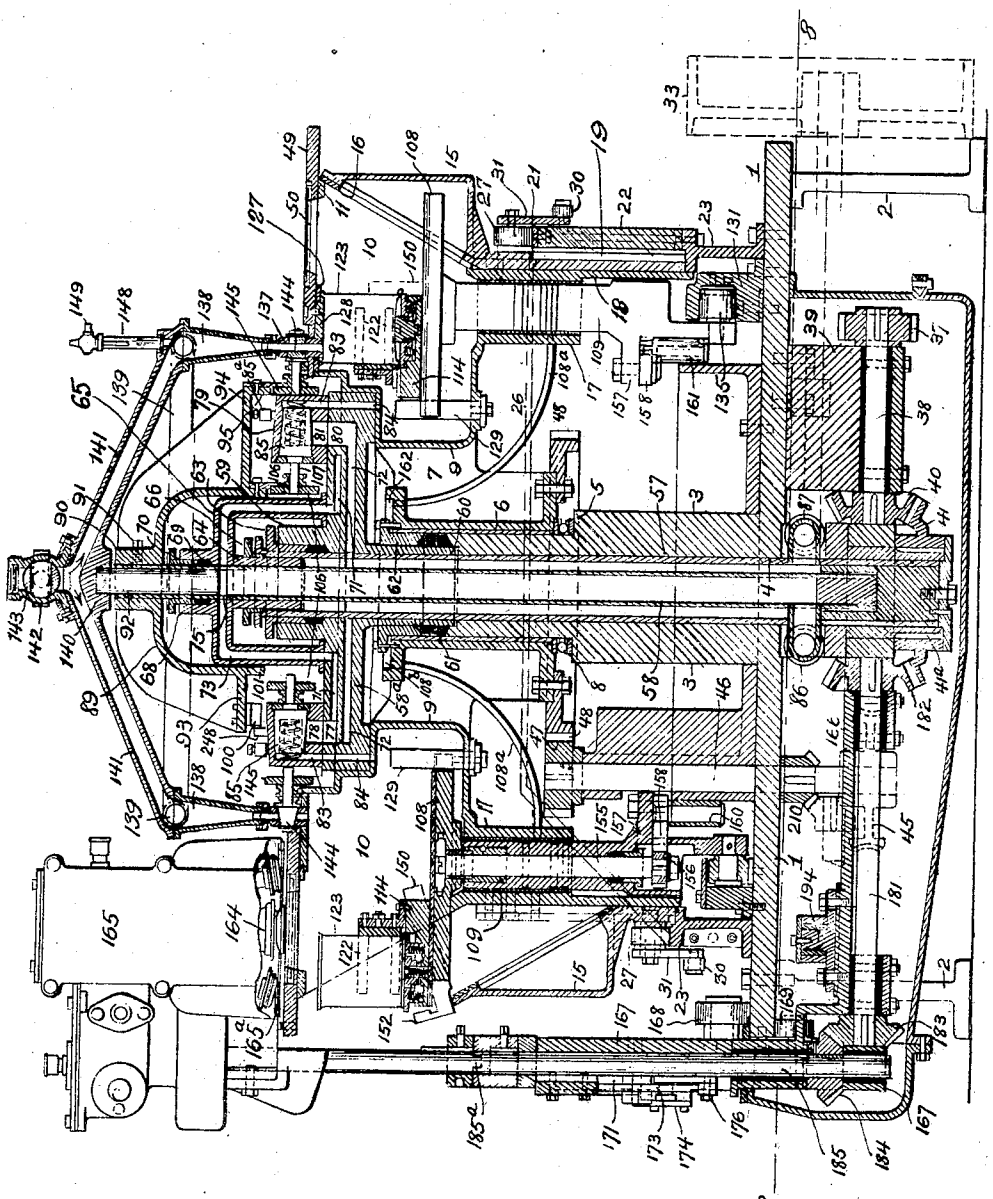
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A. K. MALMQUIST

CAN FILLING AND SEALING APPARATUS

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Inventor
A. K. Malmquist
By Seymour & Wright
Attorneys

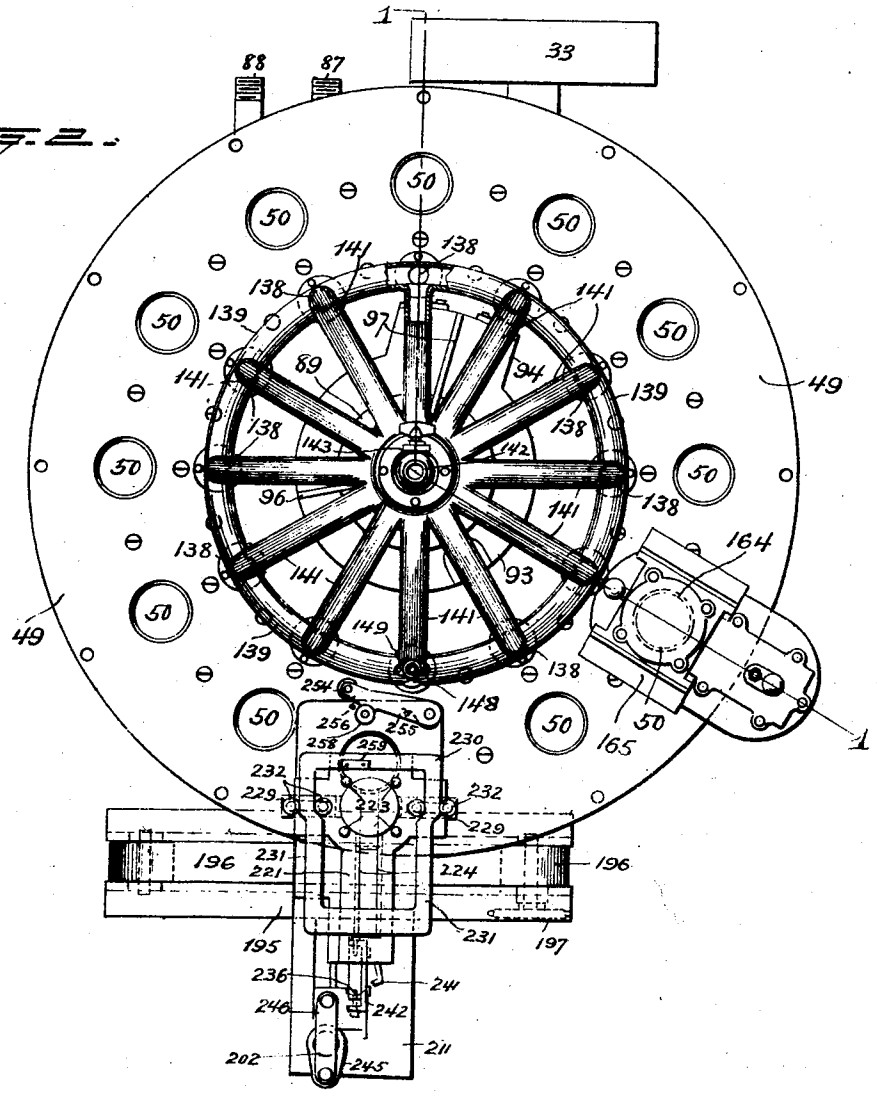
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Fig. 2.



Inventor

A. K. Malmquist

By Seymour & Bright

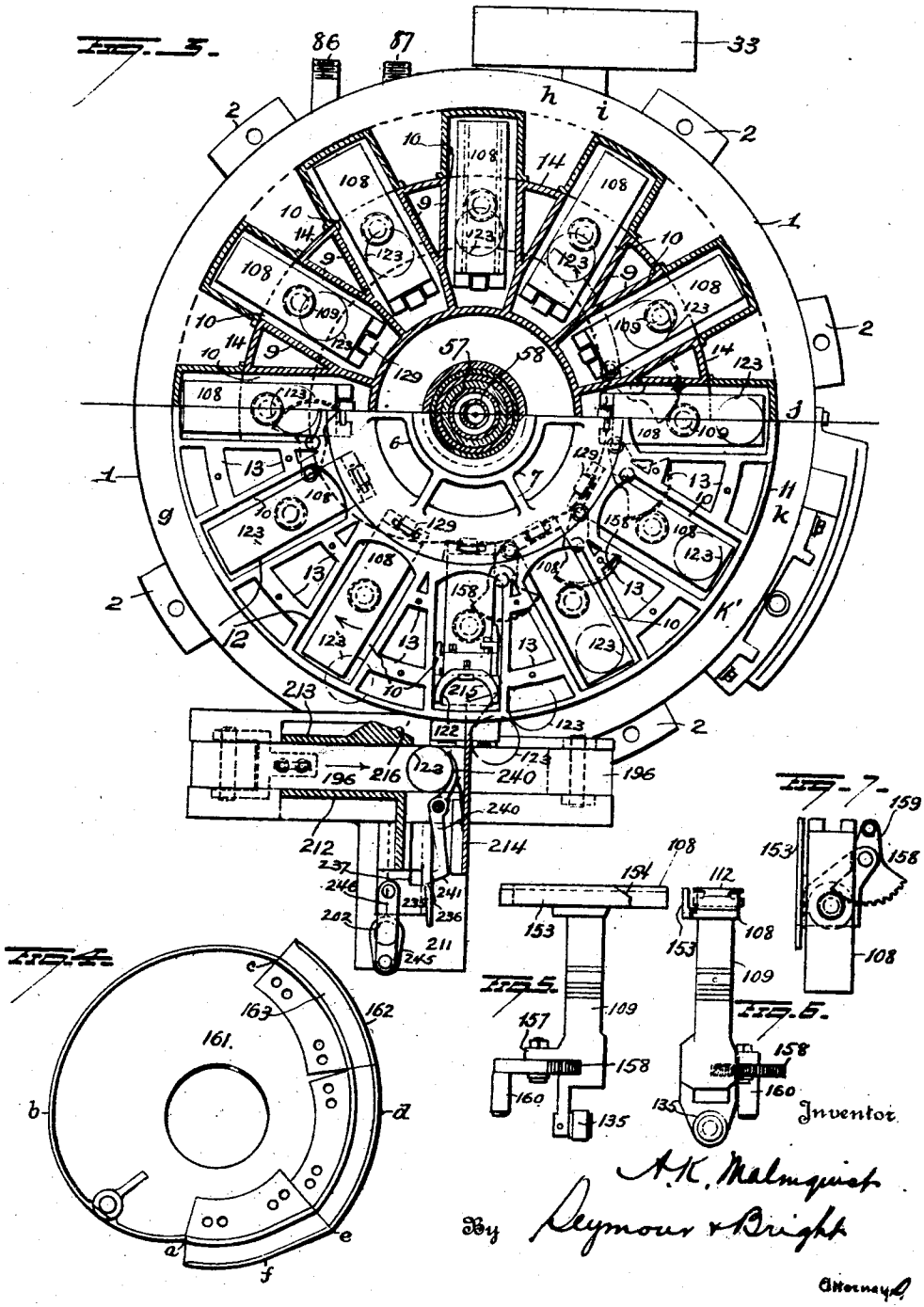
Attorneys

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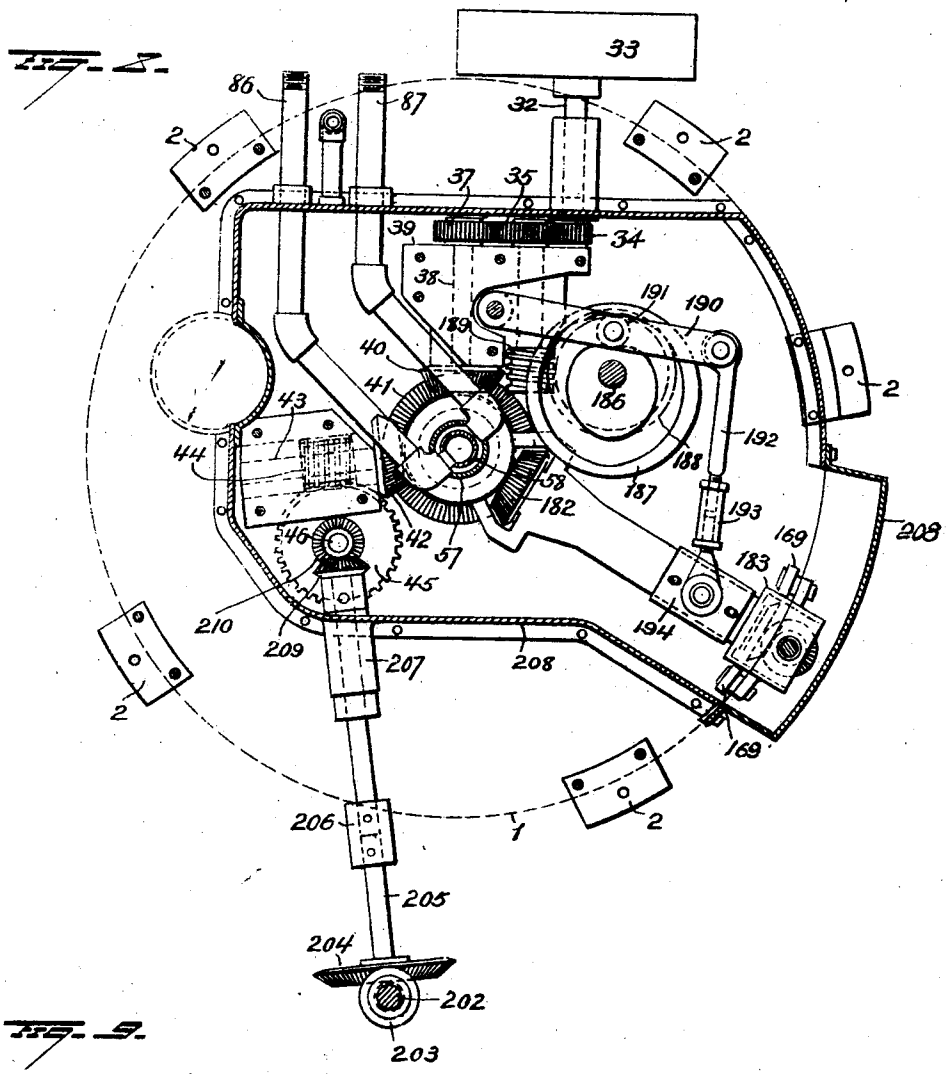


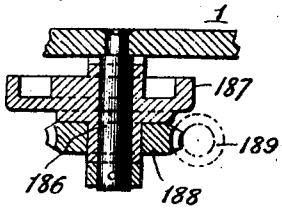
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A. K. MALMQUIST

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Inventor
A. K. Malmquist
By Seymour & Bright
Attorneys

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Fig. 10.

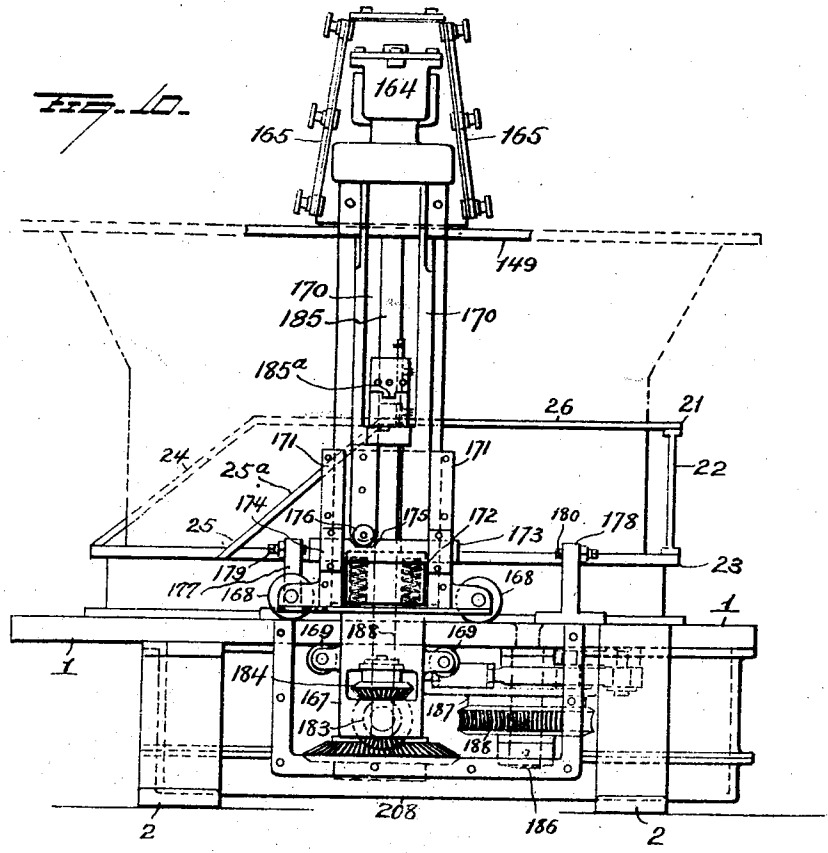
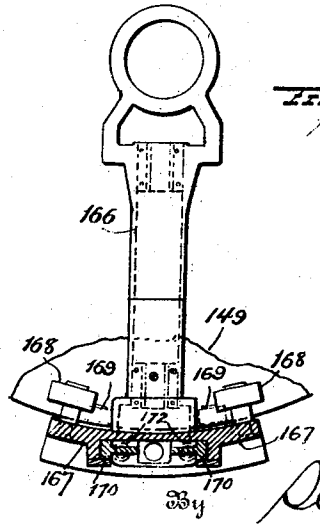


Fig. 11.



Inventor
A. K. Malmquist
By Seymour & Bright
Attorneys

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Fig. 10a.

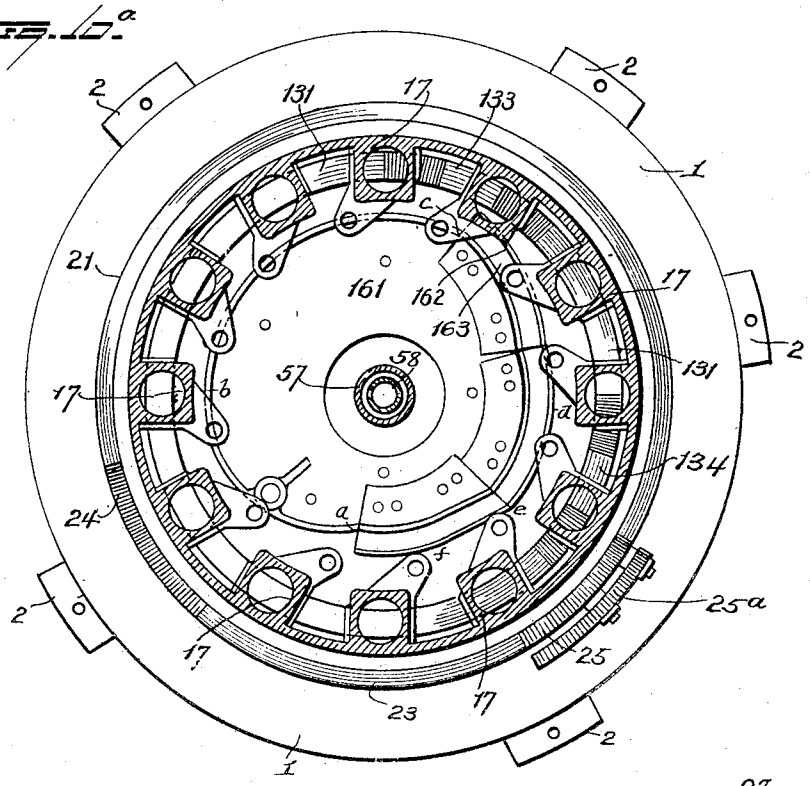


Fig. 10c.

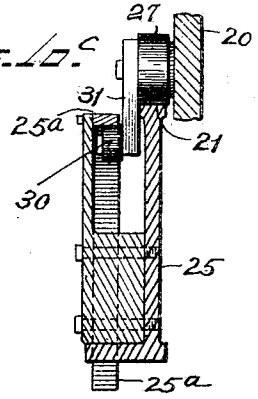
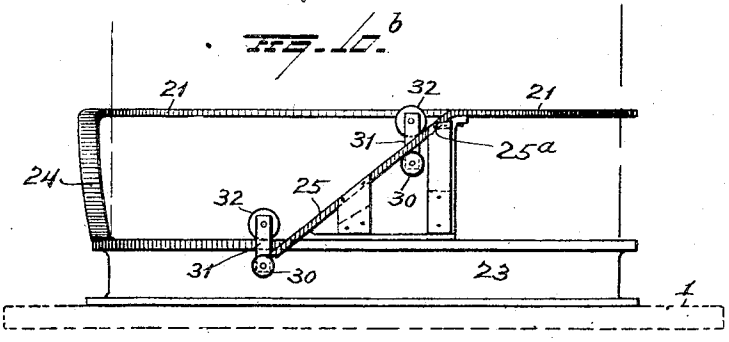


Fig. 10b.



Inventor

A. K. Malmquist

By Seymour & Bright

Attorneys

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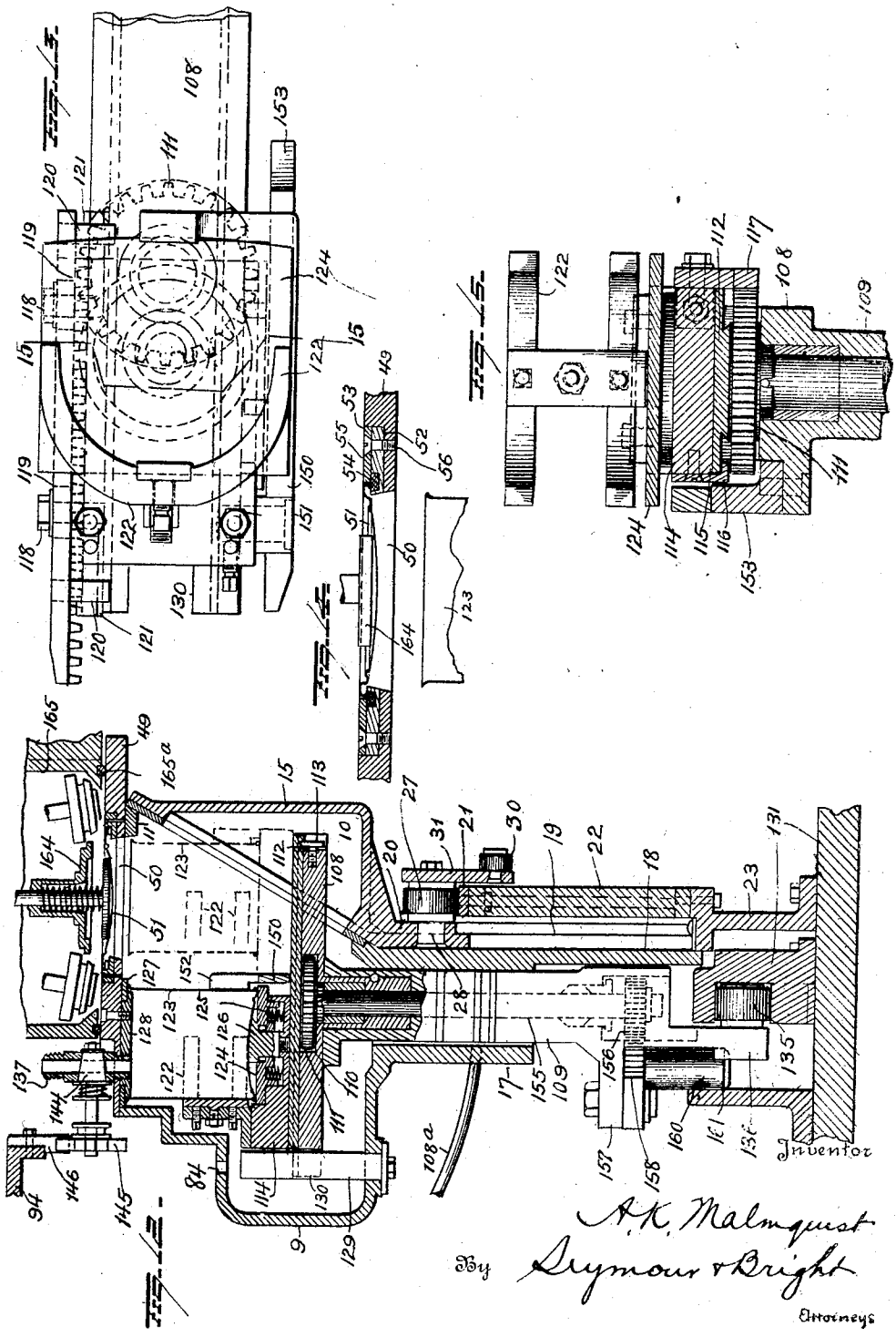
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Inventor

A. K. Malmquist

By Seymour & Bright

Attorneys

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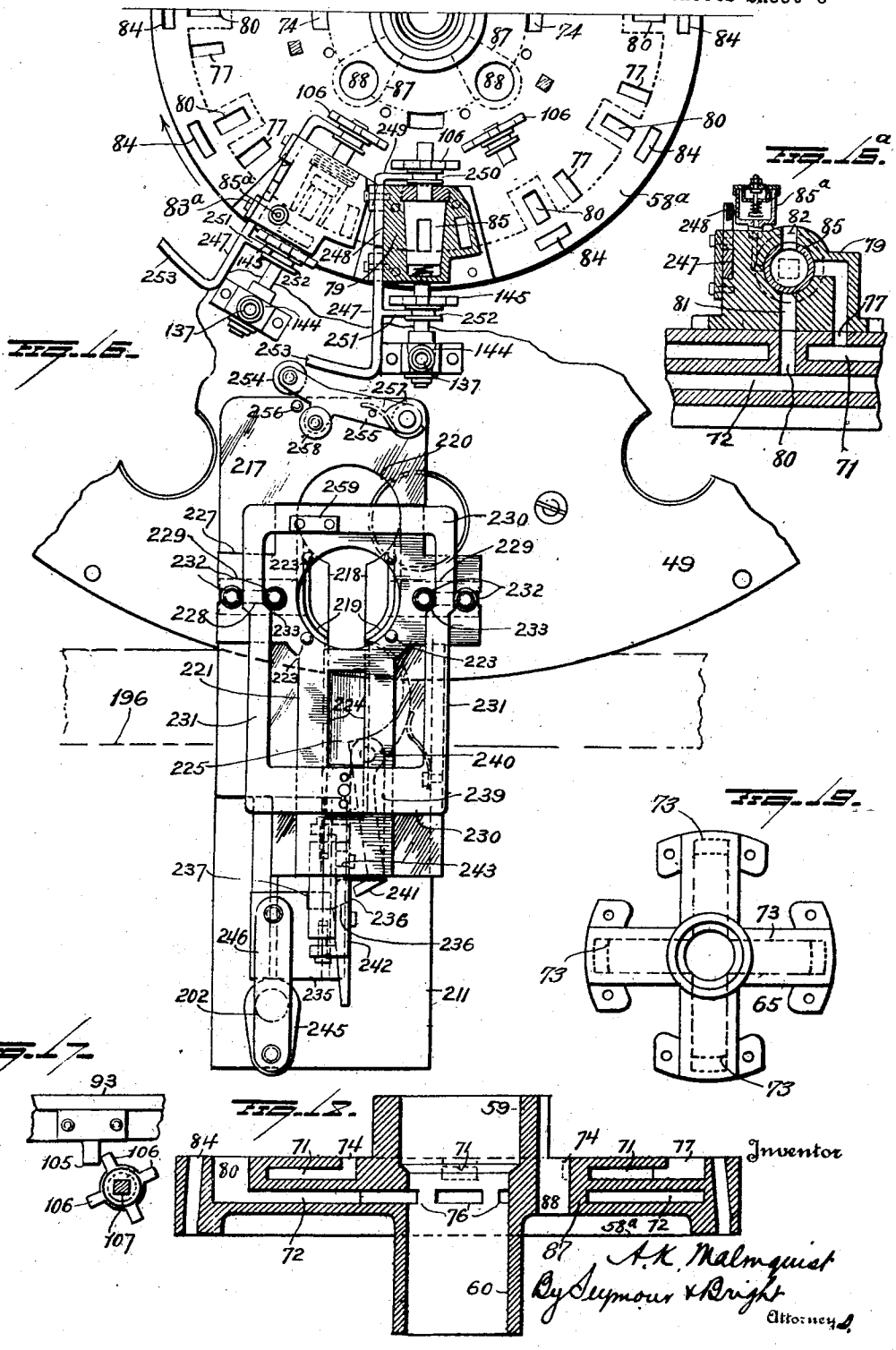
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Fig. 20.

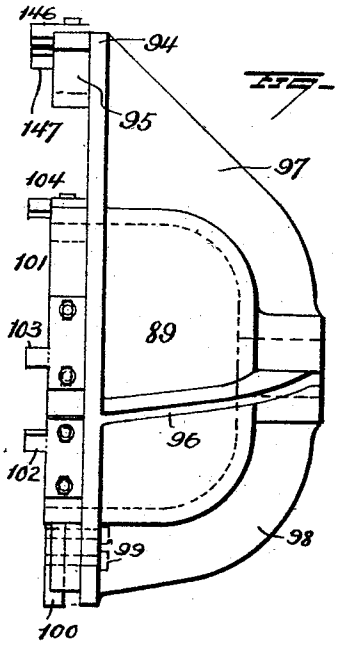


Fig. 21.

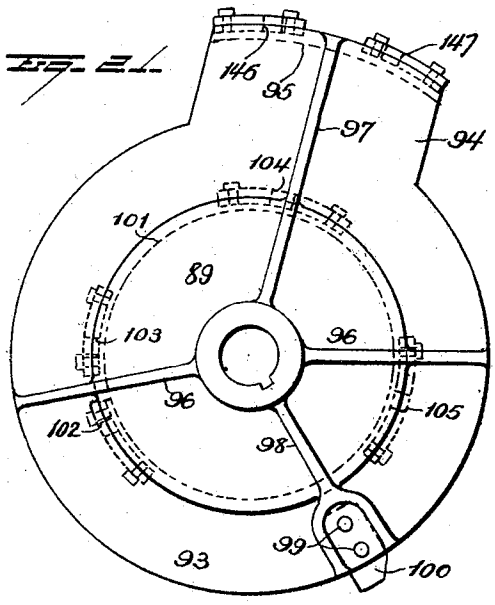


Fig. 22.

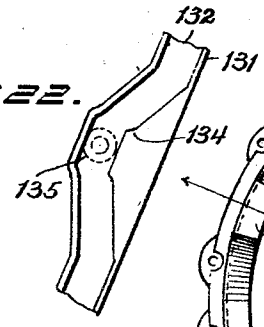


Fig. 23.

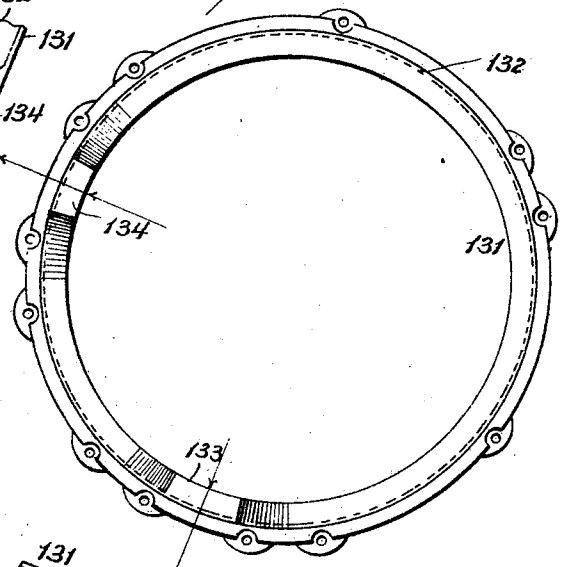
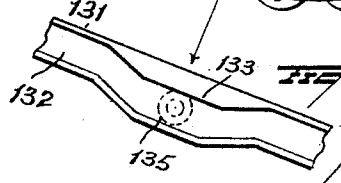


Fig. 24.



Inventor

A. K. Malmquist

By Seymour & Bright

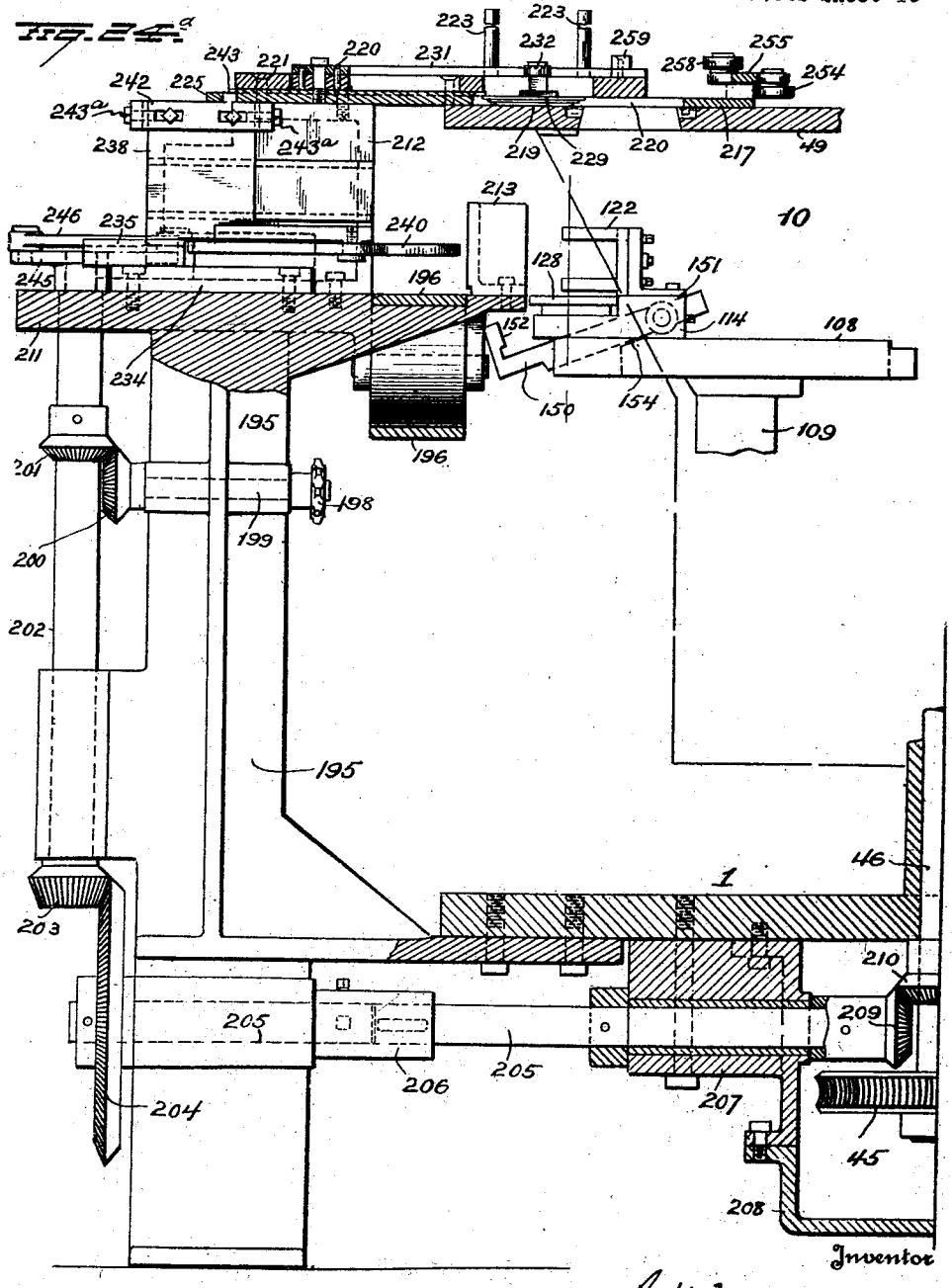
Attorneys

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CAN FILLING AND SEALING APPARATUS

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Inventor

A. K. Malmquist

By Seymour & Bright

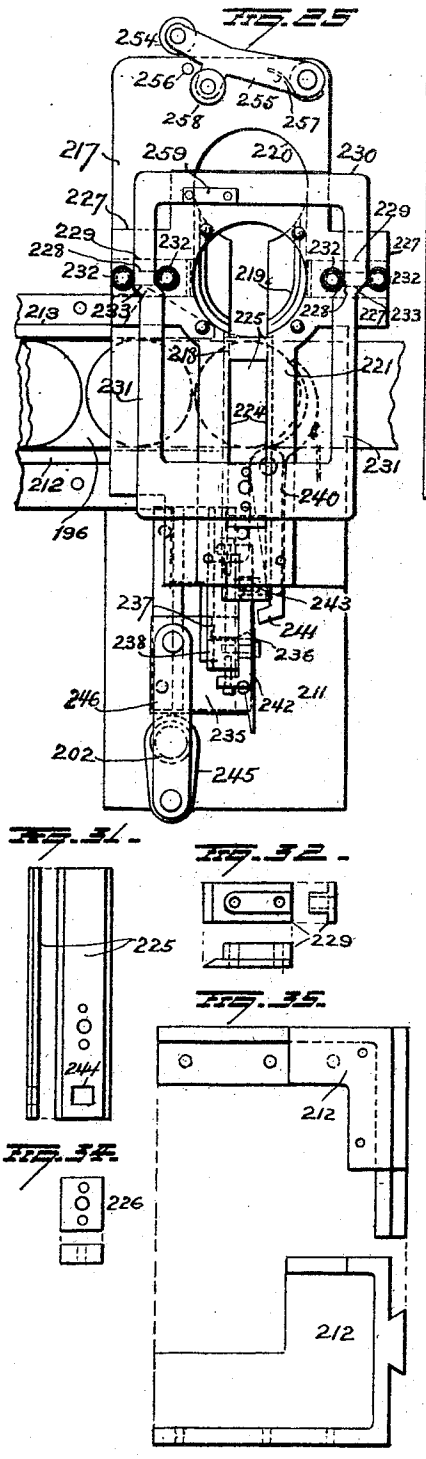
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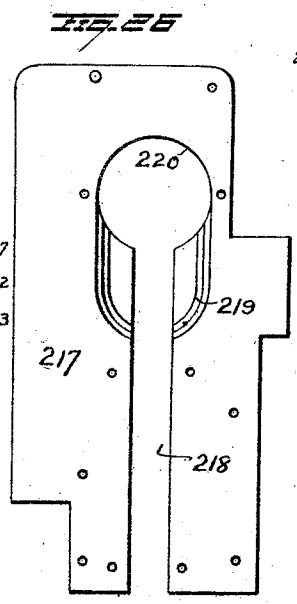
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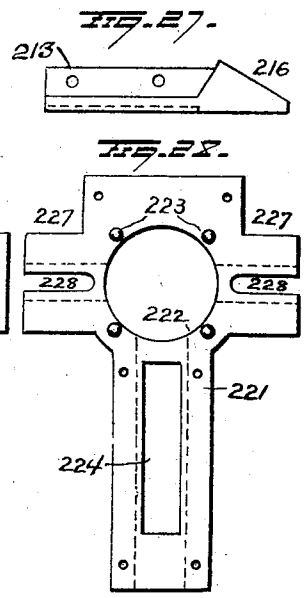
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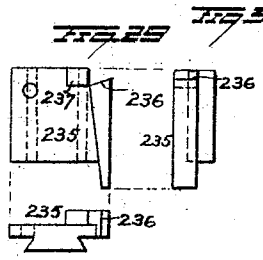
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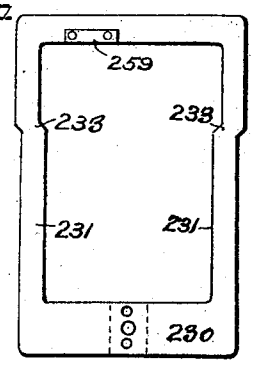
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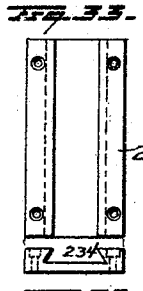


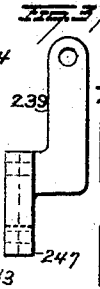


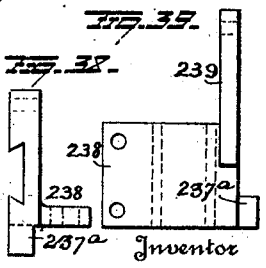


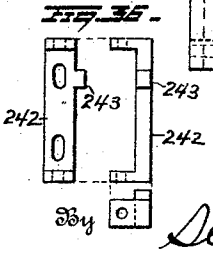












Inventor

A. K. Malmquist

By Seymour & Bright

Attorneys.

Patented Nov. 16, 1926.

1,607,269

UNITED STATES PATENT OFFICE.

ADOLPH K. MALMQUIST, OF SOUTH BELLINGHAM, WASHINGTON, ASSIGNOR TO DEMING & GOULD COMPANY, OF SOUTH BELLINGHAM, WASHINGTON.

CAN FILLING AND SEALING APPARATUS.

Application filed January 22, 1921. Serial No. 439,171.

This invention relates to improvements in canning apparatus and more particularly to the canning of materials including both solids and liquid.

In the canning of fruits and vegetables, it is customary to introduce into the cans with such solid, a quantity of liquid, such as syrup, and it is desirable that the can shall be filled as near completely as possible so to decrease the free space to a minimum and permit the liquid contents of the can to so reach the seamed joint of the cap as to give sufficient moisture to the packing material commonly employed between the cap and the can body to prevent undue drying and deterioration of such packing and the consequent liability of leakage, and it is also desirable that the fruit or vegetable shall retain their natural color and flavor.

One object of my present invention is to provide apparatus which shall operate automatically to exhaust a chamber in which a can which may contain solid food is located; to fill such can with liquid while in the vacuous chamber; to permanently seal a cap on the can while still in the vacuous chamber, and to control the timed operation of the various mechanisms to accomplish the results stated, and thereby insure the thorough penetration of the liquid into the pores of the fruit or vegetable and the sealing of the can without exposure of its contents to air after having been filled with liquid; avoiding all necessity for cooking the solid food prior to completion of filling and sealing; avoiding also the necessity for the application of heat during the exhausting of the can, filling the same with liquid and sealing, and insuring the retention of the natural color and flavor of the fruit or vegetables.

A further object is to provide apparatus for filling and sealing cans successively, automatically and with rapidity, to insure the effective filling and sealing of each can to attain the results above stated.

With these and other objects in view, the invention consists in certain novel features of construction and combinations of parts as hereinafter set forth and pointed out in the claims.

In the accompanying drawings; Figure 1 is a vertical transverse sectional view (partly in elevation) and also showing the shaft 46 and associated parts; Figure 2 a plan view; Figure 3 is a view partly in section and partly in plan showing the filling and sealing chambers and illustrating the feeding and discharge of the cans and the position which they occupy during the filling and sealing operations; Figure 4 is a detail view of the cam which controls the operation of the can shifting mechanism; Figures 5, 6 and 7 are detail views of the vertically movable can platform and parts associated therewith; Figure 8 is a transverse sectional view on the line 8—8 of Figure 1 showing the main driving mechanism, seamer shifting means, and vacuum pipes; Figure 9 is a detail sectional view of the cam 187 and associated gear 188; Figure 10 is a view in elevation showing the mechanism for controlling the shifting or reciprocating of the seaming mechanism, and the cam ways for controlling the closing and opening of the filling and sealing chambers; Figure 10^a is a horizontal sectional view of the apparatus with parts removed and showing the cam rail 21 and the cam 161; Figures 10^b and 10^c are fragmentary views showing the closure operating devices; Figure 11 is a detail view, partly in section showing parts of the structure which carries the seaming mechanism; Figure 12 is a sectional view, partly broken away, showing one of the filling and sealing or vacuous chambers and means for manipulating the can platform, supplying syrup to a can and for seaming a cap to the can; Figure 13 is a detail plan view showing the mechanism for shifting a can and its carrier from filling to sealing position and vice versa; Figure 14 is a detail sectional view showing a portion of the cap carrier and the relation of a can thereto; Figure 15 is a sectional view on the line 15—15 of Figure 13, with the pinion shown in elevation; Figure 16 is a fragmentary view, partly in plan and partly in section, illustrating the valve mechanism and the can-feeding devices; Figure 16^a is a sectional view showing one of the valves and parts with which it operates; Figure 17 is a detail view of a portion of the valve-controlling devices; Figure 18 is a sectional view of the head or casting containing ducts for the air-exhausting means; Figure 19 is a plan view of a part containing ducts for the air-exhausting means; Figures 20 to 2

inclusive are detail views illustrating the various cams; Figure 24ª is a view partly in elevation and partly in section showing the can feeding mechanism and operating means therefor; Figure 25 is a fragmentary plan view showing the can feeding means and Figures 26 to 39 are details of parts of the can feeding mechanism.

The stationary framework of the apparatus includes a base platform 1 supported on suitable legs 2 and a centrally located tubular standard 3 projecting upwardly from the platform and aligning with a suitable hole 4 in the latter.

The upper portion of the standard 3 is contracted somewhat in diameter, whereby a step or shoulder 5 is formed, and on this contracted portion of the standard, the hub 6 of a spider 7, is revolubly mounted, suitable anti-friction bearing devices 8 being located between the lower end of said hub and the step or shoulder 5. The spider 7 and its hub 6 constitute a central frame for a circular series of radial casings 9 (twelve such casings being employed in the embodiment of the invention shown in the drawings) revolubly mounted (through said spider and hub) on the standard 3, and each of said casings provides a filling and sealing chamber 10. The circular series of casings 9 with the spider 7 and hub 6 may be made in a single casting (with the exception of course, of the closures forming parts of said casings) and this casting may also include a top ring 11 having elongated openings 12 conforming to the shape of the chambers 10,—the portions of the ring in which the openings are formed being connected by integral bracing ribs 13, 13, and the radial casings 9 being connected by integral bracing webs 14, as shown in Figure 3. The closure 15 for each chamber forms, when closed, a portion of said chamber and said closure is provided with a gasket 16 to insure an air-tight joint with the casing 9 forming said chamber. Each casing 9 is provided with a tubular depending portion 17 from the lower end of which an arm 18 depends. At one side of the tubular portion 17 and the arm 18 a guide-way 19 is provided to receive an arm 20 depending from the closure 15, whereby the latter may be guided in its vertical sliding movements to open or close the casing 9 in which the filling and sealing chamber 10 is formed. To effect the vertical movements of the closure for each of said casings 9 during the rotary movement of the annular series of such casings (which rotary movement is effected by mechanism hereinafter explained) a cam rail 21 is provided, said cam rail being supported by suitable uprights 22 secured at their lower ends to a circular rail 23, the latter being mounted on and made fast to the base platform 1. The cam rail 21 is shaped to form two inclined portions 24 25 and a horizontal partly circular portion 26 (Figures 10, 10ª, 10ᵇ, and 10ᶜ) and on said cam rail, a roller 27 mounted on a stud 28 secured to the closure arm 20, is adapted to travel. It will be apparent that when a closure 15 is in its open or lowered position (as shown at the left of Figure 1) and moves from such position, the riding of the roller 27 up the inclined portion 24 of the cam rail, will cause the closure 15 to rise and close the casing 9; that while the roller is running on the horizontal portion 26 of the cam rail, the closure will be held in position to maintain the casing 9 closed air-tight, and that when said roller reaches the incline 25, it will ride downwardly thereon and permit the closure 15 to descend, thus opening the casing 9. In order to insure the descent of the closure, a sub-cam or incline 25ª may be disposed parallel with the cam or incline 25, so that a roller 30 carried by an arm 31 secured to the stud 28, will ride under said sub-cam or incline and thus effect the positive downward movement of the closure.

For imparting rotary movement to the structure comprising the casings 9 which form the filling and sealing chambers 10, the mechanism now to be described, may be employed.

A main driving shaft 32 is mounted in a suitable bearing supported by the base platform 1 and provided with a pulley 33 to be driven from any convenient source of power. As shown in Figure 8, the shaft 32 is provided with a gear 34 which imparts motion, through a gear 35 on a shaft 36, to a gear 37 on a shaft 38,—said shafts 36 and 38 being mounted in a suitable bearing block 39 supported by the base platform 1. A bevel gear 40 is secured to the inner end of the shaft 38 and meshes with a horizontal bevel gear 41 which is so located and mounted on a fixed center bearing 41ª that its axis is in line with the axis of rotation of the annular series of casings 9 forming the filling and sealing chambers. The centrally located bevel gear imparts motion to a bevel gear 42 carried by shaft 43 of a worm 44. The worm 44 imparts motion to a worm wheel 45 secured to the lower end portion of a vertical shaft 46, and the latter carries at its upper end, a pinion 47 which imparts motion to a gear 48 secured to the lower end of the hub 6 of the rotatable structure which includes the casings 9 forming the filling and sealing chambers.

An annular cap-carrier 49 is secured to the ring 11 at the top of the structure forming the casings 9 and therefore rotates with the same,—said cap carrier having a series of openings 50 for can caps 51. The cap-carrier is provided, around each opening 50 with an annular recess 52 in which a ring 53 is located and carries a packing gasket 54 on which the peripheral portion of the can

cap rests,—said gasket being held in position in a recess of the ring 53 by means of a ring 55 which overlies a portion of said gasket and is secured in place with its upper face flush with the upper face of the cap carrier 49 by screws 56 or other fastening devices which pass through said rings 53 and 55 and enter the cap carrier, as shown in Figure 14. The internal diameter of the ring 53 is approximately equal to the diameter of a can cap.

It will be observed that when a closure 15 of a casing 9 is in the position shown in Figure 2 and a can 51 is in position in the carrier 49 the filling and sealing chamber will be tightly closed, the cap forming a part of the means to accomplish this,—and when a vacuous condition is established in said chamber (as hereinafter explained) the cap 51 will be held tightly to its seat in the carrier 49 by atmospheric pressure.

To effect and control the creation of vacuous condition in the filling and sealing chambers 10, the instrumentalities now to be described may be employed.

A tube 57 is fixed at its lower end in the center bearing 41^a and passes upwardly through the tubular standard 3 of the framework,—said tube being of sufficient length to project some distance above said standard. Another tube 58 (appreciably less in diameter than the tube 57) is fixed at its lower end in the center bearing structure 41^a and passes through and a considerable distance upwardly beyond the upper end of said tube 57.

A head or casting 58^a (Figures 1 and 18) is mounted on and adapted to rotate with the structure forming the filling and sealing chambers 10 and is provided centrally with hub portions 59 and 60 projecting respectively above and below the same and surrounding the upper portion of the tube 57 so as to rotate on the same. The depending hub portion 60 enters the hub 6 and is seated at the upper end of the standard 3, and a packing 61 at the upper end of the standard and between the lower portion of the hub portion 60 and the bushing in the hub 6 is held in place by a gland 62 entering said hub 6 and secured to the upper end thereof. Packing devices indicated at 63 are provided between the upper hub portion 59 of the head 58^a and the tube 57 and into the upper end of said tube, the tubular hub 64 of a casting 65 projects,—packing means 66 being provided between said hub 64 and the tube 57. The casing 65 is also provided with an upwardly projecting sleeve 68 surrounding the inner tube 58 and receive a packing 69 held in place by a gland 70.

The head 58^a is provided with two chambers 71 and 72, one above the other and the casting 65 (which is located upon and secured to the said head) is made with four (more or less) arms having ducts 73 communicating at their outer ends with ports 74 in the head 58^a; said ports serving to connect the ducts 73 with the chamber 71 in the head, and the inner ends of the ducts 73 in the casting 65 communicate through ports 75 with the inner tube 58. The lower chamber 72 in the head 58^a communicates, through ports 76, with the tube 57. The upper chamber 71 in the head 58^a communicates through ports 77, with ports 78 in valve casings 79 located upon said head, and the lower chamber 72 communicates, through ports 80 with ports 81 in said valve casings,—said valve casing being also provided with an open port 82 controlled by a valve in said casing. Each valve casing is also provided with a port 83 which communicates with one end of a duct 84 in the head 58^a and the other end of each duct 84 communicates with one of the filling and sealing chambers 10. Within each valve chamber 79, a valve 85 (preferably of the turning-plug type) is located and adapted to be operated to establish communication between one or the other of the chambers 71 or 72 in the head 58^a and the filling and sealing chambers, or to connect the latter with the open port 82. The tubes 57 and 58 are connected by pipes 86 and 87 respectively, with separate exhaust pumps not shown, so that air may be exhausted from the chambers 10 by means of one pump and the desired degree of vacuum in said chambers then maintained by the operation of the other pump. This is important since the chambers 10 will be closed successively and a substantially constant vacuous condition must be maintained during a considerable portion of the travel of each of said chambers. Should a single vacuum pump be depended upon to exhaust the filling and sealing chambers, the degree of vacuum in the chambers in which filling and sealing operations are taking place would fluctuate as other chambers are being successively closed and exhausted. By providing connections from two pumps, the free air may first be removed from a chamber 10 and then the desired degree of vacuum in said chamber may be maintained steady through the medium of the connections with the other pump.

It may be here stated that it may be desirable to regulate the degree of vacuum to be maintained in the filling and sealing chambers, according to the nature of the particular food which is being canned. To accomplish this, an adjustable release valve 85^a may be connected with the chamber of each valve 85, so that it may be made to communicate with the chamber 10 by properly manipulating said valve 85.

The head or casting 58^a may be provided with enlargements 87 near its hub portion and these enlargements may be provided

with holes 88 for the insertion of a tool to reach the fastening means for the gland 62.

A hood 89 is disposed over the casting 65, said hood having a hub portion 90 through which the tube 57 passes and to which latter it is secured by a set screw 91, the inner end of the latter engaging a bar 92 located in the upper portion of said tube and projecting above the same. The hood 89 is made with an annular horizontal plate portion 93 disposed over the valve chamber and this plate is provided with an extension 94 located near that part of the apparatus where cans are fed to and discharged from the filling and sealing chambers 10, and said extension is provided at its free end with a depending flange 95. Ribs 96, 97, 98 are made integral with the hood, its hub and plate portion,—the rib 97 being extended to the free end of the plate extension 94 and the rib 98 being bifurcated over the plate portion 93 to facilitate the application of bolts 99 which secure a beveled or cam lug 100 in position under the plate 93. That portion of the hood 89 which depends below the plate 93 forms a flange 101, to which a plurality of cams 102, 103, 104, 105 are secured, and with these cams, a star wheel 106 on the stem 107 of each valve 85 is adapted to be made to cooperate for operating said valve to open communication of a filling chamber successively with the pipe lines of the respective vacuum pumps; then close such communication, and finally connect a chamber 10 with the atmosphere to release the vacuum therein, as hereinafter more definitely explained,—it being understood of course that said cams are so relatively located as to accomplish the results stated at predetermined intervals during the operation of the apparatus. It may be here stated that each star wheel is so mounted on its valve stem as to turn the same but that it is capable of sliding on said stem and that the star wheel carried by the valve stem will be moved into position to engage the cams and moved out of such position automatically during the operation of the apparatus, by means of devices hereinafter described.

A can platform 108 is located in each filling and sealing chamber 10 and for this platform, a tubular plunger 109 is provided, said plunger passing through and downwardly beyond the tubular extension 17 of each casing 9 and may be lubricated by lubricant flowing through pipes 108^a from a receptacle 108^b at the upper end of the hub 6. The can platform 108 is recessed at 110 for the accommodation of a pinion 111 and it is also provided with a dove-tail groove to receive the dove-tail portion of a face plate 112 for the platform, said face plate being held in place by means of a screw 113, (see Figs. 12 and 15) and serves to cover the pinion 111 and to support a can carrier 114 mounted to slide on said plate. To guide the sliding movements of the can carrier, a plate 115 having a flange 116 is secured to one side of said carrier the flange underlying one edge portion of the plate 112, and at the other side of said carrier, a rack bar 117 is secured thereto and its teeth project under the adjacent edge portion of the plate 112 and mesh with the pinion 111. The purpose of the rack-and-pinion devices above described is to slide the can carrier (as hereinafter explained) and in order that the can carrier shall be moved to accurately position the same, it is desirable that the rack-bar shall be adjustable. The rack is secured to the can carrier by means of headed bolts 118 passing through elongated slots 119 in said rack-bar and entering the carrier. Lugs 120 project inwardly from the rack-bar near respective ends thereof and through these lugs, bolts 121 are passed and made to engage the can carrier. By loosening the bolts 118 and operating the bolts 121, the relation of the rack-bar to the can carrier may easily be adjusted. A can holder 122 is secured to the can carrier 114 and serves accurately to position a can 123 on a vertically movable support 124 mounted in a recessed portion of the can carrier,—said can support 124 being mounted to yield and is normally sustained by springs 125. A headed post 126 is secured to the can carrier 114 and passes upwardly through a central opening in the can support 124, the head on said post normally lying in a recess in the can support 124 and flush with the upper face of said can support as shown at the left of Figure 1. With such construction, when the platform 108 and can carrier 114 with a can 123 thereon are raised to cause the upper open end of the can to be closed against a gasket 127 secured to the cap carrier ring 49, the can support 124 will be depressed, while the post 126 will remain in fixed position on the can carrier and thus cause the bottom of the can 123 to be pressed inwardly as shown in Figure 12, thereby reducing the internal capacity of the can,—the internal capacity of the can being further reduced when in the position shown in Figure 12 by a plate 128 secured to the under face of the cap carrier ring 49 and entering the open end of said can to compensate for the space in the can which will be displaced by the can cap, said cap being caused, by reason of the vacuous condition in the can to bow inwardly.

As hereinbefore intimated, each can platform 108 is vertically movable and it is guided in such movement and prevented from turning by a guide post 129 secured to each casing 9 and entering a notch or recess 130 in one end of the platform 108. The purpose of raising the can platform 108 is two-fold,—viz., to raise and temporarily close a can to receive syrup or other liquid, and to subsequently raise the can to receive

the cap to be seamed thereon. For effecting the raising and lowering of can platform to accomplish the results above mentioned, a cam ring 131 (Fig. 23) is employed. This cam ring (which is securely bolted to the base platform 1) is made with a continuous groove 132 and the ring is so formed that at two points cams 133 and 134 are provided, and into the groove of said cam ring, a roller 135 carried by an arm 136 depending from the plunger 109 projects. Thus it will be seen that during the rotary operation of the apparatus, the rollers 135 carried by the plungers 109 will travel through the groove of the cam ring 131 and cause the plungers and can platforms to be raised and lowered when the roller passes through the cam portions 133 and 134 of said groove.

The cap carrier ring 49 also constitutes a top plate for the annular series of filling and sealing chambers 10 and it supports a plurality of nozzles 137, one for each of said chambers. To each of said nozzles, the lower end of a funnel 138 is secured and the upper ends of the several funnels are connected with an annular pipe 139. This pipe forms part of a casting 140 of which a plurality of radial pipes 141 also form parts and this casting is supported centrally on the upwardly projecting end of the bar 92, as shown in Figure 1. The pipe casting 140 is revolubly connected with a stationary coupling 142 containing a manually operable valve 143 and to the coupling 142, a pipe is to be connected for conveying syrup from a suitable source of supply (not shown).

A syrup valve 144 is provided in each nozzle 137, and on the stem of each of said valves, a star wheel 145 is so mounted as to turn the same and to be capable of sliding thereon. For opening and closing the syrup valves 144 during the operation of the apparatus, cams 146 and 147 are secured to the flange 95 of the plate extension 94 (Figure 21) to actuate the star wheels 145 which are moved to cooperative relation thereto by means hereinafter described.

In order to determine when the funnels 138 and pipes 139 and 141 are filled with syrup, a gage 148 may be connected with one of said pipes and to permit escape of air and from said funnels and pipes when the syrup is first caused to flow thereinto, an air valve 149 may be provided at the upper end of said gage.

When a closure 15 is lowered to the position shown at the left of Figure 1 so as to open a filling and sealing chamber 10, a can will be fed automatically onto a can carrier 114 in said chamber and against the holder 122 on said can carrier. In order that the can shall be held accurately and immovably in position on the carrier while in a chamber 10, a holding lever 150 is provided. This lever is pivoted to the can carrier at 151 and is provided with an arm 152 which will become disposed to engage the can at a point directly opposite the can holder 122, as best shown in Figure 12. A plate 153 having a beveled portion or cam 154 is secured to the can platform 108 in such position that when the can carrier is moved after a can is in position thereon, the holding lever 150 will engage the incline or cam 154 and be moved thereby from the position shown at the left of Figure 1 to the position shown in Figure 12. It is evident that when a can is to be discharged, the can carrier will assume the position shown at the left of Figure 1 and the holding lever 150 will drop and rest on the incline or cam 154, thus permitting the can to be discharged from the can carrier.

When a can shall have become disposed on the can carrier, its inward movement to effect the operation of the holding lever and to position the can under the syrup nozzle, will be effected by the rack-and-pinion gearing to which reference has been made. This gearing will be actuated automatically during the continuous operation of the apparatus, by mechanism which will now be described.

The pinion 111 in each can platform 108 is carried by the upper end of a shaft 155 passing through the tubular plunger 109 which carries said platform, and to the lower end portion of said shaft, a pinion 156 is secured. Each plunger 109 is provided near its lower end with a lateral arm 157 and to this arm, a toothed segment 158 is pivotally attached in position to mesh with the pinion 156. The segment 158 is provided with an arm 159 which carries a depending roller 160. A cam 161 (Figure 4) is secured to the base platform 1 of the stationary framework and around the central standard 3 thereof and with this cam, the roller 160 cooperates to move the segment 158 and cause the latter to transmit motion to the pinion 156 in one direction or the other. In this manner, the pinion 111 is turned in one direction or the other and by its cooperation with the rack bar, moves the can carrier in one direction or the other. The cam is provided through a portion of its peripheral portion with rail portions 162 forming a cam groove 163 through which the roller 160 passes during a portion of its travel. The cam 161 is so formed that the roller 160, in travelling from the point *a* to the point *b*, will cause the can carrier to be shifted from the position shown at the left of Figure 1 to the position shown at the right of Figure 1 and as shown in full lines in Figure 12, so that the can will be disposed under the syrup nozzle 137. While the roller is passing over the peripheral portion of the cam from *b* to *c*, the can will be held under the syrup nozzle and the exhausting of the chamber 10 will take place. The shape of the cam is such that as the roller 160 passes

through the cam groove 163 from *c* to *d* the segment 158 will be moved so as to transmit motion through the pinion 156, shaft 155 and the rack-and-pinion gearing to the can carrier to move the latter from the position shown in full lines in Figure 12 to the dotted line position in said figure, when the can will be disposed under a cap securing mechanism 164. As the roller travels through a concentric portion of the groove 163 from *d* to *e*, the can will remain under the seaming mechanism, and as the roller 160 moves from the straight portion of the cam frame *e* to *f*, the carrier will be moved outwardly to the position shown at the left of Figure 1 to permit the can to be discharged. As the roller 160 is moving through the concentric portion of the groove 163 from *f* to *a*, the can carrier will be held in the position shown at the left of Figure 1, while one can is being discharged from and another can is being fed to the can carrier.

The seaming mechanism 164 to which reference is above made, may be of any preferred construction and a detailed disclosure of the same herein is unnecessary. The seaming mechanism is enclosed in a casing 165, and the said mechanism and its enclosing casing may, for convenience be hereinafter referred to as the seaming head. To effect a tight joint between the seaming head casing and the ring 49, said casing is provided with a gasket 165[a]. In order that a can and its cap shall be subjected to the seaming head for a sufficient length of time to insure the effectual sealing of a can, and as the operation of the apparatus is continuous, it is desirable that provision shall be made to cause the seaming head to travel with the revolving filling and sealing chamber structure during a limited portion of a revolution of said structure. The means which carry and control the operation of the seaming head will now be explained: The horizontal member 166 of an L-shaped swinging frame is loosely mounted on the center bearing 41[a] of the apparatus, under the base platform 1 and extends beyond the edge of the latter, the upright member 167 of said swinging frame projecting some distance upwardly above the plane of said base platform. The upright member 167 of the swinging frame carries rollers 168 which run on the base platform 1 and thus the weight of the frame and the mechanism which it carries will be sustained to a considerable extent, by the base platform and the loose connection of said swinging frame with the center bearing 41[a] will be relieved of undue strain. The upright frame member 167 may also carry rollers 169 to run against the under face of the base platform and the two sets of rollers 168 and 169 so cooperate with the base platform as to insure the free movements of the swinging frame. The said swinging frame also includes an upper frame member 170 and the frame member 167 is provided with guides 171 for said upper frame member. This upper frame member 170 carries the seaming head and between said upper frame member 170 and the vertical member 167 of the swinging frame, counterweighting or cushioning springs 172 are located, as shown in Figure 10. The upper frame member 170 carrying the seamer head is vertically movable relatively to the frame member 167 so that the seaming head may be raised slightly during a part of its swinging movement to prevent it from scraping along the upper surface of the cap carrier ring 49. To accomplish such vertical movements of the seamer head, a horizontal bar 173 (Fig. 10) is mounted to slide through suitable guides 174 carried by the vertical frame member 167 and this sliding bar is provided with a cam notch 175 to receive a roller 176 carried by the upper vertically movable frame member 170. Posts 177 and 178 are mounted on the base platform 1 and spaced apart a distance equal approximately to the length of travel of the swinging frame and the seamer head. Near the upper ends of the respective posts, adjustable stops 179, 180 are provided to be engaged by the slide bar 173. When the roller 176 is in the recess 175 in the slide bar 173, the seaming head is in proper position to seal a can and it will remain in such position during the swinging of said seaming head during a seaming operation, but when the seaming operation has been completed, the slide bar 173 will strike the stop 179 and cause it to slide, such movement of the bar cooperating with the roller 176, causing the upper frame member 170 and hence the seaming head to be raised slightly, so that when the swinging frame is moved to align the seaming head over another can cap, said seaming head will not scrape over the cap carrier ring, but when the seaming head reaches a position over a cap, the bar 173 will strike the stop 178 and will thus be slid in a manner to permit the roller 176 to enter the recess 175 and the seamer head to drop to operative position.

For operating the mechanism of the seamer head and for swinging or shifting the seamer head as above described, the mechanism now to be described may be employed:

The horizontal member 166 of the L-shaped frame which carries the seaming head, is provided with suitable bearings for a shaft 181 to one end of which a bevel gear 182 is secured and receives motion from the central gear 41. A bevel pinion 183 is secured to the outer end of the shaft 181 and transmits motion to a bevel pinion 184 secured to the lower portion of a vertical shaft 185 mounted in the vertical member 167 of said L-shaped frame, the upper end of said vertical shaft being suitably geared to the

operating mechanism of the seaming head. The shaft 185 is made in two sections adjustably coupled together as at 185ª, so that the upper section may be turned to properly adjust and time the operation of the mechanism of the seaming head.

A stub shaft 186 depends from the base platform 1 and has mounted thereon, a cam 187. The hub of this cam may be extended as shown in Figure 9 and has secured thereon, a worm wheel 188 which receives motion from a worm 189 (Fig. 8) on the shaft 36,—the latter receiving motion, through the gears 35 and 34 from the main driving shaft 32. A lever 190 is pivotally attached at one end to the bearing block 39 and between its ends, this lever carries a roller 191 which enters the groove of the cam 187. A pitman 192 is pivotally attached to the free end of the lever 190, said pitman being made in two parts adjustably connected by a turnbuckle 193 and it is pivotally connected, through the medium of a mounting 194, to the horizontal member 166 of the L-shaped frame which carries the seaming head. It is apparent that during the operation of the apparatus, the cam 187 will cause a swinging motion to be imparted to the L-shaped frame to cause reciprocation of the seamer head as previously explained.

The mechanisms for feeding the cans to the filling chambers 10; for receiving the cans from said chambers, and operating means for said mechanism, are supported by a bracket 195 secured to the base platform 1 of the apparatus, as shown in Figure 24ª. The bracket 195 carries a belt conveyor 196, the shaft of one of the pulleys of which is provided with a sprocket wheel 197. This sprocket wheel receives motion, through a suitable sprocket chain (not shown) from a sprocket wheel 198 on a shaft 199 mounted in the bracket 195. The shaft 199 carries a bevel pinion 200 which receives motion from a bevel gear 201 on a vertical shaft 202 supported in suitable bearings in the bracket 195. At the lower end of the shaft 202, a bevel pinion 203 is secured and receives motion from a bevel gear 204 on a horizontal shaft 205. The shaft 205 may be made in two sections adjustably coupled together, as at 206 and said shaft 205 is mounted in a suitable bearing near the base of the bracket 195 and also in a bearing 207 supported by a casing 208 which encloses all the gearing which is disposed below the base platform 1. A bevel gear 209 is secured to the inner end of the shaft 205 and receives motion from a bevel gear 210 on the shaft 46,—said shaft being driven in the manner hereinbefore described.

The top of the bracket 195 forms a table 211 to which upright brackets 212, 213 and 214 are secured and so spaced apart that the brackets 212 and 213 form a guideway for cans on the conveyor, and so that the bracket 214 will be disposed at right angles to the conveyor and parallel with a portion of the bracket 212,—said bracket 214 having a beveled portion 215 to facilitate the discharge of cans from the filling and sealing chambers and onto the conveyor 196 and the bracket 213 having a beveled portion 216 to facilitate the insertion of cans into said chambers, as shown in Figure 3. A plate 217 (Fig. 26) having a slot 218 is bolted to the top of the bracket 212 and projects over the cap carrier ring 49 as shown in Figures 16 and 24ª, said plate having a recessed portion 219 to receive can caps (one at a time) and an opening 220 disposed over the path of the cap openings or seats in the cap carrier ring 49 as shown in Figure 16. A cap magazine plate 221 is secured over the plate 217 and provided with an opening 222 for the passage of caps from a magazine composed of a series of upright rods 223, as shown in Figures 24ª and 28. The cap magazine plate 221 is provided with a slot 224 over the slot 218 of the plate 217, and movable in the slot 218, is a slide plate 225 (Fig. 31) carrying a block 226 (Fig. 34) movable in the slot 224 of plate 221. The cap carrier plate 221 is made with slotted arms 227 having slotted guideways 228 for the accommodation of reciprocating blades 229, one at each side of the cap magazine. A cam frame 230 (Fig. 30) is located over the cap carrier plate 221 and is secured to the block 226 on the slide plate 225 so as to be moved by the latter. The side bars 231 of the frame 230 are movable between pairs of rollers 232 on the blades 229 and said side bars 231 are formed with cams 233 to so cooperate with said rollers 232 (when the frame 230 is moved) as to reciprocate said blades for facilitating the feed of caps, one at a time, to the cap seats in the ring 49.

A guide plate 234 is secured upon the table 211 and receives a sliding block 235, having a shoulder 236 and a lug 237. A reciprocating slide 238 (Figs. 37, 38, 39) is supported by the bracket 212 and is provided with an arm 239, to which a spring-pressed lever 240 (Figs. 16, 24ª and 25) is pivotally connected,—one arm of said lever being curved and projecting over the conveyor 196 in position to receive a can, and the other arm of said lever having a toe 241 to move in front of the shoulder 236 of the sliding block 235, when said lever is operated by the engagement of a can therewith. The reciprocating slide 238 has adjustably secured thereto, a flanged plate 242, (Fig. 36),—said plate being secured by set screws 243ª (Fig. 24ª) passing through the flanges of said plate and entering said slide 238,—and the said plate 242 is provided with a lug 243 to enter a hole or socket 244 near one end of the slide plate 225.

A crank arm 245 at the upper end of the

shaft 202 is connected through the medium of a link 246 with the slide block 235, and in this manner motion is imparted to the can and cap feeding mechanism.

It will be seen that when a can on the conveyor engages the curved end of the lever 240, said lever will be turned on its pivotal support and move the toe 241 in front of the shoulder 236 of the sliding block 235, thus operatively connecting the feeding mechanism with its operating means. The feeding devices will now move forwardly and feed a can to the can carrier in one of the chambers 10 and a cap will be moved by the slide plate 225, from the recessed portion 219 of plate 217, to the hole 220, through which latter it will drop and become disposed on its seat in the cap carrier plate 49. When the block 235 of the feeding mechanism recedes, the lug 237 on said block 235 will engage a lug 237^a on the reciprocating slide 238 and cause the parts to be moved back to position to receive another can, and the cap feeding blades to be operated by the cam frame 231 to drop another cap in the recessed portion 219 of the plate 217.

The movement of the mechanism above described in a direction to feed a can to a filling and sealing chamber and a cap to position on the cap carrier ready to be seamed to a can, is utilized to shift the star wheels 106 and 145 to position to be operated by the cams 102, 103, 104, 105 and 146 and 145 respectively. To accomplish such shifting of the star wheels, the devices now to be described may be employed. To each valve casing 79, a slide bar 247 is attached and provided between its ends with a beveled lug 248. At one end, the bar 247 is provided with a lateral arm 249 to engage a grooved collar 250 carried by the star wheel 106, and between its ends, said slide bar is provided with a lateral arm 251 to engage a grooved collar 252 carried by the star wheel 145. The slide bar 247 is provided at its rear end with an arm 253 which projects laterally therefrom at an angle somewhat less than a right angle, so as to be in position to be engaged by a roller 254 carried by a lever 255 pivoted to the plate 217 of the feed mechanism and normally pressed toward a stop 256 on said plate by a spring 257. The lever 255 also carries, between its ends, a roller 258 to be engaged by a lug 259 carried by the cam frame 231. When the feeding mechanism operates to feed a can and position a cap, the lug 259 on the frame 231 will engage the roller 258 and so move the lever 255 as to cause the roller 254 to cooperate with the arm 253 of the bar 247 and cause the latter to be moved forwardly and thus shift the star wheels to positions to engage the cams during the rotary operation of the apparatus for effecting the opening of the vacuum valves 85 and the syrup valves 144. After the cans shall have been filled with syrup and sealed ready to be discharged and before the sealed can has been discharged, the beveled or cam lug 100 (Figs. 1, 17 and 21) will engage the cam lug 248 on the slide bar 247 (Fig. 16) and move said bar rearwardly, thus shifting the star wheels out of cooperative relation with the cams which actuate them. In the meantime, the feeding mechanism has been moved back by its operating mechanism.

Before the cans are fed into the apparatus, solid food may be placed in said can, the purpose of my improved apparatus being to provide means whereby syrup or other liquid shall be discharged into the cans while in vacuous chambers and to hermetically seal the cans while they are still in said chambers and without breaking the vacuum in said chambers during the liquid filling and sealing operations, and to so construct the apparatus that its operation shall be continuous and automatic.

To accomplish the results above stated with the use of the apparatus hereinbefore described in detail, the operation of said apparatus is as follows:—

The cans (which may contain solid food) will be fed into the chambers 10 successively and the cap carrier ring 49 will be supplied with can caps by the feeding mechanism above described, and when a can (which may contain solid food) shall have entered a chamber 10, it will be moved in said chamber to position under the syrup spout 137 by the operation of the rack-and-pinion mechanism and the closure 15 of said chamber will be closed by cooperation of the roller 27 with the cam rail 21. As the structure forming the filling and sealing chambers revolves, cooperation of the star wheel 106 over the sealing chamber 10 in which the can has been inserted, will engage the cam 102 (Figs. 20 and 21) and thus operate the valve 85 to establish communication between the chamber 10 and the vacuum pipe 86 and thereby cause the free air in said chamber to be removed. As the chamber 10 thus exhausted continues to travel, the star wheel 106 will cooperate with the cam 103 to cause the valve 85 to be turned to close communication between the chamber 10 and the vacuum pipe 86 and open communication between the vacuum pipe 87 and said chamber, and thus the vacuous condition in said chamber will be maintained without disturbance by the exhausting of succeeding chambers 10, which disturbance would exist and the vacuum condition in the chambers would be fluctuating if a single vacuum pump were employed. The closing of a chamber 10 will take place as the chamber containing a can travels from the feeding position approximately to the point *g* (Fig.

3) and the exhausting of said chamber as above described will be accomplished as said chamber 10 travels from the point *g* approximately to the point *h*. The chamber 10 having been exhausted, cooperation of the roller 135 carried by the plunger 109, with cam 131 will cause the can platform 108 to be raised, thus elevating the can 123 and pressing its upper edge against the gasket 127, thereby temporarily closing the open upper end of the can in such manner that its internal capacity will be slightly reduced by the plate 128 entering the same as clearly shown in Figure 12. When the can is thus elevated and closed by the raising of the platform 108, the yielding can support 124 will be depressed and the post 126 will cause the can bottom to be pressed inwardly as shown in Figure 12 and thereby further reducing the internal capacity of the can.

When a chamber 10 has passed the point *h* (Fig. 3) a star wheel 145 (Fig. 16) will engage the cam 146 (Fig. 21) thus causing the syrup valve 137 to be opened, thus permitting syrup to enter the can. As the air has been exhausted, not only from the can, but also from the pores of solid food which the can may contain, the syrup will fill said pores and also space within the can not occupied by the solid food. The star wheel 106 will then engage the cam 104 and thus cause the vacuum valve 85 to be closed. Should it now be found desirable to slightly reduce the vacuum in the chamber 10 so that it will correspond with the slightly reduced degree of vacuum which may remain in the temporarily closed can when the same is subsequently lowered and hence opened, this may be accomplished by the adjustment of the valve 85^a,—the part of the valve 85 being at this time so positioned as to align with the duct leading to said valve 85^a.

When the can shall have been supplied with syrup as above described while the chamber 10 is travelling from the point *h* to the point *i* (Fig. 3), the star wheel 145 will engage the cam 147 (Fig. 21) and cause operation of the same to close the syrup valve 144. The roller 135 carried by the plunger 109 will now pass through the cam portion 133 of the cam ring 131 and cause descent of said plunger and the can platform 108, thus lowering the can away from the temporary closure afforded by the plate 128 and the gasket 127. When the can is thus lowered, its internal capacity will be increased approximately to the extent that it has been decreased when raised, as the can will leave the plate 128 which had entered it and the can support 124 will be raised by the springs 125 and relieve the pressure of the post 126 against the can bottom. The difference in internal capacity of the can between the time of filling with liquid when said can is raised and the time when the can is lowered is approximately equal to the amount of liquid in the syrup nozzle below the valve and this amount of liquid will flow into the can so that the latter will be full after the cap shall have been secured thereto. When the chamber 10 leaves the point *i* (Fig. 3) and while it is traveling to the joint *j*, the roller 166 (Figs. 1, 5, 6 and 12) will be passing through the portion of the cam 161 from the point *e* to the point *d* (Fig. 4) and motion will be imparted in the manner previously explained, to the rack-and-pinion gearing 111 117 to move the can carrier and the can thereon over the platform 108 until the can shall have been positioned for sealing. When the can shall have thus been positioned, the roller 135 will pass through the cam portion 134 of the cam ring 131, (Fig. 23) and the platform 108 will be raised to the cap carrier ring 49 to receive a cap supported by the latter, as shown in Figures 12 and 14, while the chamber 10 is moving from the point *j* to the point *k* Figure 3. As the can reaches the sealing position under a cap and while it is being raised to receive a cap, the seaming head will be shifted by the mechanism hereinbefore explained immediately over the cap, and the can and its cap will be raised sufficiently to present the same to the seaming head to effect the seaming of the cap to the can. Seaming operation will take place while the chamber 10 moves from the point *k* to the point *k'* Figure 3, and the seaming head will be so shifted (by the mechanism hereinbefore explained), so as to move with said chamber and the can therein, until the seaming operation to seal the can shall have been completed. During the sealing operation, the roller 135 will be moving through the portion 134 of the cam ring 131 and when the roller leaves this cam portion the lowering of the can carrier and the can thereon, will be effected.

It will be observed that the can is supplied with syrup and sealed while in a vacuous chamber and the vacuum is maintained in said chamber unbroken during both of these operations.

The can having been filled and sealed, the roller 27 will have arrived at the upper end of the incline 25 of the cam rail 21 and move downwardly on said incline to permit descent of the closure 15 and hence the opening of the chamber 10,—such descent of the closure being insured by engagement of the roller 30 with the under face of the sub-cam 25^a. The roller 160 will pass through the portion of the cam 161 from the point *e* to the point *f* (Fig. 4) thus causing operation of the mechanism which actuates the can carrier to move said carrier to the position shown at the left of Figure 1. As the apparatus continues to move, and as the roller 160 moves through the portion of the cam

161 from the point *f* to the point *a* (Fig. 4), the can will be guided by the beveled portion 215 of the bracket 214 and discharged onto the conveyor 196.

It will be understood that the operations above described will be repeated in each chamber 10 of the annular series of chambers, and that the apparatus will operate continuously to perform such operations automatically, thus acomplishing the filling of the cans with liquid and sealing them rapidly, accurately and efficiently.

Various changes might be made in the details of construction of my invention without departing from the spirit thereof or limiting its scope and hence I do not wish to restrict myself to the precise details herein set forth.

Having fully described my invention what I claim as new and desire to secure by Letters-Patent, is:—

1. The combination with a series of casings forming chambers to enclose containers, of means for discharging liquid into the containers in the several chambers successively, means for successively seaming caps to the containers in said chambers, means for maintaining a vacuous condition in each chamber continuously during the liquid-discharging and cap seaming operations therein, and means operating automatically to operate the liquid-discharging means and the cap seaming means in each of said chambers during the continuous travel of the latter.

2. The combination with a chamber, liquid supplying means, and means for exhausting said chamber, and a seat for the open end of a can in said chamber, of a vertically movable can platform, means to enter the can to compensate for the depth of a cap, means for raising and lowering said platform and a can thereon, and means for controlling the formation and release of the vacuous condition within said chamber.

3. The combination with a casing forming a chamber to enclose a container, liquid discharging means communicating therewith, and a valve in said discharging means, of means for creating a vacuous condition in said chamber, means for raising said container to the liquid discharging means and temporarily closing said container and subsequently lowering the same, means for bulging the container bottom inwardly to decrease the internal capacity of the container when raised and for afterwards permitting said bottom to assume its original position to cause the internal capacity of the container to be increased when lowered, approximately to the extent it had been decreased when raised, the difference in internal capacity when raised and subsequently lowered being approximately equal to the amount of liquid remaining in the liquid feeding means below the valve after the valve shall have been closed.

4. The combination with a casing forming a chamber to enclose a can liquid discharging means communicating with said chamber, and means for creating a vacuous condition in said chamber, of a can carrier in said chamber, a support for said can carrier, a yielding can support on the can carrier, a post rigid with the can carrier and passing through said yielding can support and adapted to engage the can bottom, and means for raising the can carrier support to raise the can to the liquid discharging means, temporarily close the open upper end of the can at the top of the vacuous chamber and depress said can support.

5. The combination with a casing forming a chamber, and means for creating a vacuous condition in said chamber, of a platform in said chamber, a can carrier movable on said platform, liquid feeding means, cap seaming means, means for moving the can carrier to position a can thereon under the fluid discharging means and for shifting the carrier to position the can under the cap seaming means, means for raising the platform to present a can successively to the fluid discharging means and the cap seaming means, and means for maintaining a vacuous condition in said chamber during the liquid discharging and cap seaming operations.

6. The combination with a casing forming a chamber, a platform in said chamber, fluid discharging means, and cap seaming means, of a can carrier movable on said platform, a rack carried by said carrier, a pinion in the platform and meshing with said rack to move the carriage to position a can under the fluid discharging means and subsequently under the cap seaming means, means for raising and lowering said platform, a shaft to which said pinion is secured, another pinion carried by said shaft, a segment meshing with said last-mentioned pinion, cam means cooperable with said segment for operating the same, and means for creating a vacuous condition in said chamber.

7. The combination with a casing forming a chamber, said casing having a depending portion, and fluid discharging means and cap seaming means spaced apart at the top of said chamber, of a platform within said chamber and having a plunger depending through the depending portion of said casing, a can carrier movable on said platform, a rack carried by the can carrier, a shaft mounted in said plunger, a pinion at the upper end of said shaft and meshing with said rack, a pinion at the lower end of said shaft, a segment meshing with said last mentioned pinion and having an arm, a roller carried by said arm, cam means with

which said roller cooperates to oscillate the segment whereby the can carrier will be shifted to position under the fluid feeding means and subsequently to position under the cap seaming means, means cooperable with said plunger to raise and lower said platform and the can thereon, and means for creating and maintaining a vacuous condition in said chamber during the fluid discharging and seaming operations.

8. The combination with a casing forming a chamber, said casing provided with an opening having a recessed wall forming a can cap support, whereby a cap on said support and closing said opening will constitute temporarily a part of the top wall of said chamber, of means for creating a vacuous condition in said chamber whereby the cap will be held firmly on its support, means for discharging liquid into a can in the vacuous chamber, and means for sealing the cap to the can while the vacuous condition in said chamber is maintained.

9. The combination with a casing forming a chamber, means for moving said chamber, and means for creating a vacuous condition in said chamber, of a liquid nozzle communicating with said chamber, means for supplying liquid to said nozzle, a valve in said liquid nozzle, means for creating a vacuous condition in said chamber, a valve in said liquid nozzle, a star wheel on the stem of said valve, cam means for operating said star wheel to open and close said valve, and means for sealing a cap to the can while the vacuous condition in the chamber is maintained.

10. The combination with a structure comprising an annular series of casings forming chambers, means for moving said structure, liquid feeding means rotatable with said structure and comprising nozzles communicating with said chambers, an annular pipe, funnels connecting said annular pipe with said nozzles and pipe connections communicating with said annular pipe, means whereby liquid may be supplied to said pipe connections of said liquid feeding means, valves in said nozzles, means operable automatically to open and close said valves, means for creating a vacuous condition in said chamber, and means operating automatically for presenting cans in said chambers to the liquid nozzles and removing them therefrom.

11. The combination with a structure comprising a series of casings forming chambers, and means for moving said structure, of means for supporting and moving cans in said chambers, liquid feeding means, nozzles communicating with said liquid feeding means and with said chambers, valves in said nozzles, means operable automatically to open and close said valves successively, can cap seaming means located over the path of said chambers for seaming caps to cans in said chambers, and means for creating vacuous conditions successively in said chambers and maintaining the vacuous condition in each chamber while liquid is being discharged into the can therein and until the cap shall have been seamed to the can.

12. The combination with a casing forming a chamber, and means for supplying a can in said chamber with liquid, of means for exhausting the free air from the chamber, and separate means for subsequently maintaining a high vacuous condition in said chamber while the can is being supplied with liquid.

13. The combination with a casing forming a chamber, means for supplying liquid to a can in said chamber, means for sealing a can while in said chamber, means for controlling the liquid feeding means, and means for controlling the can sealing means, of means for exhausting the free air from said chamber, and separate means for maintaining a high vacuous condition in said chamber during the feeding of liquid into the can and the sealing of the latter.

14. The combination with a casing forming a chamber, and means for supplying liquid to a can in said chamber, of two vacuum pipes both adapted to be made to communicate with said chamber, a valve for controlling the passage of air through said pipes. and means whereby said valve may be operated to establish communication between one of said pipes and said chamber to exhaust free air from the latter and subsequently establish communication between the other pipe and said chamber to maintain a high degree of vacuum in the latter during discharge of liquid into the can, and means for sealing the can in said chamber during the maintenance of the high degree of vacuum therein.

15. The combination with a travelling structure comprising a series of casings forming chambers, means for feeding liquid to cans in said chambers, means for sealing said cans, and means for moving said structure, of two fixed vacuum pipes, a head movable with said travelling structure and having two sets of ducts, valve casings on said head and communicating with both sets of ducts. said head and valve casings also having ducts between the valve casings and said chambers, certain of the ducts in said head communicating with one of said vacuum pipes, means connecting the other set of ducts in said head with the other vacuum pipe, valves in said valve chambers, and means for operating each of said valves to connect a chamber first with one of said vacuum pipes and then with the other.

16. The combination with a structure comprising a series of casings forming cham-

bers, means for exhausting said chambers said means including vacuum valves, means for feeding liquid to cans in said chambers, said last mentioned means including liquid valves, star wheels carried by the stems of the valves of each set, means for moving said structure, and fixed cams cooperable with said star wheels to control the timed opening and closing of the valves of the respective sets to establish vacuous conditions in said chambers and the feeding of liquid into the cans while the vacuous conditions are maintained in said chambers.

17. In apparatus of the character described, the combination with a casing forming a chamber, of a vertically movable closure forming a part of said casing, said closure having a depending portion, upper and lower rollers carried by said depending portion, a rail on which the upper roller may travel to retain the closure in closed position, said rail provided with two cam portions for cooperation with said upper roller to permit raising and lowering of said closure, a subcam near one of said first-mentioned cams for cooperation with said lower roller to insure the lowering of said closure, and means for moving said casing and its closure horizontally.

18. In apparatus of the character described, the combination with a traveling structure embodying a series of casings forming chambers and closures for said casings, means for supporting cans within said chambers, and means for moving said structure, of liquid feeding means communicating with said chambers, liquid valves for controlling such communication, exhausting means communicating with each of said chambers, vacuum valves for controlling such communication, cap supporting means over said chambers, means for moving said closures to open and close said chambers, means for feeding cans and caps, means for operating said valves, means controlled by the last-mentioned feeding means to render the valve-operating means operable, and means for operating said last-mentioned feeding means.

19. In apparatus of the character described, the combination with a traveling structure embodying a series of casings forming chambers, means for supporting cans within said chambers, and means for moving said structure, of liquid feeding means communicating with said chambers, liquid valves for controlling such communication, exhausting means communicating with said chambers, vacuum valves for controlling such communication, star wheels rotatable with and movable relatively to said valves, fixed cams for cooperation with said star wheels, feeding means for cans and caps, movable members cooperable with the star wheels for moving them to position to be operated by said cams, means carried by and movable with the last-mentioned feeding means and cooperable with said movable members to effect shifting of the star wheels, and means for operating said last-mentioned feeding means.

20. In apparatus of the character described, the combination with a traveling structure comprising a plurality of casings forming chambers, means for supporting cans in said chambers, means for supporting caps to be applied to the cans, and means for exhausting said chambers, of a swinging frame, seaming mechanism carried thereby, means for swinging said frame and causing it to travel with said traveling structure during the operation of seaming a cap to a can in an exhausted chamber, and for swinging said frame in the reverse direction to position the seaming means over another exhausted chamber to seam a cap to the can in the latter.

21. In an apparatus of the character described, the combination with a traveling structure comprising a plurality of casings forming chambers, means for supporting cans in said chambers, means for supporting caps to be applied to the cans, and means for exhausting said chambers, of a swinging frame, seaming mechanism carried thereby, means for swinging said frame and causing it to travel with said traveling structure during the operation of seaming a cap to a can in an exhausted chamber, and for swinging said frame in the reverse direction to position the seaming means over another exhausted chamber to seam a cap to the can in the latter, and means for raising the seaming means during said last-mentioned swinging movement of said frame.

22. In apparatus of the character described, the combination with a traveling structure comprising a plurality of casings forming chambers, means for supporting cans in said chambers, means for supporting caps to be applied to said cans, and means for exhausting said chambers, of a swinging frame including a vertically movable member, seaming means carried by said vertically movable member of the swinging frame, means for swinging said frame and causing it to travel with the traveling structure during the operation of seaming a cap to a can in an exhausted chamber and for swinging said frame in the reverse direction to position the seaming means over another exhausted chamber to seam a cap to the can in the latter, and means for raising the seaming means during the last-mentioned swinging movement of the frame, said last-mentioned means comprising a notched slide bar carried by said frame, a part on the vertically movable member and cooperable with said notched slide bar, and rigid stops to be engaged by said slide bar ap-

proximately at respective ends of the travel of the seaming mechanism carried by said swinging frame.

23. The combination with a casing forming a chamber and provided with a closure, and means for feeding a can to said chamber, of a can carrier in said chamber to receive the can, a holding lever pivoted to the can carrier, and means to operate said holding lever and cause it to engage the can and hold it in position on the can carrier.

In testimony whereof, I have signed this specification.

ADOLPH K. MALMQUIST.