United States Patent

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[54] **AUTOMATIC CAN PACKER FOR PINEAPPLE SLICES**
10 Claims, 6 Drawing Figs.

[52] **U.S. Cl.** ..... **53/252,** 53/124 B, 53/253, 198/25, 214/1 BD
[51] **Int. Cl.** **B65b 5/06**
[50] **Field of Search** ..... 53/124 B, 124 D, 123, 252, 253, 254; 146/6; 198/24, 25; 214/1 BD

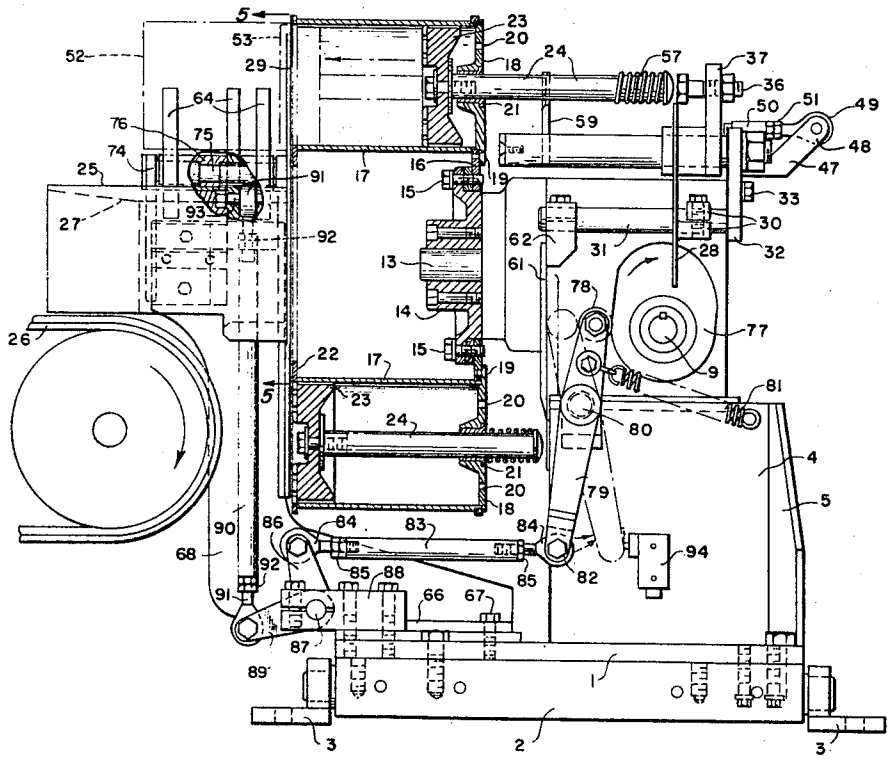
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ABSTRACT: Pineapple slices are loaded automatically into a substantially cylindrical pocket in an intermittently rotating turret and carried to a can loading station where the load is discharged into an empty can. A plunger normally maintains the loading end of the empty pocket closed but retracts within the pocket as it is loaded. The extent of retraction of the plunger determines the number of slices in the load and is variably controlled by adjustably limiting the projection of the plunger rod out of the pocket. The plunger remains in retracted position until the can loading station is reached where the plunger rod is actuated to move the plunger back to normal position and to discharge the load into the can. The plunger may be moved beyond normal position so as to enter the can somewhat and thereby to compact the load of slices in the can.



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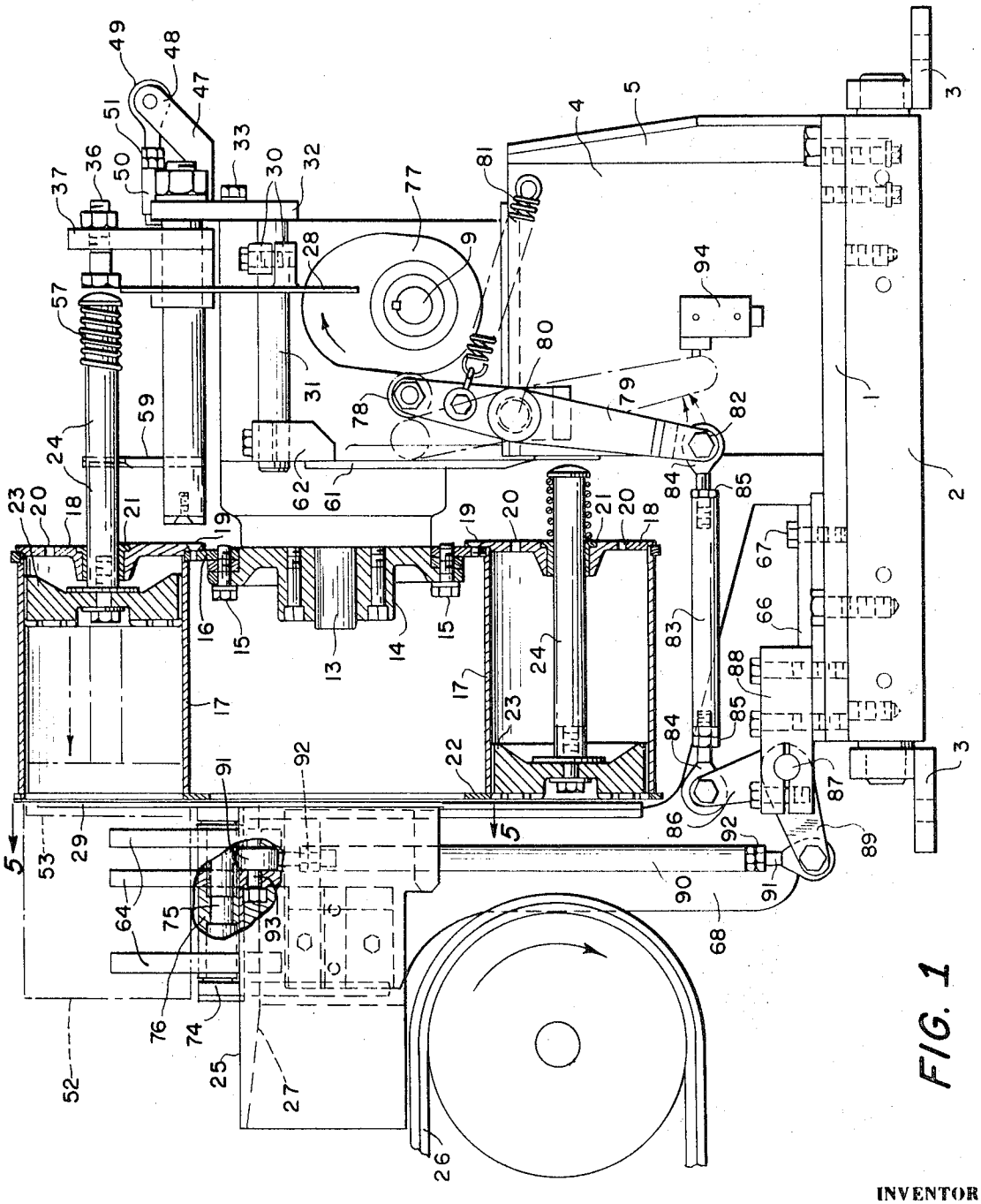


FIG. 1

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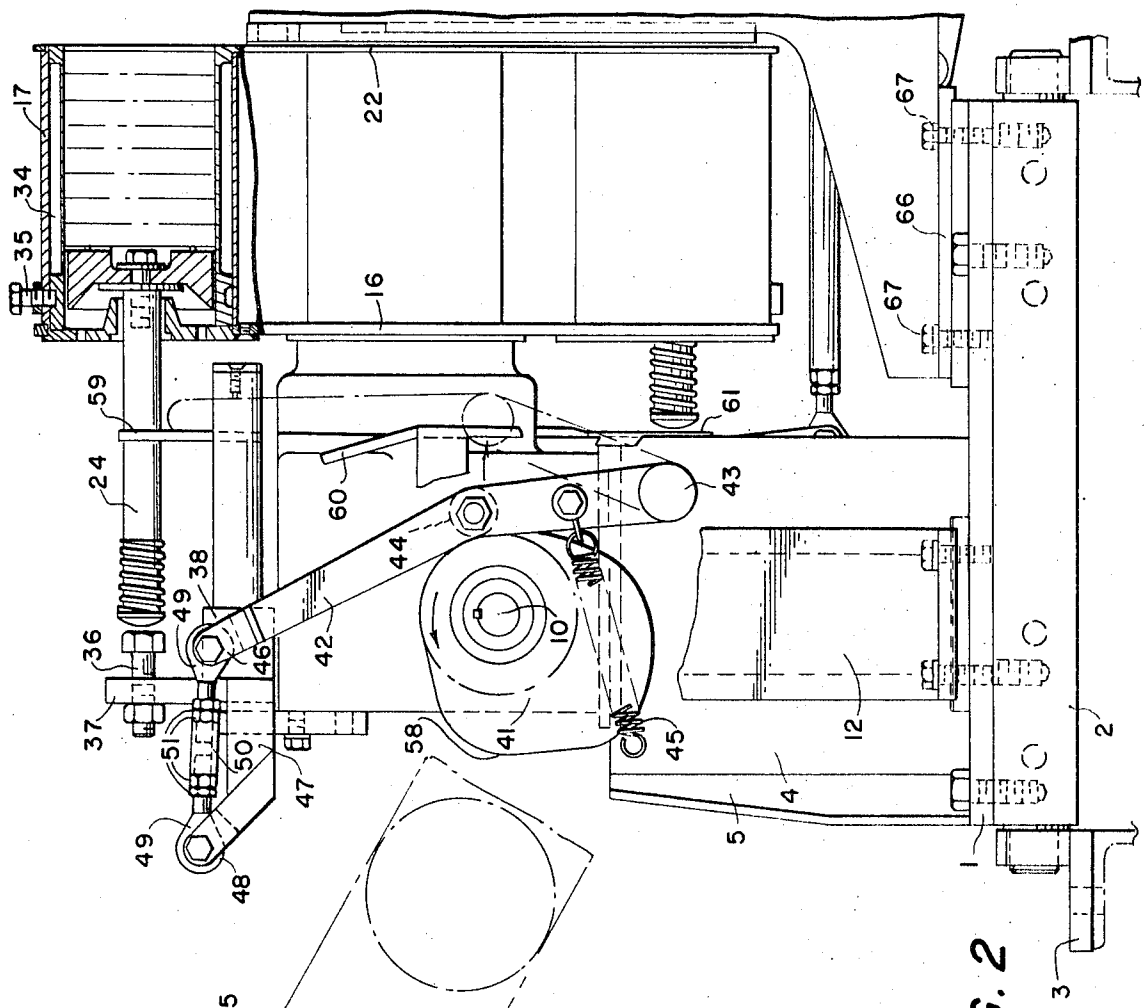


FIG. 2

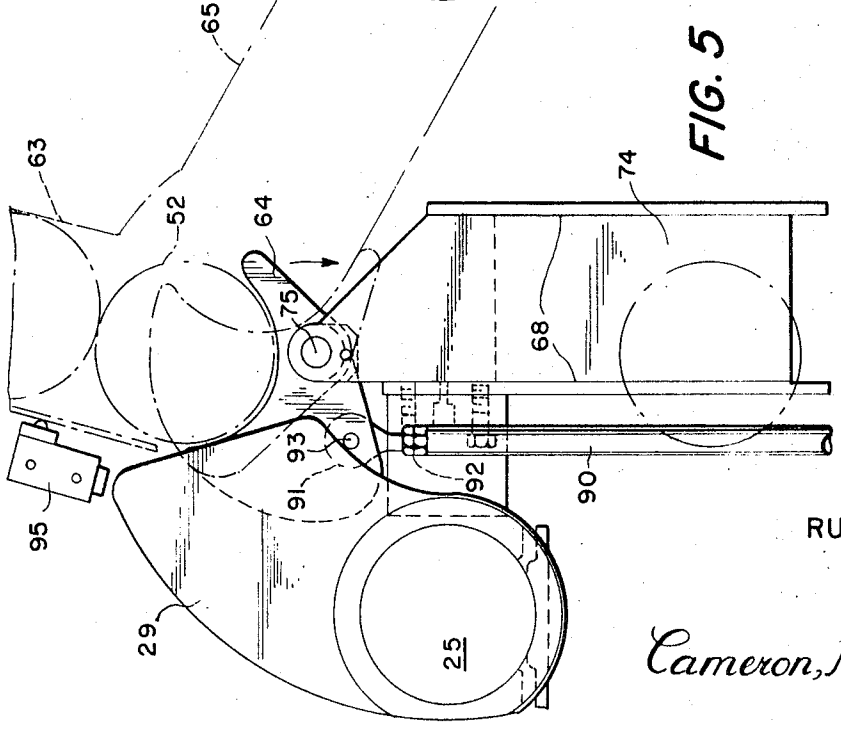


FIG. 5

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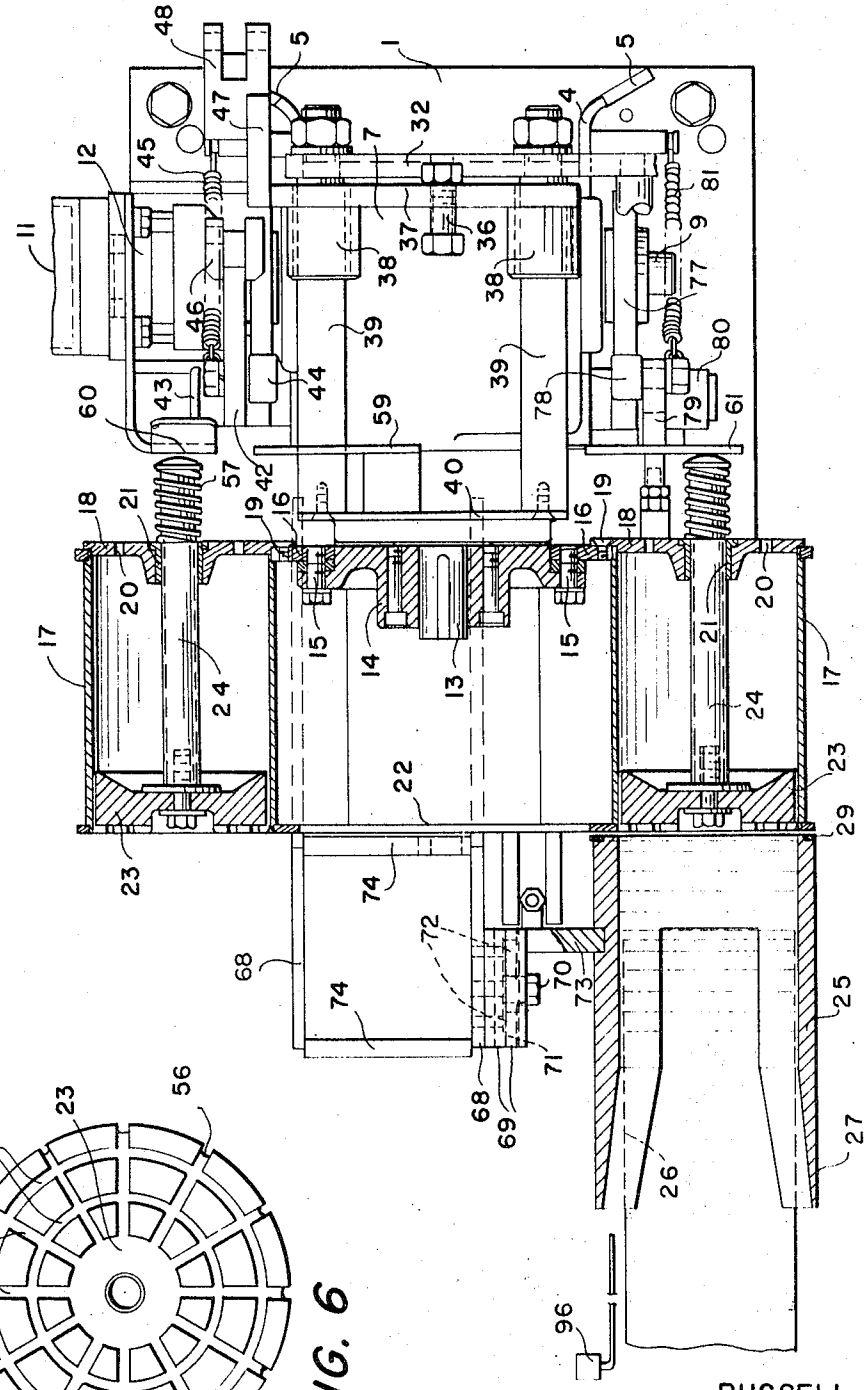


FIG. 3

FIG. 6

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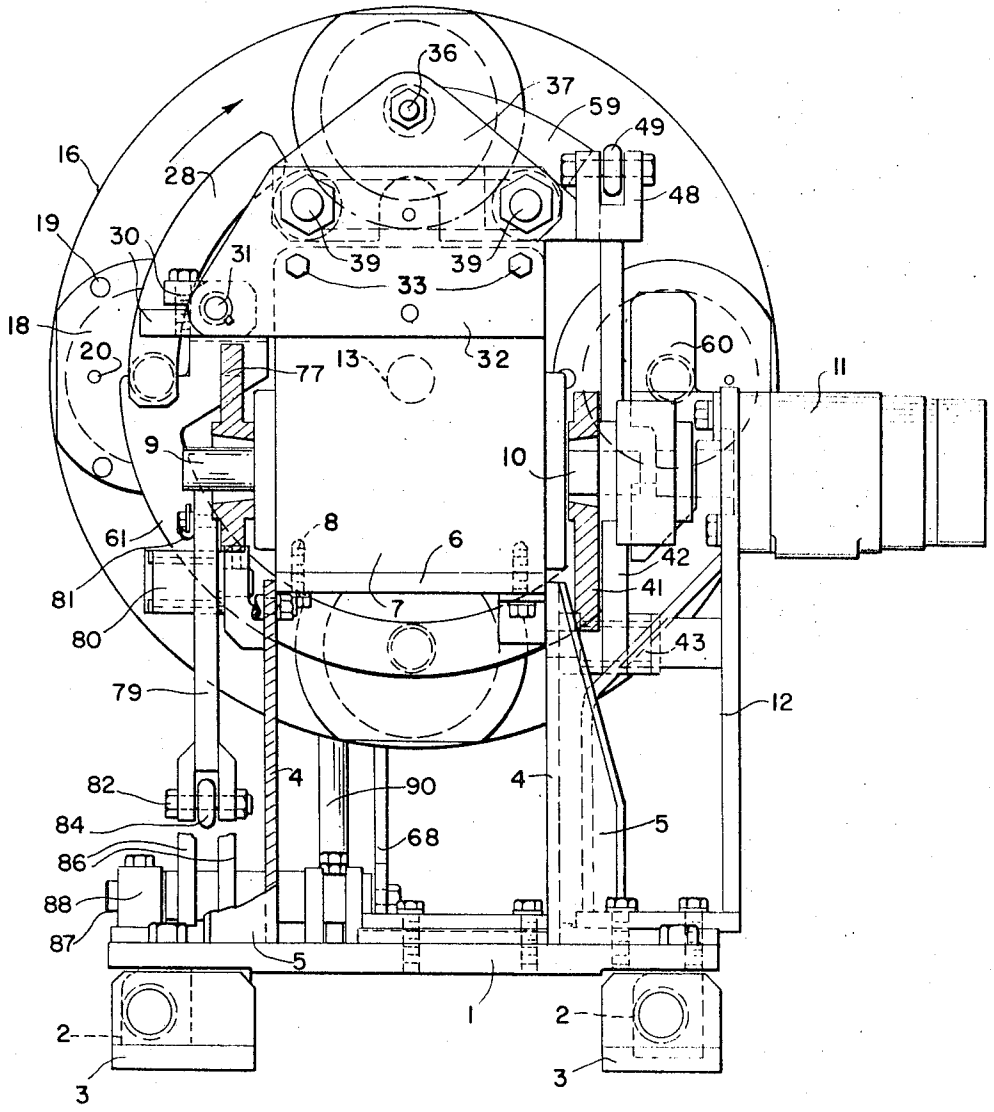


FIG. 4

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AUTOMATIC CAN PACKER FOR PINEAPPLE SLICES

BACKGROUND OF THE INVENTION

This invention relates to apparatus for automatically filling measured charges or loads of pineapple slices into cans.

Various procedures and apparatus have been used heretofore for preparing pineapple for canning in sliced form. For example, one well-known procedure, briefly described, employs a Ginaca machine which cuts the fruit into cylinders of desired diameter and then cuts off the ends of the cylinders and removes the cores. The cored cylinders then go to a trimming table where they are inspected and trimmed as required and then to a slicer which cuts the cored and trimmed cylinders into slices of desired thickness. Graded and selected slices are then placed directly into cans by packers at packing tables.

It is obvious that such well-known procedures for the preparation of slices ready for canning are susceptible of considerable variation. They constitute no part of the present invention which is concerned with loading such slices, however prepared, into the cans.

It has been proposed heretofore to use automatic equipment for loading such slices into cans. For example, Farmer U.S. Pat. No. 3,246,678, dated Apr. 19, 1966, discloses equipment in which pineapple slices are placed on edge on a conveyor which is contoured in cross section to correspond with the circumference of a slice. The conveyor carries a line or stack of such sliced to an intermittently rotating turret having pockets into which the slices are pushed at a pocket loading station by belt friction. The pockets are in the form of open-ended barrels and the advancing stack is stopped by engagement of the end slice with a stationary backing plate at the far open end of a pocket. As the turret rotates, the end slice is supported by the backing plate which terminates, however, as the pocket reaches a can loading station. Here the turret stops and a pusher moves into the loading end of the pocket and pushes the charge of slices on through the pocket and out its far open end into a waiting empty can. The pusher is then withdrawn back through the empty pocket before the turret begins to rotate again.

SUMMARY OF THE INVENTION

In apparatus embodying the present invention, an divided rotating turret of the general type already mentioned is provided with pockets that are open at one end only (hereinafter referred to as the loading end). This loading end is closed at times by a plunger or piston movable axially in the pocket and having a stem or rod which extends slidably out through the opposite closed end of the pocket. Each pocket is equipped with such a plunger which remains permanently associated with its pocket and serves the dual function of limiting or measuring the charge of slices fed into the pocket at one position or station and of subsequently ejecting the measured charge out of the pocket and into a waiting can at another position or station. The advancing stack of slices enters the loading end of the pocket, causing retraction of the plunger therein, until the desired load or charge has been fed to the pocket. Limitation of the projection of the plunger rod out of the closed end of the pocket determines the amount of the charge. At the can loading station, the motion of retraction of the plunger is reversed by pushing the plunger rod back into the pocket so that the plunger acts to eject the charge of slices back out through the loading or feed end of the pocket and into a waiting can.

Thus each pocket carries with it a piston or plunger which serves as a temporary closure for the loading end of the pocket, as a stop limiting the size of the stack of slices fed to the pocket, and also as an ejector for pushing the stack of slices back out of the pocket at the can loading station. By the use of adjustably positioned guides for limiting the projection of the plunger rod, the length of the stack of slices (i.e. the product of the number of slices times their thickness) that can be loaded into a given pocket can be varied by shifting these guides towards and away from the turret.

Apparatus embodying the invention can also be altered easily to handle slices of varying diameters intended for different sized cans. As described in more detail hereinafter, this can be accomplished by inserting liners of any desired diameter into the pockets and by using replaceable plungers of corresponding diameter.

These and other features of the invention are exemplified by the detailed description of a preferred embodiment which is set forth below.

BRIEF DESCRIPTION OF THE DRAWINGS

In the drawings:

FIG. 1 is a view, partly in cross section, of one side of apparatus embodying the invention;

FIG. 2 is a similar view of the other side of said apparatus;

FIG. 3 is a plan view of the apparatus, certain parts being shown in cross section; them

FIG. 4 is an end view of said apparatus with certain parts shown in cross section;

FIG. 5 is a detailed view showing part of the can handling mechanism, and

FIG. 6 is a detailed showing of the face of the plunger.

DESCRIPTION OF THE PREFERRED EMBODIMENT

In the preferred embodiment illustrated in the aforesaid drawings, the apparatus is assembled and mounted on a baseplate 1 of suitable size and shape which is supported or mounted in any suitable manner as by means of side rails or beams 2 and suitable mounting brackets 3. The details of such mounting and supporting means are not part of the invention and accordingly will not be described in detail.

The intermittent rotating motion of the turret, or its indexing movement, may be provided by any desired type of intermittent drive. Various types of such mechanisms are well known ranging from the Geneva drive to various special arrangements of gearing, cam and roller mechanisms, etc. Because it is better fitted for the particular needs of the present apparatus, it is convenient to use an input or drive shaft and an output turret-rotating shaft at right angles to each other and at different levels. Under these circumstances the indexing drive is preferably of the right angle index drive type in which a continuously rotating input shaft drives a cylindrical cam and the step-by-step motion of the output shaft is provided by a plate and cam followers which are engaged in succession by the input cam and moved one step ahead for each rotation of the input cam with dwells intermediate the steps. Preferably a right-angle index drive of this type having a double input shaft is provided so that both ends of the input shaft are available for operation of control cams and the like.

A roller gear right-angle index drive by Commercial Cam & Machine Company, Model No. B4H20–180, is well suited to the requirements of the invention. In terms of a revolution of the input shaft, the cam and followers are arranged so that 180° of a revolution is used to advance the output shaft and turret one step, while the other 180° of the revolution is a dwell period for the output shaft. Assuming four pockets in the turret, each advance step is 90° or one-fourth of a revolution of the turret.

Referring again to the drawing, the index drive is preferably mounted somewhat above the level of the baseplate 1 so as to leave room for the installation and operation of various parts of the apparatus as hereinafter described. To this end a pair of supporting plates 4 are mounted vertically on the baseplate in any suitable manner, as by means of welding, these vertical plates 4 preferably having angularly flanged ends 5. Extending between and welded to the upper horizontal edges of the plates 4 is a horizontal plate 6 on which the casing 7 of the index drive is suitably secured as by means of the mounting bolts 8. The double input shaft extends through this casing and projects on both sides as shown at 9 and 10. One of these ends,

for example, the end 10, is driven through any suitable type of coupling by a driving motor 11 which may be an electric motor or preferably a hydraulic motor in order to provide a convenient means of speed control. The motor 11 can be supported at the level of the input shaft 10 by means of any suitable framework mounted on the baseplate 1 and indicated generally at 12.

The turret structure is carried and rotated by the output shaft 13 of the right-angle index drive 7 and comprises a number of cylindrical pockets arranged with their axes parallel to the shaft 13. As shown, these pockets are four in number, and the turret structure makes four indexing movements each amounting to one-fourth of a revolution of the output shaft, with a substantial dwell between each indexing step to afford time to load an empty pocket at a pocket loading station and at the same time to eject the charge or load of slices from a full pocket at a can loading station. These two stations are preferably but not necessarily adjacent stops in the rotation of the turret, the other two stops being idle.

Any desired structural arrangement can be used in assembling the turret. As shown, a driving hub 14 is secured on the end of the output shaft 13 and is bolted at 15 to an annular plate 16. The four pockets already mentioned are equally spaced circumferentially around the plate 16 and comprise cylindrical open-ended tubes 17 inserted in openings in the plate 16 and secured therein preferably by welding. The end of each tube 17 at the plate 16 is substantially closed by an end plate 18 secured to the plate 16 by screws 19 and provided with suitable air vents 20 and a central opening and bushing 21 for a plunger rod passing slidably through the end plate as hereinafter described. The other open ends of the tubes 17 are preferably connected together by welding them in openings in an annular plate 22 similar to the plate 16 described above.

A pistonlike plunger or pad 23 is slidable back and forth in each of the tubes or pockets 17 and has a plunger rod 24 which slides in the bushing 21 in the pocket end plate 18. The position of the plunger 23 is controlled through the projecting end of the plunger rod 24. Each plunger has what may be termed a normal position in which it substantially closes the open end of its pocket, being substantially flush with the plane of the turret face defined by the plate 22. Each plunger 23 is also retractable from this normal position into its pocket so as to permit a stack of slices to be loaded into the pocket. Once the desired stack of slices has been loaded, further retraction is prevented by limiting the amount of projection of the plunger rod 24 out of the pocket. Subsequently, at pocket discharge station (or can loading station) external means act on the projecting plunger rod to push the plunger 23 back to its normal position thereby discharging the loaded slices from the pocket and into the can.

For loading an empty pocket, it has been found that when slices are stacked on edge on a contoured belt as already described, the friction between the belt and the slices is sufficient to cause retraction of the plunger within the pocket due to the pressure of the advancing stack of slices. Preferably the slices on the belt are guided into the end of the pocket by means such as an adjustably mounted throat 25, the belt 26 advancing the slices into the inwardly tapering end 27 of the throat and further advancing the slices through the cylindrical part of the throat and into the pocket, causing the plunger 23 to retract within the pocket as already described.

As shown, the pocket loading operation described above takes place at the left-hand position shown in FIG. 4. In order to regulate the length of the stack of slices loaded into the pockets, a stop plate 28 is mounted in position so that it is engaged by the end of the plunger rod 24 when the extent of projection thereof out of the pocket reaches the desired limit. This prevents further retraction of the plunger 23 and stops the advance of slices through the throat, the belt 26 continuing to move under the stationary slices.

The above described loading takes place while the turret is stationary during one of the dwell periods of the input cam. When the next indexing movement of the turret begins, the filled pocket 17 moves through 90° or one-fourth revolution of the turret, from the pocket loading position at the left-hand side of FIG. 4 to the can loading position at the top of FIG. 4, whereupon the turret comes again to rest because of another dwell period of the input cam. During this indexing step the slices are held in the throat 25 by the faceplate 22 of the turret, and the slices in the filled pocket 17 are held therein by means such as a stationary plate 29 (see FIG. 5) which may be mounted on the end of the throat 25. Also the projecting end of the plunger rod 24 remains in contact with the stop plate 28 which extends arcuately, as shown in FIG. 4, from the midposition of pocket loading to the top position of pocket discharge. Thus the stack of slices and plunger 23 remain axially stationary during this turret rotation.

Preferably the stop member 28 is adjustably mounted so that the amount of projection of the plunger rod 24 out of the pocket and accordingly the length of the stack of slices therein can be varied. By way of example, the stop is carried by a clamp 30 which is longitudinally adjustable along a rod 31 extending from a mounting plate or bracket 32 that is secured by screws 33 to the end of the index drive casing 7. It is also possible to handle slices of varying diameter by inserting liners of the desired diameter into the pocket 17 and replacing the plunger 23 with a similar plunger having the diameter of the liner. For example, FIG. 2 shows such a liner 34 inserted in the pocket 17 and secured in place therein by means of a set screw 35.

At the top pocket discharge position, when the turret comes to rest, the plunger rod 24 is engaged and driven inwardly relative to the pocket by means such as a bolt 36 adjustably mounted in a sliding head 37 which has sleevelike bosses 38 slidable on a pair of parallel rods 39 extending inwardly towards the turret from the mounting bracket 32. Preferably the ends of these rods adjacent the turret are connected together by a suitable strap or bar 40.

For operating the sliding head 37 and bolt 36, a fruit discharge cam 41 is mounted on the end 10 of the input shaft of the index drive. Referring particularly to FIG. 2, an operating lever 42 is pivoted at 43 on the supporting plate structure 4 and has a cam roller or follower 44 that is maintained in contact with the edge of the cam by a suitable spring 45. As shown in FIG. 2, the follower 44 bears against a low point on the cam, this being the end of the turret indexing cycle at which point an empty pocket has just come to rest at the pocket loading station and a filled pocket has come to rest at the can loading station.

As cam 41 continues to rotate, the high point of the cam face approaches the roller 44 and swings the lever 42 in a clockwise direction (as seen in FIG. 2) around its pivot 43, stretching the spring 45. This movement of lever 42 is communicated to the sliding head 37 and its bolt 36 so as to move the plunger rod 24 and plunger 23 inwardly to discharge the load of pineapple slices. Any suitable means can be employed for connecting the end of lever 42 with the sliding head. For example, the upper end of the lever has a fork or clevis 46, and a plate 47 secured by welding or otherwise to the sliding head 37 is provided with a similar fork or clevis 48. A connecting rod, preferably adjustable in length, extends between clevis 46 and clevis 48 so that the clockwise movement of lever 42 around its pivot produces sliding movement of head 37 and bolt 36 toward the turret. For clarity of illustration, the connecting rod is omitted from the plan view of FIG. 3, but FIG. 2 shows this connection in the form of a pair of eyebolts 49, one pivoted in clevis 46 and one in clevis 48, together with a coupling 50 in which the eyebolts are threaded and lock nuts 51.

The movement of the sliding head toward the turret and the accompanying movement of the plunger 23 causes the load of slices to be pushed out of the pocket 17 and into a waiting empty can 52 shown diagrammatically in dot and dash lines in FIG. 1. The apparatus for handling these cans is described in detail hereinafter. Preferably the cam 41 is designed to move the plunger somewhat beyond the end of the pocket and into

the head space of the can as indicated in dotted lines at 53 in FIG. 1. Pineapple slices have a strong tendency to stick to each other and to a flat smooth surface. By causing the plunger 23 to move into the head space of the can, the stack of slices is pushed in until the end slice of the stack comes in contact with the bottom of the can, after which the plunger is withdrawn out of the head space and back into the pocket. For the purpose of insuring that the plunger will break cleanly free from the end slice of the stack, the surface of the plunger is preferably grooved to reduce the contact area and to provide for breaking any vacuum. A typical design of grooving for the end of the plunger is illustrated in FIG. 6 in which concentric circular grooves 54 and intersecting radial grooves 55 are provided. Preferably also grooves 56 extend axially across the circumferential surface of the plunger 23 to permit air and/or juice to pass by the plunger as it is moved through the turret pocket.

During the above -described load discharging movement of the plunger rod 24, a spring 57 around the end of the rod is compressed slightly against the end plate 18 of the pocket. When the high point of cam 41 moves past the roller the fall of the cam permits spring 45 to move the lever 42 counterclockwise around its pivot 43 and thereby to withdraw the sliding head 37 and bolt 36. As this takes place, the spring 57 expands and withdraws the plunger 23 from the head space of the can. To prevent excessive recoil and possible oscillation of the parts, a dwell is provided in the cam edge 41 in the sector indicated at 58 which is made long enough, circumferentially speaking, for the spring 57, the plunger rod 24 and the plunger 23 to come to rest with the plunger in its normal position closing the end of the now empty pocket. Thereafter, as cam 41 continues to rotate, a further fall of the cam edge permits the lever 42 to move further in a counterclockwise direction whereby the sliding head 37 and bolt 36 are fully withdrawn.

As the next indexing movement of the turret takes place, the head of the plunger rod 24 engages a fixed stop plate 59 so as to maintain the plunger 23 in its normal position. This plate is mounted in any suitable manner, for example, on the strap 40 which connects the ends of the slide rods 39. When the pocket reaches the idle stop position at the right-hand side of FIG. 4, the end of the plunger rod is held in place by a further stop plate 60 that is mounted in any suitable manner on the supporting structure 12 which carries the driving motor 11. A further stop plate 61 may be provided in line with the stop plate 60 and extending from a point below the end of the plate 60 transversely to and beneath the axis of rotation of the turret and then up again to a point just below the pocket loading station already described. Plate 61 may conveniently be mounted on the end of the rod 31 previously described, by means such as a clamp bracket 62 (FIG. 1).

When the empty pocket reaches the pocket loading position already described, the end of the plunger rod moves beyond the terminus of the stop plate 61 and the pocket can then be filled with a fresh stack of slices because retraction of plunger 23 within the pocket is now possible, the plunger rod 24 moving out of the pocket until it engages the stop plate 28 referred to above.

Any suitable means can be used for feeding empty cans to the can loading position indicated at 52 in FIGS. 1 and 5 and for discharging the filled cans from this position. The can discharge or ejecting means, however, must operate in carefully synchronized relationship with the operations already described of indexing the turret, filling the empty turret pockets, and discharging the slices from the filled turret pockets.

By way of example, FIG. 5 shows diagrammatically part of a can chute 63 through which empty can bodies descend by gravity, the stack resting on the bottom can 52 which is supported in position to be filled on one or more can cradle members 64. These cradle members can be tilted to the dotted line position shown by means to be described whereby the filled cans are discharged down the inclined chute 65. The can cradle is supported by a pair of generally L-shaped supports each having a horizontal mounting flange 66 bolted at 67 to the baseplate 1 and an upwardly extending vertical leg 68. The vertical leg 68 (FIGS. 1 and 3) of the support closest to the pocket loading station can conveniently be used to support adjustably the adjacent throat 25. To this end one of a pair of plates 69 is suitably secured to the upper end of the adjacent leg 68, as by welding, and the other plate 69 is secured to the first plate by means of screws 70. These plates have mating grooves receiving a key 71 secured in the groove in the first plate 69 by screws 72. A supporting arm 73 extends outwardly from the outer plate 69 and supports the throat 25. Loosening of the screws 70, therefore, allows adjustment of the second plate 69 in the axial direction of the throat 25, and axial adjustment of the throat itself, toward or away from the face of the turret, while alignment is maintained by the key 71.

The vertical legs 68 of the two L-shaped supports are connected at their upper ends by plates 74 extending between and welded to the vertical edges of the support legs. At their upper ends, these plates 74 form supports for a pivot pin 75, and the cradle members 64 are mounted on a sleeve 76 which turns on the pivot pin 75. The sleeve 76 and cradle members 64 are rocked as a unit to discharge the filled can be mechanism described below.

For rocking the can cradle unit, it is preferred to employ a can discharge cam 77 mounted on the end 9 of the input shaft of the index drive unit 7. Thus the operating cams 41 and 77 are mounted on and driven in common with one another and with the turret indexing mechanism through positive driving connections so that precise synchronization can be established and maintained.

Referring to FIG. 1, the cam 77 rotates in the direction of the arrow, and moves through an arc of approximately 180° before the beginning of the cam rise reaches a cam roller 78 that is carried on one end of an operating lever 79 pivoted at 80 on the supporting plate structure 4 referred to above. The cam roller 78 is held in engagement with the edge of the cam by a spring 81.

The other end of the lever 79 is pivoted at 82 to one end of an adjustable coupling 83 which, as shown, comprises two eyebolts 84 connected by the threaded coupling member 83 and secured by suitable locknuts 85. The eyebolt 84 at the other end of the coupling is pivotally connected to one arm 86 of a bellcrank lever which rotates on a fixed shaft 87, one end of which is held in clamp block 88 mounted in the baseplate 1, and the other end of which may be threaded in the plate 68. The other arm 89 of the bellcrank lever is pivoted to another adjustable coupling 90 comprising a pair of eyebolts 91 connected by the threaded coupling member 90 and secured in adjusted position by locknuts 92. As shown particularly in FIG. 5, the upper eyebolt 91 is pivotally connected at 93 with the can cradle unit 64, 76.

Accordingly, as the cam 77 rotates on the input shaft of the index drive, and its high point reaches the cam roller 78, the lever 79 is rocked to the dotted line position shown in FIG. 1 with the result that the can cradle members 64 are rocked through the the coupling 83, the bellcrank lever and the coupling member 90 to eject the filled can from its filling position shown at 52 in dot and dash lines in FIG. 1 and FIG. 5.

It is preferable to employ safety switches actuated by moving parts of the apparatus described above in such a way that the drive is stopped in case of maladjustment or malfunctioning of the parts. For example, FIG. 1 shows a microswitch 94 which is periodically actuated when the cam operated lever 79 swings to its dotted line position. This switch allows the turret to stop only after the filled can has been discharged from its filling position 52. Also FIG. 5 shows a sensor 95 which stops the operation of the drive to the turret when the level of empty cans in the chute 63 drops below a predetermined minimum. A similar sensing device 96 can be employed which is responsive to the presence of slices on the belt 26. This slice sensor 96 and the empty can sensor 95 are preferably connected in series with each other so that if there should be either an inadequate supply of fruit or an inadequate supply of empty

cans the packer will stop. However, the series circuit including these two sensors is connected in parallel with the circuit of microswitch **94**, ,and accordingly the turret will not stop until this switch is actuated at the specified time during the indexing cycle. Preferably after the filled can has been discharged and before the next can loading stroke beings. With hydraulic drive motors such as motor **11**, these electrical control circuits can be used to regulate the position of electrical selector switches, solenoid operated valves and the like.

The operation of the apparatus will be understood from the foregoing description. It will be apparent to those skilled in the art that the invention makes possible a simple, yet effective, apparatus for automatically packing sliced pineapple into cans, having a minimum of operating parts and of controls requiring precise adjustment and maintenance in order to insure proper coordination of parts and operations. In particular the invention eliminates the need for stopping cylindrical or tubular bodies in precise alignment with reciprocating elements that are required to penetrate the cylindrical bodies with sliding fits. Furthermore, these results are secured while providing at the same time for variations in the size of slices and in the overall length of the stack of slices to be packed in a can. These and other advantages of the invention will be appreciated by those skilled in the art.

I claim:

1. Apparatus for canning sliced pineapple having a rotatable turret with at least one substantially cylindrical axially aligned pocket and indexing mechanism for intermittently rotating said turret and stopping it with said pocket at a pocket loading station and then at a can loading station, wherein a can load of pineapple slices is fed on edge to said pocket at said pocket loading station, carried in said pocket to said can loading station, and there discharged into an empty can, in which the improvement comprises

a plunger movable axially in said pocket with a plunger operating rod projecting out of the end of said pocket, said plunger being movable between an outer pocket-closing position where its outer face is flush with the adjacent face of the turret and an inner retracted position where the pocket is capable of receiving a can load of pineapple slices corresponding to the size of the empty can, stationary guide means slidably engaged by the end of said plunger rod for maintaining the plunger in one or the other of said positions during certain portions of the rotation of the turret, and operating means engaging said rod at said can loading station for moving said plunger from its inner position to its outer position to discharge the load of pineapple slices into the empty can.

2. Apparatus as defined in claim **1**, certain of said stationary guide means maintaining said plunger in its outer position and terminating at said pocket loading position.

3. Apparatus as defined in claim **2**, said plunger at said pocket loading station being free to retract in said pocket as the load of pineapple slices advances into the pocket.

4. Apparatus as defined in claim **1**, certain of said stationary guide means being located at said pocket loading station to limit the projection of said rod out of said pocket and thereby to control the size of said can load.

5. Apparatus as defined in claim **4**, said extension-limiting guide means at said pocket loading station being adjustably mounted to enable variation of the size of said can load.

6. Apparatus as defined in claim **4**, including a slice-retaining member having a surface closely adjacent the loading end of said pocket as it moves from said pocket loading station to said can loading station.

7. Apparatus as defined in claim **1**, including at said can loading station a power-operated means for engaging the end of said plunger rod and moving said plunger to its outer position to discharge the load of pineapple slices into the can.

8. Apparatus as defined in claim **7**, the movement of said plunger rod being sufficient to move said plunger partially out of the pocket and into the open end of the can to seat the load therein.

9. Apparatus as defined in claim **8**, including resilient means interposed between said plunger rod and turret structure for resisting movement of said plunger into said can end for returning said plunger to its flush outer position on withdrawal of said power-operated means.

10. Apparatus as defined in claim **9**, said power-operated means including a cam having a rise to move said plunger rod in its load-discharging stroke, said cam also having a dwell which limits the return movement of said plunger under the influence of said resilient means.