shelf members secured on the under side of said table and projecting into said opening, a knife frame freely supported in said opening and slidably supported on said shelf members to permit limited movement during operation of the machine, legs supporting said table, a platform supported on said legs below said table for receiving material forced through said knife frames, posts vertically supported on said table, a die frame, bushings in said die frame and projecting below said die frame, said bushings being slidably engaged on said posts, means for moving said die frame downwardly toward said table, means for normally supporting said die frame in a raised position above said table, a spacer plate secured on the top of said posts, a die block removably and adjustably supported in said die frame, a plurality of punch elements projecting downwardly on said die block, said knife frame being provided with a plurality of spaced, intersecting knife blades permanently fixed therein and having their cutting edges in one plane, the plane of said cutting edges being positioned below the upper surface of said table, said knife blades being spaced to provide openings which will register with one or more of said punch elements, said bushings serving as stops to prevent engagement of said die frame with the cutting edges of said knives.

2. In a machine of the character described, a movable die frame, said die frame being provided with an opening, a die block, said die frame being formed with a slot communicating with said opening, a stud in said die block removably engaged in said slot, a clamping screw in said die frame in opposed relation to said slot, said die block being formed with a slot in which

said clamping screw is removably engaged, whereby said die block is removably supported in the opening in said die frame by cooperation of the stud and slot in the die block with the slot and clamping screw in the die frame respectively.

3. In a machine of the character described, a table provided with an opening, a cutting frame provided with a plurality of spaced and intersecting cutting blades having their cutting edges in the same plane, means for freely and slidably supporting said cutting frame in said opening with the plane of the cutting edges of said blades below the top surface of the table and with the sides of said cutting frame spaced from the sides of said opening, a die frame movably supported above said table, means for moving said frame, a die block removably and adjustably supported in said die frame and provided with a plurality of punches spaced to register with the openings between the blades of said cutting frame, stop means on said die frame whereby said die block is stopped short of engagement with the cutting edges of said blades when the punches have passed through the cutting frame, a second die block having a smooth under surface, means for removably supporting said second block against the working faces of said punches, and stop means removably secured on said die frame and cooperating with said table for stopping said second die block short of engagement with the cutting edges of said blades.

4. In a vegetable cutting machine, a table provided with an opening, a cutting frame having a plurality of spaced and intersecting knives fixedly secured therein with their cutting edges in the same plane, said cutting frame being loosely and slidably supported in the opening in the table with the cutting edges of the knives recessed below the top of the table, a frame member slidably supported above the opening in the table for vertical movement relative thereto, a block formed with spaced and intersecting slots in its under surface registering with the knives in said cutting frame, said block being removably and adjustably supported in said frame member, said grooves forming a plurality of punch elements on said block, the edges of said punches being chamfered, said grooves being relatively wider than the thickness of the knives whereby the chamfered edges of the punches and the grooves cooperate to compensate for movement of the cutting frame in the opening in the table.

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