Nov. 15, 1966 O. A. CLEMENS ETAL 3,285,161

METHOD AND APPARATUS FOR PRESSING AND SLICING

Original Filed June 17, 1963 6 Sheets-Sheet 1

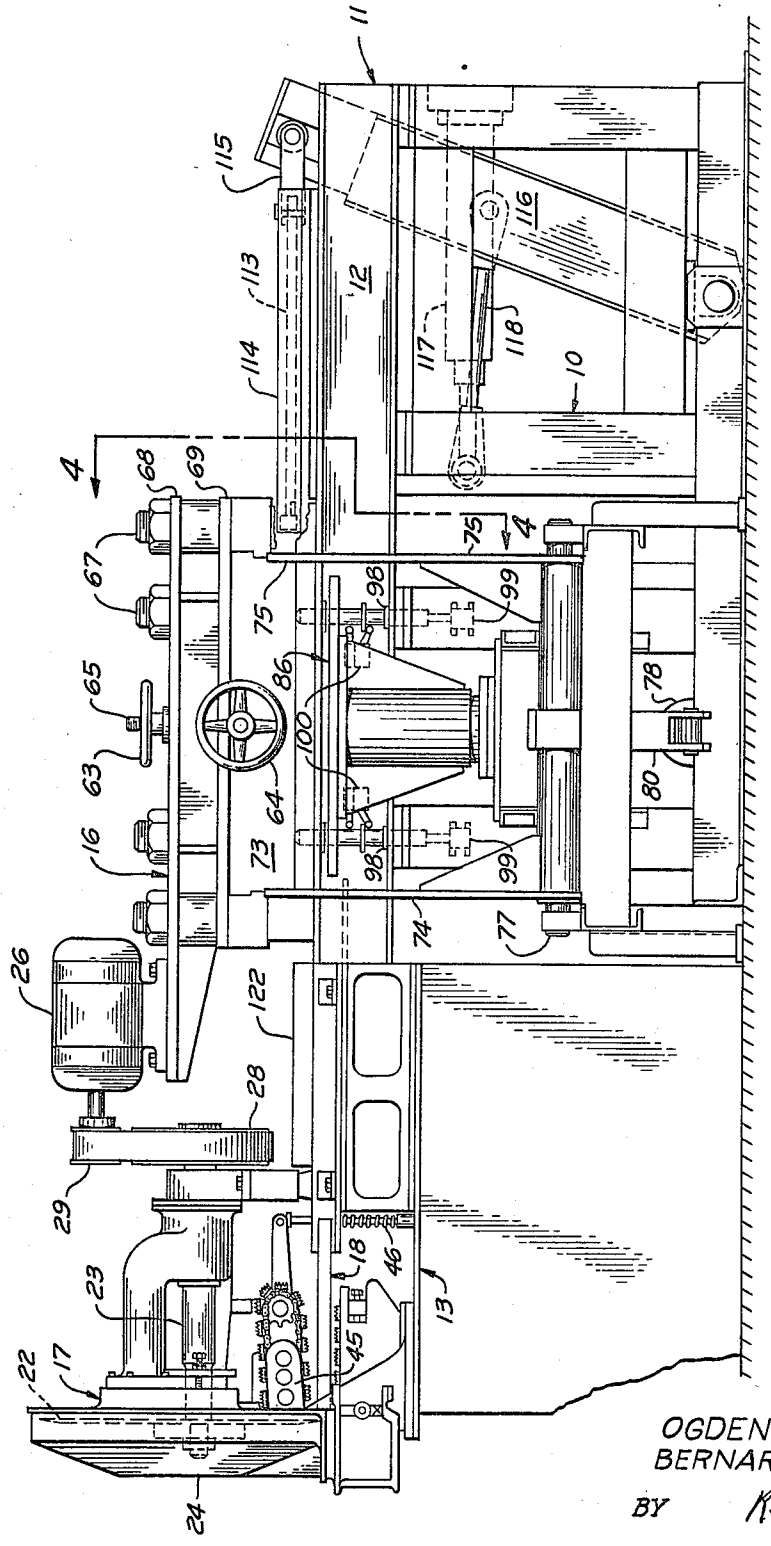


Fig - 1

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METHOD AND APPARATUS FOR PRESSING AND SLICING

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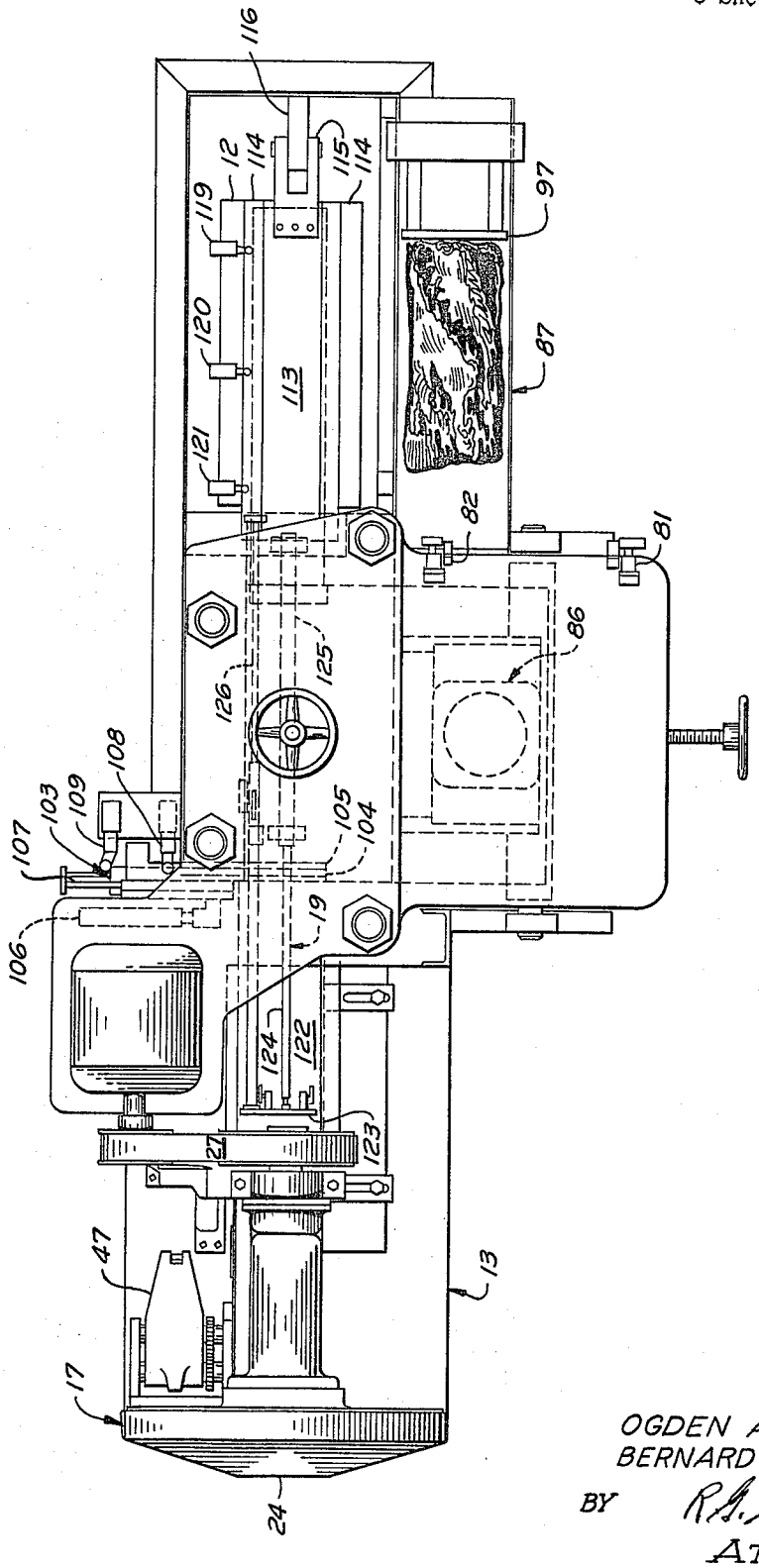


Fig. 2

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METHOD AND APPARATUS FOR PRESSING AND SLICING

Original Filed June 17, 1963 6 Sheets-Sheet 3

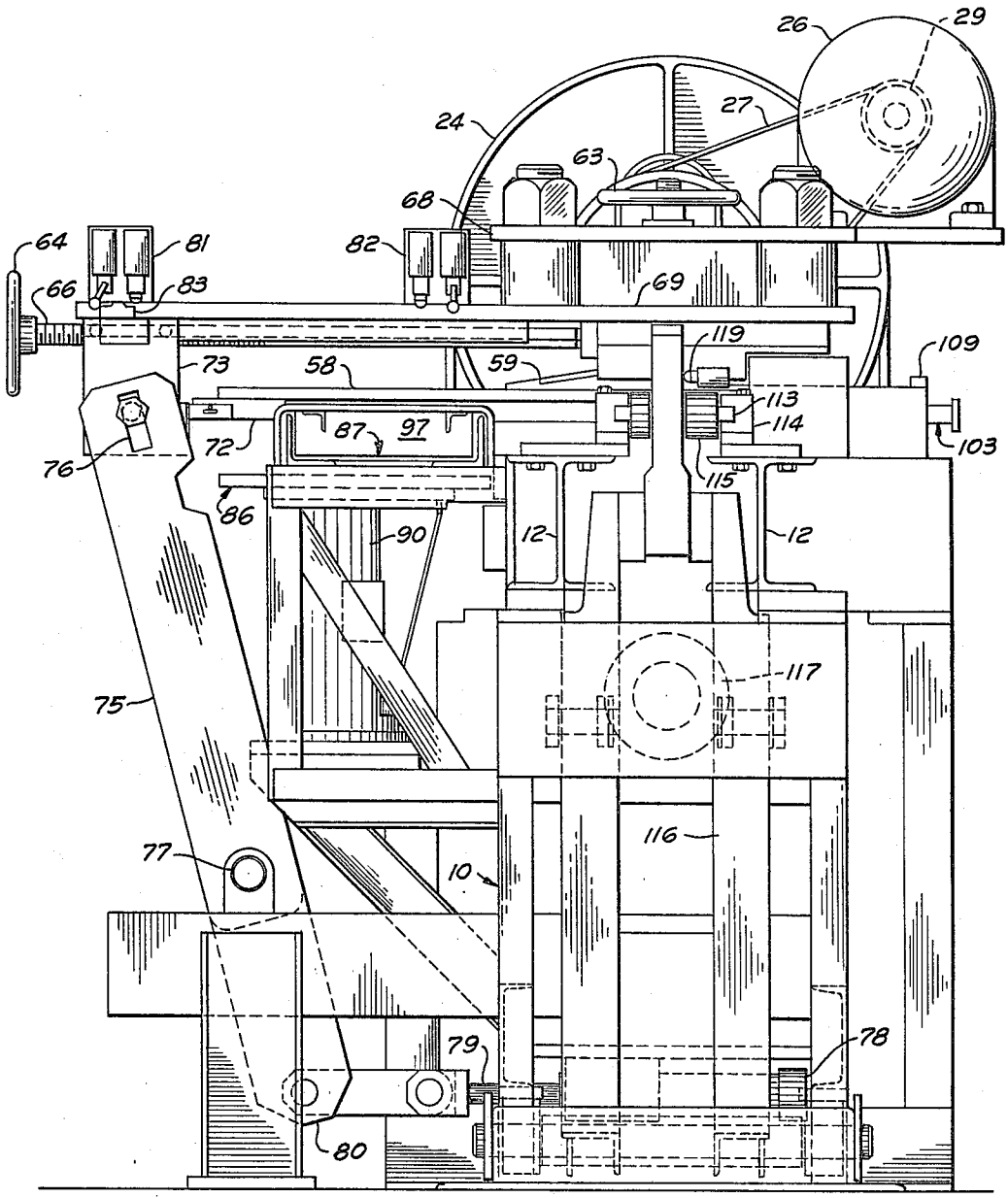


Fig. 3

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METHOD AND APPARATUS FOR PRESSING AND SLICING

Original Filed June 17, 1963 6 Sheets-Sheet 4

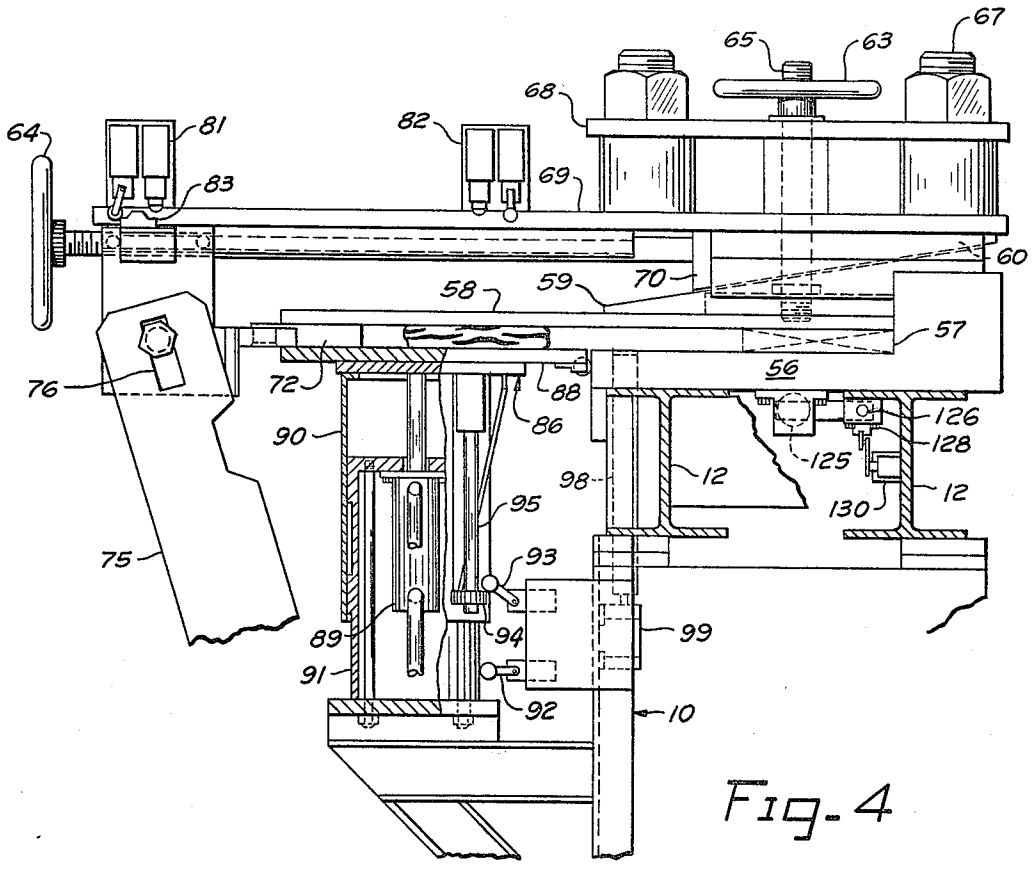


Fig. 4

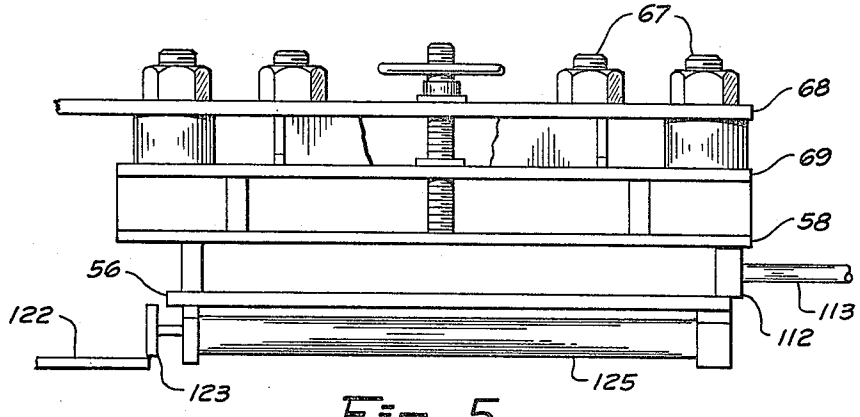


Fig. 5

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METHOD AND APPARATUS FOR PRESSING AND SLICING

Original Filed June 17, 1963 6 Sheets-Sheet 5

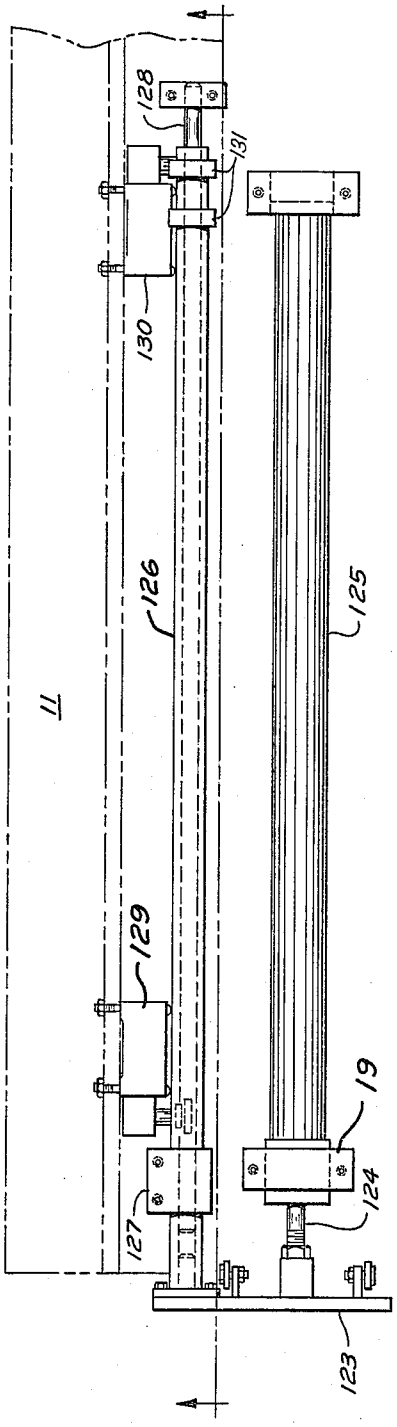


Fig-7

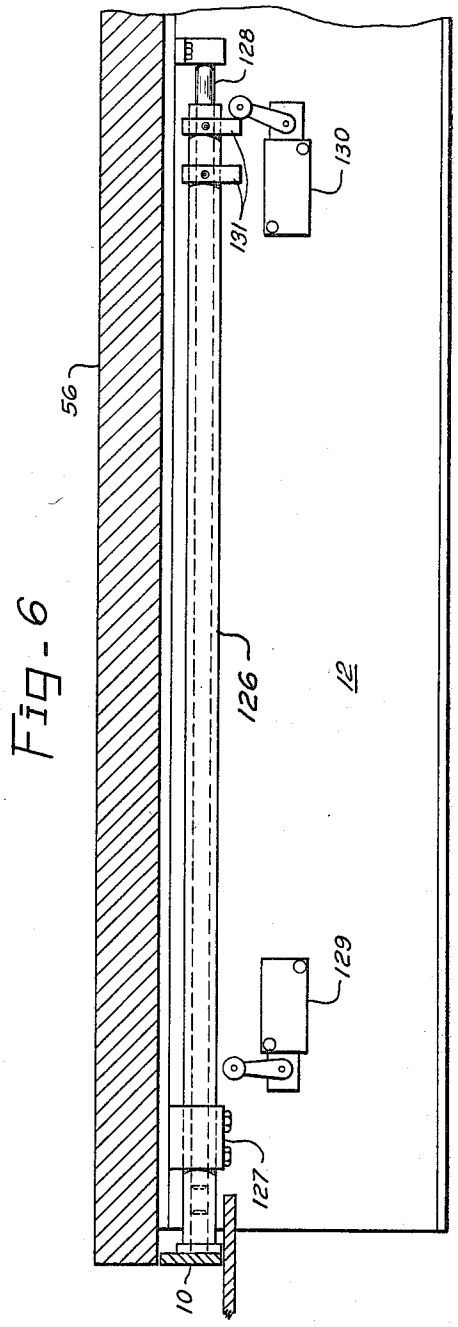


Fig-6

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METHOD AND APPARATUS FOR PRESSING AND SLICING

Original Filed June 17, 1963 6 Sheets-Sheet 6

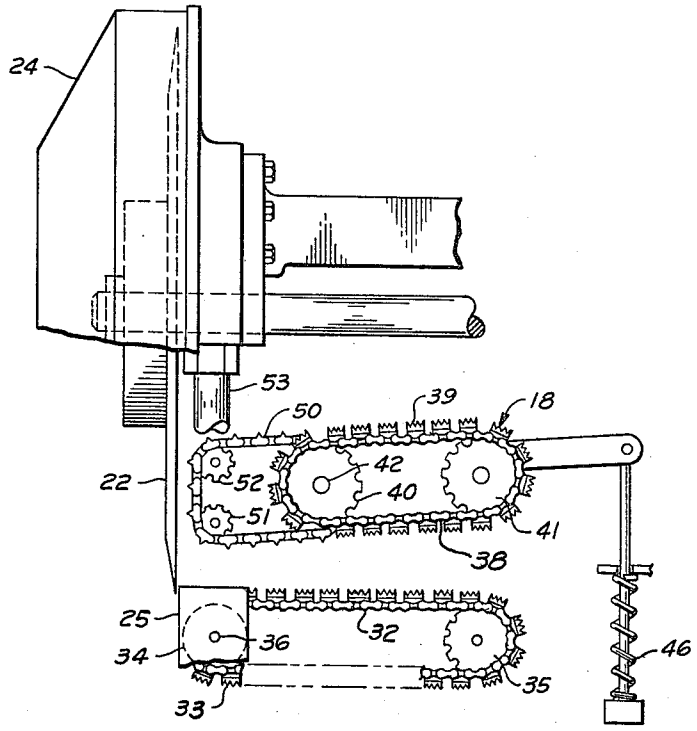


Fig. 8

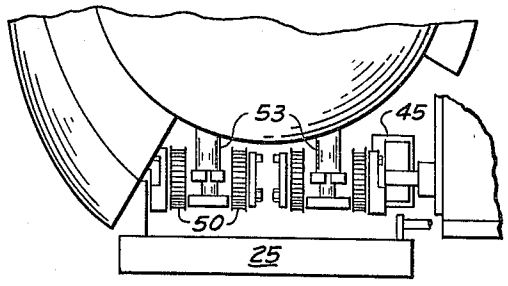


Fig. 9

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United States Patent Office 3,285,161 Patented Nov. 15, 1966

3,285,161

METHOD AND APPARATUS FOR PRESSING AND SLICING

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Continuation of application Ser. No. 288,358, June 17, 1963. This application Dec. 24, 1964, Ser. No. 440,968
16 Claims. (Cl. 100—39)

This application is a continuation of our prior application S.N. 288,358 filed June 17, 1963, now abandoned.

This invention relates to an improved method and apparatus for both press shaping and slicing slabs of material; and more specifically deals with improved method and apparatus for pressing and immediately slicing bacon bellies.

In the meat packing industry the production of sliced bacon has heretofore been accomplished in two separate and distinct operations. Starting with pork bellies that have been appropriately cured, the bellies have been pressed or shaped to square them up so that they will display substantially uniform thickness and width dimensions throughout their length. Thereafter, the shaped bellies have been stored in coolers according to classifications based upon the size of the pressed slab. Subsequently, sometimes a number of days after pressing, the slabs in a given size range have been removed from the cooler and sliced. The slicing is usually accomplished by an operator who manually inserts each slab, in turn, in a slicing machine.

Most packers utilize automatic equipment for assembling groups of slices, totalling half or one pound of product. Usually equipment for this purpose simply counts out a number of slices which have been calculated to closely approximate a weight of product, such calculations being based upon the dimension of the slab being sliced. Accordingly, it has been the practice to accumulate pressed slabs until a sufficient number thereof, having substantially equal width and thickness dimensions, have been collected to warrant a full day, or a substantial portion of a day, of slicing without the necessity of changing the slicer or packaging equipment control settings.

Unfortunately, the pressed bacon slabs exhibit a tendency to creep and revert toward their original unpressed shape. Over a period of a day or more storage, the creep in a bacon slab becomes noticeable. When such slabs are sliced, it is found that the ends will have become rounded, and a substantial portion of the slices from a given slab will be undersized and of an unpleasing shape. Accordingly a given number of slices will not always amount to a certain weight; and much of this product must be sold as an inferior grade of sliced bacon and commands a relatively low price per pound of product.

Additionally, the separate pressing, storing and slicing of bacon slabs, as heretofore practiced, necessitates a large amount of manual handling, with resultant cost of labor; and a substantial cooler storage capacity for the pressed slabs, with a resultant high capital expenditure requirement.

Accordingly, the present invention involves the classification of cured, but unpressed bacon bellies according to broad-size ranges, whereafter the bellies are pressed and shaped in the order of available size ranges, and immediately after pressing each slab is sliced without any period of storage. The most significant advantage of this process is the elimination of creep in the pressed bellies with a consequent gain in the percent yield of uniform size slices from each slab. By immediately slicing after pressing, the slabs are processed during a period where they are nearly identical in width and height throughout their length, and uneven ends are reduced. Once sliced, the individual slices show insignificant tendency to creep or

revert in dimension with the result that a significantly higher percent of the product is of uniform dimension and pleasing shape.

Accordingly, it is a primary object of the present invention to provide an improved method and apparatus for pressing and shaping food product and immediately thereafter slicing the shaped product.

It is an additional object of the present invention to provide an improved method and apparatus for pressing and shaping and immediately thereafter slicing food product wherein the slicing of successively pressed slabs is accomplished substantially continuously with the successive slabs abutting one another without interruption.

It is a further object of the present invention to provide an improved apparatus wherein bacon bellies are pressed and shaped and immediately thereafter sliced.

It is still another object of the present invention to provide an improved apparatus for pressing bacon bellies and providing for more rapid operation through horizontal infeed of an unpressed belly and automatic longitudinal ejection of the finished bacon belly.

A still further object of the present invention is to provide an improved apparatus for slicing pressed bacon bellies wherein an improved power-driven continuous feed means engages the top of a belly through a distance ending closely adjacent a slicer blade.

Briefly, the present invention involves the steps of pressing individual bacon bellies by exerting a high force against one end thereof, ejecting each pressed belly longitudinally from the zone wherein it is pressed and advancing the same toward the path of a slicing knife and into abutment with the immediately preceding pressed slab. Thereafter the abutted pressed slabs are advanced into the path of the slicing knife while the next succeeding item of product is being pressed.

Apparatus devised for performing the foregoing method comprises a slicing knife having a continuous feed means feeding thereto, such feed means being constructed to accept successive pressed slabs of product into end-to-end abutment with one another while advancing the same to a point closely adjacent the knife. Spaced a short distance from the continuous feed means away from the slicer knife is a press means for shaping the items of product; and a transfer means, for advancing pressed slabs from the press into abutment with the immediately preceding pressed slab and into contact with said continuous feed means, is located to travel between the press and aforementioned continuous feed means. Preferably the press means includes a cavity having a removable lateral side for horizontal loading of the press, and a removable longitudinal end for unloading the press, the latter being opposite a longitudinally reciprocable end ram that is operable to press a belly with the cavity and move it beyond the removable end when the latter is opened.

Further objects and advantages of the present invention will become apparent upon reading the following detailed specification in conjunction with the drawings wherein:

FIGURE 1 is a side elevation of a preferred embodiment of the apparatus of this invention;

FIGURE 2 is a plan view of the apparatus shown in FIGURE 1;

FIGURE 3 is an end elevation of the apparatus shown in FIGURES 1 and 2 taken from the right end thereof;

FIGURE 4 is a partial sectional elevation taken at about line 4—4 in FIGURE 1 with additional parts removed for clarity;

FIGURE 5 is a partial side view of the apparatus, with parts removed for clarity, showing the press portion of the apparatus;

FIGURE 6 is a detailed side elevation of the transfer means of the apparatus shown in FIGURE 2;

FIGURE 7 is a detailed plan view of the apparatus of FIGURE 6;

FIGURE 8 is a partial side elevation of the apparatus of FIGURE 1, with parts removed for clarity, showing the slicer and continuous feed means; and

FIGURE 9 is an end elevation of the apparatus of FIGURE 8 taken from the left end thereof.

The present method of pressing and slicing food product, with particular reference to the operations conducted in the production of sliced bacon, comprises, first, the classification of cured but unpressed bacon bellies according to rough-size range. Due to the broad weight range of meat animals, bacon bellies will vary widely in size. The shape of all unpressed bellies is generally irregular and they must be pressed and shaped to substantially even dimensions throughout for economical slicing on automatic equipment. Mechanical pressing, however, is limited somewhat to the extent to which a bacon belly can be reformed. That is, it is undesirable to attempt to compress the larger bellies to the same width and height dimensions to which the smallest bellies are pressed. Accordingly, the cured bellies will be classified as to small, medium or large size and then all bellies within a given size range will be pressed in sequence. When the pressing of a different size range of bellies is commenced, the press apparatus is adjusted to accommodate the difference in size.

In the present invention, each successive belly is fed laterally into an automatic press wherein preferably a large force of as much as 15,000 pounds is applied longitudinally of the belly (some initial reshaping of the height and width of the belly may be accomplished during the insertion of the belly into the press cavity). According to the cross section of the bacon, the applied force exerts pressure of as much as about 750–1000 p.s.i. on the bacon slab. As a result of this procedure, all of the bacon slabs pressed from bellies within a given size range will have substantially uniform width and height dimensions and will vary only in length.

When the desired force has been exerted longitudinally of the bacon belly, the force is released and the confinement of the slab is removed and the pressed slab is ejected longitudinally along a path toward a slicer. The pressed slab is immediately advanced along the path toward the slicer with only sufficient force to overcome the sliding friction. The slab is advanced into close end-to-end abutment with the rear end of the immediately preceding pressed slab which is already being sliced. The abutted slabs are then further advanced at a given rate into the slicer, such rate being dependent upon the thickness of slice desired. The force at which the pressed slab is advanced away from the press cavity is not sufficient to advance the slab upon abutment with the preceding item, the latter being accomplished by a separate slicer feed means.

As one pressed slab is advanced toward the slicer, the next succeeding bacon belly is pressed as described above and subsequently ejected and advanced into abutting relation. This process is repeated continuously until the supply of cured bacon bellies is exhausted.

Referring to the drawings, it will be seen that an apparatus for performing the above method is supported upon a heavy frame generally **10**, including strong upright members bearing a press bed generally **11**, comprising a pair of "I" beams **12**, and a slicer bed generally **13**. The apparatus supported thereon includes a bacon belly press, generally **16**, a bacon slicer, generally **17**, a continuous slicer feed means, generally **18**, and a transfer means, generally **19**, for conveying pressed bacon slabs from the press into the continuous feed means.

The slicer and continuous feed means

At the forward end of the machine (to the left in FIGURES 1 and 2) the slicer generally **17** and continuous feed means **18** are mounted above the slicer bed **13**. The

slicer is of substantially standard construction incorporating a flyweighted involute blade **22** fixed upon a rotatable drive shaft **23** within a housing **24**. Blade **22** is positioned to rotate in a plane adjacent a cooperating anvil **25** (shown in FIGURES 8 and 9). The drive shaft **23** is continuously driven from a suitable source of power such as an electric motor **26** through a belt **27** trained about pulleys **28**, **29** fixed to the drive shaft and motor shaft, respectively.

The continuous feed means generally **18** (shown in detail in FIGURES 8 and 9) is located immediately behind the blade **22** and is devised to continuously accept and advance successive bacon slabs for slicing in end-to-end abutment. A first pair of parallel endless chains **32** carry a plurality of transversely placed spiny cleats **33** which form a gripping surface between the horizontal runs of the chains **32**. The chains **32** are trained about drive pulleys **34** and idler pulleys **35** positioned to locate the upper surface of the cleats **33** substantially coplanar with the upper surface of the anvil **25**. The drive pulleys **34** are secured to a first power shaft **36**. Two pairs of second endless chains **38**, each pair of chains carrying a plurality of spiny cleats **39**, are trained about drive pulleys **40** and idler pulleys **41** spaced above the endless chains **32**. The drive pulleys **40** are similarly secured to a second power shaft **42**. Both the drive pulleys **40** and idler pulleys are mounted between a pair of arms **45** pivotally supported from the slicer housing **24** above the chains **32** and behind the knife blade **22**. The rear ends of the arms **45** are biased to pivot downwardly toward the lower chains **32** by means of a spring **46**. Both sets of drive pulleys **34**, **40** are continuously driven to move the opposing runs of endless chains **32**, **38** toward the blade by means of a power source, such as an electric motor and gear reducer **47**, suitably connected to the power shafts **36**, **42**.

Thus, bacon slabs, upon reaching the continuous feed generally **18**, will be gripped between cleats **33**, **39** on on the lower and upper endless chains **32**, **38**, respectively, and positively advanced toward the slicer blade. The numerous spines on the cleats insure adequate gripping of each slab to prevent back slippage.

However, due to the curvature of the pulleys **34**, **40** the forward ends of the runs of cleats end short of the path of the blade **22**. Additional engaging means are provided to guide the upper surface of the slabs to points closely adjacent the blade. To provide positive feed across the remaining space a plurality of barbed chains **50** are trained about pulleys (not shown) on the second power shaft **42**, interspaced between pulleys **40**, and pairs of small diameter idler pulleys **51**, **52** closely adjacent the path of the blade **22**. The diameters and placement of the pulleys is such as to form runs substantially coextensive of the runs of the upper endless chains **38**. The small diameter idler pulleys **51**, **52** are mounted on arms **45** adjacent downwardly biased presser foot assemblies **53** and the barbed chains **50** are urged into engagement with bacon slabs moving across the anvil **25**.

The press

Spaced a short distance rearwardly of the slicer generally **17** and continuous feed means generally **18**, is the pressing unit generally **16**. The press utilizes a high-pressure cavity defined by a fixed bottom platen **56** formed of heavy steel plate, a fixed side wall **57** similarly constructed, and an adjustable upper platen **58** (shown best in FIGURES 3, 4 and 5). A force of about 15,000 pounds is applied against one end of bacon bellies therein. Adjustment of the upper platen is obtained through relative movement of cooperating upright and inverted wedges **59**, **60**, respectively (seen in FIGURES 3 and 4), by means of hand wheels **63**, **64** and associated screw-shafts **65**, **66**, respectively.

It will be apparent in the drawings that a plurality of large vertical studs **67** extend upwardly from the bottom platen **56**. An upper cover plate **68** and a force plate

69, spaced therebeneath, are firmly secured to the upper portions of the studs 67. The plurality of inverted wedges 60 are welded to a yoke plate 70 and are slideable across the underside of the force plate 69. The upright wedges 59 are welded to the upper surface of the upper platen 58 in positions where the inclined surfaces of the respective inverted and upright wedges are in contact. Sufficient wedges are provided to evenly distribute force across the force plate 69. Screwshaft 65 is rotatably attached to the upper platen 58 and extends through a threaded collar above the force plate 69 whereby the upper platen 58 may be raised or lowered by turning hand wheel 63. Similarly, screwshaft 66 extends through a threaded collar at the edge of force plate 69 and is rotatably attached to the yoke plate 70 connecting the vertical ends of the inverted wedges 60 whereby the latter may be moved horizontally by turning the hand wheel 64.

To raise the upper platen, the upper wedges 60 are first backed off a distance and then screwshaft 65 turned to raise the upper platen 58 to the desired position. The inverted wedges 60 are then forced forward into engagement with the inclined surface of the upright wedges 59. To lower the upper platen, the screwshaft 65 is turned until the platen 58 is properly positioned and the inverted wedges 60 are forced forward into engagement with the upright wedges 59.

Unpressed bacon bellies are inserted in the high-pressure cavity, heretofore defined, by means of a side ram 72 reciprocable laterally of the cavity. The face of the side ram 72 is replaceable with members selected to closely fit in the adjustable space between the top and bottom platens 58, 56, respectively. As may be seen in FIGURES 3 and 4, the top platen 58 extends sideways of the cavity (to the left in the drawings) a significant distance. The side ram 72 is held horizontal and supported by a carriage 73 which slides between the upper platen 58 and the force plate 69. Thus, the side ram is movable from a first position adjacent the outer edge of the upper platen 58 to a second position between the upper and lower platens where it forms a second wall of the cavity opposite the fixed side wall 57.

A rocker frame, comprising a pair of pivoted members 74, 75 to which the carriage 73 is pivotally attached by studs slideable within slots 76, is the means for reciprocating the side ram between its first and second positions. The rocker frame is pivotal about an axle 77 journaled in the machine frame generally 10 beneath the path of the side ram 72. Movement is imparted to the rocker frame by means of a suitable reciprocable drive such as a pneumatic cylinder 78 (partially visible in FIGURES 1 and 3). In this installation, the pneumatic cylinder 78 is located adjacent the floor lateral to the press cavity and connected by its piston rod 79 to a downwardly extending yoke 80 attached to the members 74, 75 of the rocker frame.

Reciprocation of the side ram 72 by actuating the pneumatic cylinder 78 is controlled, in part, by limit switches 81, 82 located on the force plate 69 in position to be actuated by a cam 83 on the carriage 73 upon the side ram reaching the first and second positions, respectively. Operation of the limit switches 81, 82 will become clear in the course of the remaining description.

When the side ram 72 is at its first position spaced from the cavity, a bacon belly is positioned forward of the ram for delivery to the cavity. This is accomplished by a vertically movable elevator means generally 86 and a loading tray 87. The elevator means comprises a platform 88 which is movable from a lower position to an upper position, the latter placing the surface of the platform 88 coplanar with the bottom platen 56, by means of a suitable reciprocable drive such as an air cylinder 89 (visible in FIGURE 4). The air cylinder 89 causes the platform 88 to be lifted so as to place a bacon belly against the upper platen 58 between the side ram 72 and the cavity. Thereafter, the ram 72 will be moved to slide the belly across the platform 88; and, due to the vertical forces on the belly, considerable bending moment will be exerted on the platform. To absorb the latter moment the platform 88 is mounted upon a large diameter cylindrical sleeve 90 which is slideable telescopically upon a cylindrical canister 91 mounted on the frame 10. The air cylinder 89 is mounted within the canister with the piston rod thereof extending upwardly and connected to the underside of platform 88.

A pair of limit switches 92, 93 (seen in FIGURE 4) are mounted on the frame 10 beneath the path of platform 88 and are tripped by a dog 94 mounted upon a rod 95 depending from the elevator generally 86. Switch 93 will be tripped upon the platform 88 reaching its upper position, and switch 92 will be tripped upon the platform reaching its lower position. The full function of the switches will subsequently become clearer. However, actuation of air cylinders 78 and 89, for moving the side ram 72, and platform 88, respectively, is controlled by switches 92, 93 and 81, 82. In this regard, the pneumatic cylinder 78 will be actuated to move side ram 72 from the first to second position only when the platform 88 is elevated and switch 93 tripped; and from the second to first position only when the platform is lowered and switch 92 tripped. Similarly the air cylinder 89 will move platform 88 upwardly only when the side ram 72 is withdrawn to its first position tripping switch 81; and downwardly only when the side ram is advanced to the cavity (second position) and switch 82 is tripped.

When the elevator platform 88 is in its lower position, it is even with the aforementioned loading tray 87 which is a horizontal surface secured to the frame 10. Individual bacon bellies are manually placed on the loading tray and at the appropriate time, when the elevator means generally 86 is lowered even therewith, pushed forward onto the elevator platform 88. The bacon bellies may be either automatically or manually advanced across the tray 87 by a slide pusher 97, a manually operable mechanism being illustrated.

It should be noted that the side ram 72, upon being advanced to its second position within the press cavity, is locked in place by suitable means such as a pair of locking pins 98, shown in FIGURE 1, receivable in holes in the underside of ram 72. Pins 98 are moved by solenoids 99 which are actuated to raise the pins by the tripping of limit switch 82, and to lower the pins by the tripping of another limit switch to be subsequently explained. Also, the pins 98 actuate limit switches 100 which prevent actuation of the side ram 72 until the pins are withdrawn.

Before a bacon belly is forced into the cavity by the side ram 72, the forward end of the cavity is closed by a gate member generally 103. The gate is reciprocably mounted at one side of the press generally 16, at the side opposite side ram 72 as shown in FIGURE 2, and comprises a plate 104 slideable in a heavy track 105 across the front end opening of the cavity facing the slicer generally 17. A suitable actuator such as a pneumatic or hydraulic cylinder 106 is connected to advance and withdraw the end gate. In the preferred apparatus the connection is made through a pilot rod 107 to conserve space. A pair of limit switches 108, 109 secured adjacent the path of the plate 104 to detect the fully advanced and withdrawn positions, respectively. The functions of these switches will subsequently be explained.

The description of the press portion of the present apparatus has thus far explained five of the six surfaces which completely enclose the press cavity. It will be understood that the elevator means generally 86 actually may partially press a bacon belly, and conform its thickness to a desired dimension, when it is lifted against the top platen 58. Also, the side ram 72 may partially press a belly, to a desired width, when it is advanced into the cavity against the fixed side wall 57. However, the major pressing force, and often the only force actually reshap-

ing a belly where the latter is of lesser width and thickness than desired, is applied longitudinally of the press cavity and belly, in the direction of the slicer generally **17**, by a reciprocal end ram **112**. The working face of the end ram is interchangeable so as to closely and slidingly fit within the cavity defined by the adjustable top platen **58** and replaceable side ram **72**.

The end ram **112** is mounted on an end of a bar **113** which is horizontally reciprocable in a pair of ways **114** secured to the I beams **12** of the press bed generally **11**. In turn, the opposite end of the bar **113** is connected by a yoke **115** to the upper end of a swinging beam **116** which is pivotally mounted at the base of the machine frame generally **10**. Between the yoke **115** and the pivot point of the swinging beam **116**, a reciprocable drive means, preferably a pneumatic cylinder **117**, is connected to the latter by a tie rod **118** or the like. The end ram **112** is reciprocable from a first, or fully withdrawn position, to a second adjustable compression position whereat bellies are fully pressed; and finally a third full forward position where bellies are ejected from the cavity.

The pneumatic cylinder **117** is controlled by limit switches **108** and **100** so that it will not be actuated to advance the swinging beam **116**, bar **113**, and end ram **112** from the first to the second positions until both the gate member generally **103** is in position to close the front of the cavity and locking pins **98** are raised insuring that the side ram **72** is positioned in the cavity. Only when these conditions are satisfied will the end ram **112** be moved forward toward the end gate **103** and against a belly within the cavity.

Three limit switches **119**, **120** and **121** are positioned along the path of the bar **113** to be tripped by a lug thereon when the end ram **112** is at the first, second and third positions respectively. Limit switch **120** is preferably adjustably mounted so as to be movable in the direction of the bar **113** so that the second or compression position of the end ram **112** may be pre-established, according to the size of bellies being pressed, to create a force in the range of 15,000 pounds against the bacon belly being pressed. When the limit switch **120** is tripped as the ram **112** advances (reverse motion will not trip this switch) the pneumatic cylinder **117** is momentarily reversed, to relieve the force on the bacon belly, and cylinder **106** may be actuated to withdraw the front gate **103** from the press cavity. The latter movement occurs when a further switch, to be explained, is also actuated by the transfer means generally **19**. Opening gate **103** results in switch **109** being tripped which results in cylinder **117** advancing the end ram **112** from its second to third position to eject the pressed slab from the open cavity.

Switch **121**, which is tripped upon the end ram **112** reaching full forward, again reverses the action of cylinder **117** to withdraw the end ram, and additionally actuates solenoids **99** to withdraw the locking pins **98** from the side ram **72**, and allow the latter to be returned to its first position to receive the next belly. This switch also initiates the transfer means generally **19** to advance the slab toward the slicer. Switch **119** will be tripped upon the end ram **112** being fully withdrawn to its first position. Upon the latter switch being tripped the end gate **103** is closed by cylinder **106**; and the cylinder **78** of side ram **72** is readied to advance the latter to its second position when the next belly is properly positioned by the elevator means **86**.

When the pressed bacon slab is ejected from the cavity by the end ram **112** it will be driven off of the forward edge of the lower platen **56** where it will drop slightly to a dead plate generally **122**, on the slicer bed generally **13**, which extends to the slicer feed chains generally **17**. The previously-mentioned transfer means generally **19** is located to advance a slab ejected from the pressing cavity into the continuous feed generally **17**.

The transfer mechanism

Specifically, the transfer means, details of which are best shown in FIGURES 6 and 7, comprises a pusher bar **123** connected by a piston rod **124** to a pneumatic cylinder **125**, the latter being suspended beneath the lower platen **56**. The pusher bar **123** is slideable along the dead plate **122** from a first position adjacent the lower platen **56** to a second position just a few inches from the continuous feed chains generally **18**. One side of the pusher bar **123** is preferably connected to a telescopic guide rod **126** extending rearwardly parallel to the piston rod **124**. The outer portion of the guide rod is reciprocably supported in a bearing block **127** secured to the press bed generally **11** while the inner stationary portion thereof is fastened to the bed at its end **128**. A pair of limit switches **129**, **130** are secured to the I beams **12** of the press bed **11** opposite the forward and rear ends, respectively, of the pneumatic cylinder **125** and are actuated by a pair of annular lugs **131** fixed to the reciprocal portion of the guide rod **126**. The forward limit switch **129** will be tripped by the one lug **131** when the pusher is fully advanced to its second position toward the slicer feed **18**, and switch **130** will be tripped by a lug **131** when the pusher bar **123** is fully withdrawn to the first position.

The apparatus is interconnected so that the end gate **103** will not be withdrawn until the pusher bar **123** is in its first position and switch **130** tripped thereby (in addition to switch **120** being tripped). It is to be noted also that the end ram **112** will not be advanced to its third position to eject a slab until the gate **103** is withdrawn and switch **109** is tripped. The limit switch **129**, however, merely causes the pneumatic cylinder **125** to reverse the pusher bar **123** when the latter reaches its full forward or second position. It should also be understood that the pneumatic cylinder operates on low-pressure air from a suitable source and control valve (neither shown), and is of a suitable size to exert a force through the pusher bar **123** which is only sufficient to overcome the friction of a pressed slab on the dead plate **122**. Thus, when a slab is advanced thereby it will push very lightly against any preceding slab, and the additional sliding resistance of such preceding slab will fully equal the force exerted by the cylinder **125**. As a result there will be no tendency for the transfer means generally **19** to force slabs into the path of the knife blade **22** and the latter will be controlled solely by the continuous feed generally **18**. However, the pusher bar **123** will gradually advance fully to its second or forward position, insuring that the last pressed slab is engaged by the continuous feed and closely abuts the end of the preceding slab.

Obviously many modifications and variations of the invention as hereinbefore set forth may be made without departing from the spirit and scope thereof, and therefore only such limitations should be imposed as are indicated in the appended claims.

We claim:

1. An improved method for pressing and slicing food product, said method comprising the steps of confining a unit of product having a major longitudinal dimension within a pressing zone having given cross-sectional dimensions defined by four contiguous side walls and an end wall, by inserting the unit therein in a lateral direction; applying a force against the unit of product longitudinally of said product and said zone walls toward said end to conform the product to the shape of said zone; removing said end wall of said zone and thereafter ejecting the product from said zone in the longitudinal direction beyond said end; immediately advancing said ejected product in said longitudinal direction toward a slicing means; continuing to advance said ejected product in said direction until it is in abutment with the immediately preceding ejected item of product; thereafter continuously feeding said abutted items of product by separate means in said direction into said slicing means, and repeating the preceding steps upon successive items of product.

2. An improved method for pressing and slicing bacon bellies, said method comprising the steps of confining one bacon belly within a pressing zone having given cross-sectional dimensions defined by four contiguous side walls and an end wall by inserting the unit therein in a lateral direction; applying a force longitudinally against said one bacon belly toward said end to shape the belly to conform to the dimensions of said zone; releasing said force on said belly; removing said end wall of said zone and thereafter ejecting the shaped belly from said zone in the longitudinal direction beyond said end and to a level below said zone; immediately urging said shaped and ejected belly with minimum force along a path in said direction longitudinal to said belly toward a slicing means; continuing to advance said belly along said path until said one belly abuts a preceding shaped belly whereby said minimum force is overcome; thereafter continuously feeding the abutted bellies in said longitudinal direction by separate means into said slicing means; and repeating the preceding steps to abut a further shaped belly into abutment with said one belly.

3. An apparatus for pressing and slicing food product, said apparatus comprising in combination: a slicing means; continuous feed means at one side of said slicing means for constantly urging a unit of food product to the path of slicing means; press means having a cavity defined by four contiguous side walls and an end wall, said press means positioned at said one side of said slicing means spaced from said continuous feed means and adapted for pressing irregular items of food product in a lengthwise direction aligned with said continuous feed means into regularly-shaped slabs of predetermined and uniform width and thickness dimensions, one of said sidewalls being movable to laterally and horizontally feed the food product into said cavity; means to eject food product slabs in said lengthwise direction from one end of said press means toward said slicing means; and transfer means movable in said lengthwise direction directly and toward said slicing means between said one end of said press means to said continuous feed means to advance food product slabs immediately upon being ejected from said press means toward said slicing means and until positively engaged by said continuous feed means.

4. An apparatus for pressing and slicing food product, said apparatus comprising in combination: a rotary slicer blade; a plurality of endless chains at one side of said blade for constantly urging units of food product into the path of said blade; press means at said one side of said blade spaced from said endless chains, said press means being for shaping irregular items of product and disposed to eject shaped units of product toward said endless chains; and a transfer ram reciprocably mounted beneath said press means, said ram disposed to extend toward said endless chains and move ejected units of product from said press means into engagement with said chains and into abutment with a preceding shaped unit of product.

5. The apparatus of claim 4 wherein the endless chains comprise a first lower set of chains and a second upper set of chains for engaging the upper and lower surfaces of the units of product, and wherein one of said first and second sets of chains are biased toward the other set.

6. The apparatus of claim 4 wherein the plurality of endless chains comprises a first lower set of chains and at least a second upper set of chains, both first and second sets of chains bearing cleats for engaging said bacon slabs, said first and second sets of chains terminating a short distance from said rotary slicer blade, and a plurality of relatively short endless chains carrying barbs thereon, said short endless chains being in line with said second set of chains and extending to adjacent said rotary slicer blade.

7. The apparatus of claim 4 wherein the plurality of endless chains comprises a first lower set of chains and at least a second upper set of chains, both said first and second sets bearing cleats for engaging said bacon slabs, said first and second sets of chains terminating a short distance from said rotary slicer blade with said second upper set of chains being pivotally mounted thereat; a plurality of relatively short endless chains carrying barbs thereon, said short endless chains being in line with said second set of chains and extending to adjacent said rotary slicer blade; and means to bias the second set of chains about the pivotal mounting toward said first set of chains.

8. In an apparatus for slicing food product including a rotary slicer blade, the improvement comprising: a first lower set of chains at one side of said blade, said first set of chains being driven to move the upper run thereof toward said blade; and a second upper set of chains spaced above said first set of chains and extending toward said blade, said second set of chains being driven to move the lower run thereof toward said blade, one of said first and second sets of chains being biased toward the other; and additional independent engaging means positioned between said blade and second chains extending from said second set of chains to points closely adjacent said blade.

9. The improved apparatus of claim 8 wherein the second upper set of chains are supported between a pair of arms, one end of said arms being pivotally mounted adjacent said blade; and a bias means is connected to the opposite end of said arms to normally pivot the rear portions of said upper chains toward said first chains whereby product entering therebetween will be engaged by both said sets of chains throughout substantially the entire length of said upper and lower runs.

10. The improved apparatus of claim 8 wherein both first and second sets of chains bear cleats for engaging said food product, said first and second sets of chains terminating a short distance from said rotary slicer blade, and a plurality of relatively short endless chains carrying barbs thereon, said short endless chains being in line with said second set of chains, and extending to points closely adjacent said rotary slicer blade.

11. The improved apparatus of claim 8 wherein both first and second sets of chains bear cleats for engaging said food product, said first and second sets of chains terminating a short distance from said rotary slicer blade with said second upper set of chains being pivotally mounted thereat; a plurality of relatively short endless chains carrying barbs thereon, said short endless chains being in line with the second set of chains and extending to points closely adjacent said rotary slicer blade; and means to bias the second set of chains about the pivotal mounting toward said first set of chains.

12. In an apparatus for pressing food product including a rectangular cavity having a major longitudinal axis disposed horizontally, the improvement comprising: loading means to insert product into said cavity horizontally and laterally of said axis; reciprocable means at one longitudinal end of said cavity movable longitudinal and inwardly thereof toward an opposite end to compress and reform a unit of food product contained within said cavity; means to move said reciprocable means part way into said cavity to compress said product therein; means to move said reciprocable means further into said cavity to eject product therefrom after compression; and a removable end gate positionable to close said cavity during compression of said product and to open said cavity for ejection of said product.

13. The improved apparatus of claim 12 wherein the cavity has a removable lateral side for horizontally introducing a unit of food therein.

14. The improved apparatus of claim 12 including a transfer means positioned external of the cavity and movable parallel to said reciprocable means for advancing a unit of food after it has been ejected beyond said end gate.

15. The improved apparatus of claim 13 including a transfer means positioned external of the cavity and movable parallel to said reciprocable means for advancing a unit of food after it has been ejected beyond said end gate.

16. In an apparatus for pressing food product including a rectangular cavity having a major longitudinal axis disposed horizontally, the improvement comprising: fixed top, one side, and bottom walls of said cavity, said top extending outwardly of said cavity opposite said one side; a removable sidewall opposite said fixed sidewall, said removable sidewall being reciprocably movable horizontally lateral to said cavity in sliding contact with said top; platform means adjacent said cavity and beneath said outwardly extending top, said platform means being movable to present a unit of food product to a position between said cavity and said removable sidewall when the latter is outward of said cavity whereby inward movement of said removable sidewall will advance such product laterally into said cavity; reciprocable means at one

longitudinal end of said cavity movable longitudinally and inwardly thereof toward an opposite end to compress and reform a unit of food product contained within said cavity; means to move said reciprocable means part way into said cavity to compress said product therein; means to move said reciprocable means further into said cavity to eject product therefrom after compression; and a removable end gate positionable to close said opposite end of said cavity during compression of said product and to open said cavity for ejection of said product.

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