Aug. 11, 1959 W. BERTHELSEN ET AL 2,898,953

VACUUM FILLING MACHINE

Filed May 17, 1957 6 Sheets-Sheet 1

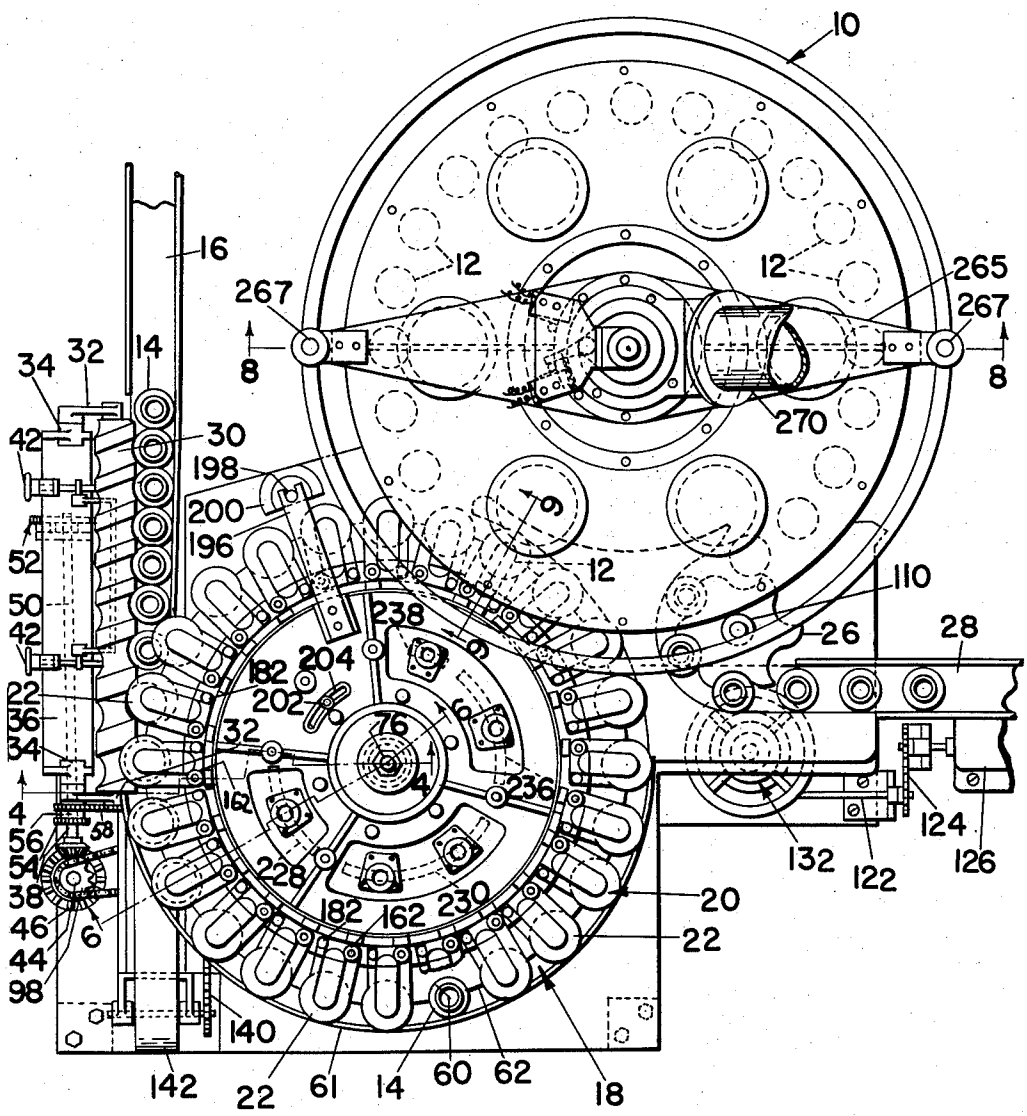



FIG. 1

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FIG. 2

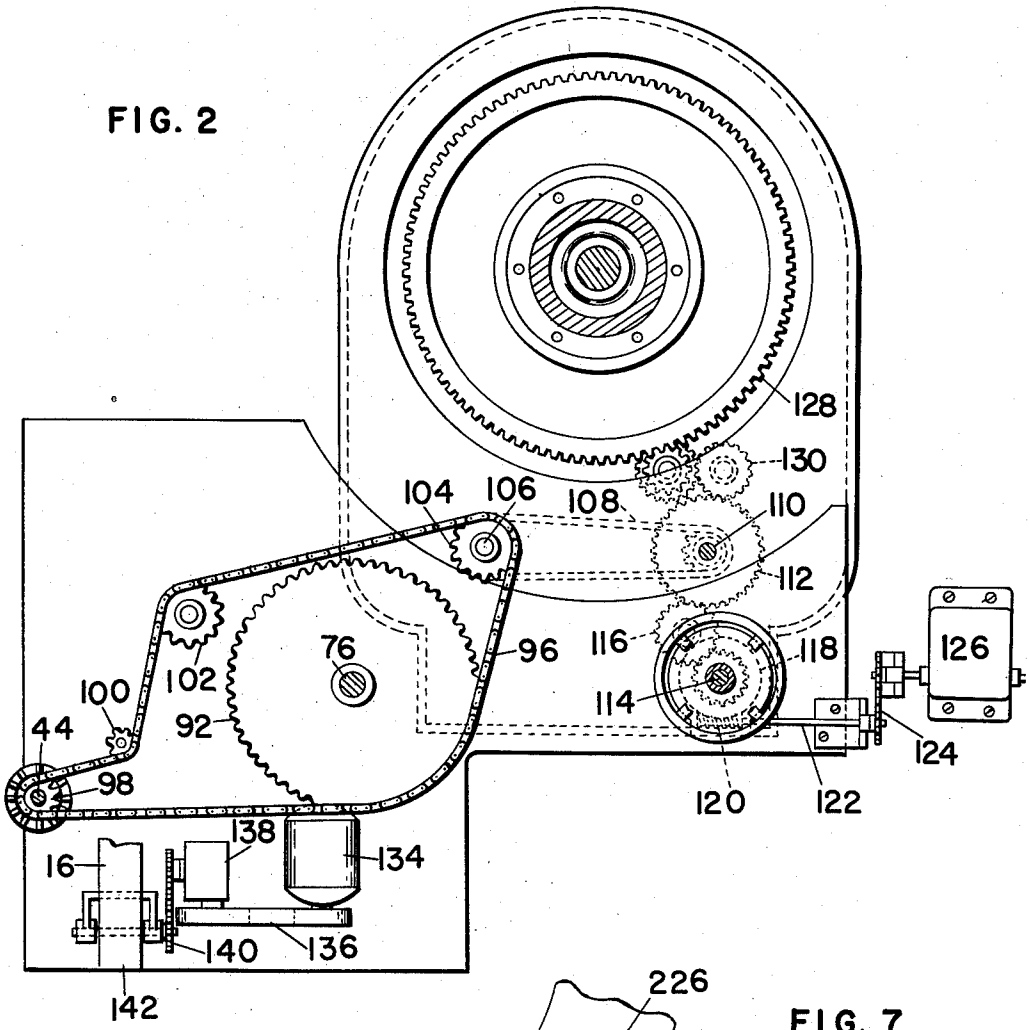
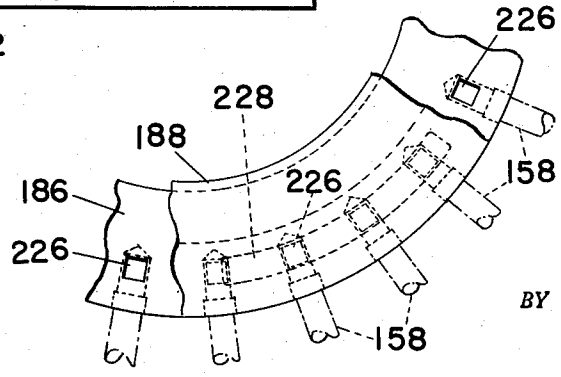



FIG. 7



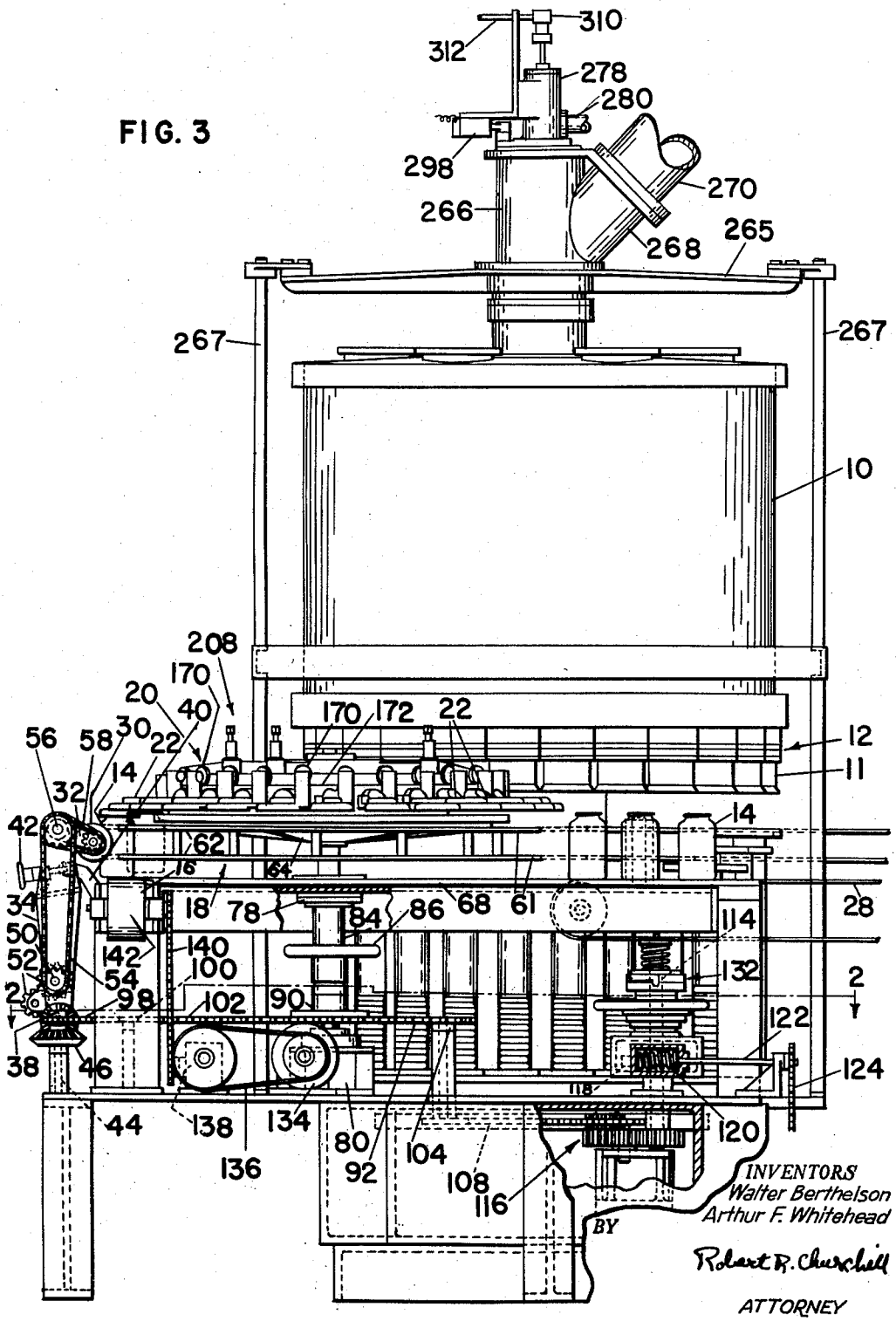

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FIG. 3



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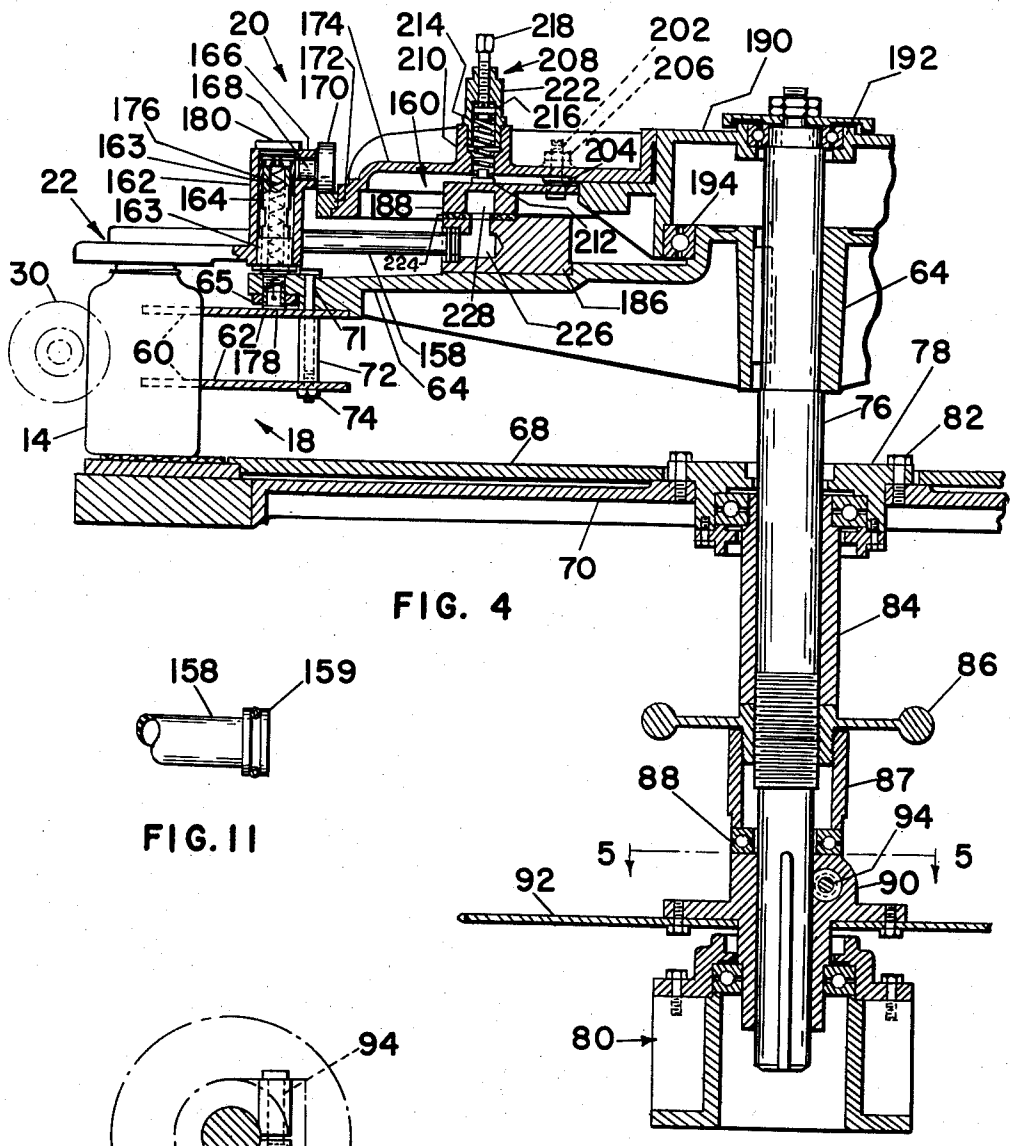



FIG. 4




FIG. 11




FIG. 5

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VACUUM FILLING MACHINE

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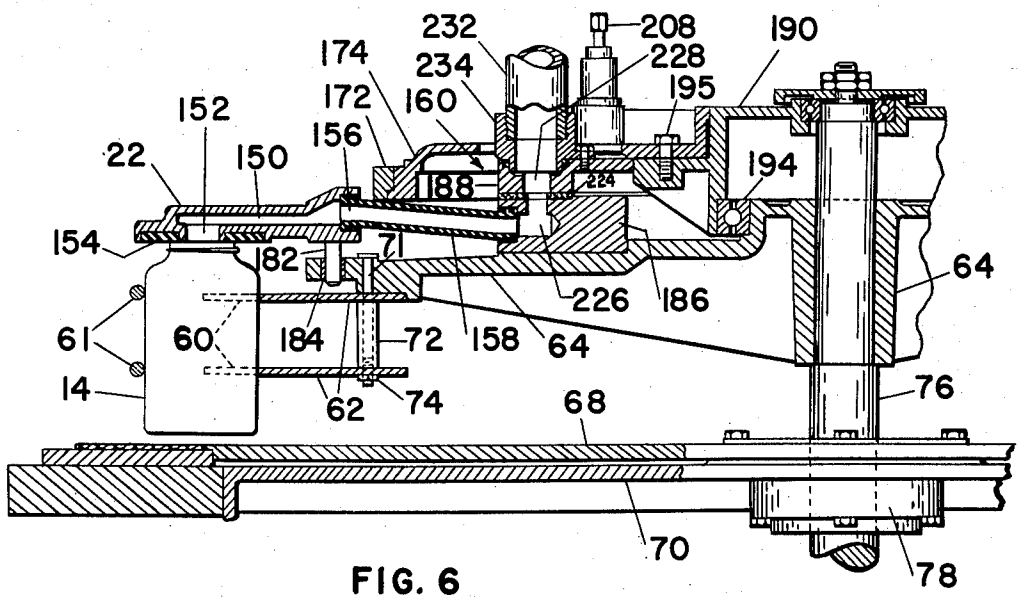



FIG. 6

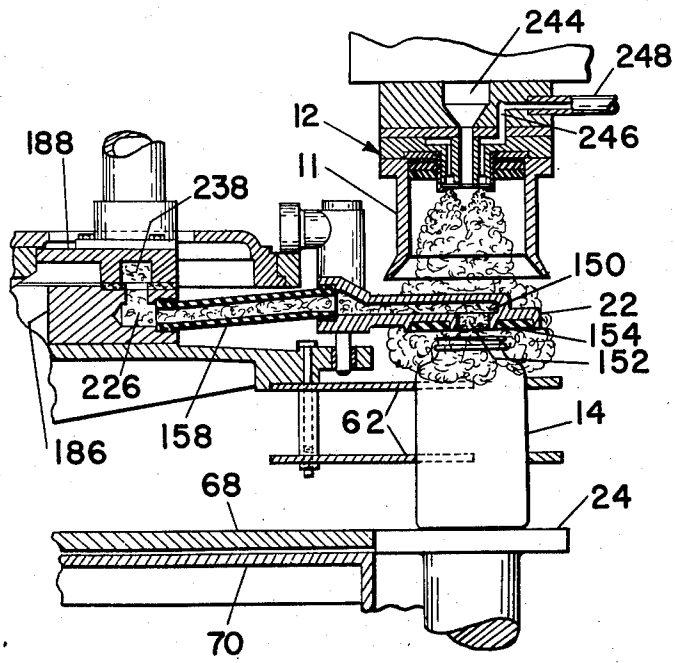



FIG. 9

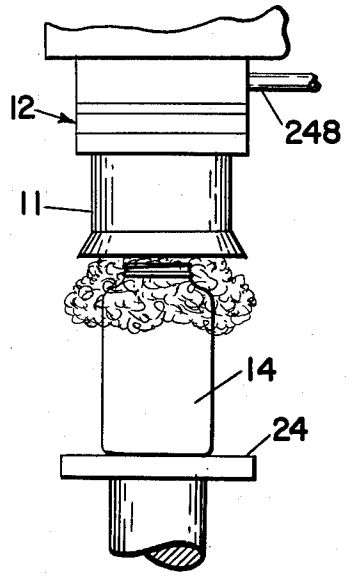



FIG. 10

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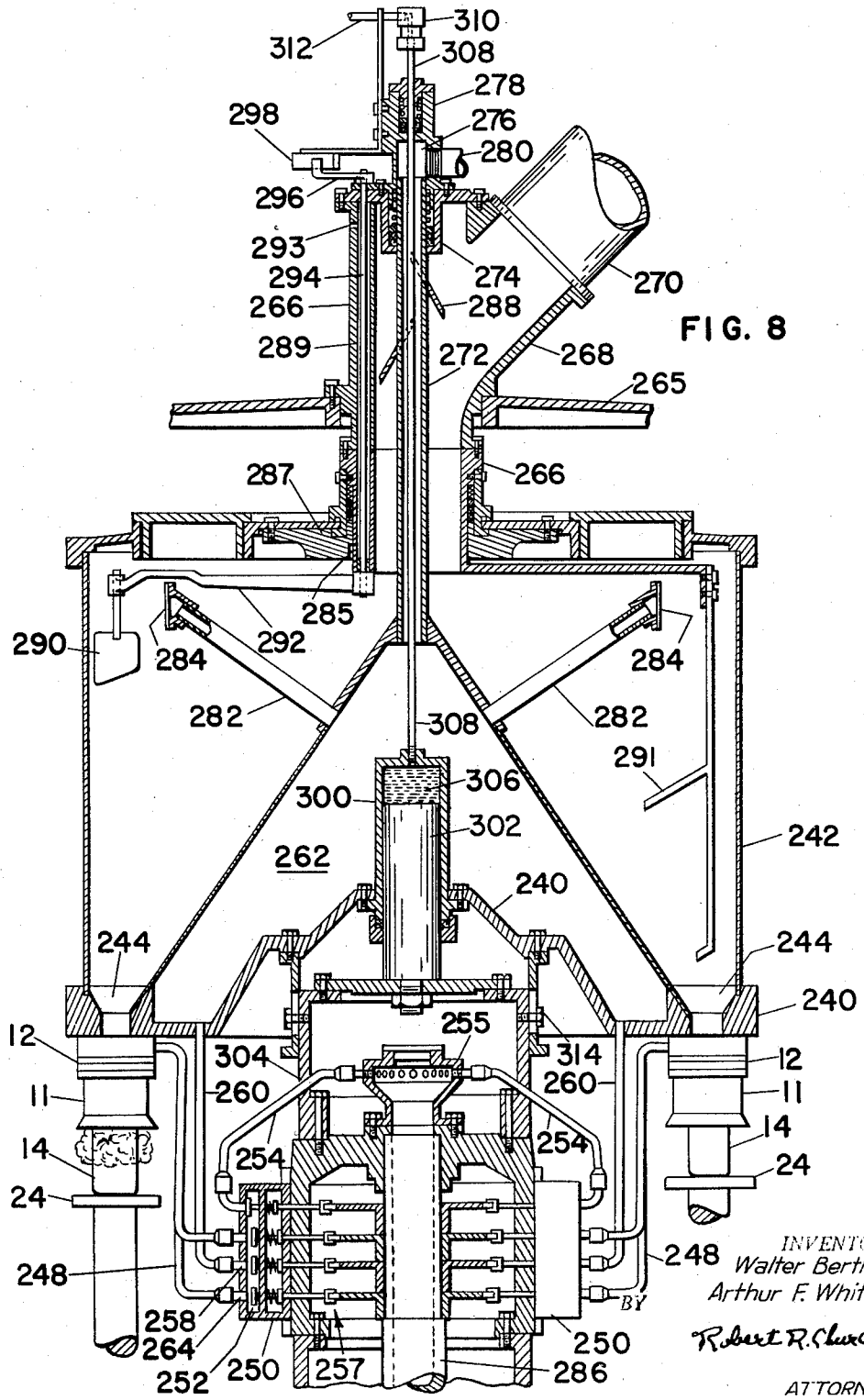



FIG. 8

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United States Patent Office 2,898,953 Patented Aug. 11, 1959



2,898,953

# VACUUM FILLING MACHINE

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Application May 17, 1957, Serial No. 659,926

15 Claims. (Cl. 141—48)

This invention relates to a vacuum filling machine.

The invention has for an object to provide a novel and improved vacuum filling machine having provision for transferring successive empty containers from a supply thereof into operative relation to successive vacuum filling heads, and wherein novel provision is made for evacuating and purging the empty containers with an inert gas in a novel, superior and efficient manner during the transfer operation and during the application of the mouth of the container into sealing engagement with its filling head.

With this general object in view and such others as may hereinafter appear, the invention consists in the vacuum filling machine and in the various structures, arrangements and combinations of parts hereinafter described and particularly defined in the claims at the end of this specification.

In the drawings illustrating the preferred embodiment of the invention:

Fig. 1 is a plan view of a rotary vacuum filling machine embodying the present container evacuating and purging apparatus;

Fig. 2 is a horizontal sectional plan view taken on the line 2—2 of Fig. 3 and showing the driving mechanism;

Fig. 3 is a side elevation of the machine shown in Fig. 1;

Fig. 4 is a vertical cross sectional view taken on the line 4—4 of Fig. 1 showing one of the evacuating and purging heads of the transfer mechanism, with the purging head in its lowered position;

Fig. 5 is a horizontal section plan view detail taken on the line 5—5 of Fig. 4;

Fig. 6 is a cross sectional detail view similar to Fig. 4 showing the evacuating and purging head in an elevated position, the section being taken on the line 6—6 of Fig. 1;

Fig. 7 is a plan view detail of a portion of the purging mechanism shown in Fig. 1;

Fig. 8 is a vertical cross section of the vacuum filling machine as taken on the line 8—8 of Fig. 1;

Fig. 9 is a vertical cross section on the line 9—9 of Fig. 1 showing the purged container in alignment with a vacuum filling head and showing the purging head elevated above the mouth of the container;

Fig. 10 is a similar view showing the container being elevated into operative engagement with its filling head; and

Fig. 11 is a detail view of a connecting tube to be referred to.

In general the present invention contempletes a vacuum filling machine having novel container purging apparatus for evacuating and gassing successive empty



containers during their transfer to and application thereof to their respective vacuum filling heads to reduce to a minimum the oxygen content in the containers prior to the filling operation whereby to prevent oxidization of those materials, subsequently deposited into the containers by the vacuum filler, which are particularly susceptible to contamination upon prolonged exposure to the air.

The invention is herein illustrated as embodied in a rotary vacuum filling machine which may be of the type illustrated and described in the United States patent to Carter, No. 2,360,198, issued October 10, 1944, and wherein successive containers are presented into alignment with successive filling heads and elevated into operative engagement therewith to perform the vacuum filling operation.

In accordance with the present invention provision is made for purging successive empty containers during their transfer from a supply thereof into alignment with their respective vacuum filling heads by purging means engageable in sealing relation with the mouths of successive containers and having provision for first evacuating the empty containers and then introducing an inert gas, such as nitrogen, thereinto, the gassing operation being continued during removal of the transfer purging means from sealing engagement with the containers and during elevation of the containers into operative and sealing engagement with their respective vacuum filling heads.

Referring now to the drawings and particularly to Fig. 1, in general 10 represents a rotary vacuum filling machine having a plurality of circumferentially spaced vacuum filling heads, indicated generally at 12, and to which successive empty containers 14 are transferred from a supply conveyer 16 by rotary transfer mechanism, indicated generally at 18. The evacuating and purging apparatus, indicated generally at 20, is mounted on and movable with the rotary transfer mechanism 18 and includes a plurality of radially extended and circumferentially spaced evacuating and purging heads 22 which are arranged to engage the mouths of successive containers 14 in sealing relation during the transfer operation. The vacuum filling machine 10 is provided with a plurality of elevating platforms 24 arranged in alignment with their respective filling heads 12 and in operation a container 14 is delivered by the transfer mechanism onto an elevating platform 24 during the continuous rotation of the transfer mechanism and the rotary filler whereupon the container is elevated into sealing engagement with its filling head 12 to perform the vacuum filling operation. Thereafter the elevating platform 24 is lowered, and the filled container is transferred from its platform by a rotary transfer member 26 onto a discharge conveyer 28 for delivery to a closure applying machine not shown.

As illustrated in Figs. 1 and 3, the containers 14 are advanced in contiguous engagement on the conveyer 16 from a supply thereof and into cooperating engagement with one side of a helical feed screw 30 having a groove therein provided with a gradually increasing pitch to progressively increase the spacing between adjacent containers and to present successive foremost containers into vertical alignment with successive purging heads 22. The feed screw 30 is disposed on one side of the conveyer 16 and is supported between laterally extended arms 32 carried by the spaced upright arms 34 of a

bracket 36 which is pivotally mounted on a shaft 38, the pivotally mounted bracket being adjustably secured to brackets 40 extended from the machine frame by adjusting screws 42 whereby to permit adjustment of the feed screw toward or from the containers.

The feed screw 30 is arranged to be rotated in timed relation to the rotation of the transfer mechanism 18 through connections from a vertical drive shaft 44 and bevel gears 46 to the horizontal shaft 38. The shaft 38 is connected to an intermediate shaft 50 through a gear train 52, the shaft 50 being connected by a chain and sprocket drive 54 to an upper shaft 56 mounted in one of the upright arms 34. The upper shaft 56 is connected to the feed screw by a chain and sprocket drive 58.

The foremost containers advanced in spaced relation on the conveyor 16 are received in pockets 60 formed by cutout portions in vertically spaced annular transfer plates 62 carried by a rotary supporting bracket 64 forming a part of the rotary transfer mechanism 18. As shown in Fig. 4, the pockets 60 are aligned with successive purging heads 22 and are arranged to register with successive containers being advanced by the feed screw 30 and to transfer the containers from the conveyer 16 onto a stationary supporting disk 68 carried by the platen 70 of the machine frame. The annular transfer plates 62 are supported from the bracket 64 by depending bolts 71 having a spacing sleeve 72 extended between the plates and held in assembled relation by nuts 74. The containers are guided and retained in the pockets 60 by outer guide rails 61.

As illustrated in Fig. 4, the rotary supporting bracket 64 is keyed to a central shaft 76 which is rotatably supported in upper and lower bearing units 78, 80 respectively, the shaft 76 and the purging mechanism 20 carried thereby being arranged for vertical axial adjustment to accommodate containers of different heights. The upper bearing unit 78 is secured to the platen 70 by bolts 82 and is provided with a depending sleeve 84, the lower end of which engages the hub of a hand wheel 86 threadedly engaged with an intermediate portion of the shaft 76. An extension sleeve 87 threadedly secured to the hand wheel 86 bears against a thrust bearing 88 interposed between the sleeve 87 and the upper end of a drive flange 90 supported in the lower bearing unit 80. The drive flange 90 is keyed to the lower end of the central shaft 76, the keyway being elongated to permit vertical adjustment of the shaft, and the drive flange is provided with a sprocket 92 bolted thereto and connected by a chain drive to the main drive of the machine. The drive flange 90 is also provided with a clamping unit 94, see Fig. 5, for retaining the shaft in its vertically adjusted position. Vertical adjustment is effected by first loosening the clamp unit 94 and then rotating the hand wheel 86 to effect vertical axial movement of the central shaft 76 relative to the bearing units 78, 80 whereupon the clamping unit 94 may again be tightened.

Referring now to Fig. 2, the drive to the central shaft 76 includes a chain 96 which runs over the sprocket 92, around sprocket 98 fast on the vertical drive shaft 44, over idler sprockets 100, 102, and sprocket 104 mounted on a vertical drive shaft 106. The shaft 106 is connected by a chain and sprocket drive 108 to a vertical shaft 110 on which the discharge spider 26 is mounted. The shaft 110 is provided with a spur gear 112 connected to the main drive shaft 114 by a gear train 116. The main drive shaft 114 is provided with a worm gear 118 in mesh with a worm 120 fast on a shaft 122 which is connected by a chain and sprocket drive 124 to an electric motor 126. The rotary vacuum filling machine driving gear 128 is connected to the spur gear 112 by a gear train 130. As indicated generally in Fig. 3, the main driving shaft 114 may be provided with a separable overload clutch connection 132 of known structure arranged to disconnect the drive in response to abnormal resistance to rotation such as may occur in the event of a jam of the containers and to open the circuit to the driving motor to stop the machine whereby to prevent breakage of the containers or damage to the operating parts of the machine. In practice the shaft 110 may be provided with similar overload safety mechanism of known structure not shown. As illustrated in Figs. 2 and 3, the conveyor 16 may be provided with its individual driving motor 134 connected by a belt 136 to a speed reduction unit 138, the latter being connected by a chain and sprocket drive 140 to the conveyer drive pulley 142.

Referring now to Figs. 4 and 6 each radially arranged purging head 22 comprises a hollow member having a chamber 150 and provided with an opening 152 in its underside, an annular resilient sealing washer 154 carried by the head and surrounding the opening being provided for airtight sealing engagement with the mouth of a container. Each purging head 22 is further provided with an opening 156 at its inner end which is connected by a flexible tube 158 to a rotary valve unit indicated generally at 160. The ends of the flexible tube 158 may be provided with adapter 159 arranged to afford airtight seals with the purging heads and the valve unit. Each purging head is carried by and mounted for vertical movement relative to the rotary bracket 64 and as shown in Fig. 4, each purging head is formed integrally with a vertical sleeve portion 162 provided with bushings 163 and mounted for vertical sliding movement on a hollow upstanding stud 164 secured at its lower end in the bracket 64 by a nut 65. The vertical sleeve portion 162 is provided with a laterally extended hub 166 which carries a stud 168 fixed therein and provided with a roller 170 cooperating with an annular cam piece 172 carried by an annular stationary bracket 174. A spring 176 extended between a lower cap member 178 in the end of the hollow stud 164 and an upper cap member 180 engaged with the upper end of the sleeve 162 tends to urge the purging head 22 downwardly into sealing engagement with the mouth of a container. A depending stud 182 carried by the purging head and spaced from the sleeve 162 is slidingly received in a bushed opening 184 in the bracket 64, as shown in Figs. 1 and 6, to prevent rotation of the purging head on its supporting stud. In operation successive purging heads 22 are disposed in their upraised position when they arrive in registered alignment with their respective containers and immediately thereafter successive purging heads are lowered into sealing engagement with their containers as shown in Fig. 4.

The rotary valve unit 160 includes a lower annular valve member 186 carried by and rotatable with the rotary bracket 64, and a cooperating upper annular valve member 188 which bears against the lower valve member and is fitted about the outer circumference of a stationary intermediate bracket 190 supported in a bearing unit 192 mounted at the upper end of the shaft 76 and by a second bearing unit 194 mounted at the upper end of the rotary bracket 64. The annular bracket 174 carrying the cam piece 172 is mounted over a shouldered portion of the intermediate bracket 190 and may be secured thereto by bolts 195 as shown in Fig. 6. The bracket 174 and its connected bracket 190 are held from rotation by a radially extended bar 196 secured to the bracket 174 and engaged at its outer slotted end with an upstanding pin 198 extended from a bracket 200 attached to the platen of the machine frame. As indicated in Figs. 1 and 4, the upper valve member 188 may be initially rotatably adjusted relative to the bracket 174 by a stud connection 202, the lower end of which is fitted into an opening in the inwardly extended portion of the valve member 188 and the upper end extended through an arcuate slot 204 in which the stud may be tightened by a nut 206 to retain the parts in their adjusted position. As also shown in Figs. 1 and 4, the stationary bracket 174 carries a plurality of resiliently mounted presser units, indicated generally at 208, which serve to urge the stationary valve member 188 downwardly into sealing engagement with the movable valve member 186. As herein shown, each

presser unit 208 is mounted in an upstanding hub portion 210 and includes a presser plate 212 engageable with the upper surface of the valve member 188, and a coil spring 214 interposed between the presser plate 212 and a collar 216 secured to the end of an adjusting screw 218. The adjusting screw 218 is mounted in an extension sleeve 222 threadedly engaged with the hub 210. As shown in Fig. 4, an annular wear strip and sealing member 224 is interposed between the upper and lower valve members 188, 186.

Each lower valve member 186 is provided with individual ports 226, as shown in detail in Fig. 7, which are arranged to communicate with successive of a plurality of arcuate slotted ports, herein shown as four spaced ports, formed in the underside of the upper valve member 188. The first two arcuate ports comprise evacuating ports 228, 230, each of which may and preferably will be individually connected to separate sources of vacuum by similar connections including a conduit 232 threadedly connected to a fitting 234 secured in airtight relation to the upper surface of the stationary valve member 188 and in communication with its respective arcuate port. The succeeding two arcuate ports comprise gassing ports 236, 238 which are connected by similar individual fittings and conduits to separate sources of an inert gas, such as nitrogen.

Referring now to Fig. 1, in the operation of the evacuating and gassing apparatus immediately after a purging head 22 is lowered by its cam 172 into operative sealing engagement with the mouth of a container, brought into registry therewith by the feed screw 30, the port 226 communicating with the purging head is moved into communication with the first arcuate port 228 to effect evacuation of the container. It will be observed that at this time upon partial evacuation of the container the purging head 22 may be elevated by the cam piece 172, as shown in Fig. 6, the container remaining in sealing engagement with its purging head by virtue of the suction whereby to lift the bottom of the container off the conveyer belt 16 and to maintain the container out of frictional engagement with the belt and the stationary supporting disk 68 during the evacuating operation. The first stage of evacuation of the container may be performed under a relatively high degree of vacuum to remove most of the air from the empty jars and, without loss of vacuum, the purging heads are next moved into communicating engagement with the arcuate port 230 into the second evacuating stage where the containers are again subjected to a relatively higher degree of vacuum. In practice there is a slight drop in vacuum during the first evacuating stage each time an empty container is brought into engagement with a purging head. Thus, the purpose of performing the evacuation in two stages and by independent sources of vacuum is to eliminate the effect of such drop in vacuum during the second stage and to isolate the second stage evacuating apparatus from the contaminating air brought in with each container entering the first stage whereby to produce relatively highly evacuated containers during said second stage which are substantially entirely free of air. It will be understood that the purging heads remain in sealing engagement with their respective containers throughout the evacuating and gassing operations. It will also be understood that while the containers are herein illustrated as being lifted out of frictional engagement with the belt 16 and supporting disk 68, during the transferring and evacuating operation such lifting is not essential to successful operation of the evacuating and purging mechanism, and the containers may remain in sliding engagement with the belt and the supporting disk during transfer and evacuation if desired. In any event the cam 172 is designed to effect lowering of the purging heads 22 to present the bottoms of the containers onto the supporting disk 68 and in sliding engagement therewith prior to arriving at the gassing stations.

As herein shown, the gassing operations are also preferably performed in two stages, the first gassing operation being effected when the purging head 22 arrives in operative engagement with the arcuate port 236 where the evacuated container is flushed with inert gas. At this stage of the purging operation the gas is preferably flushed into the container under a pressure well above atmospheric pressure, substantially at a pressure of about 22.7 lbs. per square inch. The advantage of subjecting the containers to a pressure of inert gas well above atmospheric pressure is that when the purging head 22 is subsequently removed from operative engagement with the mouth of its container the positive pressure within the container effects forcing of the gas upwardly and outwardly from the container, the gas being thus forced out carrying with it at least part of the oxygen remaining in the container and also tends to drive back any air in the area around the mouth of the jar at the point of transfer of the container to the elevating platform 24 forming a part of the vacuum filling machine 10. In the operation of the device the cam piece 172 effects lifting of the purging head 22 from the mouth of the container as it approaches the transfer point of the container from the stationary supporting disk 68 onto the platform 24 which, as shown in Fig. 1, occurs at the point of tangency of the rotary path of the containers through the transfer mechanism and through the vacuum filling machine. At this time the purging head is in communication with the second purging station 238 which permits escape of gas from the elevated purging head at a relatively low pressure whereby to flood the area around the mouth of the container with the inert gas during lifting of the purging heads and movement of the container onto its elevating platform 24, the release of gas from the purging head being continued for a short time after transfer of the container onto the platform 24 and during movement of the purging head away from the container on the platform 24. Provision is also made at this time for releasing inert gas through the shrouded portion 11 of the vacuum filling head 12, as illustrated in Figs. 9 and 10, whereby to maintain an atmosphere of inert gas around the mouth of the evacuated and purged container during elevation thereof into sealing engagement with its vacuum filling head.

As illustrated in Fig. 8, the vacuum filling machine 10 may and preferably will comprise a machine of the type illustrated in the patent to Carter, No. 2,360,198, above referred to, and which includes a plurality of shrouded filling heads 12 carried by a rotary supporting bracket 240 which also carries the material supply hopper 242 having openings in communication with the material inlets 244 of each filling head. Each filling head 12 is further provided with passageways 246 which may be connected by flexible conduits 248 to individual valve blocks 250 each having a chamber 252 operatively connected to a source of vacuum through conduits 254, manifold 255 and through the central hollow supporting shaft 286. The valve blocks 250 may be similar in structure and mode of operation to those shown in the Carter patent and are provided with a plurality of cam operated valves indicated generally at 257 for controlling the vacuum to effect evacuation of the container and withdrawal of the material through the inlet 244 and into the container to fill the same. In accordance with a feature of the present invention one port 258 in each valve is operatively connected by a conduit 260 to a source of inert gas under pressure contained in a chamber 262 defined by the conical inner wall of the supply hopper 242 and the top of the supporting bracket 240. Another port 264 in the valve block 250 is operatively connected by the conduit 248 to the passageways 246 in the filling head so that in operation the cam operated valve block 250 may be controlled to supply inert gas under pressure through the passageways to be discharged into the shrouded portion 11 of the filling head and about the open mouth of a container being elevated into operative

relation thereto, such action being continued until the mouth of the container is engaged in sealing relation to its filling head whereupon the container is evacuated and filled in the manner above described.

It will be understood that in the operation of the prior filling machine shown in the Carter patent, No. 2,360,198, one of the ports in the valve block is open to the atmosphere and that during a single filling operation the interior of each container is subjected to alternate evacuation and opening to the atmosphere a number of times each filling cycle to effect packing or tamping of the powdered material in the container during successive partial filling operations, and that in the present structure instead of being open to the atmosphere the port **264**, shown herein, is connected to the inert gas under pressure so that in practice the material is purged with the inert gas during such successive partial filling operations to mix the material with the gas, successive evacuating operations during filling further removing with the gas any air remaining in the container to prevent contamination of the material by air. It will also be understood that upon completion of the filling operation the inert gas is also caused to flow through the filling head and about the mouth of the container during the lowering of the filled container and transfer thereof onto the discharge conveyer **28** by the transfer member **26**. In practice the discharge conveyer **28** delivers the containers to a closure applying machine, not shown, suitable provision being made to protect the open mouths of the filled containers from the entrance of air during the delivery thereof and until the container is provided with a closure.

As shown in Fig. 8, the upper end of the rotary supply hopper **242** is mounted for rotation relative to and in sealed relation to a hollow stationary sleeve **266** supported above the hopper by a bracket **265** secured to upright supporting rods **267** as shown in Fig. 3. The sleeve **266** is provided with an offset portion **268** connected by a conduit **270** to a source of supply of the material. The upper end of the conical chamber **262** is provided with a pipe **272** which extends through the sleeve **266** and is mounted for rotation in an upper bracket **274**, the pipe being in communication with a chamber **276** formed in a connecting bracket **278**. The chamber **276** is connected by a conduit **280** to a source of inert gas under pressure. Thus, in the operation of the vacuum filling machine the conical chamber **262** is provided with an inert gas under pressure which may be conducted by conduits **260** to the chambers **252** in the valve blocks **250** and through the conduits **248** to the filling heads as described.

Provision is also made for supplying inert gas under pressure to the space above the material within the supply hopper **242**, and as shown in Fig. 8, communicating conduits **282** extended angularly from the inert gas chamber **262** terminate in screened openings **284** within the interior of the supply hopper whereby to flood the area above the material in the hopper with the inert gas and to exclude air therefrom. As shown in Fig. 8, a vent opening **285** in the underside of the hopper cover supporting member **287** communicates with a passageway **289** in the sleeve **266** and with an upper vent **293** open to the atmosphere to permit escape of air when gas under pressure is introduced into the chamber **262**. It will be understood that the pressure of the gas on the upper surface of the material in the hopper also serves to lessen any tendency of bridging of the material therein. Suitable stirrer blades **291** extended from the stationary sleeve **266** to within the rotary supply hopper **242** serve to promote the flow of the material through the hopper, and stirrer blades **288** secured to and rotatable with the upstanding pipe **272** serve to loosen the material and promote the flow thereof as it enters the supply hopper from the conduit **270**.

Suitable provision may also be made for maintaining a substantially constant level of the material in the supply hopper which, as shown in Fig. 8, may include a feeler blade **290** mounted on the end of an arm **292** secured to the lower end of a vertical rod **294** mounted to rock in the sleeve **266**. The upper end of the rod may be provided with a switch arm **296** normally held in an inoperative position by a spring (not shown) and which is arranged to be rocked into engagement with a microswitch **298** when the height of the material exceeds a predetermined level and engages the feeler blade **290**. The microswitch **298** may form part of a circuit (not shown) for discontinuing the supply of material through the supply conduit **270** until the material withdrawn from the hopper lowers the lever thereof below the path of the feeler blade whereupon the supply of the material is again automatically initiated.

Provision may also be made for conveniently raising and lowering the vacuum filling unit relative to the horizontal level of the transfer mechanism whereby to accommodate containers of different height. As illustrated in Fig. 8, this may be accomplished hydraulically by the provision of a cylinder **300** secured to the upper portion of the supporting bracket **240** which cooperates with a piston **302** extended from the upper end of a central rotary supporting unit **304**. The cylinder is supplied with hydraulic fluid **306** through a piping connecting **308** extending upwardly through the pipe **272** and bracket **278**, terminating in an adapter **310** which may be connected to a source of hydraulic fluid by a pipe **312**. In practice when it is desired to raise or lower the level of the vacuum filling unit the connecting bolts **314** which secure the vacuum filling unit to the central unit **304** may be loosened in their slotted connections and the hydraulic fluid may be manually pumped into the cylinder to effect elevation thereof, or the fluid pressure may be reduced to effect lowering of the unit whereupon the bolts **314** may be again tightened to secure the vacuum filling unit in its adjusted position.

From the above description it will be observed that the present vacuum filling machine is provided with apparatus for purging empty containers with an inert gas in a novel and efficient manner during the transfer of the containers to the vacuum filling machine and during application of the containers into sealing engagement with their respective vacuum filling heads. It will also be observed that the material in the supply hopper of the vacuum filling machine is also subjected to an atmosphere of inert gas to lessen the air content of the material being vacuum filled and that during the vacuum filling operation, the inert gas is also drawn into the container upon discontinuance of the vacuum whereby to reduce to a minimum contamination by air of the contents of the container.

While the preferred embodiment of the invention has been herein illustrated and described, it will be understood that the invention may be embodied in other forms within the scope of the following claims.

Having thus described the invention, what is claimed is:

1. In a vacuum filling machine, in combination, vacuum filling means including a plurality of vacuum filling heads adapted for sealing engagement with the mouths of successive containers, means for transferring successive empty containers from a supply thereof into operative sealing relation to said filling heads, container purging means carried by said transfer means and engageable in sealing relation with said containers, said purging means including means for first evacuating the containers and means for then filling the containers with an inert gas released by said purging means during the transfer operation and while the containers are continuously maintained in sealing engagement with said purging means, means for continuing release of gas from said purging means during removal of the latter from sealing engagement with its container and during delivery of the container to the vacuum filling machine into alignment with a vacuum

filling head, and means for simultaneously releasing inert gas from said aligned filling head to flood the area around the open mouth of the gas filled container during application of the container into sealing engagement with said vacuum filling head whereby the mouth of the gas filled container is continuously surrounded by a flow of inert gas without a break in continuity from the time the purging head is removed to the time the mouth is sealed by its vacuum filling head.

2. In a vacuum filling machine, in combination, vacuum filling means including a plurality of vacuum filling heads adapted for sealing engagement with the mouths of successive containers, rotary transfer means for transferring successive empty containers from a supply thereof into operative sealing relation to said filling heads, container purging means including a plurality of purging heads carried by said transfer means and engageable in sealing relation with successive containers, said purging means including means connecting said purging heads first to a source of vacuum for evacuating the empty containers, and then to a source of inert gas for releasing the gas into the evacuated containers during the transfer operation and while the containers are continuously maintained in sealing engagement with said purging heads, each purging head being connected to continue the release of inert gas therefrom during removal of the purging head from sealing engagement with its container and during delivery of the container to the vacuum filling machine into alignment with a vacuum filling head, and means for simultaneously releasing gas from said aligned filling head to flood the area around the open mouth of the gas filled container during application of the container into sealing engagement with said vacuum filling head whereby the mouth of the gas filled container is continuously surrounded by a flow of inert gas without a break in continuity from the time the purging head is removed to the time the mouth is sealed by its vacuum filling head.

3. A vacuum filling machine as defined in claim 2 wherein the purging heads are mounted for vertical movement relative to the containers, and means for moving the purging heads into and out of sealing engagement with the mouths of the containers.

4. A vacuum filling machine as defined in claim 2 wherein the purging heads are mounted for vertical movement relative to the containers, and means for moving the purging heads into and out of sealing engagement with the mouths of the containers, each container being lifted upwardly upon partial evacuation thereof in sealing engagement with its purging head by virtue of the suction whereby to avoid frictional engagement of the bottom of the container with its supporting means during movement of the container from the supply to the transfer means during the evacuating operation.

5. A vacuum filling machine as defined in claim 2 wherein the evacuating operation is performed in two successive stages connected to separate sources of vacuum, the first stage removing most of the contaminating air from the incoming empty containers, and the second stage being isolated from said first stage and effecting further removal of air.

6. A vacuum filling machine as defined in claim 2 wherein the inert gas is introduced into the evacuated container under a pressure above atmospheric pressure whereby upon subsequent removal of the purging head the escaping pressurized gas will retard entrance of surrounding air into the container.

7. A vacuum filling machine as defined in claim 2 wherein the inert gas is introduced into the evacuated container under a pressure above atmospheric pressure whereby upon subsequent removal of the purging head the escaping pressurized gas will retard entrance of surrounding air into the container, the gas being also released from the purging head upon removal thereof from sealing engagement with its container further retarding entrance of air into the container.

8. A vacuum filling machine as defined in claim 2 wherein the vacuum filling heads are provided with shrouded portions and the gas released from each filling head is confined in said shrouded portion to flow around the mouth of the gas filled container during application of the container into sealing engagement with the filling head.

9. A vacuum filling machine as defined in claim 2 wherein the source of vacuum and the source of gas is controlled by a rotary valve having spaced ports in a stationary member of the valve, each purging head being connected to an individual port in the movable member of said valve for communication with successive of said spaced ports.

10. A vacuum filling machine as defined in claim 2 wherein the source of vacuum and the source of gas is controlled by a rotary valve having spaced ports in a stationary member of the valve, each purging head being connected to an individual port in the movable member of said valve for communication with successive of said spaced ports, and means for resiliently pressing said stationary valve member into airtight relation to said movable valve member.

11. A vacuum filling machine as defined in claim 2 wherein provision is made for advancing and spacing successive containers in register with successive of said purging heads.

12. A vacuum filling machine as defined in claim 2 wherein the vacuum filling machine includes a material supply hopper operatively connected to said vacuum filling heads, and means for releasing inert gas under pressure into the space above the material in the supply hopper.

13. A vacuum filling machine as defined in claim 2 wherein the vacuum filling machine includes a material supply hopper operatively connected to said filling heads, and means for releasing inert gas under pressure into the space above the material in the supply hopper, said hopper having a relatively small vent open to the atmosphere to permit escape of air from the hopper when the inert gas is introduced therein whereby to reduce to a minimum the air content of said hopper and the material therein.

14. A vacuum filling machine as defined in claim 2 wherein the vacuum filling machine includes a material supply hopper, a chamber having a supply of inert gas under pressure, connections between said chamber and the filling heads for releasing gas through the heads during application of the containers into sealing relation to said filling heads, and connections from said chamber to the interior of said supply hopper for introducing gas under pressure into the space above the material in said hopper.

15. In a vacuum filling machine, in combination, vacuum filling means including a plurality of vacuum filling heads adapted for sealing engagement with the mouths of successive containers, and means for evacuating and gassing successive empty containers prior to application of the containers into sealing engagement with their respective filling heads, said evacuating and gassing means comprising means engageable in sealing relation with the mouths of the empty containers, and means operatively connected thereto for first evacuating the air from the containers and then introducing an inert gas into the evacuated containers, said inert gas being introduced into the containers under pressure, the pressurized gas escaping from the containers upon removal of said evacuating and gassing means retarding entrance of air into the containers, said evacuating and gassing means having provision for releasing gas during removal thereof to further retard entrance of air into the containers, and means for also releasing gas from the filling heads to flood the area around the mouths of the containers during application of the latter into sealing engagement with their filling heads, said release of gas from the gassing means

and from the filling heads occurring contemporaneously and extending over the space between said gassing means and said filling heads whereby the mouths of the containers are continuously flooded with a flow of gas from the time of removal of the gassing means to the time of sealing engagement with said filling heads.



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