

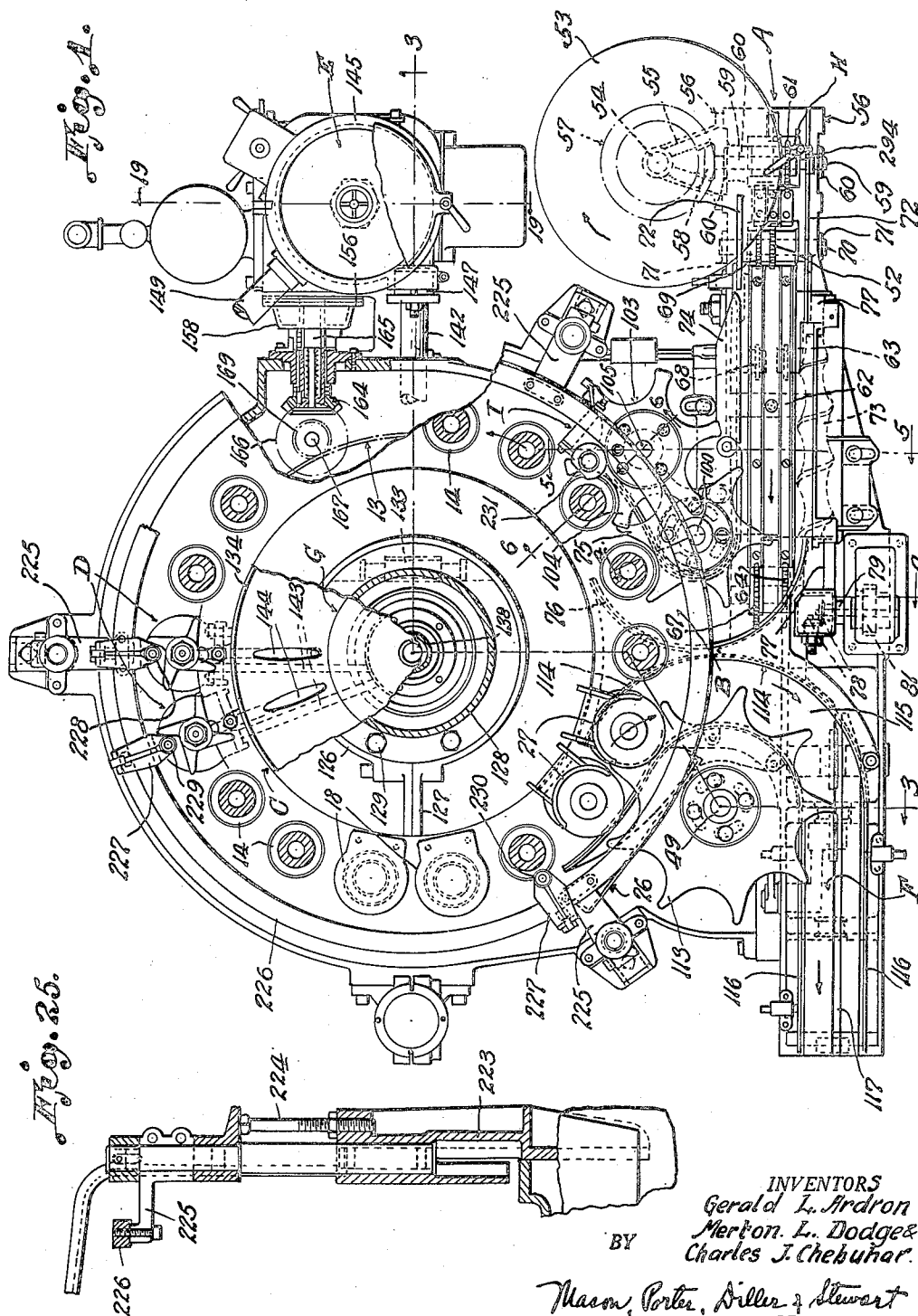
March 27, 1951

G. L. ARDRON ET AL
SIRUPING MACHINE AND METHOD FOR
SIRUPING FILLED CONTAINERS

2,546,418

Filed Aug. 12, 1946

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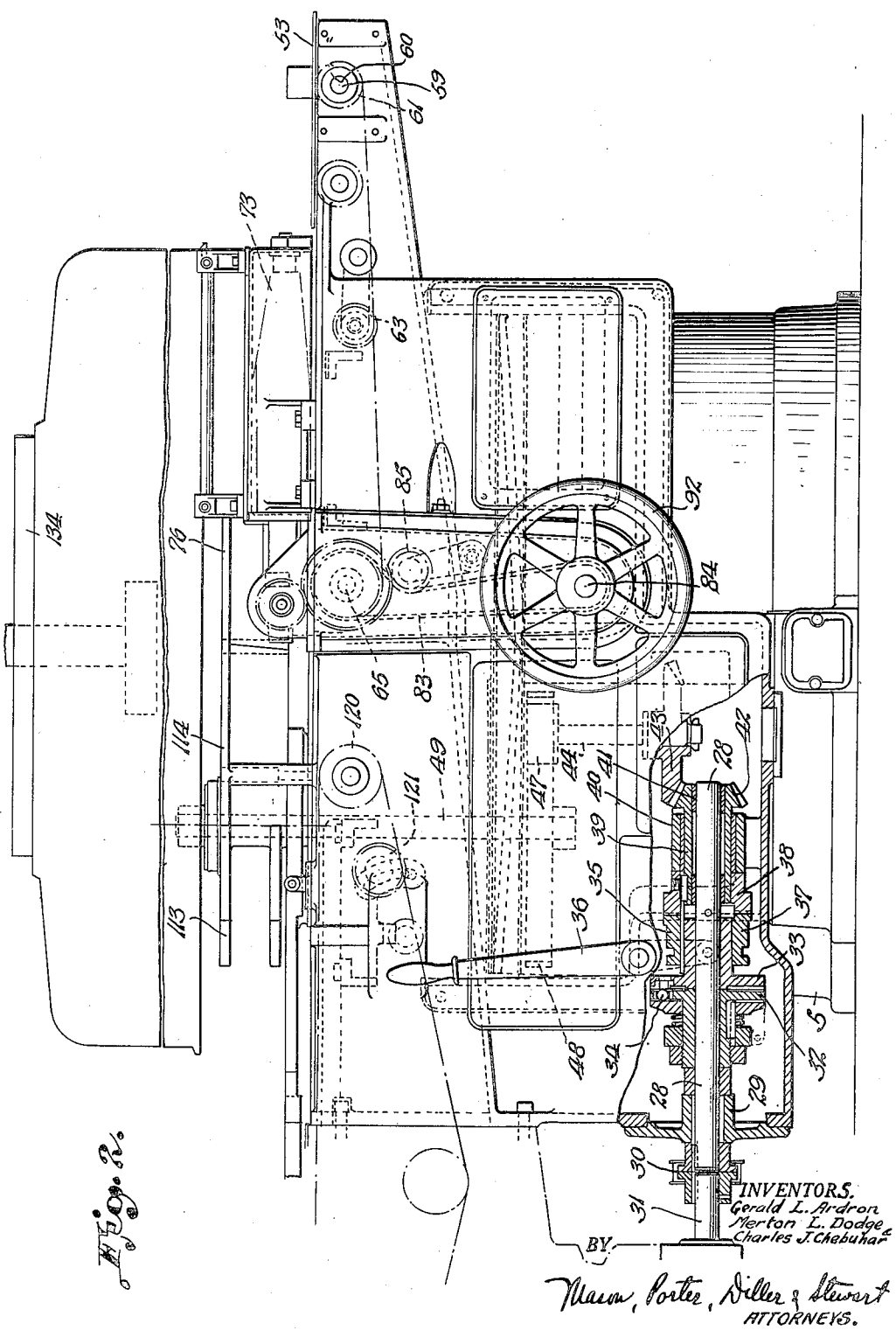
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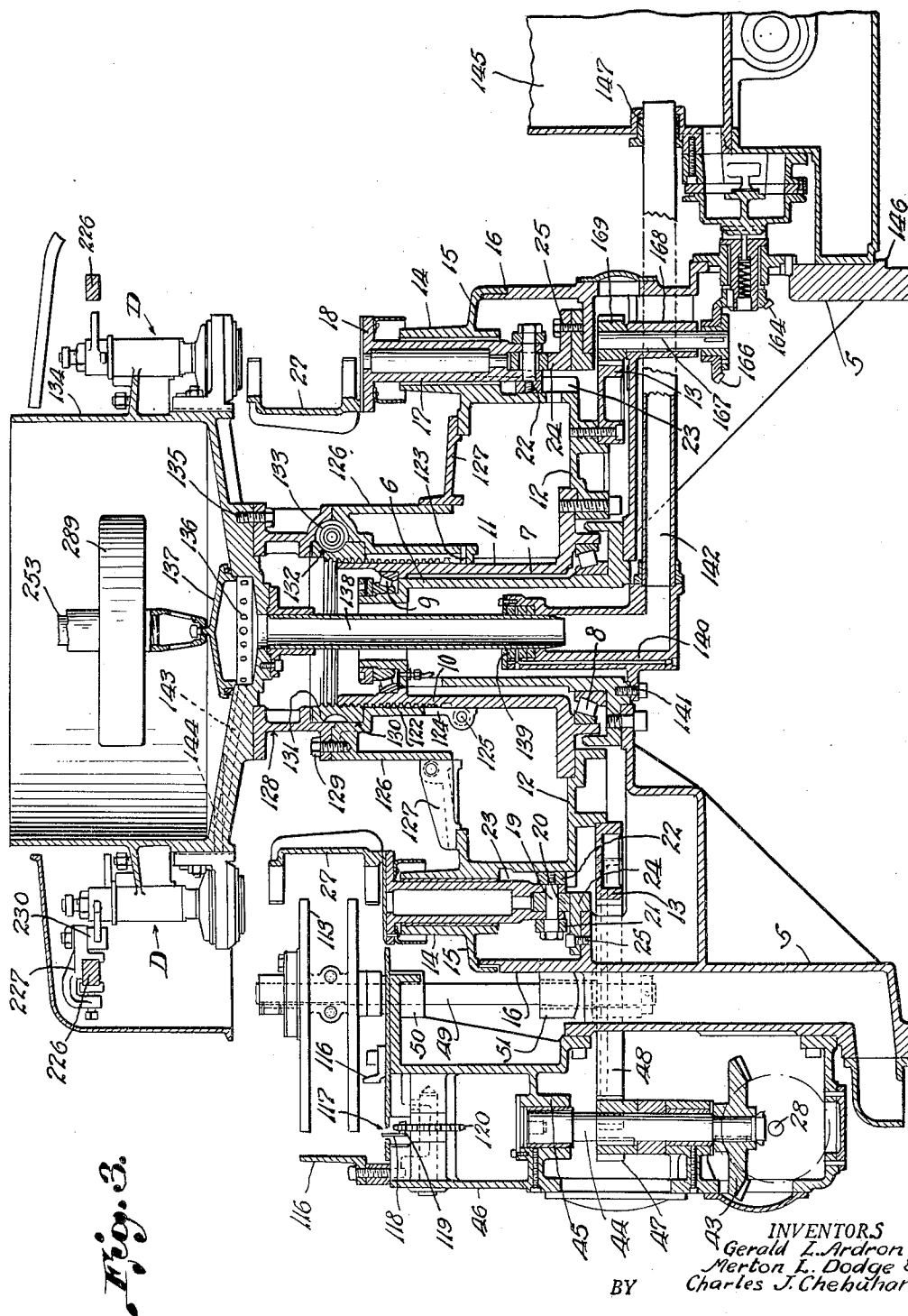


Fig. 3.

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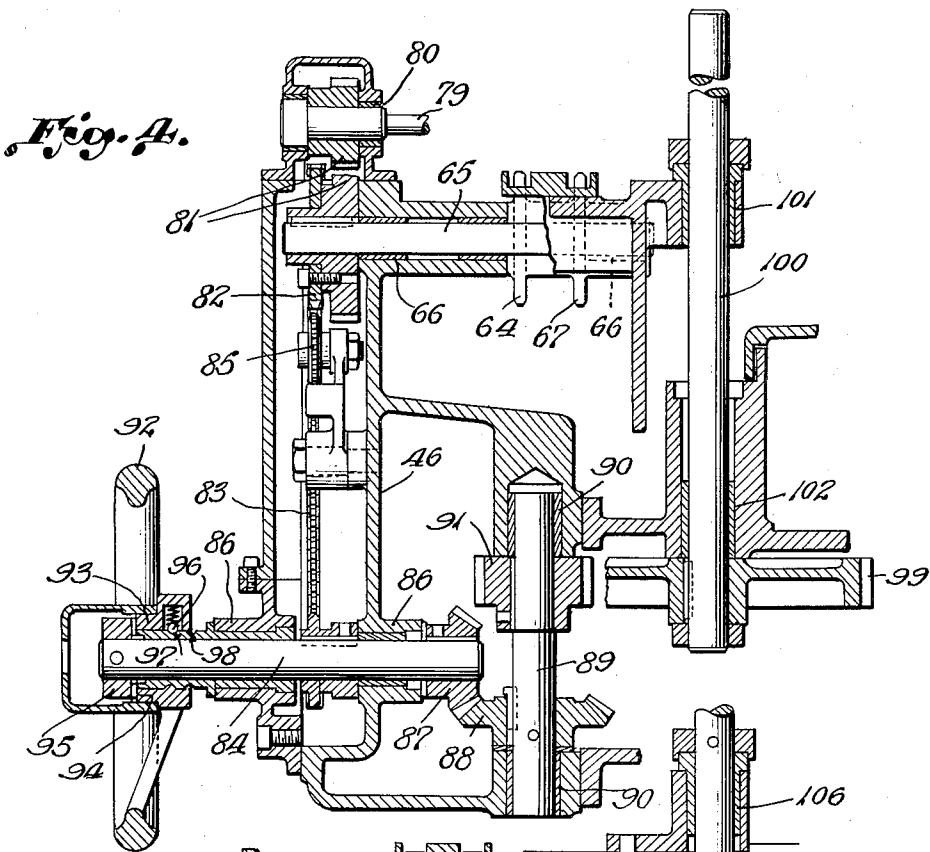
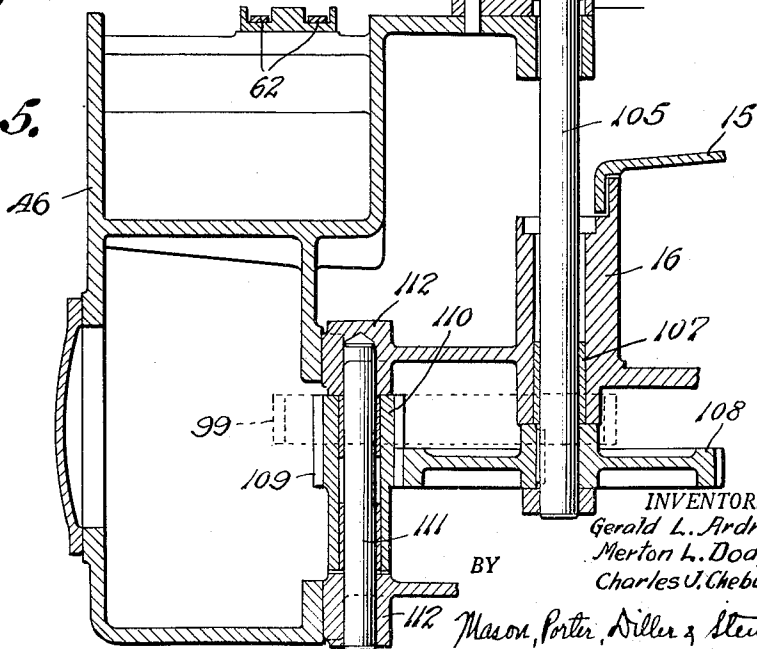


Fig. 5.



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Fig. 10.

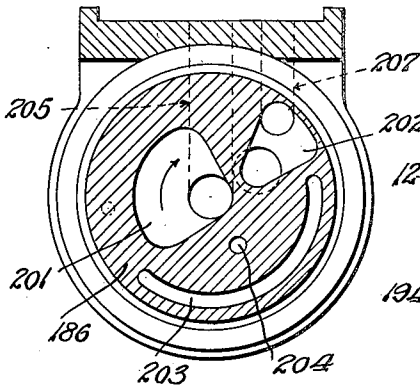


Fig. 11.

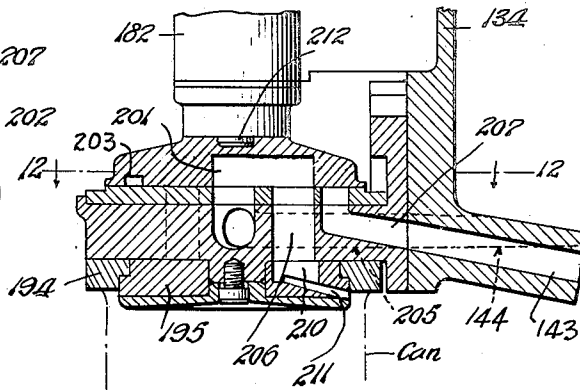
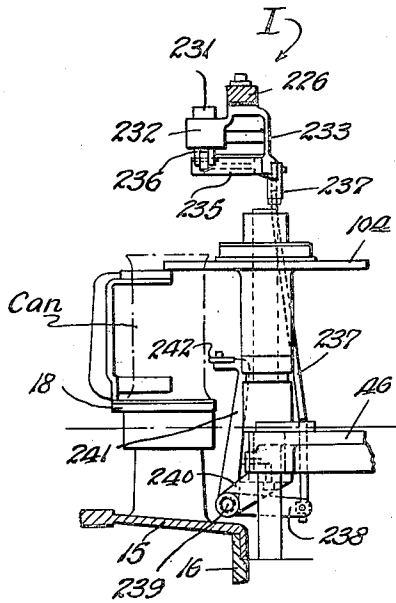


Fig. 6.

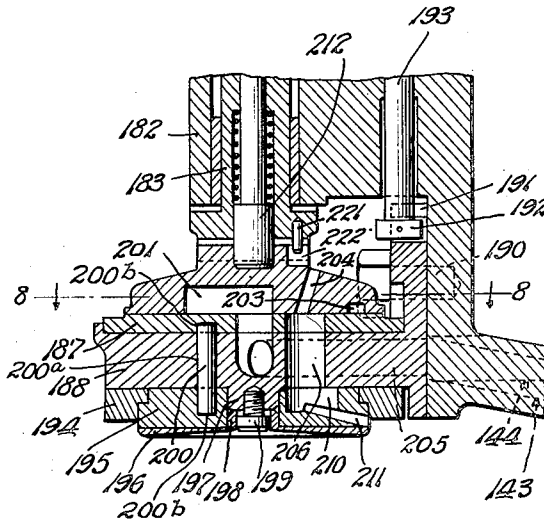


Fig. 7.

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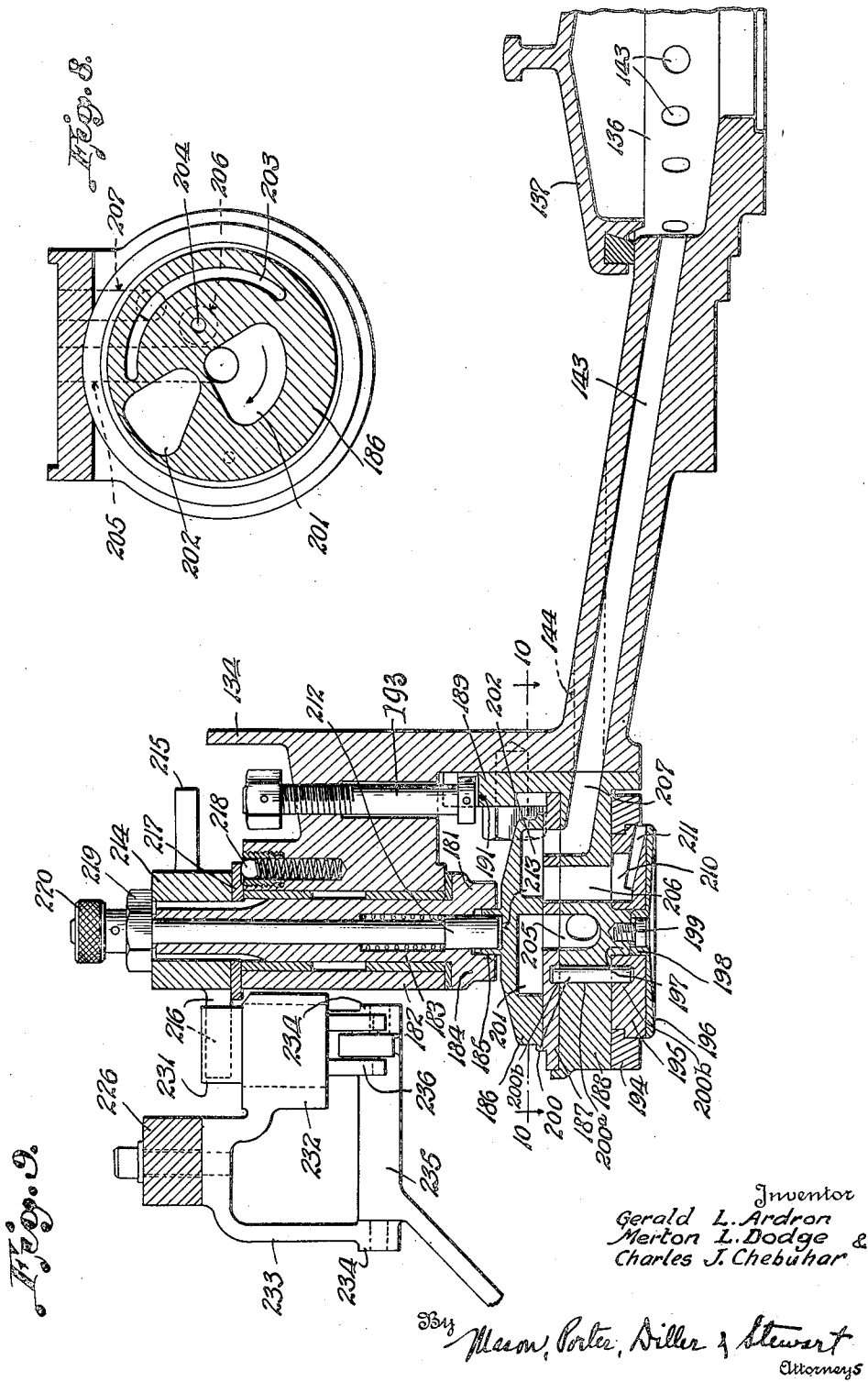
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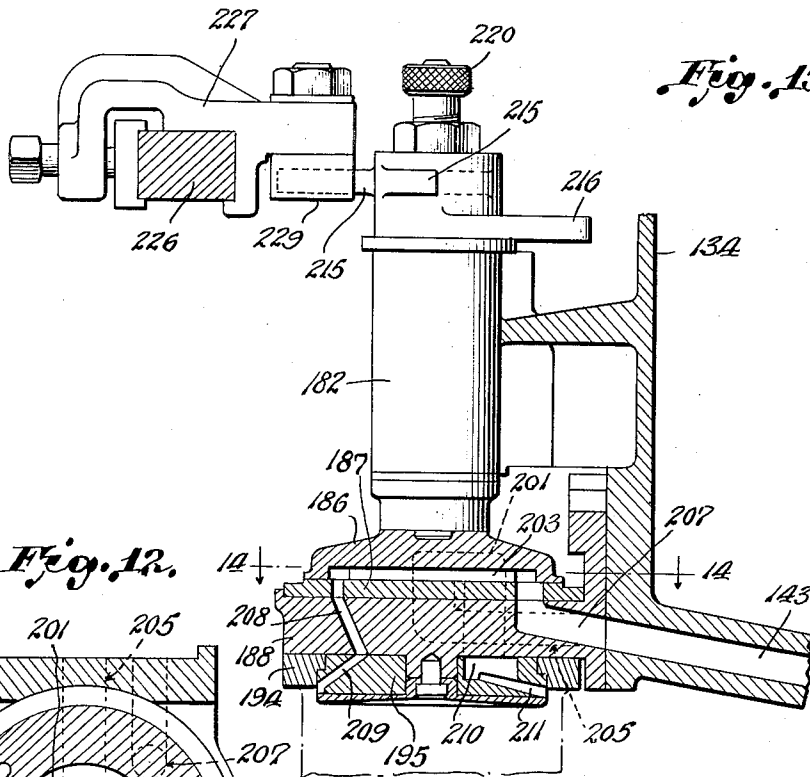


Fig. 12.

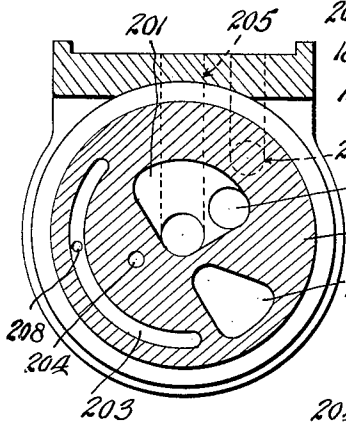
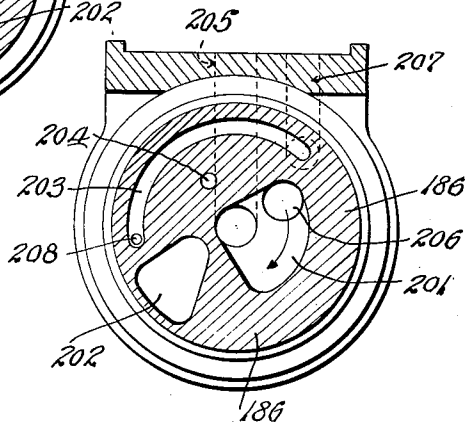


Fig. 14.



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Fig. 22.

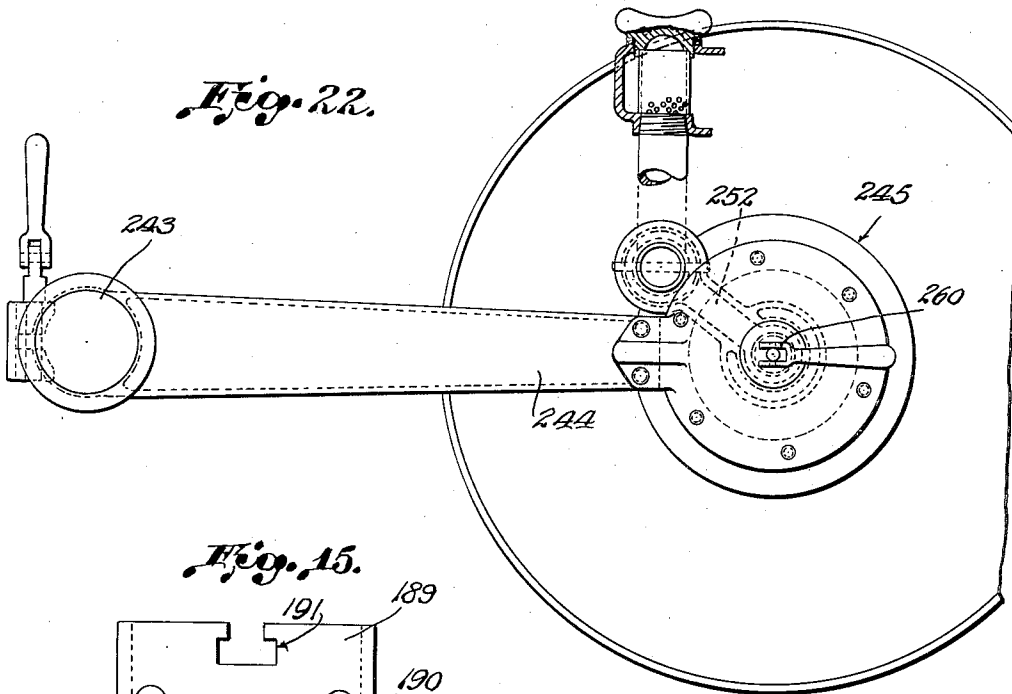


Fig. 15.

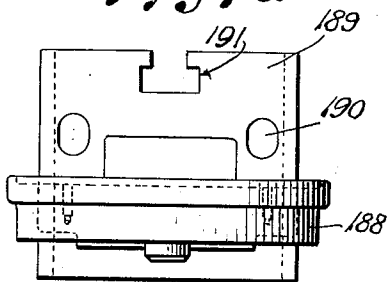


Fig. 17.

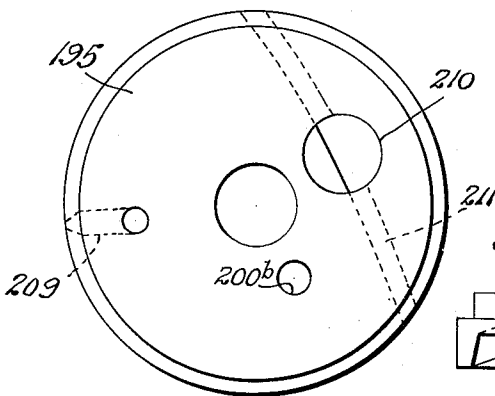


Fig. 16.

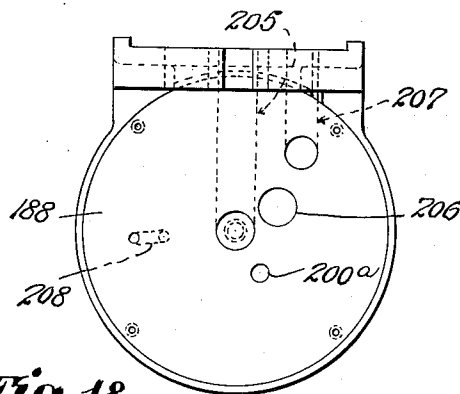
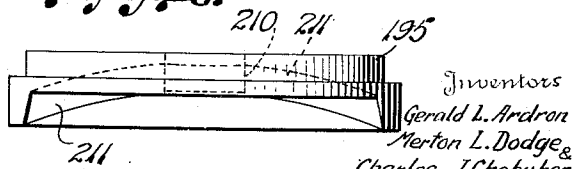


Fig. 18.



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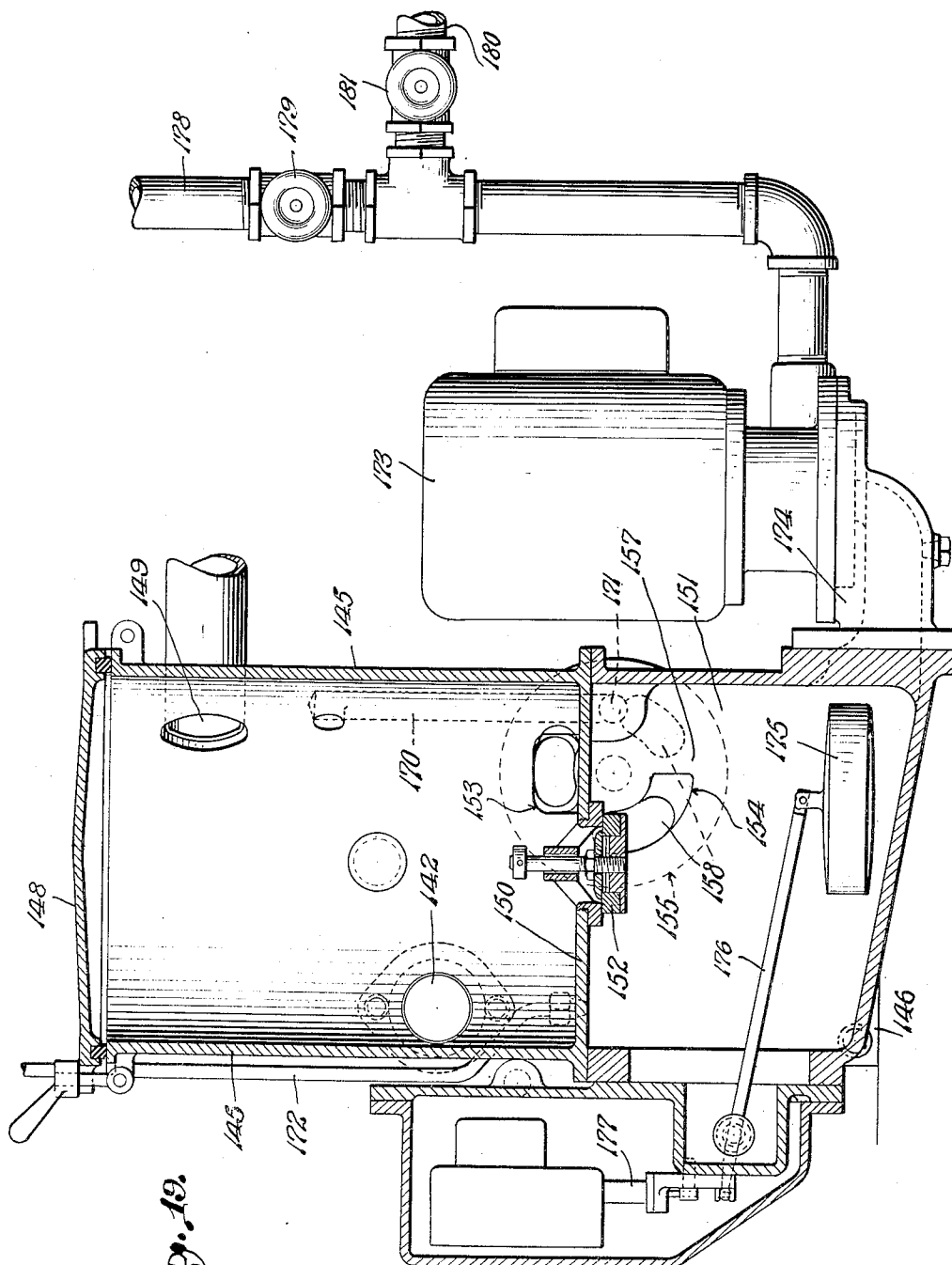


Fig. 19.

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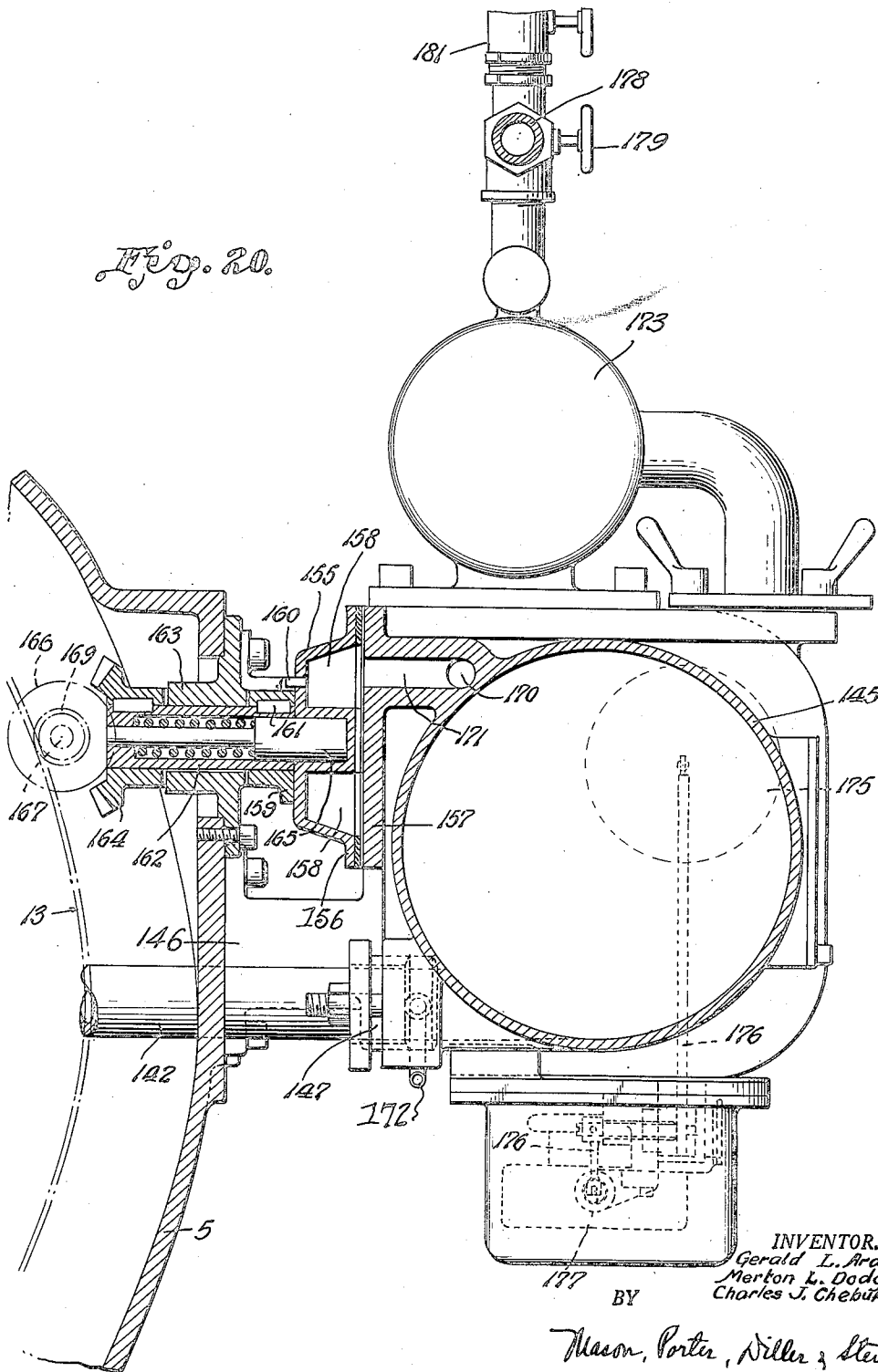
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Fig. 20.



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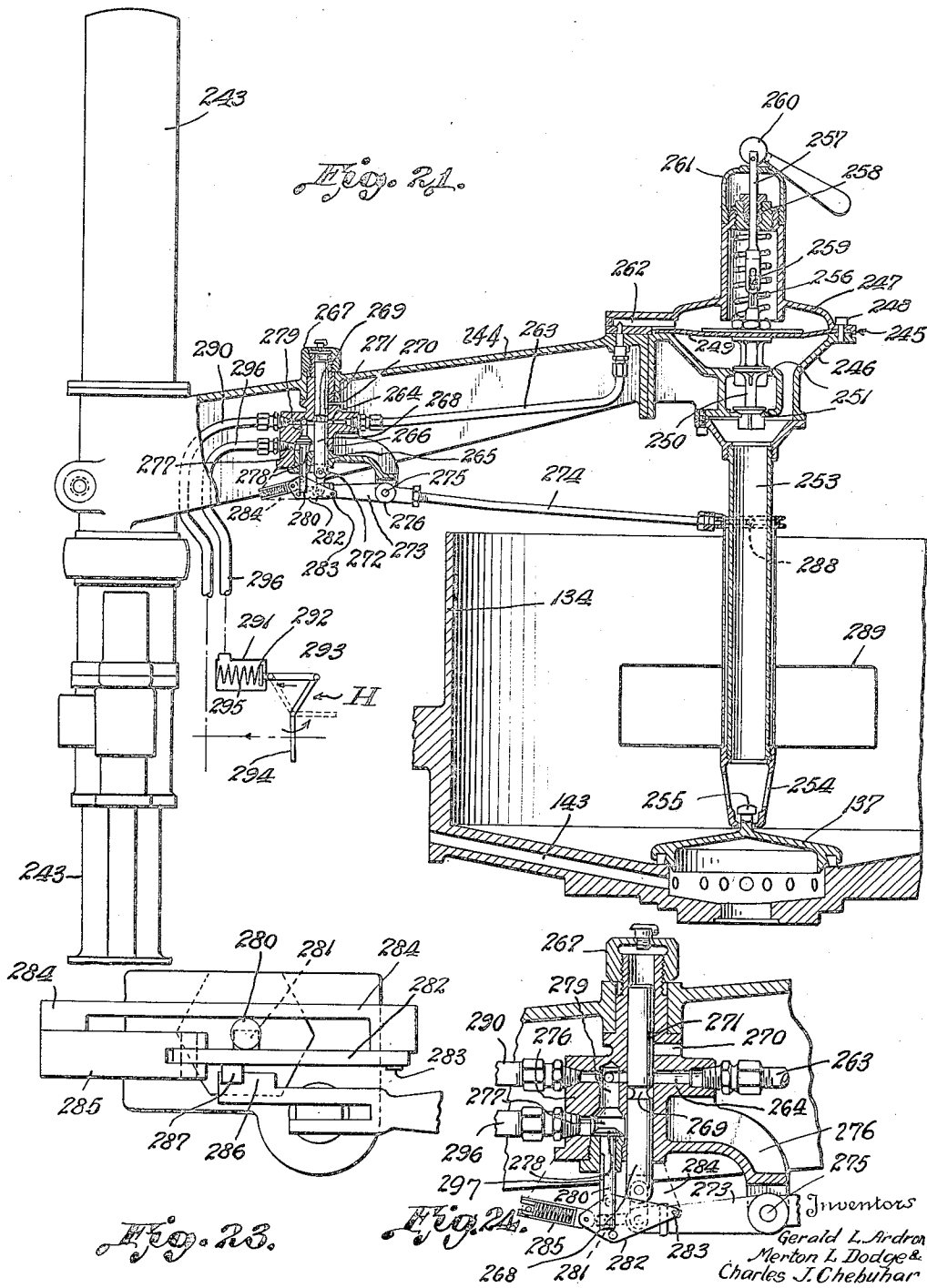
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UNITED STATES PATENT OFFICE

2,546,418

SIRUPING MACHINE AND METHOD FOR
SIRUPING FILLED CONTAINERS

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Application August 12, 1946, Serial No. 689,864

24 Claims. (Cl. 226—98)

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The invention relates generally to liquid filling machines and primarily seeks to provide a novel machine structure capable of rapidly and accurately filling liquid into containers in a manner assuring the provision of predetermined, uniform head spaces therein. The invention also embraces a novel method of filling containers in a manner for assuring the provision of predetermined, uniform head spaces therein.

Among the objects of the invention is that of providing a novel method of the character stated involving the filling or syruling of the containers by first drawing a high vacuum in the container and contents with a displacer member of predetermined effective volumetric capacity inserted therein, shutting off the vacuum and then flowing the syrup or other liquid into the evacuated container, then continuing the supply of syrup or other liquid and drawing off residual air and surplus liquid through a restricted port for completely filling the container except for the displacement of the displacer member, then shutting off the auxiliary vacuum and the liquid flow and opening the container to the atmosphere.

It is customary in the packaging of fruit or comparable products in containers to fill said products into the containers, and then to add a quantity of syrup or other liquid to the fill in each container in order to provide a definite, predetermined liquid level or head space therein, and, in some instances, to improve the taste of the products. When the added liquid is intended to improve the taste of the product, as in the case of syrup in fruit containers, it is desirable to draw a vacuum in the containers prior to the introduction of the syrup thereinto, thereby to facilitate the introduction of the syrup into the containers and also into the interstices in and between component parts of the fill. Therefore, it is an object of the invention to provide a novel syruling machine structure in which is provided means for temporarily closing the container and drawing a vacuum therein incidental to the syruling function.

Another object of the invention is to provide an improved machine structure of the character stated in which there are included displacer head means effective to temporarily close the containers and determine the head space to be provided therein, means for rapidly evacuating the temporarily closed containers, means for discontinuing said rapid container evacuation, means including a reservoir open to atmosphere for directing the syrup or other liquid by atmospheric air pressure augmented gravity flow into

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the evacuated containers, means for providing a limited auxiliary drawing of vacuum in the containers while continuing the flow of liquid thereinto to draw off residual air and surplus liquid so as to assure filling of the containers to the full extent permitted by said displacer head means, means for discontinuing the auxiliary evacuation and the inflowing of liquid, and means for opening the filled containers to atmosphere.

Another object of the invention is to provide a machine of the character stated wherein is included means for varying the duration of the main evacuation of the containers and also the timing of the fill, the auxiliary evacuation of the containers, and the opening of the containers to atmosphere.

Another object of the invention is to provide a machine structure of the character stated in which there are included a continuously rotating turret structure having a plurality of equidistantly spaced vertically reciprocable container supporting pads thereon, a reservoir tank rotatable with and about the axis of the turret and having filler units thereon disposed one over each said pad and each comprising a displacer head against which the containers are sealed by lifting of the pads and a shiftable valve for controlling the drawing of the vacuum in the containers, the flowing of liquid thereinto and the opening of said containers to atmosphere, means for actuating the valve means as the turret and tank are rotating, means for feeding containers onto the pads to be filled thereon, and means for feeding containers from the pads and out of the machine after they have been filled.

Another object of the invention is to provide a machine structure of the character stated in which the reservoir tank and the filler units thereon are vertically adjustable with respect to the container supporting pads so that the machine can be adjusted for filling containers of different heights.

Another object of the invention is to provide a machine of the character stated in which the valve means and the valve actuating means comprises a rotatably mounted valve disk in each filler unit, a star wheel attached to each valve disk, means for engaging and indexing each star wheel as the turret and tank are rotated for moving the valve disks to their several control positions, and means for preventing indexing of any valve disk that overlies a pad devoid of a container during the whole of any given turret rotation during which said pad remains empty.

Another object of the invention is to provide a

machine of the character stated in which the valve disk indexing star wheels each includes a finger disposed at an individual level and engageable with a roller for indexing the respective valve disk to the high vacuum drawing position, and three fingers disposed at a common but different level and being successively engageable with rollers for indexing the respective valve disk first to a position for shutting off the high vacuum and commencing the flow of liquid into the vacuumized container, then to a position for continuing the flow of liquid and initiating the auxiliary vacuumization effective to draw off residual air and surplus liquid fill, and then to a position for shutting off the liquid flow and the auxiliary drawing of vacuum and for opening the container to atmosphere, said first mentioned roller being shiftably mounted, and there being included means for displacing the shiftable roller from the path movement of a particular one of the individual level fingers whenever there is no container supported on the pad underlying the filler unit of which said particular finger forms a part.

Another object of the invention is to provide in a machine of the character stated a trap tank through which the vacuum is drawn and into which surplus fill drawn off from the containers is received.

Another object of the invention is to provide a machine of the character stated in which the trap tank and the open reservoir tank normally are isolated one from the other, and in which there is included means for opening communication between said tanks to permit the latter to drain into the former.

Another object of the invention is to provide a machine of the character stated in which there are included the beforementioned trap tank and a drain tank and novel means for transferring liquid from the trap tank into the drain tank without opening the trap tank to atmosphere.

Another object of the invention is to provide novel means for maintaining a predetermined working level of liquid in the reservoir tank, and means for preventing the feeding of containers into the machine if said tank does not have a proper supply of liquid therein.

Another object of the invention is to provide novel liquid level controlling means of the character stated including a vacuum source, and means for preventing the feeding of containers into the machine upon failure of said vacuum source.

With the above and other objects in view that will hereinafter appear, the nature of the invention will be more clearly understood by reference to the following detailed description, the appended claims, and the several views illustrated in the accompanying drawings.

In the drawings:

Figure 1 is a somewhat diagrammatic plan view illustrating a syruping machine structure embodying the invention.

Figure 2 is a side elevation of the machine shown in Figure 1, parts being broken away and in section, the parallel guides for guiding the infeeding cans toward the timing screw being omitted for purposes of clarity.

Figure 3 is a vertical cross section taken on the line 3—3 on Figure 1.

Figure 4 is a fragmentary vertical cross section taken on the line 4—4 on Figure 1.

Figure 5 is a fragmentary vertical cross section taken on the line 5—5 on Figure 1.

Figure 6 is a fragmentary vertical cross section

taken on the line 6—6 on Figure 1 and illustrating the "no container-no fill control."

Figure 7 is an enlarged fragmentary vertical cross sectional view taken through one of the filler head units, the valve being shown in the number one position in which the syrup feed porting, the main vacuum porting and the auxiliary vacuum porting are closed, and the porting effective to open the container to atmosphere is open.

Figure 8 is a horizontal section taken on the line 8—8 on Figure 7.

Figure 9 is a view similar to Figure 7, the whole of the filler head unit being shown, and the valve being illustrated in the number two position in which the syrup feed porting is closed, the main vacuum porting is open, and the auxiliary vacuum porting and the porting effective to open the container to atmosphere are closed.

Figure 10 is a horizontal section taken on the line 10—10 on Figure 9.

Figure 11 is a view similar to Figure 9, the valve being shown in the number three position in which the syrup feed porting is open, and the main vacuum porting, the auxiliary vacuum porting and the porting effective to open the container to atmosphere are closed.

Figure 12 is a horizontal section taken on the line 12—12 on Figure 11.

Figure 13 is a view similar to Figure 9, the valve being shown in the number four position in which the syrup feed porting is open, the main vacuum porting is closed, the auxiliary vacuum porting is open, and the porting effective to open the container to atmosphere is closed.

Figure 14 is a horizontal section taken on the line 14—14 on Figure 13.

Figure 15 is a face view of one of the stationary valve heads.

Figure 16 is a plan view of the valve head shown in Figure 15.

Figure 17 is a plan view of one of the displacer port disks.

Figure 18 is an edge view of the disk shown in Figure 17.

Figure 19 is an enlarged fragmentary vertical sectional view taken on the line 19—19 on Figure 1.

Figure 20 is an enlarged horizontal sectional view taken through the trap tank and drain valve.

Figure 21 is an enlarged vertical cross sectional view illustrating a non-operating position of the means for controlling the introduction of liquid into the reservoir tank, the container feed stop gate also being diagrammatically illustrated.

Figure 22 is a plan view of the parts shown in Figure 21.

Figure 23 is an inverted fragmentary plan view illustrating the control valve snap action.

Figure 24 is an enlarged fragmentary vertical cross sectional view showing the vacuum control valve shifted by elevation of the float in the reservoir tank.

Figure 25 is a fragmentary vertical sectional view illustrating one of the valve actuator ring supporting standards.

In the improved syruping or filling machine herein disclosed, the containers are fed into the machine by an infeeding means generally designated A, and onto individual vertical reciprocable container supporting pads arranged in equidistantly spaced relation about the periphery of a continuously rotated turret structure generally designated B. While moving about on the turret, the containers are filled with the syrup or other

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liquid which flows by gravity from the reservoir tank structure generally designated C into the containers, greatly accelerated by low pressure within the containers, said containers being supported by the turret pads and lifted by said pads into sealing contact with the filler units D. As will be explained in detail hereinafter, the filler head units include control valve structures, and valve actuating devices are operated so as to effect the syringing or filling of the containers in four stages as follows: First, a high vacuum is drawn in the container for withdrawing air from the interstices in and between the components of the fill therein, and then the vacuum is cut off. After the vacuum has been cut off, syrup or other liquid is allowed to flow by gravity into the vacuumized container from the reservoir tank, said flow being greatly accelerated due to the low pressure in the evacuated container. The flow of the syrup or other liquid into the vacuumized container continues until the pressure of the residual air in the container prevents further flow, and then the auxiliary vacuum porting opens to effect a drawing off of the residual air while continuing the supply of the syrup or other liquid to the container for completely filling said container to the extent permitted by the displacer pad forming a part of the filler head. During the drawing of the auxiliary vacuum, surplus liquid is drawn off into a trap tank. After thus completing the filling of the container, the auxiliary vacuum porting is closed and the porting effective to permit entry of air at atmospheric pressure is opened, and then the turret pad which has been effective to hold the container against the filler head is lowered. The trap tank is generally designated E.

After the container have been filled in the manner above described and lowered by the turret pads, they are fed out of the machine by feed-away means generally designated F.

A proper working level of the syrup or other liquid is maintained in the reservoir tank C by a vacuum and float controlled supply means generally designated G, and a swingably mounted gate is associated with the container infeeding means A and is effective whenever the supply of syrup or other liquid in the reservoir tank C is exhausted or dangerously low to stop the feeding of containers into the machine. The feed stopping means is generally designated H.

There is also provided means for preventing actuation of the control valve of any filler head unit D beneath which no container is positioned for receiving the syrup or other liquid. This no container-no fill control means is generally designated I.

Turret structure and support

The turret structure and the support therefor is best illustrated in Figures 1, 2 and 3 of the drawings. There is provided a frame base 5 upon which is secured an upstanding, hollow center column 6. The column 6 is surrounded by a turret sleeve 7 which is rotatable about lower bearings 8 and upper bearings 9. The sleeve 7 is externally threaded as at 10 and provided with a vertical key-way 11 for a purpose to be described hereinafter.

The turret table 12 is secured to a flange projecting outwardly from the sleeve 7, and a ring gear 13 is secured to said table in the manner best illustrated in Figure 3. The table 12 is provided with a plurality of equidistantly spaced

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upright guides 14 which extend upwardly and downwardly through the sloping ring portion 15 of said table. It will be apparent by reference to Figure 3 that the downwardly turned peripheral edge portion of the table ring portion 15 rotatably embraces a peripheral wall 16 projecting upwardly from the frame base 5.

A plunger 17 is vertically reciprocable in each guide 14, and each said plunger carries a container supporting pad 18 at its upper end. The lower end of each plunger is bifurcated and equipped with a radially disposed cross pin 19 on which is mounted a pad lifting roller 20, and a pad lowering roller 21. Each plunger also is equipped with a key projection 22 which is slidable in an upright guide groove 23 provided in the table ring 12 in a manner for maintaining the proper position of the pads as the turret is rotated about the center column or standard 6. The rollers 20 ride upon a cam 24 which is secured as at 25 upon the frame base 5, and the rollers 21 are engageable under a lowering cam 26 which is effective to assure the lowering of the pads after completion of each syringing or filling cycle. See Figures 1 and 3.

Turret drive

The means for imparting rotation to the turret structure is best illustrated in Figures 2 and 3 of the drawings. A driver shaft 28 is rotatably mounted in a bearing 29 provided in a plate removably secured on the frame base, and rotation is imparted to said shaft through a flexible coupling 30 by a shaft 31. The shaft 31 serves to represent any suitable power input source, and it may constitute a projection from the cover clinching machine associated with the vacuumizing and closing machine to which the syringing machine feeds the container treated therein, or said shaft may be a part of the vacuumizing and closing machine itself.

The shaft 28 has a driver disk 32 keyed thereon, and said disk serves to drive the disk 33 through an overload release means 34 of a type well known in the art. The disk 33 projects from a sleeve which is free on the shaft 28, and a clutch head 35 is splined on said sleeve and shiftable therealong by engagement therewith of the forked end of the clutch lever 36. By shifting the clutch head 35, it is possible to engage the clutch face 37 thereof with or disengage said clutch face from engagement with a similar clutch face formed on the end of a driver sleeve 38 which is keyed on a sleeve 39 having rotary bearing as at 40 on the frame base. It will also be noted by reference to Figure 2 that the sleeve 39 provides bearing for the inner end of the shaft 28. A bevel pinion 42 is provided at the inner end of the sleeve 39 and meshes with and imparts rotation to a bevel gear 43 secured to the lower end of an upright shaft 44. See Figures 2 and 3. The shaft 44 is rotatable in bearings 45 provided therefor in the feed table framing 45, and said shaft has secured thereon a spur gear pinion 47 which meshes with and drives a spur gear 48 secured on an upright shaft 49 which is rotatable in an upper bearing 50 provided in the feed table framing 46 and a lower bearing 51 provided on the frame base. The gear 48 meshes with and drives the turret ring gear 13, thus imparting continuous rotation to the turret structure. The shaft 49 serves another purpose which will be described hereinafter.

Container feed-in means

The means for feeding the containers into the machine is best illustrated in Figures 1, 2, 4 and 5 of the drawings. The containers may be fed into the machine on a chain passing about the center sprocket 52 of a double idler sprocket, but in the example of embodiment of the invention herein disclosed, the containers are fed into the machine on a rotary disk 53. The disk 53 is secured to the upper end of an upright shaft 54 which is rotatable in a bearing bracket 55. It will be apparent by reference to Figure 1 of the drawings that the bracket 55 may be mounted at 56 at either side of the feed table framing so as to place the disk 53 in the manner illustrated in Figure 1, or at the opposite side of the feedway. The disk has a bevel gear 57 affixed thereto, and rotation is imparted to said gear by a bevel pinion 58 mounted on a cross shaft 59 which is rotatable in bearings 60 provided therefor on the feed table. The shaft 59 is driven by a chain which passes over a sprocket 61 secured on said shaft, and said chain passes over one of a pair of parallel supporting rails 62 mounted on the feed table, over a tightener sprocket 63, and over a driver sprocket 64 secured on a cross shaft 65 which is rotatable in bearings 66 provided on the feed table framing. See Figures 1, 2 and 4. A second sprocket 67 is secured on the shaft 65, and a chain passes over the sprocket 67, over the other guide rail of the pair of parallel rails, over tightener sprocket 68, and over the second sprocket 69 which is companion of the beforementioned center sprocket 52 and which rotates idly about the cross shaft 70 supported in the feed table bearings 71.

The containers fed into the machine by the disk and chains above referred to pass between parallel side guides 72 and between the timing screw 73 and the opposing, yieldably pressed guide wall 74. The timing screw times the in-feeding of the containers so that they will properly be engaged by the star wheel 75 which cooperates with the arcuate guide 76 in feeding the individual containers onto the supporting pads 18 which are serially presented by continuous rotation of the turret structure in the manner hereinabove described.

The timing screw 73 rotates in bearings 77 supported on the feed table and is driven by a bevel gear couple 78 from a cross shaft 79 which is rotatable in bearings 80 supported on the feed table. See Figures 1, 2 and 4. The shaft 79 is driven by a spur gear couple 81 from the previously mentioned shaft 65 on which the sprockets 64 and 67 are mounted. A sprocket 82 is secured to the shaft 65 and is driven by a chain 83 which passes over a driver sprocket secured on a shaft 84 in the manner clearly illustrated in Figure 4. A suitably mounted tightener sprocket 85 engages the chain 83.

The shaft 84 rotates in bearings 86 and has a bevel gear 87 affixed thereon. Rotation is imparted to the gear 87 and the shaft 84 by a bevel gear 88 secured on the idler shaft 89 which is rotatable in bearings 90 provided therefor in the feed table frame. It will be noted by reference to Figure 4 that the idler shaft 89 has a spur gear 91 secured thereon.

A hand wheel 92 is provided and includes a hub 93 which is slidable along the shaft 84 and equipped with a clutch face 94 engageable with a clutch head 95 secured on said shaft. Spring detent means 96 carried by the hand wheel hub

is engageable in recess 97 for yieldably holding the hand wheel in the clutched condition, or in a recess 98 for yieldably holding the hand wheel in the out-of-clutched condition. When the hand wheel is in the clutched condition with the hub 93 engaging the clutch head 95, the various parts of the machine may be moved manually. The spur gear 91 meshes with a spur gear 99 on an upright shaft 100 mounted in an upper bearing 101 provided on the feed table framing and a lower bearing 102 provided in the frame base, and said gear 99 meshes with and is driven by the turret ring gear 13. The beforementioned star wheel 75 is secured upon the upper end of the shaft 100, and thus the star wheel, the feeder disk 53, the chains passing over the rails 62 and the timing screw 73 are driven by the turret ring gear 13 through the power transmitting connections above described.

As the containers are fed onto the turret pads 18 by the star wheel 75, they are engaged by rounding up pockets 103 of the half mold turret 104 which is secured to the upper end of an upright shaft 105. The shaft and rounding up turret structure is best shown in Figures 1 and 5, and said shaft is rotatable in an upper bearing 106 supported on the feed table framing, and a lower bearing 107 provided in the frame base. A spur gear 108 is secured to the lower end of the shaft 105 and meshes with and is driven by a pinion gear 109 formed on an idler sleeve 110 which is rotatable about a stud shaft 111 secured in the frame base bearings 112. It will be noted that the spur pinion 109 is of considerable length and is engaged by and driven by the beforementioned spur gear 99. It will thus be apparent that the rounding up turret is driven by the turret ring gear 13.

Container feed-out means

The means for feeding the containers out of the machine after they have been syruped or filled is best illustrated in Figures 1, 2 and 3 of the drawings. A star wheel 113 is secured on the upper end of the beforementioned upright shaft 49, and as the star wheel is rotated it cooperates with the arcuate guide 114 which strips the filled containers from the turret structure pads 18 and pockets 27 and feeds them over the feed table floor 115 into the longitudinal feedway provided between the parallel guides 116. The floor of the longitudinal feedway is slotted as at 117 to receive the feed lugs 118 projecting upwardly from the feed-away chain 119. See Figure 3. The chain 119 passes over an idler sprocket 120 supported on the feed table framing and said chain also passes over a tightener sprocket 121. It is to be understood that the chain 119 is driven from the clincher machine or the vacuumizing and closing machine to which the syruped containers are delivered from the syruping machine, thereby to assure that the containers will be fed into the receiving machine in proper timed relation to the devices which receive them.

The reservoir tank

The reservoir tank structure is best illustrated in Figures 1, 2, 3, 21 and 22. A lower support ring 122 surrounds the externally threaded sleeve 7 and has a key 123 which is slidable in the upright keyway 11 formed in the external surface of the sleeve 7. The ring 122 is split at its lower end as at 124 and can be drawn together by a screw 125 to tightly clamp the sleeve 122 on the

sleeve 7, or said screw may be loosened to permit sliding of the sleeve 122 along said sleeve 7 for a purpose to be described hereinafter. The sleeve 122 has a peripheral skirt 126 which is vertically slidable within a split cover ring 127 mounted on the table ring portion 15 in the manner best illustrated in Figures 1 and 3 of the drawings. An upper tank supporting ring 123 is provided and is secured upon the lower ring 122 as at 129. The rings 123 and 122 are so shaped as to provide between them a bearing recess 130 in which to rotatably receive an adjuster ring 131 which is threaded on the externally threaded surface of the sleeve 7. The adjuster ring is provided with a worm gear periphery 132 which is engaged by a rotatable adjuster worm gear 133. It will be apparent by reference to Figure 3 that by rotating the captive screw or worm gear 133, rotation will be imparted to the adjuster ring 131, and said ring and the connected supporting rings 122 and 123 will be caused to move upwardly or downwardly on the supporting sleeve 7 according to the direction in which the adjuster ring is turned.

An open topped reservoir tank 134 is secured as at 135 upon the upper supporting ring 123, and it will be observed that said tank is formed to include a central well or sump 136. The well or sump 136 is closed by a gravity seated, gasketed cover 137. The sump opens through its bottom into an attached, depending drain and vacuum pipe 138, and it will be noted by reference to Figure 3 that the lower end of the pipe 138 is slidable through a gland 139 in the upright leg of an elbow duct 140 extending upwardly into the hollow supporting column 6 and secured to the bottom end thereof as at 141. The elbow duct 140 leads to the trap tank which will be described in detail hereinafter through a horizontal duct 142.

The floor or bottom of the tank 134 has a plurality of vacuum and drain ducts 143 formed therein, one said duct being provided for each of the filler head units supported on the tank, and said ducts open into the sump or well 136 at their inner ends and extend through the peripheral wall of the tank at their outer ends. Beside each vacuum and drain duct 143, there is also provided a liquid feed duct 144, but these ducts extend through the peripheral wall of the tank and open into the bottom of the tank above the removable sump cover 137. Thus the inner or receiving ends of the liquid feed ducts 144 are isolated from the inner or delivery ends of the vacuum and drain ducts 143 by the removable cover 137.

Trap tank and vacuum source

The trap tank and vacuum source is best illustrated in Figures 1, 3, 19 and 20. The trap tank 145 is uprightly supported on a bracket 146 attached to the side of the frame base 5. The vacuum and drain duct 142 passes through a gland 147 into the interior of the trap tank in the manner clearly illustrated in Figures 3 and 20. The open top of the tank 145 is closed by a readily removable cover 148, and the tank is connected near the upper portion thereof, as at 149, with the main vacuum source. It will thus be apparent that the interior of the tank 145, the duct 142, the duct 149, the pipe 138, the well or sump 136 and the vacuum ducts 143 in the bottom of the tank will have a high vacuum drawn therein.

An intermediate wall 150 divides the tank into an upper vacuum chamber and a lower drain tank or chamber 151. The lower chamber 151 communicates with the upper or vacuum chamber

through a vacuum lifted, gravity lowered valve 152. It will be apparent that so long as a vacuum is drawn in the upper trap tank chamber the valve 152 will remain closed, and when the vacuum is cut off, as when the machine is shut down, the valve will open by gravity action and freely drain any liquid from the bottom of the vacuum chamber into the lower drain tank.

It will be apparent by reference to Figure 19 of the drawings that the wall of the trap tank structure presented toward the base frame 5 is provided with two liquid transfer openings, one thereof designated 153 being disposed above the intermediate wall 150 or in the vacuum chamber portion of the trap tank structure, and the other 154 being disposed below said wall or in the drain tank portion of said structure. A rotary transfer valve 155 is provided and has its flanged wall 156 rotatable in seal contact against a tank wall 157 provided with the previously mentioned openings 153 and 154. The transfer valve has three isolated pockets 158 opening through the flanged wall 156 for communication with the openings 153 and 154.

A driver collar 159 is notch and pin connected as at 160 with the transfer valve 155 and is connected as at 161 to a hollow sleeve 162 which is rotatable in a bearing 163 secured to the frame base 5. A level gear 164 is secured to the sleeve within the frame base 5, and a spring pressed plunger 165 extending through said sleeve engages the valve 155 and holds the same in seal contact against the trap tank wall 157. The bevel gear 164 meshes with and is driven by a bevel gear 166 which is secured on an upright shaft 167. The shaft 167 is rotatable in a bearing 168 in the frame base and has a spur gear pinion 169 secured thereon in position for meshing with and being driven by the turret structure ring gear 13.

It will be apparent that as the turret structure is continuously rotated, continuous rotation will be imparted to the transfer valve 155, and as each valve pocket comes opposite the opening 153 in the trap tank wall above the intermediate wall 150 it will receive syrup or liquid which may be contained in the lower portion of the upper trap tank chamber and will carry the same downwardly and deliver it through the wall opening 154 into the lower drain tank or chamber 151.

In order to facilitate filling of the valve pockets with liquid to be transferred from the trap tank into the drain tank chamber 151, the trap tank structure is provided with a vacuum duct 170 which opens into the upper or vacuum chamber of the tank structure at a high point. At its lower end, said vacuum duct opens through the wall opposed by the rotary transfer valve 155 in position for communicating with the valve pocket openings as they are serially presented by rotation of the valve. In this manner, as each valve pocket registers with the vacuum duct portion 171, said pocket will be evacuated in a manner for greatly facilitating the filling of said pocket as it comes opposite the previously mentioned wall opening 153. The upwardly extending duct 172, open at its upper end, serves constantly to open the drain tank 151 to atmosphere as shown in Figures 19 and 20.

An electric motor operated pump 173 is supported on a bracket 174 at one side of the trap tank structure, and said pump is automatically controlled for drawing off liquid from the drain chamber 151. In order to automatically control the pump, a float 175 is provided in the drain

tank and is connected by a pivoted actuator level 176 with a switch actuator 177 best illustrated in Figure 19 of the drawing. When the actuator 177 is lowered, it closes the switch and starts the motor, and when said actuator is raised, it opens the switch and stops the motor. Any suitable form of make and break contact switch may be provided and said switch may be connected with the motor in a conventional manner. The pump 173 may deliver liquid from the drain tank or chamber 151 through a line 178 controlled by a valve 179 so as to return the liquid to the reservoir tank 134, or the pumped liquid may be delivered through a line 180 controlled by a valve 181 to any other suitable discharge point.

Filler head units

The filler head units are best illustrated in Figures 1, 3 and 7 to 18. At the position of each filler head unit the reservoir tank 134 is provided with an upright bearing 132 attached to or formed integrally upon the periphery of said tank. In each bearing is mounted a valve drive spindle 133 having a splined upper end extending above said bearing. At its lower end, each spindle 133 has a enlargement equipped with a cross groove or keyway 184 in which to receive a key 185 upstanding from the upper surface of a valve rotor 186. Each valve rotor is rotatable upon and against a hardened wear plate 187 which is secured to the upper surface of a valve head 188 having a horizontal body portion and an upright mounting bracket portion 189 which is slot and screw secured as at 190 to the reservoir tank. One of the valve heads 188 is shown in detail in Figures 15 and 16, and from these figures and Figure 9 it will be apparent that the upright mounting bracket portion 189 of each head is provided with a dovetail socket 191 in which to receive the head 192 of an adjuster screw 193 threaded through the respective extension from the tank upon which the particular bearing 132 is supported. It will be obvious that by loosening the screw 190 and turning the adjuster screw 192 it is possible to lift or lower the head 192 according to the direction in which the screw 193 is turned.

A container sealing gasket 194 is provided below each valve head 188, and each gasket is held in place by a displacer port disk 195 which is in turn held in place by a displacer pad 196. The head 188 is provided with a depending boss 197, and the pad 196 is provided with an upstanding boss 198, and a screw 199 extending through an aperture in the boss 198 and threaded into a tap in the boss 197 serves to securely hold the pad 196 and the displacer port disk 195 in assembly on the underface of the valve head 188. It will be apparent by reference to Figure 9 that the displacer port disks 195 also serve to hold the sealing gaskets 194 in place. A dowel 200 extending through an aperture 200a the valve head 188 and into sockets 200b provided in the under surface of the wear plate 187 and in the upper surface of the displacer port disk 195 serves to hold said wear plate and displacer port disk against rotative movement relative to the valve head 188.

It will be apparent by reference to Figures 8, 10, 12 and 14 that each valve rotor 186 is provided with an arcuate center liquid port 201, and also a smaller arcuate main vacuum port 202 disposed to one side of the port 201. Each valve rotor also is equipped with a long narrow arcuate auxiliary vacuum port 203, and also an air port 204.

Each valve head 188 is provided with a liquid port 205 extending in a generally horizontal direction toward the center of the reservoir tank and in position for communicating with the respective liquid feed duct 144 of said tank. The port 205 also includes a portion which turns upwardly through the center of the head and in line with the axis of the respective valve rotor 186 so as to always communicate with the center liquid port 201 therein. The valve head 188 also has an air, vacuum and liquid flow port 206 which extends vertically therethrough to one side of the center, and also a vacuum port 207 having a generally horizontal portion extending toward the tank center in position for communicating with the respective vacuum and drain duct 143 of the reservoir tank and including an upwardly directed portion extending through the upper surface of the valve head in position for communicating at times with the vacuum port 202 of the valve rotor 186. Each valve head also has an auxiliary vacuum bore or port 208 extending through the lower and upper surfaces thereof. It is to be understood that the wear plate 187 is provided with a plurality of circular bores, one for registering with each of the port portions 205, 206, 207 and 208 opening through the top face of the valve head 188 in the manner clearly illustrated in Figures 9 and 13 of the drawings.

The formation of the displacer port disk is best illustrated in Figures 7, 9, 11, 13, 17 and 18 from which it will be apparent that each said disk is equipped with an auxiliary vacuum bore or port 209 and a bore 210 extending through the upper surface thereof and opening at its lower end into a narrow, long arcuate slot 211 extending through the periphery of the disk in the manner best illustrated in Figures 17 and 18 and serving as a vacuum and liquid flow passage. The peculiar shaping of this passage makes it possible to serve its vacuum drawing and liquid flowing purposes efficiently and without danger of parts of the container fill engaging in and clogging said duct or opening.

It will be apparent by reference to Figures 7 through 14 of the drawings that by rotating the valve rotors 186 over the wear plates 187, the several ports and passages described in detail hereinabove can be brought into cooperative communication for first vacuumizing the containers, then flowing in the main body of the syrup or other liquid, then drawing an auxiliary vacuum to draw off residual air and surplus liquid to assure filling of the containers to the extent permitted by the particular displacement of the pad and disk 195 and 196, after which the containers can be opened to atmosphere.

Valve actuating means

The means for indexing the individual valve rotors 186 as the turret structure is being continuously rotated on its support is best illustrated in Figures 1, 3, 9, 11 and 13. A spring pressed plunger 212 extending downwardly through each of the valve drive spindles 133 and engaged in a socket 213 in the top portion of the respective valve rotor serves to yieldably press the said rotor in seal contact against the underlying wear plate 187, and also to center said valve rotor. A star wheel actuator 214 is mounted on each spindle 133, having its hub spline secured to the top of said spindle. Each of the actuators 214 is equipped with four equidistantly spaced actuator fingers, three of which designated 215 are arranged in a common horizontal plane, and the

fourth of which, designated 216, is disposed in an individual, lower plane. As the turret is continuously rotated, the fingers of the several actuator members 214 move past and contact actuator rollers, and upon each roller contact, the contacting actuator 214 is indexed 90° so as to impart a 90° movement to the respective valve rotor 186 about its center. Each star wheel actuator 214 has a detent plate 217 secured to the under surface of its hub, and each detent plate is provided with a plurality of recesses corresponding to the positions to which the valve rotors are indexed and which are engageable with spring pressed detents 218 mounted in their respective valve head bearing projections and serving to yieldably hold the valve rotors in the positions to which they are indexed. A nut 219 threaded on each spindle 183 serves to hold the respective star wheel actuator 214 in place thereon, and a lift knob 220 secured to the top of each spring pressed plunger 212 makes it possible to readily displace the plungers when it is desired to remove the valve rotors 186. When a given plunger 212 has been lifted, it is a simple matter to slide the respective valve rotor laterally in a manner for separating the tongue and groove connection 185, 184 with the respective spindle head. Each spindle head has a pin 221 projecting downwardly therefrom into a receiving recess 222 formed in the top of the respective valve rotor 186, and these pin and recess connections assure the assembly of the rotors and the valve heads in proper cooperative relation.

At three equidistantly spaced points about the frame base, support standards 223 are secured to said base in the manner best illustrated in Figures 1 and 25 of the drawings. Said standards have relatively movable sections which are adjustable as to height by manipulation of adjuster screws 224. The standards 223 support brackets 225 which extend radially inwardly and serve as supports for a mounting ring 226. Three clamp brackets 227 are adjustably secured on the mounting ring 226, and each said bracket supports a star wheel actuator positioning roller. The roller which is effective to shift the valve rotor from the number two to the number three position is designated 228. The roller which is effective to shift the valve rotor from the number three to the number four position is designated 229 and the roller which is effective to shift the valve rotor from the number four position to the number one position is designated 230. The other actuator roller 231 which shifts the valve rotor from the number one position to the number two position is not adjustably mounted, but is vertically movable and forms a part of a no container-no fill mechanism which will now be described in detail. It will be apparent that by adjusting the positions of the brackets 227 and the actuator rollers 228, 229 and 230 carried thereby it is possible to vary the timing of the valve indexing and the periods over which the valve will remain in their several adjusted positions. In this manner it is possible to vary the timing and duration of the main evacuation of the containers, the inflowing of liquid during the main fill, the auxiliary evacuation of the containers and the drawing off of fill surplus, and also the opening of the containers to atmosphere.

No container-no fill control

As previously stated, each time one of the valve actuator star wheels 214 engages one of the roll-

ers 228, 229, 230 and 231, the particular valve rotor will be indexed a quarter-turn. The no container-no fill control device is best illustrated in Figures 1, 6 and 9 of the drawings from which it will be apparent that the roller 231 is vertically reciprocable in a bearing hub 232 formed on a bracket 233 which is secured beneath the mounting ring 226 in the manner clearly illustrated in Figures 6 and 9. The bracket is equipped with bearing ears 234 which rockably support the bell crank lever 235. One arm of the bell crank lever is connected with the roller 231 as at 236, and the other arm of the lever is connected by an upright thrust rod 237 with an arm 238 of a bell crank actuator. The bell crank actuator is pivoted as at 239 on a bracket 240 which is supported on the feed table framing 46 in the manner illustrated in Figure 6. The other arm 241 of the bell crank actuator extends uprightly adjacent the rounding up turret or half mold 104 and has an arcuate cam plate 242 adjustably mounted thereon in the manner illustrated in Figure 6 in position for being displaced by each container as it is being rounded up by the respective turret pocket 27 and the engaging rounding up pocket 103 of the turret 104. Outward displacement of the arm 241 by container contact serves to depress the rod 237 and effect a lifting of the actuator roller 231 into the effective position illustrated in Figure 9. In side effective position, the roller 231 will be engaged by the low level finger 216 of the passing star wheel actuator 214 to impart an indexing movement to the respective valve rotor 186.

From the foregoing it will be obvious that unless a container is in position on a turret pad 18 so that it will displace the control arm 241 in the manner above described and effect a lifting of the roller 231 into the effective position shown in Figure 9, said roller will remain in its ineffective, lowered position in which the low level star wheel finger 216 will pass thereover without contacting the same. It will also be apparent that unless the low level finger 216 on a given filler head unit is indexed by contact with the roller 231, said finger 216 will remain in the outwardly projected position, and all of the remaining high level fingers 215 will be out of position for contacting any of the remaining rollers 228, 229 and 230. Thus the particular unit beneath which no container is supported will be moved about the whole filling cycle without being active to either draw a vacuum or deliver syrup. When the particular pad 18 again comes into position for receiving a container and a container is deposited thereon, the associated filler head will function normally during the ensuing cycle of the vacuumizing and syruping operation.

Reservoir tank level control

The means for assuring the provision of a proper level of liquid in the reservoir tank 134 is best illustrated in Figures 21 and 22. Upon a frame standard 243 disposed at one side of the machine is mounted a supporting arm 244, said arm extending radially over the tank in the manner clearly illustrated in Figure 22. A supply valve generally designated 245 is supported at the free end of said arm directly over the center of the tank 134. The valve comprises a main body 246 and a cover section 247 removably secured to the body section as at 248. A diaphragm 249 is secured between the sections

246 and 247, and a valve element 250 is attached to the diaphragm so as to be lifted and lowered thereby, away from or into contact with the seats 251 provided in the lower valve section 245.

When the valve 250 is lifted by upward movement of the diaphragm 249 from the non-operating position shown in Figure 21 by evacuation of the space above the diaphragm, the seats 251 are uncovered and liquid is permitted to flow through the valve discharge from a supply duct 252 (Figure 22) and into a supply pipe 253 depending from the valve body. At its lower end the pipe 253 is provided with a drain cover supporting member 254 having a loose, lost motion couple 255 with the drain cover 137. When the parts are in the normal position illustrated in Figure 21, liquid is free to flow into the tank 134 about the loose couple 255, assuming, of course, that the valve element 250 has been unseated, and when the arm 244 is loosened on the supporting standard 243 and lifted to enable cleansing of the tank or for other reasons, the upwardly moving support member 254 will lift the drain cover 137 to permit draining away of any liquid remaining in the tank, and also for making the bottom of the tank fully accessible.

A compression spring 256 constantly tends to hold the valve member 250 on the seats 251. An actuator rod 257 passing upwardly through a gland 258 has a slot and pin connection as at 259 with the diaphragm and is connected at its upwardly extending end with an eccentric head 260 formed on a hand lever which may be turned in engagement with the removable bonnet 261 for effecting a manual lifting of the diaphragm and the connected valve member 250. The slot and pin connection 259 permits upward and downward movement of the diaphragm independently of the manual control of the rod 257.

A vacuum duct 262 is provided in the valve section 247 above the diaphragm 249, and said duct is connected by a pipe 263 with a duct 264 disposed to intersect the uprightly disposed plunger bore 265 formed in the control valve 266 which is removably mounted as at 267 on the supporting arm 244. A plunger 268 is vertically reciprocable in the bore 265, and said plunger is equipped with an annular recess 269 effective as the plunger is lifted or lowered to open or close vacuum source communication through the duct 264. An air port 270 is provided in the control valve 266 above the duct 264, and a bleed groove 271 is provided in the plunger 268 in position for communicating between the duct 264 and the air port 270 whenever the plunger is in its lowered position.

At its lower end, the plunger 268 is link connected as at 272 with the short end 273 of an actuator lever 274 which is pivoted intermediate its end as at 275 on an extension 276 from the valve 266. The valve 266 also has a valve chamber 277 and a valve 278 vertically reciprocable therein and effective to permit or prevent vacuum communication through said chamber with the vacuum duct 264. The stem 280 of the valve 278 extends downwardly and has pin and recess connection as at 281 with a snap member 282 which is pivoted at 283 at one end on a support 284 extending from the valve 266. At its other end, the snap member 282 is pivoted to a spring toggle link 285 which is connected at its other end to the support 284. The lever end 273 has an extension 286 which is operable between two vertically spaced pins 287 projecting from the

snap member, and the free end of the lever portion 273 has a fork connection at 288 with a float 289 surrounding the supply pipe 253 at the center of the reservoir tank 134. A vacuum line 290 is connected with the duct 264 and with a suitable vacuum source, preferably the vacuumizing chamber in the vacuumizing and closing machine to which the containers are delivered from the syringing machine forming the subject matter of the present disclosure.

It will be apparent that each time the float 289 falls to a predetermined position indicating an insufficient level of syrup or other liquid in the tank 134, the upward movement of the lever end 273 will serve to shift the snap member to the elevated position illustrated in Figure 21, closing the valve 278 and lifting the plunger 268 to open communication between the space above the diaphragm 249 and the vacuum line 290 through the duct 264. The evacuation of the section 247 of the valve 245 will lift the diaphragm and unseat the valve member 250, thereby permitting syrup or other liquid to flow through the supply duct 252 and the supply pipe 253 into the tank 134. When the supply of liquid in the tank 134 reaches a proper level the float 289 will have been lifted to effect a depression of the lever end 273 sufficient to move the plunger 268 downwardly and cause the snap member 282 to reverse its position and unseat the valve 278. The lowering of the plunger 268 will cut off the vacuum source and open the pipe 263 and the space above the diaphragm 249 to atmosphere through the bleed duct 271 and the air port 270.

Container stop control

The means for preventing the feeding of containers into the machine when the supply of syrup or liquid is exhausted or dangerously low, or when the vacuum source in the vacuumizing and closing machine to which treated containers are to be fed from the syringing machine is inadequate is best shown in Figures 21 and 22. The stop control generally designated I and previously referred to comprises a cylinder 291 having a piston 292 reciprocably mounted therein. The piston is connected as at 293 with a stop gate 294 disposed in the manner somewhat diagrammatically illustrated in Figure 1 so that when it is extended across the feedway over which containers are fed into the machine, it will prevent the infeeding of containers. A spring 295 constantly tends to force the piston in a direction for placing the gate in a feed stopping position. A duct 296 connects the cylinder 291 with the chamber 277 of the control valve 266, and whenever the valve 278 is open, as it will be whenever there is a proper level of syrup or other liquid in the tank 134, the duct 296 and the cylinder 291 behind the piston 292 will be evacuated through the vacuum line 290, thereby holding the gate in the open position against action of the spring 295. In other words, whenever there is a proper level of liquid in the tank 134 and a proper vacuum in the line 290, the feed stop gate 294 will be displaced so as not to interfere with the infeeding of containers.

In Figure 21 of the drawings the syrup or liquid supply control devices are shown in the position which would prevail when a day's run of the syringing machine has been completed, or when the machine is not in operation. The float 289 is in the fully lowered position and since the vacuum line 290 is not being evacuated, the

chamber above the diaphragm 249 likewise will not be evacuated and the balanced valve 250 will be seated in the manner illustrated. The plunger 268 is positioned with its annular passage 269 disposed to communicate between the duct 263 and the line 290. The valve 278 is closed, and obviously the container feed stop gate 294 is closed so as to prevent feeding of containers into the syruping machine.

Assuming that the machine operation is started and that a vacuum is drawn in the associated closing machine and in the vacuum line 290, the space above the diaphragm 249 will be evacuated through the conduit 263 so as to effect a lifting of the diaphragm and an opening of the valve 250 to permit the syrup or other liquid to enter the tank 134.

As the liquid flows into the tank 134 it raises the float 289 which in turn actuates the lever 274, 273 so as to move the snap member 282 downwardly past dead center and effect an opening of the valve 278. The opening of the valve 278 brings about an evacuation of the line 296 and brings about a shifting of the gate 294 to the out-of-the-way position in which it will permit the infeeding of containers into the syruping machine. During normal operation of the syruping machine, the syrup or liquid feed control operates in the manner previously described.

Operation

Assuming that there is a proper level of syrup or other liquid in the reservoir tank 134 and that there is a proper vacuum in the line 290, preferably leading to the vacuumizing and closing machine into which the containers are to be fed after leaving the syruping machine, the container feed-in stop gate 294 will be in the open position and the disk 53 and the chains passing over the sprockets 61, 64 and 69, 67 will feed containers over the entrance feedway under the control of the timing screw 73. The timing screw 73 will properly space the containers to be picked up by the turret 75 and deposited thereby onto the supporting pads 18 of the continuously rotating turret structure. The pad lifting cam 24 is so shaped that the lifting of the pads commences shortly before the point of tangency of the feed turret 75 and the pitch circle of the supporting pads 18 has been reached. The final lifting of the containers by the pads 18 is effected just as the half mold 183 and the respective pad 18 are on center. The final lifting of the pad places the upper end of the container in seal contact against the gasket 194 of the respective filler unit. As each container moves into the fully lifted position, it displaces the cam 242 and effects a lifting of the roller 231 into its effective position illustrated in Figure 9. As was previously described, when no container is supported on a pad 18, the roller 231 will not be lifted and the particular filler unit will proceed through the whole of the syruping cycle in an ineffective condition.

As a given filler unit approaches the actuator roller 231, the valve rotor 186 thereof will be in the number one position illustrated in Figures 7 and 8 of the drawings. In this position, the ducts 205 and 201 will be filled with liquid but will not be in communication with the interior of the sealed container. The interior of the sealed container will be open to atmosphere through the slot 211 and bore 210 in the displacer port disk 195, the port 206 in the valve head 188 and the rotor port 204. As the low level star finger 216

engages the roller 231 the valve rotor 186 will be indexed one quarter-turn to position the rotor in the manner illustrated in Figures 9 and 10, or in other words, to place the valve in its number two position. In this position, the valve port 201 remains in communication with the syrup supply duct 205, but there is no communication between these ducts and the interior of the container. The vacuum duct 207 which communicates with the reservoir tank duct 143, the pipe 138, the vacuum duct 142 and the trap tank 145 is in communication with the interior of the container through the valve port 202, the head port 206 and the displacer disk port 210, 211, thereby to draw a high vacuum in the container. As the unit reaches the position of the roller 228, the projected high level finger 215 of the star wheel 214 will engage said roller and index the valve rotor 186 one quarter turn to place the same in the number three position illustrated in Figures 11 and 12. In this position, the high vacuum communication described in connection with valve position number two is closed off and the syrup feeding porting is effective to allow the syrup to rapidly flow from the tank 134 into the evacuated container. The syrup or liquid flows through the tank passage 144, the registering head passage 205, the valve rotor port 201, the head port 206 and the displacer disk porting 210, 211 into the container. As was previously explained, the tank 134 is open to atmosphere, and therefore the syrup rapidly flows into the container by atmospheric air pressure augmented by gravity flow.

As the filler unit approaches the roller 229, the then projected high level star wheel finger 215 engages said roller and imparts an indexing movement of 90° to the valve rotor 186 to move the same to the number four position shown in Figures 13 and 14, but at the time this position is reached by the filler head, the container will have been filled except for the resistance of the residual air remaining in the container head space. In other words, before the unit reaches the number four position, the syrup or other liquid flows into the container until the pressure of residual air therein prevents additional flow. The previously described registration of the syrup flow duct 144, 205, 201, 210 and 211 is maintained and the auxiliary vacuum drawing porting is now open. Thus the auxiliary vacuum will be drawn through the respective vacuum duct 143 and the other ports and passages now in open communication with the interior of the container, namely the valve head port 207, the valve rotor port 203, the valve head port 208, and the displacer port disk port 209. This auxiliary evacuation of the container will serve to draw off the residual air, and syrup or other liquid sufficient to completely fill the container to the extent permitted by the projection thereinto of the displacer port disk and displacer pad will flow into the container in the manner previously described. Any surplus of fill will be drawn off through the previously described auxiliary vacuum drawing ports and ducts into the tank sump 136 and through the pipe 138 and vacuum duct 142 into the trap tank 145 from whence it will be transferred into the drain tank 151 by rotation of the valve 153 in the manner previously described.

It is to be understood that since the voids in the fill in a container will vary considerably, the length of time the valve rotor is left in the number four position will be set for the maximum expectant amount of container voids in order to

assure that every container will receive a complete fill of syrup or other liquid. The varying amount of surplus in the containers resulting from the variations in the voids in the fills therein will be drawn off into the trap tank in the manner above described. It is also to be understood that the effective displacement of the displacer port disk and displacer pad projecting into the container during the filling thereof can be varied by placing one or more shims between the contacting faces of said disk and pad, thereby to vary the amount of head space provided in each container.

The number four position of the valve illustrated in Figures 13 and 14 will pertain until the filler unit reaches the position of the roller 230 at which time the then outwardly projected upper level finger 215 of the star wheel actuator 214 will engage the roller 230, and as the turret moves past the roller the valve rotor 186 will be indexed a quarter-turn so as to return said roller to the first described position illustrated in Figures 7 and 8 in which the interior of the container is open to atmosphere through the displacer port disk porting 211, 210, the valve head port 206 and the valve rotor port 204. With the interior of the container thus open to atmosphere the container is lowered by the pad, and as the container moves away from the sealing gasket 194 any liquid clinging to the bottom of the gasket and the depresser pad will drip into the container. The lowering of each pad 18 by the cam 24 will be completed at a point just beyond the point of tangency of the discharge turret 113 and the pitch circle of the pads 18.

After the filled containers are lowered they are stripped off the supporting pads 18 by the guide 114 and engaged by the fingers of the discharge turret 113 and moved over the arcuate floor 115 into position for being picked up by the lugs 118 of the chain 119 which feeds the containers out of the syruping machine and into the machine in which the containers are to be closed.

As syrup or other liquid collects in the drain tank 151 during the operation of the machine, the float 175 automatically controls operation of the pump 173 to remove the liquid from said tank and return it to the reservoir tank 134 through the valve control line 178, or to another place of distribution through the valve control line 180.

A globe valve controlled feed line (not shown) may also be employed to feed syrup to the tank, if desired, and said valve may be used to control the flow of syrup to the reservoir tank during actual operation of the machine, so that the incoming syrup will approximate the amount being filled into the containers, thereby to minimize the operation of the float controlled devices shown in detail in Figures 21 and 22 of the drawings.

The syruping machine structure disclosed herein presents numerous advantages. The reservoir tank 134 is not under vacuum, and the main and auxiliary vacuum lines are not connected thereto. Consequently, when a given valve is positioned for opening the vacuum lines, the vacuum is drawn in the container only, the reservoir remaining under atmospheric pressure, and when said valve is subsequently positioned for opening the liquid line, the liquid flows into the container under atmospheric pressure, augmented by gravity action, thereby filling the container much more rapidly than would be possible in presently known machines.

As previously described, the main vacuumizing

of the containers is accomplished at a high vacuum, or in other words at the maximum speed permissible without damaging the fill of food. The vacuum is then entirely shut off and the syrup is drawn into the container until the vacuum is satisfied, or in other words until the pressure of the residual air in the container prevents additional inflowing of liquid. In case the machine stops with a filler head in the condition stated, no syrup will be drawn through the container and into the vacuum line. In case the machine is stopped when a filler head is in adjustment for drawing an auxiliary vacuum in the container, syrup will continuously flow through the container into the vacuum line, but since the vacuum line porting is very small, the amount of liquid so drawn is limited and is readily taken care of by the trap tank equipment which is isolated from the interior of the reservoir tank 134. The trap tank and auxiliary equipments serve to catch any liquid in the vacuum line and transfer the same to a tank under atmospheric pressure continuously with the main machine in operation.

Means are provided for preventing vacuumizing and filling operations when no container is supported on a given pad. As previously described, the actuator roller 231 is lifted only when a container is actually passing the first adjustment station, and if the valve is not adjusted at said station, no movements of adjustment are imparted thereto throughout the ensuing cycle of operations, or in other words until the pad again reaches the station at which the roller 231 is located and has a container properly supported thereon.

The provision of the previously described means for automatically controlling the flow of syrup or other liquid into the reservoir tank 134, and the automatically controlled container feed stop gate 294 assures against feeding of containers into the machine when the level of syrup or other liquid is dangerously low in the reservoir tank 134, or when there is a failure of vacuum in the line leading to the control devices from the vacuumizing and closing machine to which the syruped containers are fed from the syruping machine. This means also assures against the feeding of containers into the machine at the commencement of operation thereof until the reservoir tank 134 has been suitably filled with syrup or other liquid.

The machine structure herein disclosed is but an example of embodiment of the invention, both as to means and method, and it is to be understood that the mechanism disclosed and the various method steps performed by the disclosed means may be variously modified without departing from the spirit and scope of the invention as defined in the appended claims.

We claim:

1. A machine of the character described comprising, a continuously rotatable turret having a plurality of equidistantly spaced vertically reciprocable container supporting pads thereon, a vacuum duct, a reservoir tank rotatable with and about the axis of the turret and having filler units thereon disposed one over each said pad and each comprising a displacer head against which the containers are sealed by lifting of the pad and a rotary valve means equipped with cooperating porting and passages effective for controlling communication between said duct and the containers for the drawing of the vacuum in the containers, the flowing of liquid into said containers from said tank and the opening of

the containers to atmosphere, means for imparting unidirectional indexing movements to the valves as the turret and tank are rotating to successively place them in four distinct positions the first of which is effective to open communication with a high vacuum source to rapidly evacuate a container, the second to close off said vacuum source and open communication to the tank to cause liquid to flow into the container by gravity action augmented by atmospheric pressure, the third to maintain the liquid flow communication and to open a restricted auxiliary vacuum communication to draw off residual air and completely fill the container and draw off surplus fill, and the fourth to cut off the auxiliary vacuum communication and open the container to atmosphere.

2. A machine of the character described comprising, a reservoir tank having a filler unit thereon including a shiftable valve having porting therein for controlling the flowing of liquid from the tank into containers, means for actuating the valve means, means for feeding containers into position to be filled, means including a vacuum control line for supplying liquid to the tank, and means for preventing the infeeding of containers when the vacuum in said line is inadequate to perform its intended function.

3. A machine of the character described comprising, a reservoir tank having a filler unit thereon including a shiftable valve having porting therein for controlling the flowing of liquid from the tank into containers, means for actuating the valve means, means for feeding containers into position to be filled, means including a vacuum control line for supplying liquid to the tank, and means for preventing the infeeding of containers when the vacuum in said line is inadequate to perform its intended function, said last named means including a gate, spring means constantly tending to place the gate as an obstruction across the path of movement of containers into position to be filled, and cylinder and piston means effective when connected with the vacuum line to hold said gate out of position for obstructing movement of containers toward said position to be filled.

4. A machine of the character described comprising, a reservoir tank having a filler unit thereon including a shiftable valve having porting therein for controlling the flowing of liquid from the tank into containers, means for actuating the valve means, means for feeding containers into position to be filled, means including a vacuum control line for supplying liquid to the tank, and means for preventing the infeeding of containers when the vacuum in said line is inadequate to perform its intended function, said last named means including a gate, spring means constantly tending to place the gate as an obstruction across the path of movement of containers into position to be filled, and cylinder and piston means effective when connected with the vacuum line to hold said gate out of position for obstructing movement of containers toward said position to be filled, and means for opening or closing communication between said line and the cylinder and piston means accordingly as the level of liquid in the tank is above or below a predetermined operating level.

5. A machine of the character described comprising, a reservoir tank having a filler unit thereon including a shiftable valve having porting therein for controlling the flowing of liquid from the tank into containers, means for actuat-

ing the valve means, means for feeding containers into position to be filled, means for maintaining a supply of liquid in the tank including a liquid supply line, a diaphragm supply valve for permitting or preventing flow through the supply line into the tank, a vacuum duct connected with the supply valve and a vacuum source, and a float controlled valve for permitting or closing off communication between the vacuum source and the supply valve to open communication between the vacuum source and the supply valve and effect an opening of the latter when the liquid level in the tank becomes low.

6. A machine of the character described comprising, a reservoir tank having a filler unit thereon including a shiftable valve having porting therein for controlling the flowing of liquid from the tank into containers, means for actuating the valve means, means for feeding containers into position to be filled, means for maintaining a supply of liquid in the tank including a liquid supply line, a diaphragm supply valve for permitting or preventing flow through the supply line into the tank, a vacuum duct connected with the supply valve and a vacuum source, and a float controlled valve for permitting or closing off communication between the vacuum source and the supply valve to open communication between the vacuum source and the supply valve and effect an opening of the latter when the liquid level in the tank becomes low, and means for preventing the infeeding of containers when the supply of liquid in the tank falls below a predetermined level and including a gate, spring means constantly tending to place the gate as an obstruction across the path of movement of containers toward the pads, cylinder and piston means effective when connected with the vacuum source to hold said gate out of position for obstructing movement of containers toward said pads, a second valve for controlling communication between the vacuum source and said cylinder and piston means, and snap action means effective when the float means reaches a predetermined low position to close said second valve and when said float means reaches a predetermined high to open said second valve.

7. In a machine of the character described; an open top reservoir tank having filler units supported thereon in spaced relation about the periphery, a liquid flow duct and a vacuum and drain duct passing through its periphery at the position of each filler unit; each said filler unit comprising a valve head secured to the tank and having a horizontally extended support portion equipped with a liquid flow port opening through its upper face and communicating with the respective tank liquid flow duct, a vacuum and drain port opening through its upper face and communicating with the respective tank vacuum and drain duct, an air vacuum and liquid flow port opening through both the upper and lower faces thereof, and an auxiliary vacuum bore; a valve rotor rotatable over the upper face of the valve head and having an air port extending upwardly therethrough and having formed in its under face a liquid port constantly communicating with said liquid flow port, a main vacuum port, and a restricted auxiliary vacuum port; and a displacer port disk secured beneath the valve head and having an auxiliary vacuum port registering with the auxiliary vacuum bore of the valve head and disposed for communication with the interiors of containers, and a liquid vacuum and air bore and arcuate slot the vacuum and air

bore registering with the air vacuum and liquid flow port of the valve head and the arcuate slot being disposed for communication with the interiors of containers; said porting being so cooperatively arranged that upon indexing of the valve rotor at quarter turns first the main vacuum port, the vacuum and drain duct, the air vacuum and liquid flow port and the liquid vacuum and air porting bore and arcuate slot will communicate to draw a vacuum in a container and communication through other duct and porting will be closed, second the liquid port, the liquid flow port, the air vacuum and liquid flow port and the liquid vacuum and air porting bore and arcuate slot will communicate and communication through other duct and porting will be closed, third the auxiliary vacuum port, the vacuum and drain duct, and the auxiliary vacuum ports will communicate while the second mentioned communication continues, and fourth the air port, the air vacuum and liquid flow port and the liquid vacuum and air porting bore and slot will communicate and communication through other duct and porting will be closed.

8. Machine structure as defined in claim 7 in which there is included a displacer pad secured to the under face of the valve head and adapted to be shim spaced to extend a greater or lesser distance below said head for projection into a container.

9. In a machine of the character described, a reservoir tank having filler units supported thereon in spaced relation about the periphery and each including a valve head, a displacer means depending from the valve head for projecting downwardly into a container to be filled and having a surrounding gasket disposed for temporary sealing contact against open container tops, a valve rotor rotatable over the valve head, each said rotor, said valve head and said displacer means having cooperative porting therein for controlling liquid flow from the tank into a container sealed against the respective gasket, means for imparting rotation to said rotor, each said rotor having a center socket in its upper portion, and a spring pressed pin engaging in and removable from each rotor socket for removably holding the rotor in place and constantly urging the same against the respective head.

10. In a machine of the character described, a reservoir tank having filler units supported thereon in spaced relation about the periphery and each including a valve head, a displacer means depending from the head for projection downwardly into a container to be filled and having a surrounding gasket disposed for temporary sealing contact against open container tops, a valve rotor rotatable over the valve head, each said rotor, said valve head and said displacer means having cooperative porting therein for controlling liquid flow from the tank into a container sealed against the respective gasket, means for imparting rotation to said rotor, said displacer means including a pad extension subject to being shim spaced from the remainder of the displacer means to vary the depth to which the displacer means will extend down into containers when the open tops thereof are temporarily sealed against the gasket.

11. In a machine of the character described, a reservoir tank, a filler means, a well in the bottom of the tank, a removable cover isolating the well from the bottom portion of the tank, means for controlling the drawing of a vacuum in a container and directing liquid thereinto from

said tank and drawing off surplus fill through said filler means and including a vacuum and drain line depending from said well, a constantly evacuated trap tank into which said line is connected and into which drained surplus fill is received from said line, a drain tank, and means for transferring liquid from the trap tank into the drain tank without disturbing the evacuated condition in the trap tank comprising an outlet opening in the trap tank and an inlet opening in the drain tank, and a rotary valve having isolated pockets serially presented to receive liquid through said outlet opening and carry the same to and discharge it through said inlet opening into the drain tank.

12. In a machine of the character described, a reservoir tank, a filler means, a well in the bottom of the tank, a removable cover isolating the well from the bottom portion of the tank, means for controlling the drawing of a vacuum in a container and directing liquid thereinto from said tank and drawing off surplus fill through said filler means and including a vacuum and drain line depending from said well, a constantly evacuated trap tank into which said line is connected and into which drained surplus fill is received from said line, a drain tank, and means for transferring liquid from the trap tank into the drain tank without disturbing the evacuated condition in the trap tank comprising an outlet opening in the trap tank and an inlet opening in the drain tank, and a rotary valve having isolated pockets serially presented to receive liquid through said outlet opening and carry the same to and discharge it through said inlet opening into the drain tank, and a duct having one end opening into the trap tank and its other end opening into the drain tank in position to draw a vacuum in each said isolated valve pocket as it is approaching communication with said outlet opening.

13. A machine of the character described wherein is provided, a rotatable turret having a plurality of equidistantly spaced container supporting pads thereon, a reservoir tank rotatable with and about the axis of the turret and having filler units thereon disposed one over each said pad and each including a rotary valve for controlling the drawing of the vacuum in the containers the flowing of liquid thereinto and the opening of the containers to atmosphere, means for actuating the valve means as the turret and tank are rotating, means for imparting unidirectional indexing movements to the valves as the turret and tank are rotating and including a star wheel attached to each valve and having a finger in one plane engageable for moving the valve to the vacuum drawing position and other fingers in another plane individually engageable for moving the valve to other positions, and abutment elements placed about the periphery of the tank and all save one being disposed in a plane for engaging said other fingers but not said one finger; the improvement comprising means for moving said one element into position for engaging said one finger each time a pad supported container is about to pass said one element and for moving said one element out of position for engaging said one finger whenever no pad supported container is moving past said one element, thereby to prevent actuation of any valve beneath which no container is supported, and means for moving said one abutment element into and out of position, said last named means comprising a pivoted bell crank lever hav-

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ing a cam affixed to one arm thereof in position for being engaged and displaced by passing containers supported on the turret pads, a second pivoted bell crank lever having one arm thereof connected with the movable element and its other arm connected with the other arm of the first mentioned bell crank lever so that upon each displacement of the cam by a passing container the bell crank levers will be positively moved in one direction for effectively placing said one element and movement of said bell crank levers in the opposite direction will serve to positively retract said one element from its effective position.

14. A machine of the character described comprising, a continuously rotatable turret having a plurality of equidistantly spaced vertically reciprocable container supporting pads thereon, a vacuum duct, a reservoir tank rotatable with and about the axis of the turret and having filler units thereon disposed one over each said pad and each comprising a displacer head against which the containers are sealed by lifting of the pads and a shiftable valve for controlling communication between said duct and the containers for the drawing of the vacuum in the containers, the flowing of liquid into said containers from said tank and the opening of the containers to atmosphere, means for actuating the valve means as the turret and tank are rotating, means for vertically adjusting the positions of the individual filler units on the tank, and means for vertically adjusting the position of the tank and the filler units supported thereon relative to the container supporting pads.

15. A machine of the character described comprising, a continuously rotatable turret having a plurality of equidistantly spaced vertically reciprocable container supporting pads thereon, a vacuum duct, a reservoir tank rotatable with and about the axis of the turret and having filler units thereon disposed one over each said pad and each comprising a displacer head against which the containers are sealed by lifting of the pads and a shiftable valve for controlling communication between said duct and the containers for the drawing of the vacuum in the containers, the flowing of liquid into said containers from said tank and the opening of the containers to atmosphere, means for actuating the valve means as the turret and tank are rotating, means for vertically adjusting the positions of the individual filler units on the tank, and means for vertically adjusting the position of the tank and the filler units supported thereon relative to the container supporting pads, said last named means including means for vertically adjusting the positions of the individual filler units on the tank, and means for vertically adjusting the position of the tank and the filler units supported thereon relative to the container supporting pads and comprising an externally threaded sleeve, an adjuster ring threaded on said sleeve and rotatable relative to the tank but held against longitudinal movement relative to said tank, and means for imparting rotation to said ring.

16. In a machine of the character described, a liquid supply tank open to atmosphere, a vacuum line, a filler head, means for supporting a can in position to have liquid filled therein, said head including a movable valve with fill control porting therein for communication with the can, the tank and the vacuum line, and means for operating the valve to direct liquid from the

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tank into the can and for then drawing off surplus fill from the can and then closing off the tank and duct and can communication, said head having a displacer portion for projecting into the can and cooperating with the surplus fill draw off to determine the amount of fill in the can.

17. In a machine of the character described, a liquid supply tank, a vacuum line, a filler head, means for supporting a can in position to have liquid filled therein, said head including a movable valve with fill control porting therein for communication with the can, the tank and the vacuum line, means for operating the valve to direct liquid from the tank into the can and for then drawing off surplus fill from the can and then closing off the tank and duct and can communication, said head having a displacer portion for projecting into the can and cooperating with the surplus fill draw off to determine the amount of fill in the can, a constantly evacuated trap tank connected by a duct with said filler head to receive therein surplus fill drawn off from each can, a drain tank, and rotary valve means for transferring liquid from the trap tank to the drain tank without disturbing the vacuum in said trap tank.

18. A machine as defined in claim 17 in which there is included means for constantly opening the drain tank to atmosphere.

19. A machine as defined in claim 17 in which there is included float controlled means for pumping drained liquid away from the drain tank whenever the liquid reaches a predetermined level therein.

20. A machine as defined in claim 17 in which the liquid transferring means includes an outlet opening in the trap tank and an inlet opening in the drain tank, and a rotary valve having isolated pockets serially presented to receive liquid through said outlet opening and carry the same to and discharge it through said inlet opening into the drain tank.

21. A machine as defined in claim 17 in which the liquid transferring means includes an outlet opening in the trap tank and an inlet opening in the drain tank, and a rotary valve having isolated pockets serially presented to receive liquid through said outlet opening and carry the same to and discharge it through said inlet opening into the drain tank, and a duct having one end opening into the trap tank and its other end opening into the drain tank in position to draw a vacuum in each said isolated valve pocket as it is approaching communication with said outlet opening.

22. A machine as defined in claim 17 in which there is included in the trap tank a gravity opening valve for permitting direct flow from the trap tank into the drain tank whenever the vacuum fails in the trap tank but which normally is held closed by said vacuum.

23. In a machine of the character described, a liquid supply tank open to atmosphere, means for supporting a container open at its top, means for temporarily sealing the open top of the container and including a displacer member of predetermined displacing capacity projecting down into said open top, an evacuating duct, a fill control means having a shiftable valve member and a valve head stationary relative to said shiftable valve member and having a valve member opposing surface over which said valve member is shiftable, said displacer member being fixed to and depending from said valve head, said valve head

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having a liquid flow port and a high vacuum port both opening through said valve member opposing surface with the former having connection with the interior of the tank and the latter having connection with said evacuating duct, and said valve head and said displacer member having a liquid flow and evacuating port and a low vacuum port opening through said valve member opposing surface and through the displacer member for communication interiorly of a temporarily sealed container; and said valve member having a port adapted at times to communicate between atmosphere and said liquid flow and evacuating port, a port for communicating at times between said liquid flow and evacuating port and said liquid flow port, a port for communication at times between said high vacuum port and said liquid flow and evacuating port, and an auxiliary vacuum port for communicating at times between said high vacuum port and said low vacuum port; and means for shifting the valve member to successive positions for cooperatively positioning said ports incidental to the filling of a container to first bring about the drawing of a high vacuum in the sealed container, then close off drawing of the vacuum and bring about the inflowing of liquid into the vacuumized container from said tank by gravity action augmented by atmospheric pressure until the pressure of residual air in the container prevents additional inflowing of liquid, then, while continuing said liquid flow port communication, bring about the drawing of an auxiliary vacuum in the container to draw

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off and permanently away residual air and surplus liquid over and above the volume necessary to completely fill the container except for the space therein filled by said displacer member, then discontinue the drawing of the auxiliary vacuum and the inflowing and drawing off of surplus liquid, and then open the container to atmosphere.

24. Machine structure as defined in claim 23 in which there are included means varying the timing of the shifting of the valve member to enable the varying of the duration of the main evacuation of the container, the timing of the inflowing of liquid, the auxiliary evacuation of the container, and the drawing off of fill surplus.

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