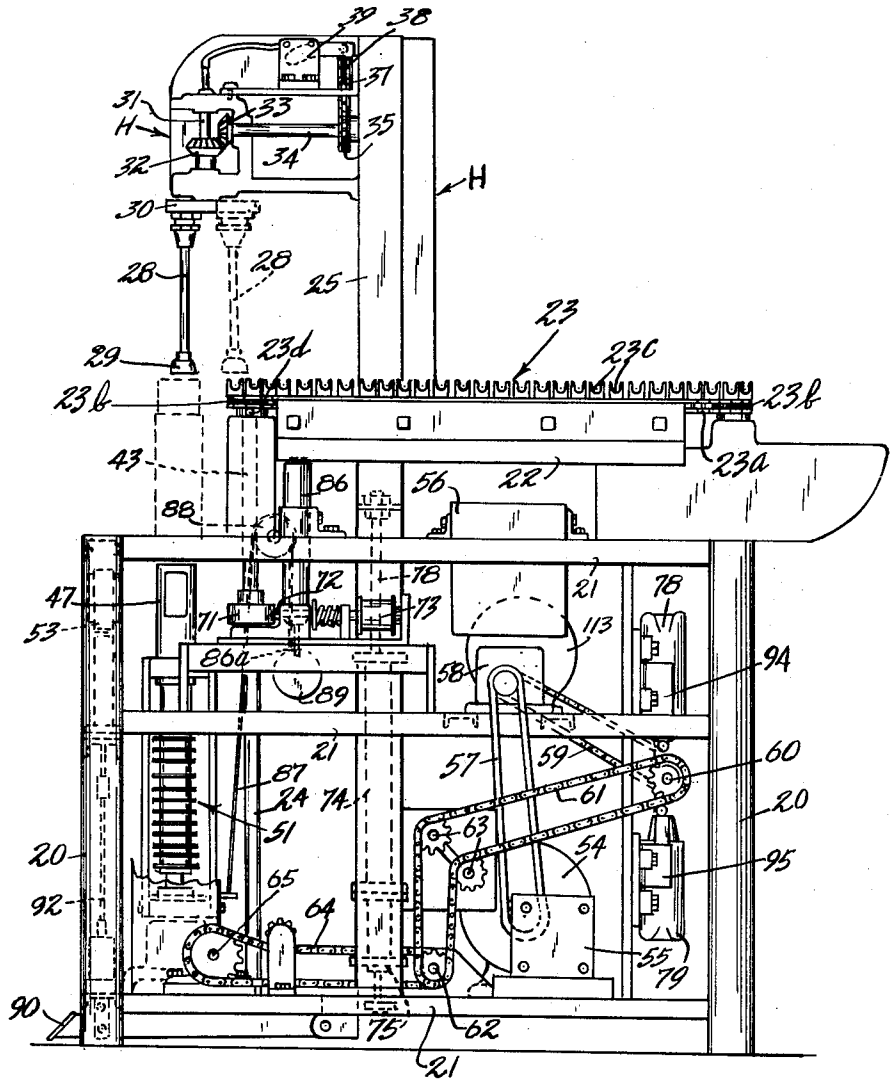
Oct. 12, 1954 G. A. WEIMER 2,691,472

OLIVE PACKING MACHINE WITH SYNCHRONIZED CONTAINER POSITIONING MECHANISM

Filed Sept. 14, 1950 9 Sheets-Sheet 1

FIG. 1



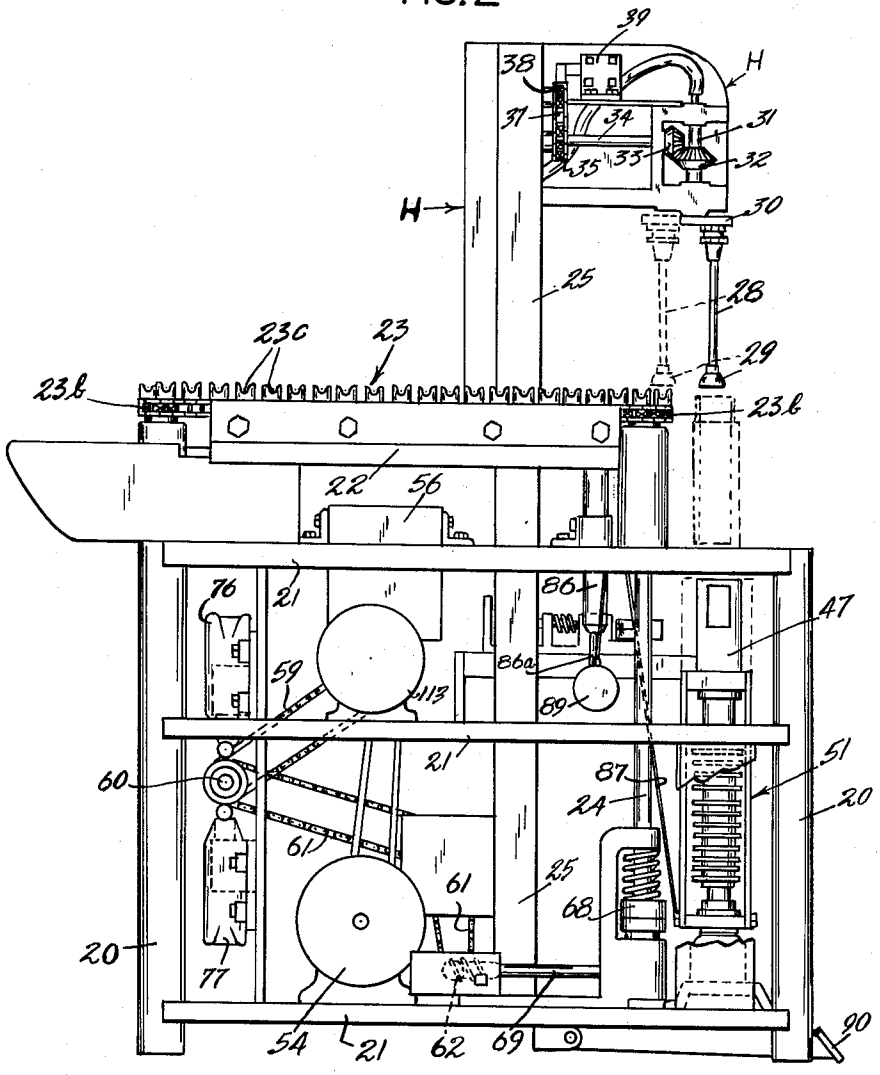
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OLIVE PACKING MACHINE WITH SYNCHRONIZED CONTAINER POSITIONING MECHANISM

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FIG. 2



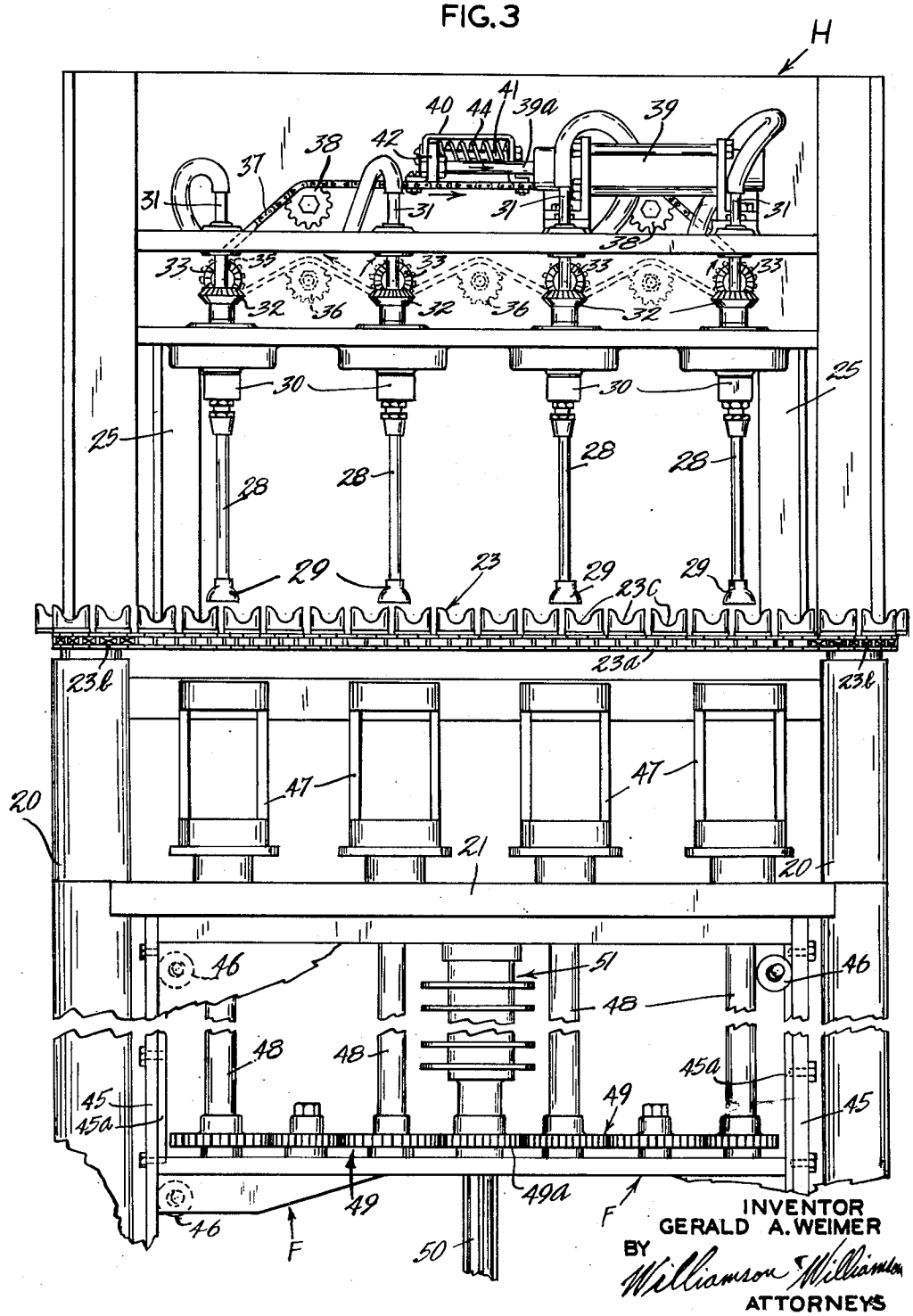
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OLIVE PACKING MACHINE WITH SYNCHRONIZED CONTAINER POSITIONING MECHANISM

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FIG. 3



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OLIVE PACKING MACHINE WITH SYNCHRONIZED CONTAINER POSITIONING MECHANISM

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FIG. 4

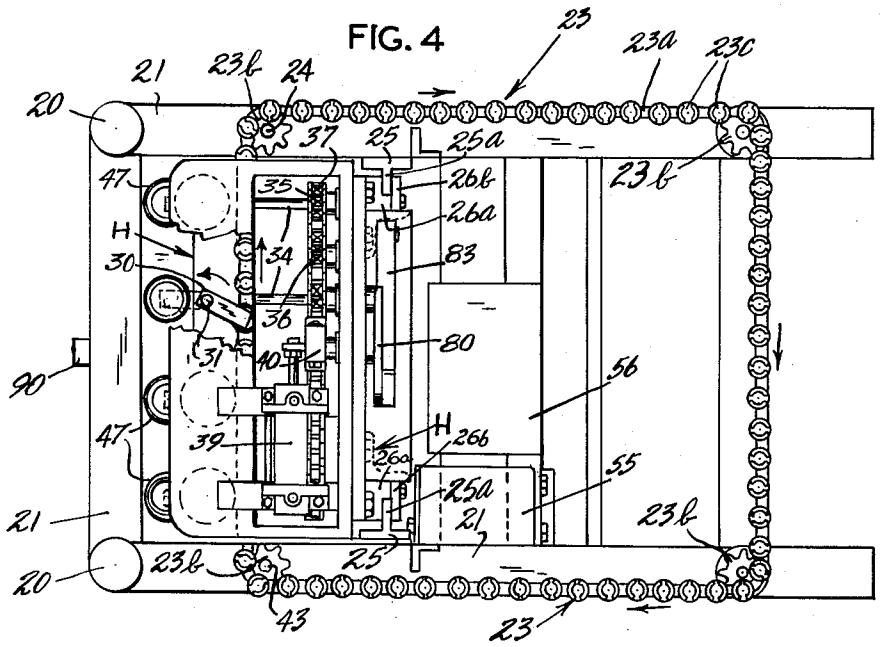
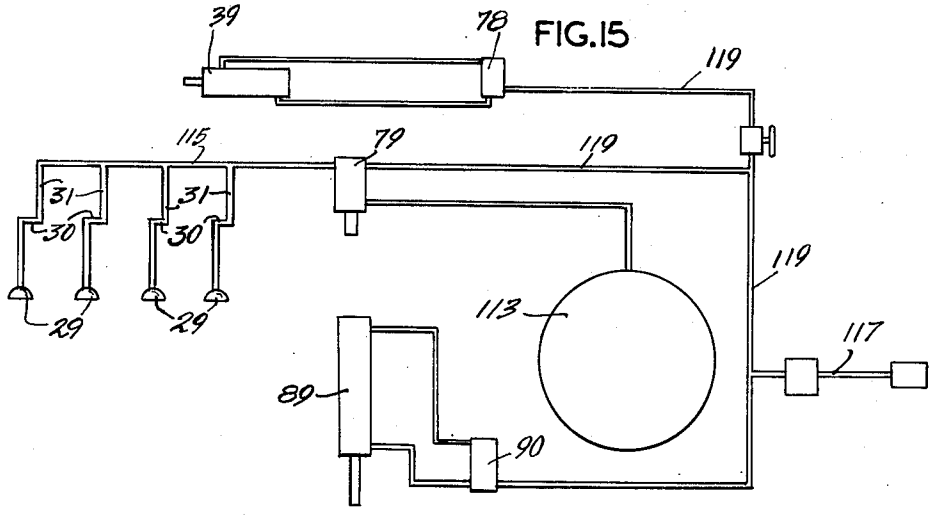


FIG. 15



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OLIVE PACKING MACHINE WITH SYNCHRONIZED CONTAINER POSITIONING MECHANISM

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FIG.16

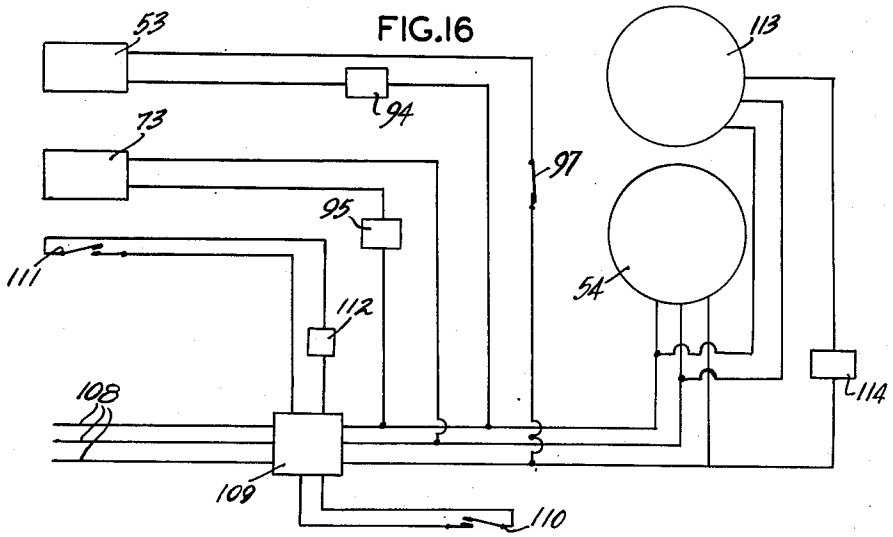
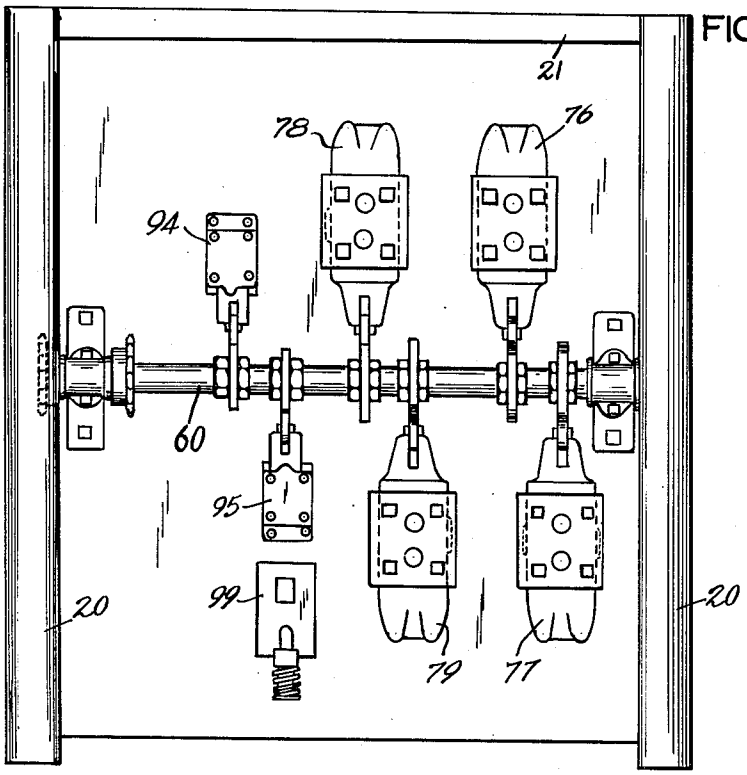


FIG.5



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OLIVE PACKING MACHINE WITH SYNCHRONIZED CONTAINER POSITIONING MECHANISM

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FIG. 6

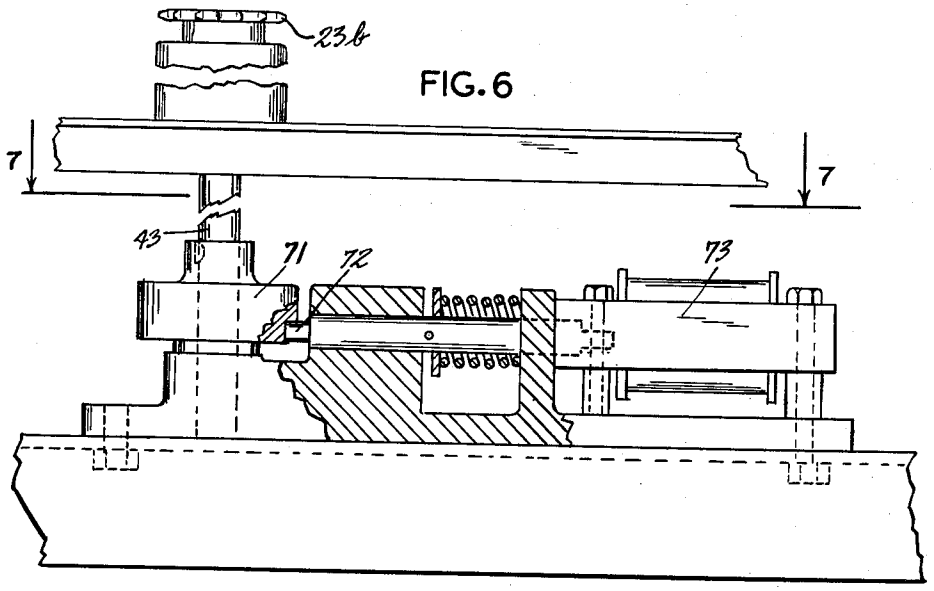
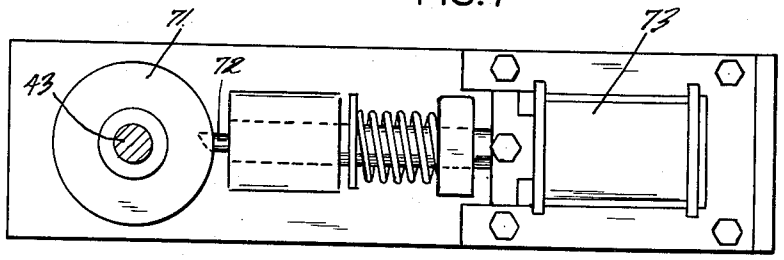


FIG. 7



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OLIVE PACKING MACHINE WITH SYNCHRONIZED CONTAINER POSITIONING MECHANISM

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FIG. 18

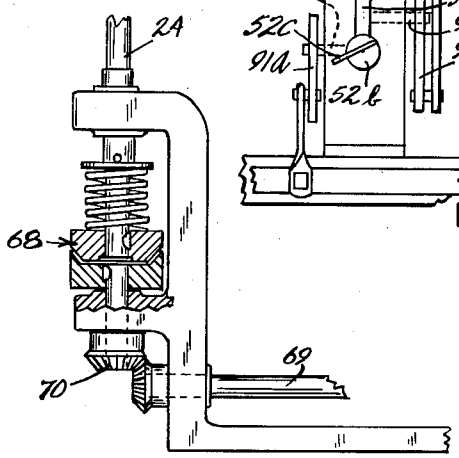


FIG. 9

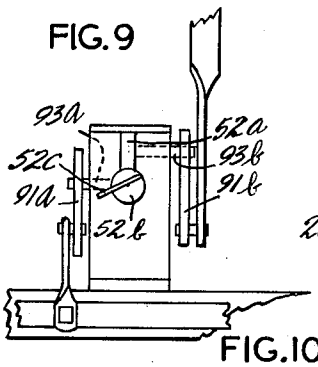


FIG. 10

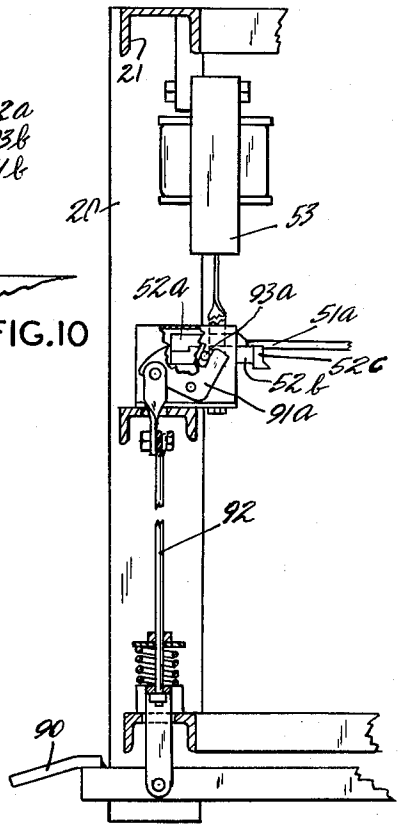
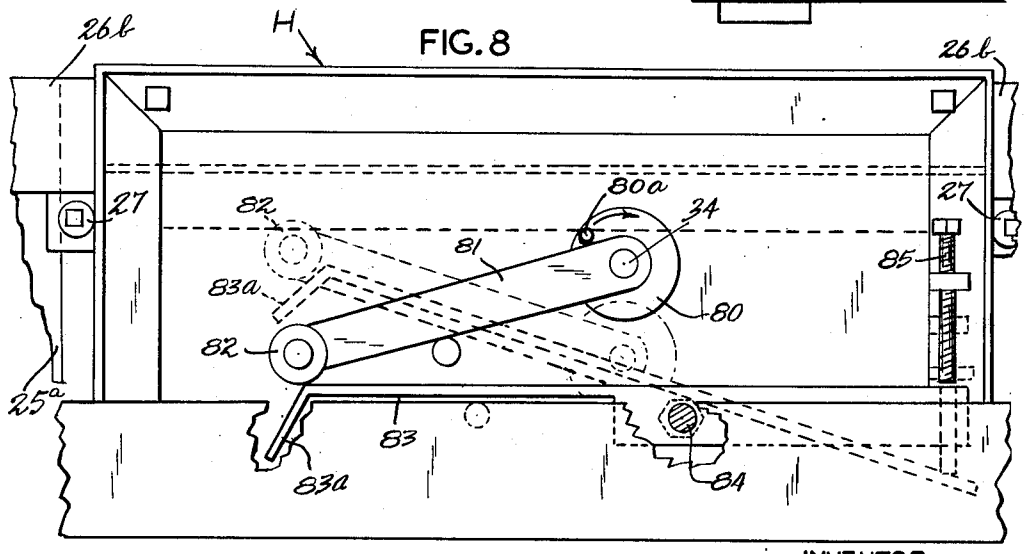


FIG. 8



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OLIVE PACKING MACHINE WITH SYNCHRONIZED CONTAINER POSITIONING MECHANISM

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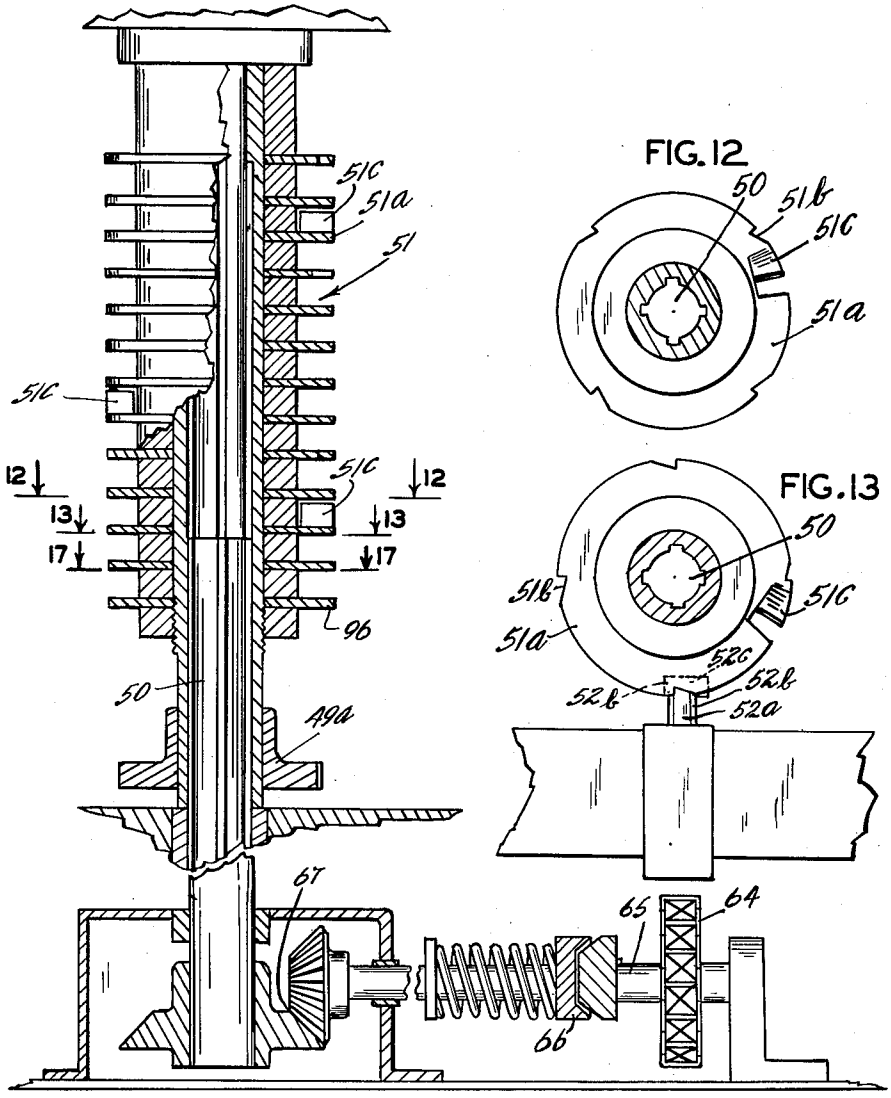


FIG. 11

FIG. 12

FIG. 13

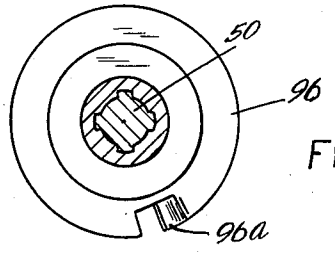


FIG. 17

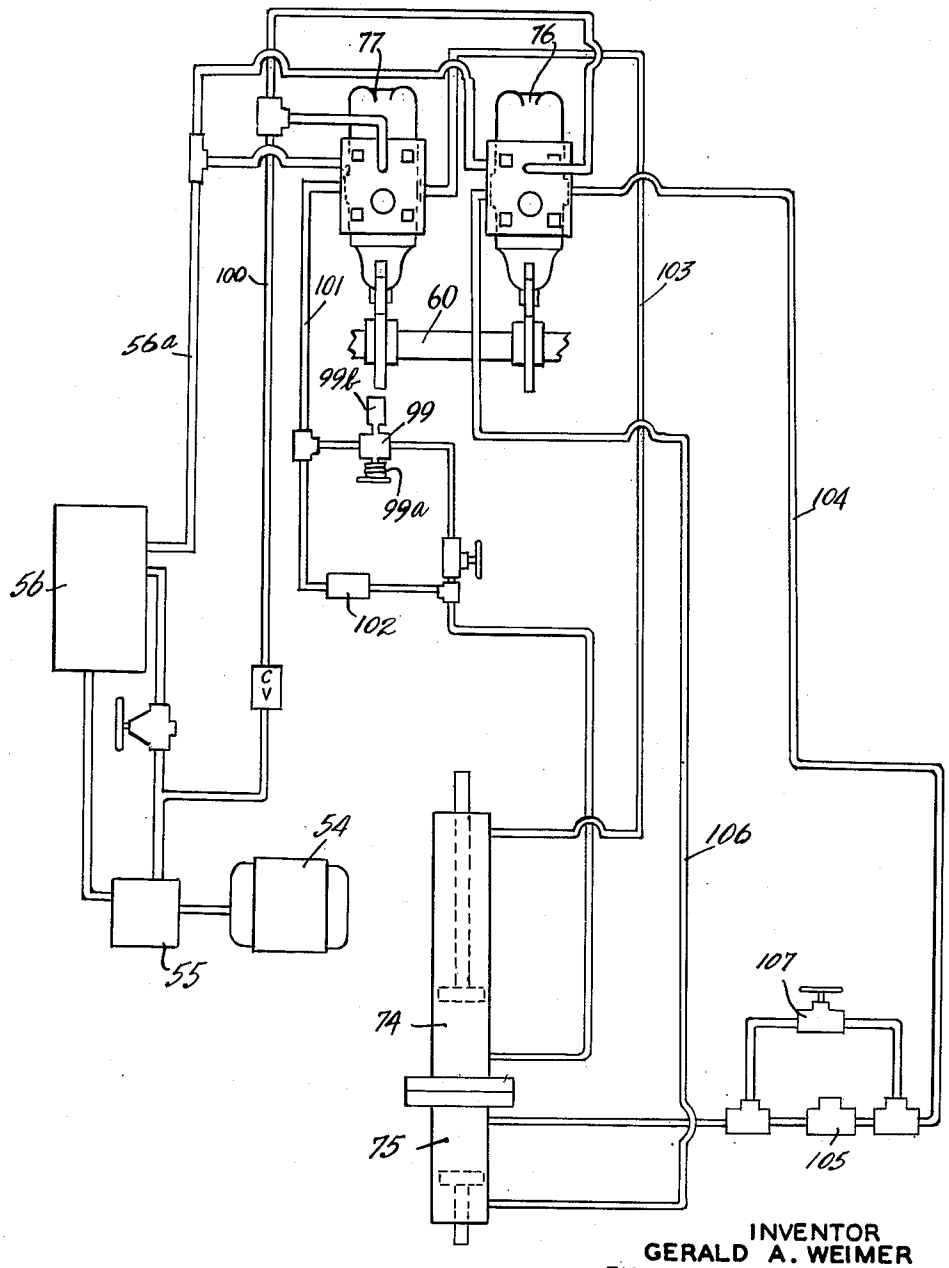
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OLIVE PACKING MACHINE WITH SYNCHRONIZED CONTAINER POSITIONING MECHANISM

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FIG. 14



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Patented Oct. 12, 1954

2,691,472

UNITED STATES PATENT OFFICE

2,691,472

OLIVE PACKING MACHINE WITH SYNCHRONIZED CONTAINER POSITIONING MECHANISM

Gerald A. Weimer, Minneapolis, Minn., assignor to Ernst and Ernst, Minneapolis, Minn., a partnership

Application September 14, 1950, Serial No. 184,878

14 Claims. (Cl. 226—16)

1

This invention relates to a machine for packing articles in containers and more particularly to a machine for packing olives in precisely predetermined relation within a jar.

The invention disclosed and claimed herein is closely related to my invention described and claimed in my application for patent Serial No. 8,233, entitled "Olive Packing Machine," and filed February 13, 1948. While the machine disclosed in said application operated in a satisfactory manner, the machine disclosed herein is in many respects an improvement thereon.

It is an object of my present machine to provide a novel and greatly improved machine particularly designed to pack olives in open top jars in precisely predetermined relation therein.

It is another object to provide a machine designed to pick up articles from a conveyor, transfer the articles from the conveyor to a container and place the articles in a precisely predetermined position in the container and to successively shift the container at predetermined intervals, whereby a number of articles may be packed within the container in precisely predetermined relation therein.

More specifically it is an object to provide a machine particularly designed for packing olives in jars and constructed to successively pick up and transfer olives, one at a time, into each of the jars being packed and discharge each olive at precisely the same point and to progressively shift the jar being packed after the placing of each olive therein to pack a number of olives in the jar in precisely predetermined relation therein.

It is another object to provide mechanism working in close cooperation with the other mechanisms of the machine for finally positioning the olives at the bottom of the packing stroke.

It is still a further object to provide extremely efficient and ingeniously constructed mechanism for positioning the jars in which the olives are being packed after each olive has been placed therein.

These and other objects and advantages of my invention will more fully appear from the following description made in connection with the accompanying drawings, wherein like reference characters refer to similar parts throughout the several views and, in which:

Fig. 1 is a side elevational view of my olive packing machine showing certain portions of the machine in one position in full lines, and another position in dotted lines;

Fig. 2 is a side elevational view of the machine

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shown in Fig. 1 as viewed from the other side thereof;

Fig. 3 is a front elevational view of the machine with parts thereof broken away;

Fig. 4 is a top plan view of my machine with portions thereof broken away and showing the packing arms in one position in full lines, and in another position in dotted lines;

Fg. 5 is a fragmentary rear elevational view of the arcuating cams;

Figs. 6 and 7 are fragmentary sectional views showing the holding mechanism for the conveyor, Fig. 7 being taken substantially on the line 7—7 of Fig. 6;

Fig. 8 is a fragmentary vertical sectional view with portions of the machine broken away and showing the final positioning mechanism for the olive packing arm;

Fig. 9 is a front elevational view of the mechanism shown in Fig. 10;

Fig. 10 is a side elevational view of the pawl retracting mechanism for the jar indexing and positioning stack;

Fig. 11 is a vertical sectional view of the jar index stack and mechanism therefor;

Fig. 12 is a horizontal sectional view taken substantially along the line 12—12 of Fig. 11;

Fig. 13 is a horizontal sectional view taken substantially along the line 13—13 of Fig. 11;

Fig. 14 is a diagrammatical view of the hydraulic system;

Fig. 15 is a diagrammatical view of the air system for supplying both positive and negative air pressures;

Fig. 16 is a diagrammatical view of the electrical connections and apparatus;

Fig. 17 is a horizontal sectional view taken substantially along the line 17—17 of Fig. 11; and

Fig. 18 is a fragmentary sectional view of the driving mechanism for the conveyor.

As illustrated in the accompanying drawings, I provide a substantially rigid supporting frame having the four upstanding legs 20 which are rigidly interconnected by horizontally disposed interconnection members 21. A conveyor supporting frame designated as an entirety by the numeral 22 is rigidly mounted on the top of the main supporting frame, and an intermittently travelling supply conveyor 23 is mounted for horizontal travelling around the periphery of said frame 22. In the form shown, the conveyor 23 consists in a link chain 23a trained about four sprockets 23b, respectively journalled at the four corners of the frame 22. A plurality of closely spaced open topped olive-receiving cups 23c are

mounted in upstanding relation on the top of said chain and are carried thereby. The two rear sprockets 23b are idlers. The left front sprocket as viewed from the front of the machine, is the driving sprocket and the right front sprocket is the conveyor holding or stopping sprocket. A conveyor drive shaft 24 is fixed to the driving sprocket and extends downward therefrom to the bottom of the machine, as best shown in Figs. 1 and 2. The driving and holding mechanisms for the conveyor will be subsequently described along with the other driving mechanisms for all of the other parts of the machine.

A head carriage track is formed by a pair of upright supports 25 which are rigidly mounted on the horizontal frame members 21 and extend upwardly a substantial distance thereabove. In the form shown, each of these uprights 25 has a T cross-sectional shape with the webs 25a of the two T's 25 lying in opposed relation, as best shown in Fig. 4. A reciprocating head H is slidably mounted on said tracks 25. The head has a pair of cooperating guide members 26a and 26b respectively, fixed at the sides thereof and slidably engaging the webs 25a of the respective T-shaped uprights 25. As best shown in Fig. 8, a pair of concentrically journalled rollers 27 are eccentrically mounted on each side of the head frame and the peripheral surface of the rollers is constructed to ride on the opposed edges of the webs 25a, to facilitate easy, uniform movement of that said carriage. The eccentric mounting permits the rollers to be shifted laterally, relative to the longitudinal edge portion of said webs, so as to permit firm engagement therewith and prevent rocking or binding of the carriage during its vertical reciprocation on the track. The reciprocating packing head H has a number of spaced vertically disposed pick-up and packing elements 28 mounted for swinging movement in depending relation thereto, as best shown in Fig. 3. In the form shown, each of these pick-up and packing elements 28 is a hollow tubular member depending from the forwardly extending portion of the head H and having highly flexible, resilient suction cups 29 respectively fixed on the bottom thereof. The suction cups 29 each has an aperture formed therein and communicating with the passage within its tubular member 28.

Each of the packing elements 28 is fixed at the top to one end of an oscillating arm 30 which is fixed at its other end to a hollow shaft 31, journalled in suitable bearings in the head for oscillation on a vertical axis. These hollow shafts 31 are horizontally spaced apart and each of the shafts has a bevel gear 32 fixed thereto. The arm 30 has a communicating passage therein, to afford communication between the depending hollow elements 28 and the hollow shafts 31. Each of the bevel gears 32 meshes with a similar bevel gear 33 mounted on a horizontally disposed shaft 34, journalled in the head H as best shown in Figs. 2 and 3, and each of the shafts 34 has a sprocket fixed thereon for driving said shafts and bevel gears. As best shown in Fig. 3, an idler sprocket 36 is interposed between each of the shaft driving sprockets 35 in order to maintain the driving engagement with each of said sprockets while simultaneously driving all of the sprockets 35 in the same direction. A flexible chain 37 is trained about the sprockets 35 and 36 as best shown in Fig. 3, as well as around a pair of idler sprockets 38, journalled above the other sprockets 35 and 36.

In the form shown, the actuating means for driving the chain 37 is an air-responsive piston-containing cylinder 39 having a piston rod 39a which is connected to said chain as by the yoke 40. The yoke 40 has a longitudinally disposed rod 41 fixed thereto and a connector bar 42 is fixed at one end to the piston rod 39a and is slidably mounted on rod 41. A relatively high tension yieldable element such as the spring 44 is interposed between the end of the yoke 40 and one side of the bar 42 to permit restrained shifting movement of the bar 42 on the rod 41 in one direction, without shifting the piston rod 39a for purposes to be described hereafter. The valve structure for actuating the pneumatic piston within cylinder 37 and supplying air to the hollow shafts 31 will be described hereafter.

A jar positioning mechanism is provided and, in the form shown, constitutes a vertically slidable frame F mounted on the main frame structure. A pair of vertically disposed plates 45 are mounted in transversely disposed position at the front portion of said main frame and the jar carrying frame F is slidable thereon. Rollers 46 constructed similarly to the rollers 27 for the head carriage, are provided at the sides of the jar carrying frame and respectively engage the opposed surfaces of the upstanding plates 45. A pair of guides 45a are respectively fixed to the plates 45 to maintain straight-line movement of the carriage and guide the rollers in their vertical travel. A jar holder 47 for each of the packing elements 28 is mounted on frame F and a vertically disposed shaft 48 is fixed to each jar holder 47 and is journalled on said frame. It will be seen from Figs. 2 and 4 that the jar holders 47 are disposed in outwardly spaced relation from the front run of the conveyor 23. In the mechanism illustrated, each crank arm 30 for the packing elements 28 swings through an arc of 190 degrees from the pick-up position to the jar entering position over the respective centers of the jars. In Fig. 3 the conveyor 23 is shown in pick-up position and the packing elements 28 are shown in jar entering position. The jar positioning shafts 48 are journalled in the jar supporting frame F on horizontally spaced vertical axes, and suitable driving connections are formed between adjacent shafts 48 such as the pinion gear train designated as an entirety by the numeral 49, best shown in Fig. 3, which simultaneously drives all of the shafts 48 in one direction. A central pinion 49a provides the driving power for the gear train and is splined to the shaft 50 on which said pinion is free to slide in a vertical direction. The gear train 49 and shafts 48, as well as the jar holders 47, all shift vertically with the jar supporting frame. The driving mechanism will be subsequently described.

An indexing stack 51 is splined to shaft 50 in fixed relation to the pinion 49a, as best shown in Fig. 11. The top of the indexing stack 51 is fixed to the jar supporting carriage F, as best shown in Figs. 3 and 11, and is constructed to vertically position said carriage as well as oscillating through the gear train 49 said jar holders 47 into the proper olive receiving position. The stack comprises a plurality of vertically spaced disks 51a on top of a synchronizing starting disk 96, as best shown in Figs. 11, 12, 13 and 17. Each of these disks 51a has a predetermined number of notches 51b formed in the periphery thereof and also a lowering ramp 51c is provided, as best shown in Fig. 11. In Fig. 11, the stack

51 and jar supporting frame F are shown in raised position.

A normally projected disk engaging and supporting dog 52 is shown in Figs. 9 and 10. The dog 52 is divided into two parts, 52*a* and 52*b*, as best shown in Fig. 9. A dog retracting bell crank 91*a* is pivotally mounted on one side of the pawl carrying block and another bell crank 91*b* is pivotally mounted on the other side of the pawl carrying block. A solenoid 53 is mounted above the bell crank 91*b* and is connected to the forward end thereof. The bell crank 91*a* has a slot formed in the upper portion thereof and a retracting pin 93*a* is disposed therein and is fixed at its inner end to the lower pawl 52*b*. A similar slot is formed in the bell crank 91*b* and a pin 93*b* is fixed at its inner end to the upper pawl 52*a* and is received in said slot. The two dogs 52*a* and 52*b* are so related, as best shown in Fig. 10, that the upper pawl 52*a* may be retracted without retracting the lower pawl 52*b*. This is accomplished by the solenoid 53. However, retraction on the lower pawl 52*b* will necessarily retract the upper pawl due to the interlocking stepped construction, as best shown in Fig. 10. The bell crank 91*a* is actuated by a foot lever 90 which is interconnected therewith by a link 92.

The disks 51*b* and 96 ride on the outer portion of the lower pawl 52*b* and more particularly on a guiding and supporting element 52*c* fixed to the outer face thereof, as best shown in Fig. 9. The upper dog 52*a* is normally projected outwardly by suitable resilient means, and is adapted to engage the notches 51*b* formed in the periphery of the disks 51*a*, as best shown in Figs. 11, 12 and 13. The notches 51*b*, in the form shown, constitute the mechanism for intermittently stopping the rotation of the jars in holders 47 and for packing four olives in each layer. It should be noted that the olives in adjacent layers will be staggered and that adjacent disks have their notches 51*b* disposed at 45 degrees relative to each other. If only two or three olives were to be packed in a layer, the number of notches 51*b* would be changed to the number of olives desired in each layer and the spaces between the disks would be varied with the variation in the thickness of the olives. The bottom pawl 52*b* normally supports the weight of the entire frame during the intermittent rotation of the disk 51*a*. After four olives have been packed in each layer, the ramp 51*c* gradually lowers the stack 51, and when the end of the ramp is raised the lower pawl 52*b* will engage the underside of the marginal peripheral portion of the disk immediately thereabove and will support the jars at that elevation until the four olives are packed in the next layer. The mechanism for rotating the disks will be hereafter described.

Driving mechanisms

As best shown in Fig. 1, a suitable source of rotary power, such as the electric motor 54, is provided and drives a hydraulic pump 55 which is connected to a hydraulic fluid reservoir 56 and supplies fluid under pressure to the hydraulic system to be hereinafter described. A driving connection such as the belt and pulley drive 57 connects the motor 54 with a reduction gear box 58 from which a chain and sprocket drive 59 extends to a cam shaft 60. A chain and sprocket drive 61 extends from the cam shaft downwardly to a transversely disposed power transfer shaft 62. A pair of belt tightening idlers 63 maintain driving tension in the runs of the chain 61. A chain and sprocket drive 64 interconnects power transfer shaft 62 and an indexing stack drive shaft 65, as best shown in Figs. 1 and 11. As best shown in Fig. 11, a friction clutch mechanism 66 permits the chain and sprocket drive 64 to be constantly operated while the stop dog 52 holds the spline shaft 50 which is driven by shaft 65 through bevel gear 67. Whenever the pawl 52*a* is retracted by the solenoid 53, the clutch will rotate the spline shaft 50 until the pawl 52*a* engages the next notch 51*b*.

A similar slipping clutch mechanism is provided for the conveyor drive such as the clutch 68 mounted at the lower portion of shaft 24, as best shown in Fig. 2. The shaft 62 drives a connector shaft 69 which is connected through bevel gears 70 to the lower end of shaft 24 below the clutch 68, as best shown in Fig. 18. A stop mechanism having an enlarged collar 71 is fixed to a vertically disposed stub shaft 43 which in turn is fixed to the right front conveyor solenoid 23*b*, as best shown in Fig. 1. The collar 71 has a recess formed therein to receive a normally projected dog or pawl 72 which is releasable by a solenoid 73. The sides of the collar 71 are such that a single rotation thereof will advance the conveyor 23 by five olive carrying cups. This will permit a single conveyor run to supply the four packing elements of the machine.

A pair of hydraulic cylinders are connected end to end such as the relatively long cylinder 74 and the short cylinder 75 shown in dotted lines in Fig. 1. A hydraulic piston works in each of said cylinders and is actuated by fluid supplied under pressure from pump 55 through valves 76 and 77, shown in Figs. 5 and 14. The valve 76 controls the flow to the small cylinder 75 and the valve 77 controls the flow to the large cylinder 74. The piston rod of the piston working in cylinder 74 is designated by the numeral 78 and is fixed at the upper portion thereof to the head carriage 26, and the piston rod of the piston working in the small cylinder 75 is fixed to the bottom of the main supporting frame so that any shifting movement of either piston within its cylinder will cause shifting movement of the carriage 26 relative to its guiding supports 25. Suitable lines for supplying fluid under pressure from pump 55 through the valves 76 and 77 are provided although the details of these connections are not shown except in the diagrammatic view designated as Fig. 14. A cam actuated valve 78, as shown in Figs. 5 and 15, controls the air supply to the pneumatic cylinder 39 for shifting the chain 37 and swinging the arms 30 through the predetermined arc from olive pick-up position to position for lowering said olive into the jar. The valve 79 controls the supply of air at super-atmospheric pressure to the olive pick-up cups 29 to positively eject the olives therefrom in their discharge position at the bottom of the packing stroke.

After the olive has entered the jar through the diminished mouth and neck thereof, it is necessary to swing the arms 30 a slight distance, in order to place the olive with a portion thereof engaging the side wall of the jar. This portion is, of course, the end of the olive which has been stuffed with pimento. The mechanism for producing this final shifting movement to position the olive against the side wall of the container is best shown in Fig. 9. Any one of the several shafts 34 could be extended rearwardly through the rear of the head H. As illustrated in Fig. 4, the second shaft from the left side of the ma-

chine as it is viewed from the front, is the one extended through the head and as shown in Fig. 8, a collar 80 is fixed to said shaft and an arm 81 is freely journalled on such shaft. The arm 81 has a roller 82 journalled on the free end portion thereof and said roller engages an actuating lever which is pivotally mounted relative to the main frame on a pivot pin 84 which is disposed at an intermediate portion of said lever. An adjustable rod such as the screw 85 is mounted on the rear of head H directly above the free end of lever 83, for engaging the same when the head and packing elements are lowered to a predetermined elevation. The other end of lever 83 has a downwardly extending camming arm 83a disposed at slightly greater than a right angle to the elongated lever 83. A stop pin 80a is fixed to the rear face of collar 80 and positively engages the upper surface arm 81 when the packing elements 28 are disposed in jar entering position over the respective centers of the jars, and positively positions said packing elements, as shown in the full line positions of Figs. 1, 2 and 3. When the head reaches the bottom of the long packing stroke, the rod 85 engages the free end of the lever 83 and shifts the camming arm 83a at the other end of the lever 83 upwardly to move the actuating arm 81 upwardly into the dotted position as shown in Fig. 8. The head H, of course, continues to travel downwardly to the bottom of the stroke, and at the extreme bottom of the stroke the oscillation of the shaft 34 to which the collar 80 is fixed swings the arms 30 and the packing elements 28 laterally to position the olives in each of the cups 29, adjacent the side wall of the jar. The spring 44 is compressed by this return shifting movement without moving the piston within cylinder 39.

One of the main problems in placing the olive within the jar is to position the olive with its longitudinal axis disposed radially of the jar and the pimento end of the olive firmly engaged against the side wall of the jar. The diminished mouth or neck portion of the jar makes it necessary to insert the olive into the jar and thereafter shift the olive laterally to place the same against the side wall thereof. It has been found that, by placing the olives with the pimento end facing toward the right in the conveyor cups 23c and by swinging the olive through 190 degrees when inserting the same into the jar and swinging the same back 10 degrees, a net arc of 180 degrees is produced which will face the pimento towards the left as viewed from the front and position the longitudinal axis of the olive substantially radially within the jar. To adjust inaccuracies in the construction of the machine and to initially adjust the position of the conveyor cups 23c so that a net swinging arc of 180 degrees is produced on each olive, the set screw 23d in the sprocket 23b disposed at the right front corner of the machine as viewed from the front, is loosened and the sprocket turned on its stub shaft 43. After the proper adjustment has been made, the set screw is then, of course, tightened. Obviously it would be possible to place the olives in a different relation within the cups 23c and to swing the olives through a different arc than the arc of 180 degrees. However, the embodiment of my invention above described has been found to be the most convenient and practical and the best operational results have been obtained therefrom.

When the last olive has been packed in jars held in the holders 47, the jar holding carriage is at the bottom of its downwardly shifting movement, as best shown in Figs. 1 and 2. In order to begin the packing of the next series of jars, the entire jar holding carriage must be raised so that the bottom disk of the stack 51 is supported on the dog or pawl 52 and said pawl is engaged in the first notch 51b of the lowest jar positioning disk 51a, as best shown in Fig. 13. This elevation of the jar holding carriage or frame F is accomplished by a pneumatic jack mechanism constituting the cylinder 86 shown in Fig. 1 with a piston working therein responsive to shifting movement to air under pressure. A flexible connection member 87 is trained over a fixed pulley 88, a counter-balancing weight in the form of a transversely disposed cylinder 89 is connected to the free end of the flexible connection member 87 and a piston rod 86 engages said cylinder 89 to force the same downwardly when air under pressure is introduced into the cylinder 86. The upper end of the cylinder 86 is fixed to the top portion of the supporting frame and said cylinder extends downwardly therefrom and forcibly projects the piston rod 86a downwardly. The rod 86a is received in a recess provided in the upper portion of the cylinder 89 and suitable guide means may be provided for said cylinder to limit a displacement thereof during the shifting movement. In order to raise the jar holding frame F both dogs 52a and 52b must be fully retracted to release the same from the indexing stack, to permit the carriage and stack to be shifted upwardly. This is accomplished by the linkage shown in Fig. 10, actuated by the foot lever 90 which pulls downwardly on a bell crank 91a to which it is connected by a link 92.

A pair of cam actuated switches 94 and 95 are respectively provided for controlling the operation of the solenoids 53 and 73. The main cam shaft 60 of course, synchronizes the actuation of the hydraulic rams, the actuation of the pneumatic piston within cylinder 39, the timing of the air blast through the pick-up cup 29 and the intermittent driving of the conveyor 23. However, in order that the indexing stack be synchronized with the rest of the mechanisms, it is necessary that the pawl or dog 52a be engaged in the first notch 51b of the lowest indexing disk 51a in stack 51. This is accomplished by inserting a starting disk such as the disk 96, below the bottom indexing disk 51a. This starting disk 96 has no rotational interrupting notches similar to the notches 51d but has a smooth periphery, as best shown in Fig. 17, with only a single ramp 96a for lowering the stack to engage the dog 52 in the first notch 51b of the bottom indexing disk 51a. A normally closed push button switch 97 in series with solenoid 53 and under the control of the machine operator opens up the circuit through said solenoid, until the suction cups 29 are in the proper pick-up position, at which time the push button switch is released, and the packing cycle is started with the indexing stack synchronized with the other parts of the machine. An electric limit switch 98 is mounted on the front panel of the jar holding carriage F, and when the carriage reaches the bottom of its stroke this limit switch shuts off the entire electric power for the machine until the jar holding carriage is again raised.

As best shown in the hydraulic diagram illustrated in Fig. 14, the machine may be stopped at any point to make any adjustment necessary, and the head will be positively held in the exact position in which it was when the machine was

stopped. This is accomplished by a solenoid actuated check valve 99 which is normally closed by spring 99a but is held open by energization of the solenoid 99b whenever the circuit to the pump motor 54 is closed. The hydraulic system receives fluid under pressure from pump 55 which supplies said fluid through supply line 100 to the two cam actuated valves 76 and 77. When the valve 77 is in one position, the fluid under pressure travels through supply line 101, check valve 102 or check valve 99 and into the lower portion of cylinder 74, to elevate the piston therein and raise the head carriage 26 through its long stroke. The fluid in the top of the cylinder 74 flows back to reservoir 56 through line 103, valve 77 and return line 56a. When the valve 77 is in another position fluid under pressure will be supplied through line 103 and will return through line 101 and check valve 99 which will be held open by solenoid 99b, as long as the machine is in operation. The valve 76 when in one position, supplies fluid to the small cylinder 75 through line 104 and a conventional sequence valve 105, and when in another position, supplies fluid through line 106 to the bottom of cylinder 75, and backflows fluid from the upper portion of cylinder 75 through sequence valve 105 and line 104 and back to the reservoir 56 through return line 56a. It will be seen that the sequence valve 105 prevents lowering of the head carriage 26 when the valve 107 is closed and the machine is stopped during the pick-up stroke. The solenoid check valve 99 holds the carriage 26 in the precise position in which it was stopped during the packing or stroke. Without these valves 105 and 99, backflow would be permitted through the valves 76 and 77 and the head, if stopped in an intermediate position, would slowly fall and lower the packing member 28 and suction cup 29 onto olives which had already been packed in the jars and cause considerable damage thereto.

In Fig. 16 the wiring diagram for all of the mechanisms is shown. A 220 volt circuit is indicated by the three lines 108, a master switch 109 and two push button switches 110 and 111 and a limit-switch 112 to the motor 54. The limit-switch 94 is actuated by its cam mounted on the main cam shaft 60, and intermittently energizes solenoid 53 to retract pawl 52a from its engaged notch 51b. The cam actuated switch 95 intermittently energizes solenoid 73 to retract the stop pawl 72 and permit rotation of shaft 43 and limited movement of the conveyor 23.

A vacuum pump is connected in parallel with the motor 54 and is designated by the numeral 113, and is illustrated in Figs. 1, 2 and 16. A limit-switch 114 is positioned on the front portion of the main frame adjacent the bottom of the jar holding carriage when said carriage is in extreme raised position with the disk 96 supported on the pawl 52b. A cam on the lower portion of the carriage actuates the limit-switch 114 to stop the vacuum pump during the period that the extreme bottom disk 96 is engaged by the pawl 52. This is to permit a "dry run" of the packing head H and the member 28 without picking up an olive in order to permit synchronization of the packing stroke with the proper positioning of the dog 52a in the first notch 51b of the bottom indexing disk 51a, as has been previously described.

The fluid pressure supply system is illustrated in Fig. 15. A vacuum pump 113 serves to produce a vacuum in the supply line 115 which communicates with the upstanding hollow shafts 31 mounted in the packing head H. The cam actuated valve 79 normally affords communication between the vacuum pump 113 and the supply line 115. A super-atmospheric supply is provided from any suitable source 117 and a cam actuated valve 78 controls the flow of fluid such as air under pressure, through the pneumatic cylinder 39 which controls the oscillation of the packing arms 30 and packing members 28 as has been previously described. The foot control valve 90 controls the actuation of the pneumatic ram 89 which raises the jar supporting frame into initial starting position as has been previously described. The cam actuated valve 79 normally provides a vacuum in supply line 115 but when the suction cups 29 with olives therein reach the discharge position within the jar, said valve 79 affords communication between super-atmospheric air pressure line 119 and supply line 115 which positive air pressure is sufficient to overcome the vacuum supplied by said vacuum pump 113 and serves to positively eject the olives at the discharge position, adjacent the side wall of the respective containers.

Operation

The cups 23c of the conveyor 23 are initially filled with olives with the pimento facing toward the right in the front run of the conveyor as viewed from the front. The indexing stack 51 is then synchronized with the packing stroke of the packing head H and thereafter the entire operation of completely packing the jars of olives is carried out automatically as long as the conveyor 23 is kept filled with olives. In the form shown, four jars are simultaneously filled by the four packing members 28. The stack and jar holding carriage F, of course, is initially raised and is progressively lowered by the operation of the pawl 52b and the indexing disks 51a. The first olives are initially received in the respective suction cups 29 which are lowered into engagement therewith by the small hydraulic ram in cylinder 75 actuated by the cam operated valve 76. There is a constant suction through the hollow packing members 28 which is maintained by the operation of the vacuum pump 113 during the entire packing cycle. After a predetermined interval of engagement between the suction cups 29 and the olives in the conveyor cups 23c, the ram in cylinder 75 raises the packing head H a short distance, to permit the olives carried by the cups to clear the conveyor. The packing head is substantially held at this elevation until the arms 30 are swung outwardly to lie directly above the centers of the respective jars into which the olives are to be placed. This is accomplished by the actuation of the valve 78 by its cam, to supply air under positive pressure from line 119 to the cylinder 39 which shifts the chain in the direction shown by the arrows of Fig. 3. These arms 30 are, in the form shown swung through a counter-clockwise arc of 190 degrees, as viewed from the top in Fig. 4, which positions the packing members 28 and the olives carried by the suction cups 29 directly over the centers of the jars, as illustrated in Fig. 3. The stop 80a positively positions the members 28 in jar entering position. At this point the valve 77 actuates the ram in the longer cylinder 74 to lower the head H and the olives carried by the cups 29 into the respective jars. Toward the bottom of the stroke the actuating lever 83 is engaged by pin or rod 85 to swing the arm 81 upwardly and shift the collar 80 in a clock-wise direction, as viewed from the rear in Fig. 8, which

produces a counter-clockwise rotation on the second shaft 34 from the left, as viewed from the front in Fig. 3. This shifts the chain 37 back and swings the arm 30 back into a substantially 180 degree relation to the pick-up position shown by the full lines in Fig. 4, and places the pimento end of the olive against the side wall of the container with the longitudinal axis of the olive disposed along a radius thereof. At this point the cam actuated valve 79 introduces air under positive pressure from line 119 to line 115 and overcomes the vacuum in said line, to positively eject and place the olive in a precise position in the jar. When the olive has been ejected the head H will be raised by actuation of the ram in the longer cylinder 74 by valve 77, to introduce hydraulic liquid under pressure at the bottom of said cylinder to raise the ram and remove the suction cups 29 from the jars. When the head is raised the weight of the arm 81 will cause the same to immediately fall against stops provided to hold the same in normal position, and the spring 44 swings the arms 30 back into 190 degree relation with the pick-up position thereof to permit central removal of the cups 29 from the respective jars. When the cups 29 have been raised to the top of the stroke, the cam 78 supplies air to cylinder 39 to push the ram therein outwardly and swing the arm back into pick-up position, as shown by the full lines in Fig. 1. At this point the ram within the short cylinder 75 lowers the suction cups 29 into engagement with the olives in the conveyor and the operation is repeated. As soon as the olives are picked up from the conveyor, the pawl 73 will be retracted and the conveyor will be shifted in the direction shown by the arrows in Fig. 4, by a distance of five cups, in order to supply filled cups to each of the packing members 28 and suction cups 29.

In the machine illustrated four olives are to be packed in each layer, and when said four olives have been placed in each layer, the indexing stack 51*a* being supported on the pawl 52*b* will be rotated to permit said pawl 52*b* to ride on the ramp 51*c* and through the opening at the end of the ramp and engage the next adjacent disk disposed thereabove.

As was described in my previously identified copending application, the problem in packing olives is the positioning of the olives within containers having diminished mouths or neck portions. Since the olive must be placed with the pimento against the outside wall of the jar, it is necessary that a final positioning or shifting movement be imparted to the olive at the lower portion of the packing stroke to place the olive against the side wall. This narrow or diminished neck portion serves to securely lock the olives in their packed position within the jars after the jars have been fully packed. The diminished mouth portion makes it extremely difficult if not impossible to introduce more than one olive at a time therethrough. Therefore, it is necessary to successively pack olives in the container individually one at a time.

It will be seen that I have provided a highly efficient mechanism in which the parts thereof are closely synchronized and work in close cooperation one with the other, to pack olives individually in jars. It should be kept in mind that this mechanism could of course be used for packing other articles within their respective containers. The mechanism hereinbefore described operates to supply articles such as olives to a precisely predetermined pickup position, to provide a pick-up element mounted on a packing member for initially engaging and holding an article thereon, said mechanism thereafter raising said article a slight distance and horizontally shifting the same into jar entering position, then lowering the article into the jar, and after entrance, shifting the article outwardly to engage the side wall of the jar and finally imparting a blast of air thereto to discharge the olive or other article from the pick-up element. In the form shown, a plurality of jars can be simultaneously packed as by the four packing members 28. The jar positioning mechanism is extremely ingeniously constructed, and is closely synchronized with the other parts of the machine to successively shift a jar of olives after a predetermined number of olives has been packed therein. In the form shown, the jar rotates after each olive has been placed therein, and drops when a layer of four olives has been placed therein. It should be noted that when the carriage or frame F drops after the last olive has been placed in the jar, the limit switch 112 is opened by the operation of a suitably positioned cam to completely cut off all of the power to the motor 54 and vacuum pump 113.

It will of course be understood that various changes may be made in the details, arrangements, and proportions of the parts without departing from the scope of my invention.

What I claim is:

1. A packing machine for individually placing articles one at a time in precise, predetermined relation within an open-topped container, said machine comprising a supporting structure, a reciprocating head mounted for substantially vertical reciprocation on said structure, at least one article packing member mounted in depending relation on said head for horizontal shifting movement relative thereto, actuating means for reciprocating said head from a precisely predetermined article pick-up elevation to a precisely predetermined article discharge elevation, actuating means synchronized with said reciprocating means and connected with said packing member for horizontally shifting said packing member from a precise pick-up position to a container entering position, said connection between said shifting means and said article packing member providing for lost motion movement of said packing member relative to said shifting means, mechanism connected with the packing member and mounted on the packing head and responsive for actuation to the downward shifting movement of the head at the lower portion of the packing stroke to swing said packing member outwardly within the container toward the side wall thereof into a precise discharge position whereby all of the articles to be packed in said container will be discharged therein, one at a time, by said packing member, each time said packing member is in precisely the same position vertically and horizontally, means on said packing member for retaining an article thereon from pick-up position to discharge position, a container holder shiftably mounted on said structure, and mechanism synchronized with all of said packing member shifting means for progressively moving each container holder after each article has been placed in the container held therein to position the container to receive successive articles in precisely predetermined relation to the articles previously packed in the container.

2. A packing machine for individually placing

articles one at a time in precise, predetermined relation within an open-topped container, said machine comprising a supporting structure, a head mounted for substantially vertical movement on said structure, at least one article packing member mounted in depending relation on said head for horizontal shifting movement relative thereto, actuating means for vertically moving said head from a precisely predetermined article pick-up elevation to a precisely predetermined article discharge elevation, actuating means synchronized with said head moving means and connected with said packing member for horizontally shifting said packing member from a precise pick-up position to a container entering position, said connection between said shifting means and said article packing member providing for lost motion movement of said packing member relative to said shifting means, mechanism connected with the packing member and mounted on the packing head and constructed to be responsive for actuation to the downward shifting movement of the head at the lower portion of the packing stroke to swing said packing member outwardly within the container toward the side wall thereof into precise discharge position and means on said packing member for retaining an article thereon from pick-up position to discharge position.

3. A packing machine for placing articles one at a time in successive layers within an open-topped container, said machine comprising a supporting structure, a head mounted for substantially vertical movement on said structure, a plurality of article packing members mounted in depending relation on said head with provision for horizontal shifting movement relative to the head, actuating means for vertically moving said head from a precisely predetermined article pick-up elevation to a precisely predetermined article discharge elevation, inter-connection means drivingly interconnecting all of said packing members and simultaneously shifting all of said members horizontally, means for actuating said inter-connection means to horizontally shift all of said packing members from a precise pick-up position to a container-entering position, a lost motion connection between said horizontal actuation means and said inter-connection means to permit shifting movement of said packing members without shifting said actuating means, mechanism in driving engagement with said inter-connection means and mounted on the packing head and constructed to be responsive for actuation to downwardly shifting movement of the head at the lower portion of the packing stroke to swing each of said packing members outwardly within its respective container toward the side wall thereof into precise discharge position, and means on said packing member for retaining an article thereon from pick-up position to discharge position.

4. A packing machine for individually placing articles in precise predetermined relation in layers within an open-topped container, said machine comprising a supporting structure, a reciprocating head mounted for vertical movement on said structure, at least one article packing member constituting a depending hollow element, a swinging arm fixed to the upper portion of said hollow element, and mounted for swinging movement on said head to shift said packing member horizontally, a hydraulic system for vertically reciprocating said head from article pick-up position to article discharge position and back to article pick-up position, an air-pressure system including an air pressure control valve for swinging said arm through a predetermined arc, means for normally applying suction to said packing member, article engaging elements mounted at the lower end of said packing member and constructed to permit said suction means to hold an article therein, a container holder mounted on said structure to position a container to receive articles from said packing member, cam actuated valve mechanisms for synchronized operation of the hydraulic system and the air-pressure system for shifting said head vertically and for swinging said arm, an interconnecting line between the air-pressure control valve and the suction supply line leading to said packing member to introduce air under positive pressure into said suction line when said article packing member reaches its discharge position within the container to overcome the suction in said line and positively eject the article from the article engaging element.

5. The structure set forth in claim 4 and means connected with the container holder for progressively rotating said container holder to position the container to receive articles in each layer therein and means for periodically lowering said container holder after a predetermined number of articles have been packed in each layer.

6. The structure set forth in claim 4 and a plurality of vertically spaced stop elements connected with the container holder for supporting the same, and mechanism for actuating said stop elements to progressively rotate the container holder to receive a predetermined number of articles in predetermined relation in each layer therein and periodically lowering said container holder after each layer has been packed.

7. A packing machine for placing articles, one at a time, in precise predetermined relation within an open topped container, said machine comprising article supply means successively delivering articles, one at a time, to a precise pickup location, a packing member having an article pickup and retaining element thereon, timed actuating means for effecting relative movement between said pickup and retaining element and said article supply location to engage said element with an article held in said pickup location, container supporting means disposed in close association to said article pickup and retaining element, actuating mechanism for effecting relative movement between the pickup and retaining element and the container supporting means to position an article picked up and retained in said element substantially centrally above the opening in a container held in said supporting means, actuating mechanism for effecting relative vertical movement between the container supporting means and the pickup and retaining element with an article held in said element to position the retained article within the container in laterally spaced relation to the side wall thereof, actuating mechanism to obtain relative lateral movement between the pick-up and retaining element and the container while said element is disposed within the container to engage the retained article within the container against a portion of the inside wall of said container, ejecting means associated with said pick-up and retaining element to release the retained article so positioned, and mechanism synchronized with said actuating mechanism to obtain subsequent to the release of each article, intermittent relative horizontal movement between

the successive article receiving portions of a container held in said container supporting means and the discharge position of said article pick-up and retaining element to place successive articles in predetermined relation to said pre-placed article.

8. The structure set forth in claim 7, and said pickup and retaining means enclosing a negative pressure suction system and said ejecting means constituting mechanism for overcoming said negative pressure and applying positive ejecting pressure to the article when placed in discharge position.

9. The structure set forth in claim 7, and said second mentioned actuating mechanism comprising a cam controlled hydraulic system synchronized with said other actuating mechanism for effecting relative vertical movement between the centrally positioned pickup and retaining element and the container held in said supporting means.

10. The structure set forth in claim 9, and a single control cam shaft having a plurality of cams fixed thereto for producing synchronized actuation and control of said actuating means and mechanisms.

11. A packing machine for successively placing, one at a time, a plurality of substantially similar articles in precise predetermined relation within an open topped container, said machine comprising a conveyor mechanism having a plurality of article positioning and confining cups disposed in substantially side by side relation thereon and constructed to receive and maintain an article in a precisely pre-arranged orientation therein, intermittent actuating mechanism connected with said conveyor to successively shift said cups into a precisely predetermined article pickup location in space, a packing member having an article pickup and retaining element thereon and mounted for lifting movement relative toward and away from the precise pickup location of the successive articles in said cups, container supporting means disposed in close association with said packing member, actuating mechanism connected with said packing member for shifting the same into pickup position to precisely register in predetermined oriented relation an article held in the cup disposed in said pickup location, means operatively associated with said pickup and retaining element to securely retain therein an article engaged thereby, said actuating mechanism shifting said pickup and retaining element with an article therein away from said pickup location to centrally position the same above a container held in said container supporting means, actuating mechanism for effecting relative vertical movement between the container held in said supporting means and said pickup and retaining element to position an article held in said element within said container centrally between the side walls thereof, actuating mechanism connected with said packing member to shift said pickup and retaining element laterally within said container to engage the article held therein against a portion of the inside wall of the container to shift said article into a precisely predetermined discharge position in space, article ejecting means for releasing the retained article so positioned, and mechanism synchronized with said actuating mechanisms to obtain subsequent to the release of each article, intermittent relative horizontal movement between successive article receiving portions of a container held in said container supporting means and the discharge position of said article pick-up and retaining element to place successive articles in predetermined relation to said pre-placed article.

12. A packing machine for placing olives, one at a time, in precise predetermined relation within an open topped container, said machine comprising an olive packing member having an olive pickup and retaining element thereon, a container supporting means disposed in close association to said packing member, means for effecting relative movement between the pickup and retaining element and the container supporting means to position an olive retained in said element centrally above the opening in the container, means for picking up and retaining an olive in said element, means for effecting relative vertical movement between the container supporting means and the pickup and retaining means to position the retained olive within the container centrally of the inside wall thereof, means to obtain relative lateral movement between the pickup means and the side wall of the container to firmly press a portion of the olive into engagement with said inside wall, said container supporting means including lateral stabilizing structure disposed in upwardly spaced relation above the lower portion thereof to engage and provide lateral support for the intermediate portion of a container positioned therein and securely hold said container against lateral shifting movement when the olive is pressed against the inside surface thereof, means for ejecting the olive so positioned, and mechanism synchronized with said actuating mechanisms to obtain intermittent rotary movement of the container supporting means through a predetermined arc after each olive is placed therein.

13. A packing machine for packing articles, one at a time, in precise predetermined relation within an open topped container, said machine comprising an article pickup and transferring mechanism including a shiftably mounted pickup and retaining element and mechanism for shifting the same from pickup position to discharge position, a container holding member mounted for vertical shifting movement relative to said pickup and transferring mechanism and journalled for rotation on an upstanding axis, container holder positioning mechanism including an elongated rotatably mounted interconnected disc structure having a plurality of horizontally disposed disc elements vertically spaced apart the distance between planes through the center lines of adjacent article layers, said structure being vertically slidable with said holder and being fixed thereto for rotation therewith, each of said discs having a plurality of stop elements fixed thereon corresponding with the number of articles to be placed in each layer, and said stop elements being peripherally spaced to correspond with the spacing between the articles in each layer, a retractible supporting pin engaging the lower surface of a selected disc to normally support the disc stack and container holder thereon and being periodically retractible to clear said stop elements, means for causing rotation of said disc stack whenever said pin is retracted, and each of said discs having a lowering slot formed therein to permit said pin to engage the next successive disc and lower the container holder a distance equal to the spacing between said discs.

14. A packing machine for placing articles, one at a time, in precise predetermined relation within an open top container, said machine com-

prising an intermittently moving conveyer having article confining and positioning cups mounted thereon for positively holding individual articles in a precise, predetermined pick-up orientation and position, a packing member having an article pick-up and retaining element thereon, timed actuating means for effecting relative movement between said pick-up and retaining element and said pick-up location to precisely register an article in said pick-up and retaining element, actuating mechanism for effecting relative movement between the pick-up and retaining element and the container supporting means to position an article picked up and retained in said element substantially centrally above the opening in a container held in said supporting means, actuating mechanism for effecting relative vertical movement between the container supporting means and the pick-up and retaining element with an article held in said element to position the retained article within the container in laterally spaced relation to the side wall thereof, actuating mechanism to obtain relative lateral movement between the pick-up and retaining element and the container held in said container supporting means while said element is disposed within the container to engage the retained article within the container against a portion of the inside wall of said container, ejecting means associated with said pick-up and retaining element to release the article so positioned, actuating mechanism synchronized with said other actuating mechanisms for intermittently shifting said article supply conveyer, and mechanism synchronized with said actuating mechanisms to obtain intermittent relative horizontal movement between successive article receiving portions of a container held in said container supporting means and the discharge position of said article pick-up and retaining element subsequent to the release of each article to place successive articles in predetermined relation within the container to articles preplaced therein.

References Cited in the file of this patent

UNITED STATES PATENTS

Number	Name	Date
1,588,156	Anderson	June 8, 1926
1,935,739	Freese	Nov. 21, 1933
1,943,483	Miller	Jan. 16, 1934
2,253,283	Minaker	Aug. 19, 1941
2,294,274	Buxbaum	Aug. 25, 1942
2,326,146	Kurzbin	Aug. 10, 1943
2,544,125	Bain et al.	Mar. 6, 1951
2,546,501	Hamilton	Mar. 27, 1951
2,587,584	Althoff	Mar. 4, 1952