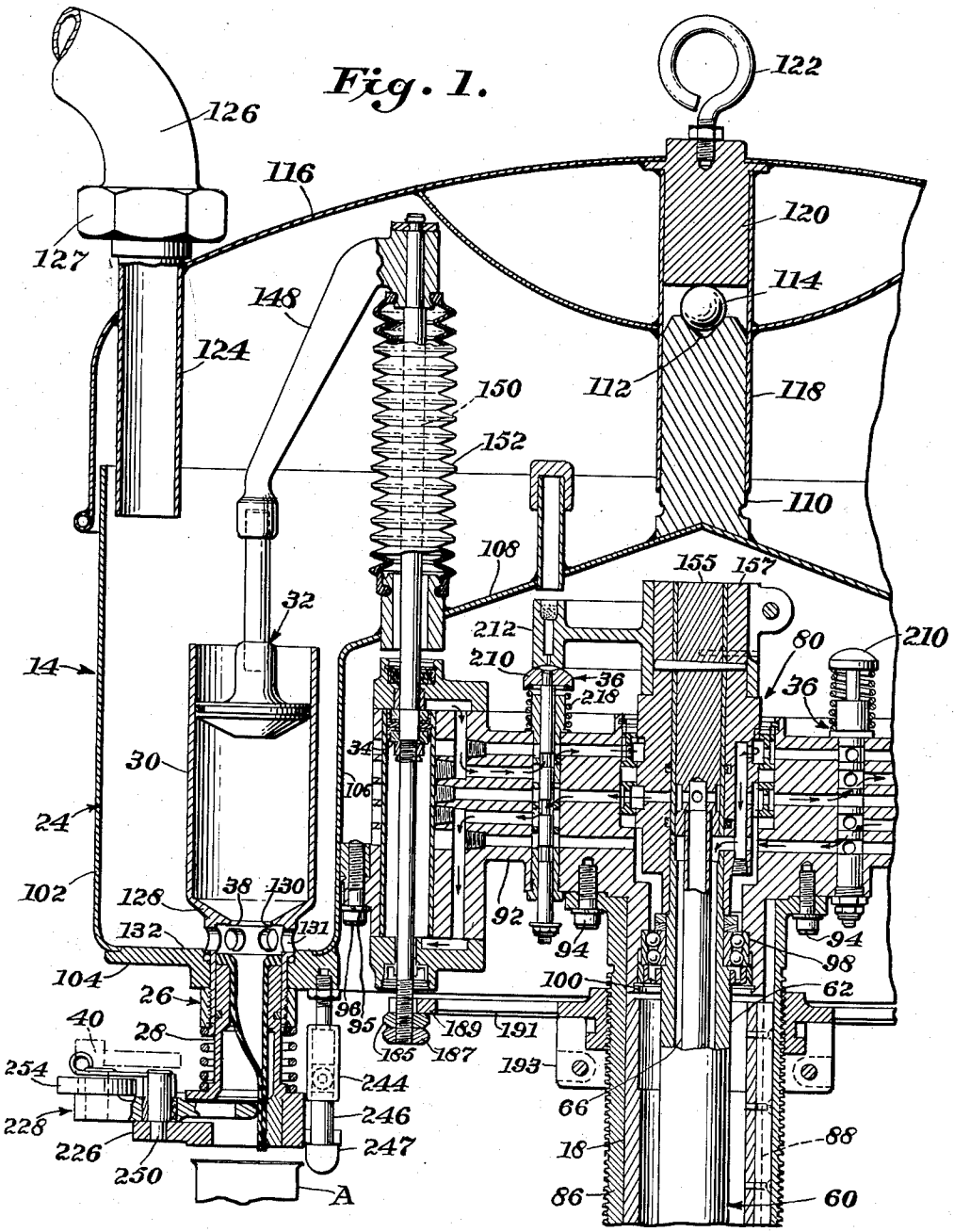
Sept. 4, 1956 L. F. PAHL ET AL 2,761,605

PISTON TYPE FILLING MACHINE

Filed July 16, 1954 12 Sheets-Sheet 1

Fig. 1.



INVENTORS.

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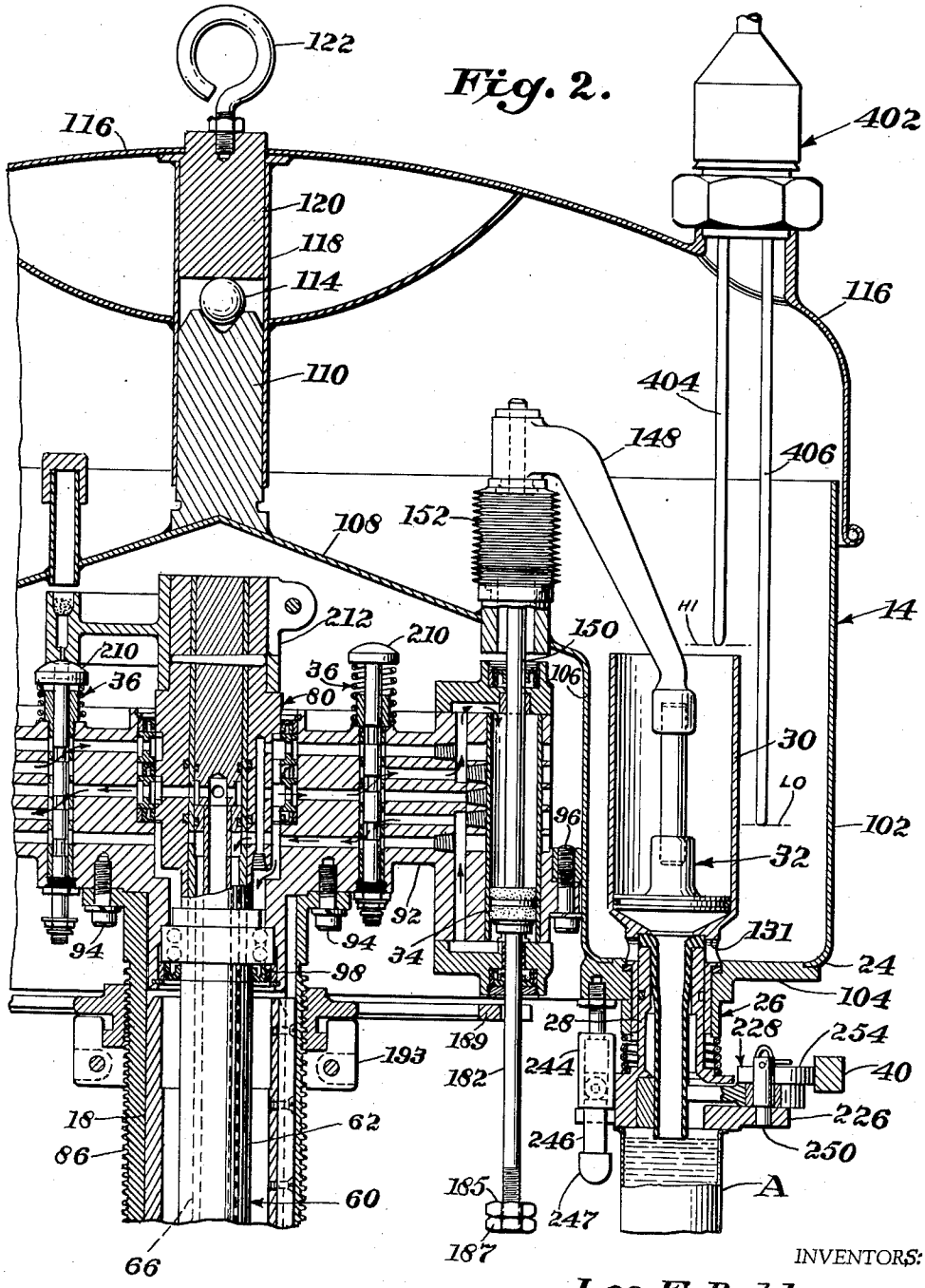
BY Cushman, Darby & Cushman
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Sept. 4, 1956 L. F. PAHL ET AL 2,761,605

PISTON TYPE FILLING MACHINE

Filed July 16, 1954 12 Sheets-Sheet 2

Fig. 2.



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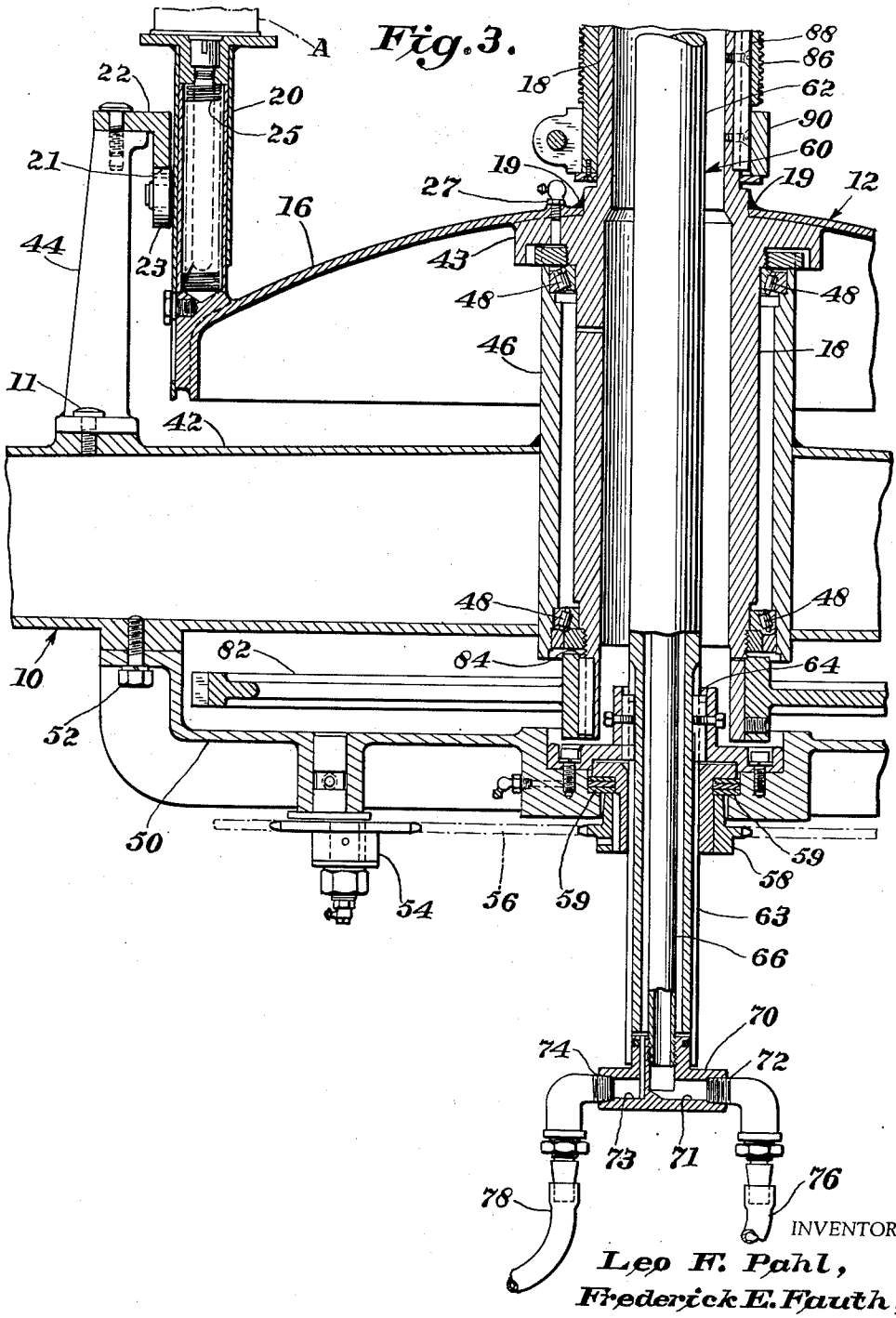
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PISTON TYPE FILLING MACHINE

Filed July 16, 1954 12 Sheets-Sheet 3

Fig. 3.



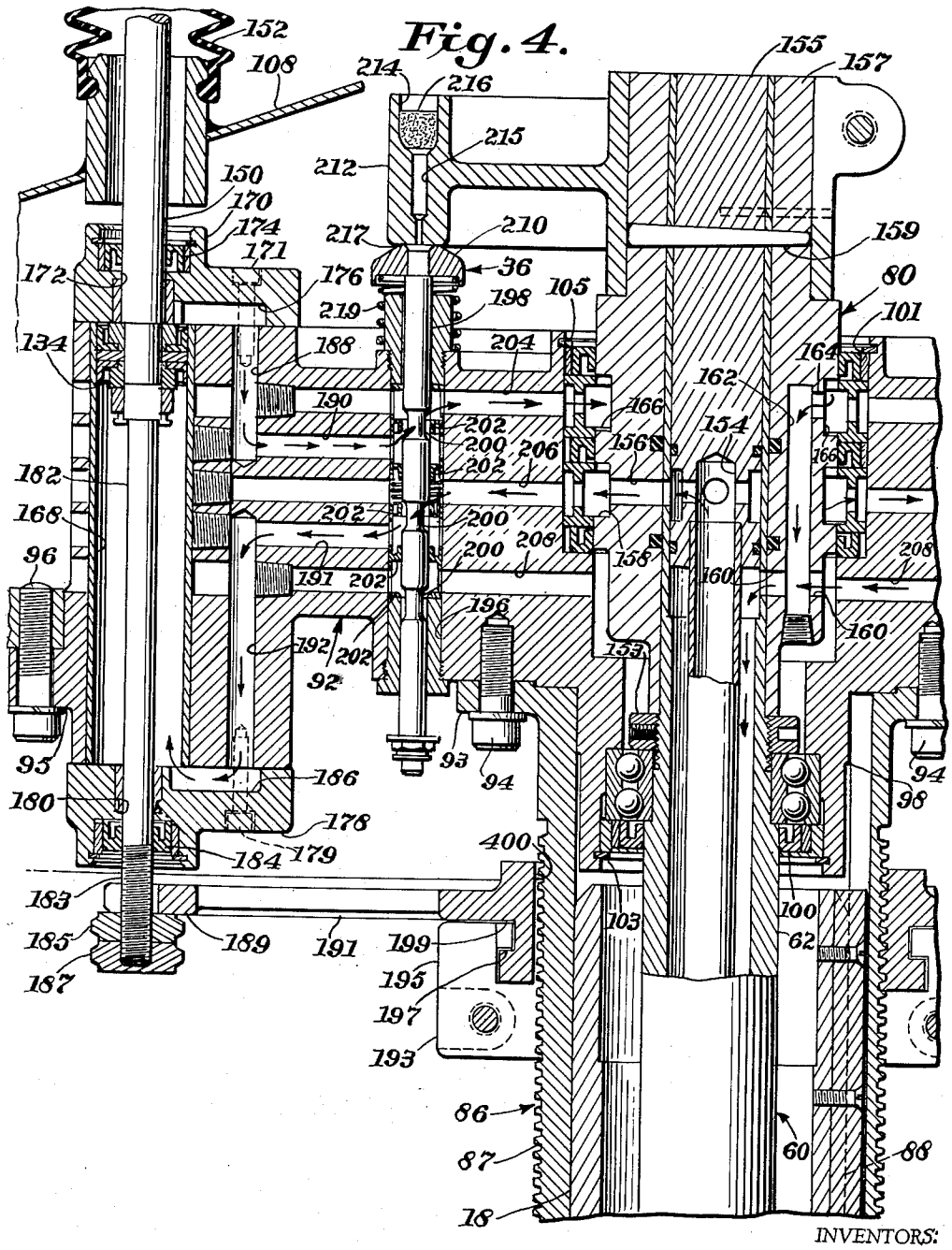
INVENTORS:
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PISTON TYPE FILLING MACHINE

Filed July 16, 1954 12 Sheets-Sheet 4

Fig. 4.



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Sept. 4, 1956 L. F. PAHL ET AL 2,761,605

PISTON TYPE FILLING MACHINE

Filed July 16, 1954 12 Sheets-Sheet 5

Fig. 5.

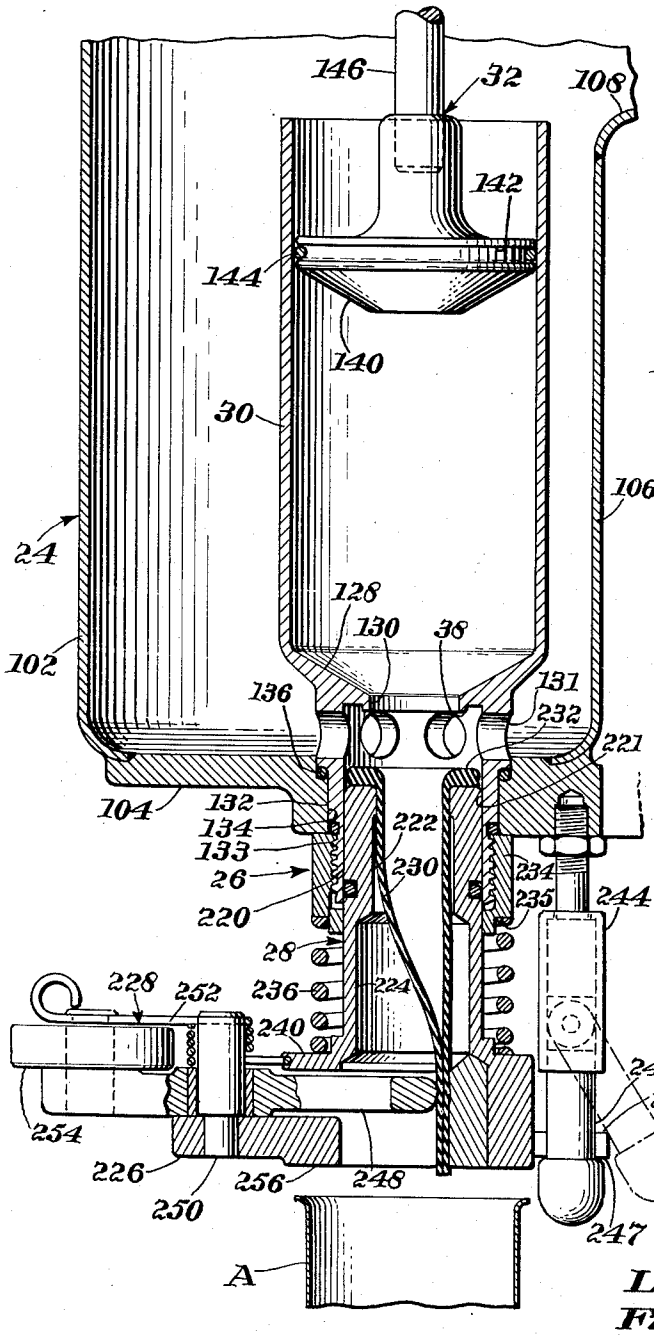


Fig. 6.

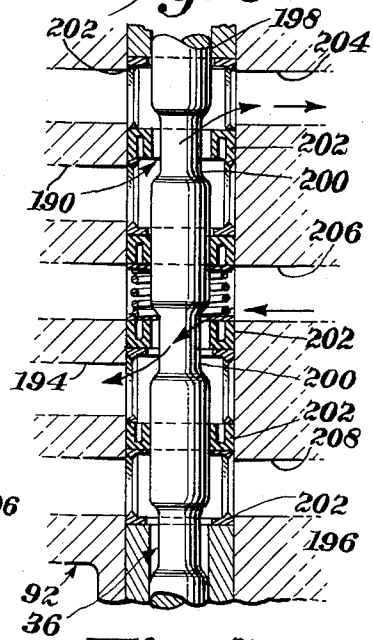
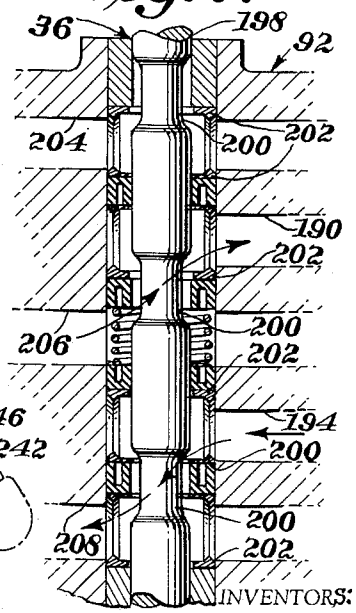


Fig. 7.



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Sept. 4, 1956 L. F. PAHL ET AL 2,761,605

PISTON TYPE FILLING MACHINE

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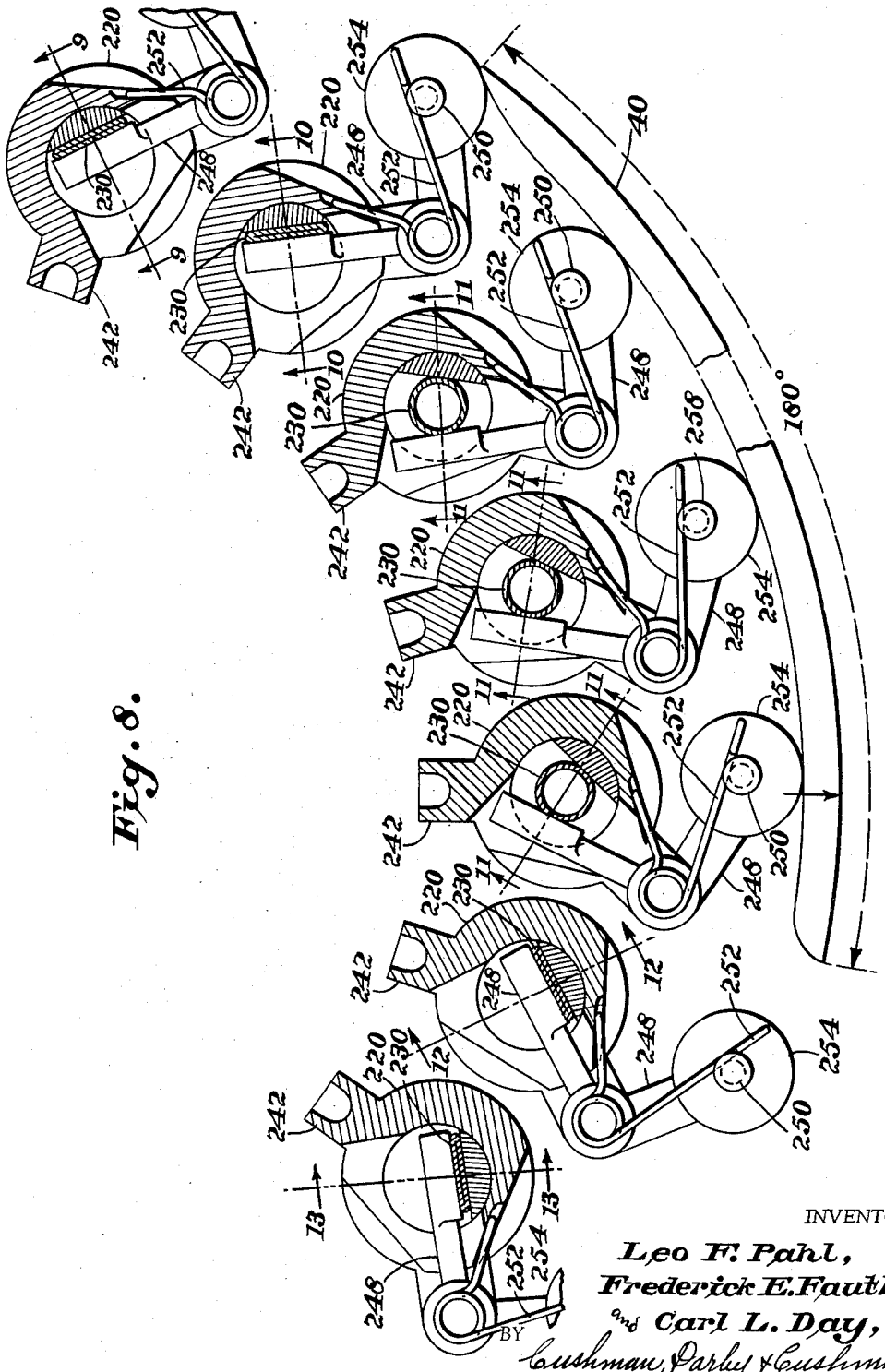


Fig. 8.

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Sept. 4, 1956 L. F. PAHL ET AL 2,761,605

PISTON TYPE FILLING MACHINE

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Fig. 9.

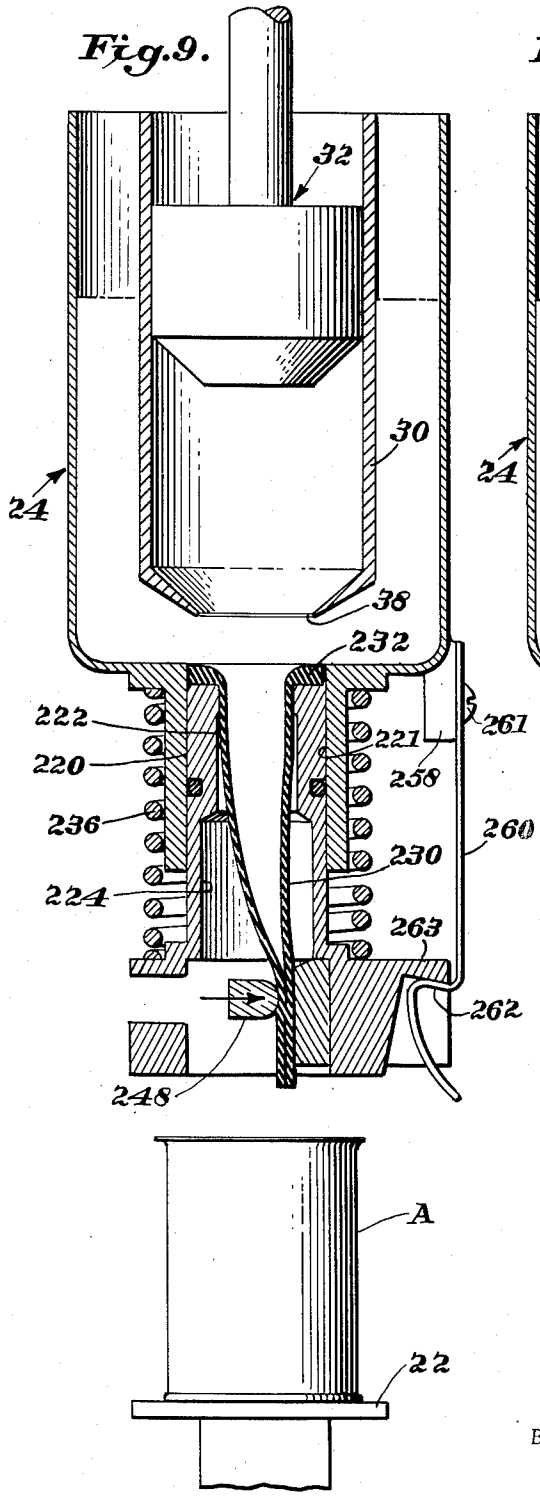
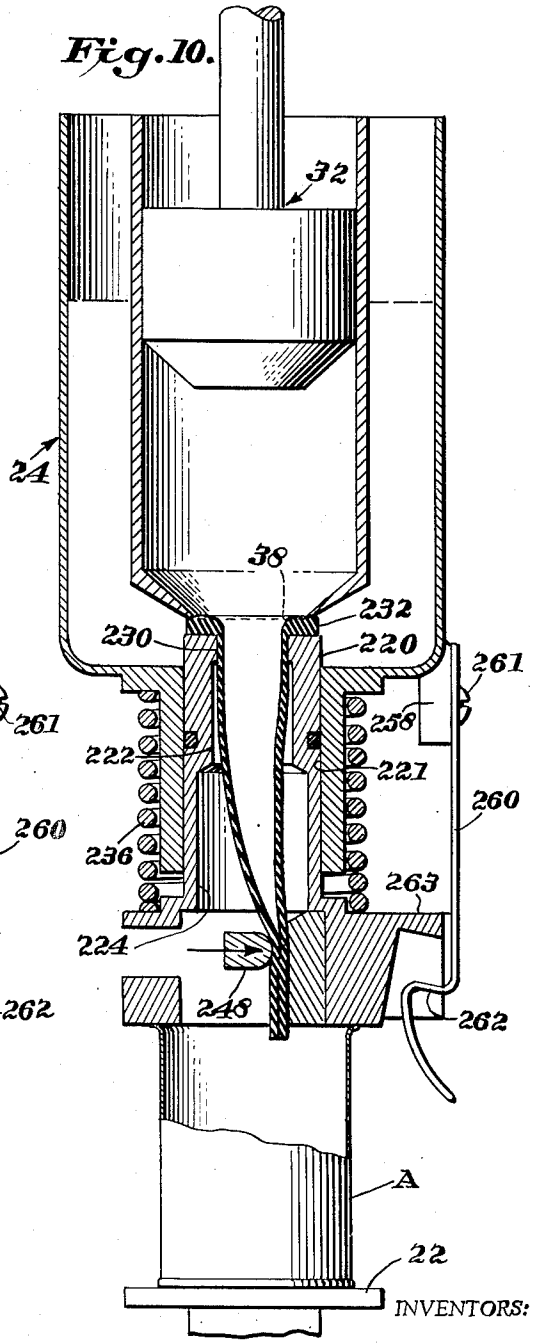


Fig. 10.



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Sept. 4, 1956 L. F. PAHL ET AL 2,761,605

PISTON TYPE FILLING MACHINE

Filed July 16, 1954 12 Sheets-Sheet 8

Fig. 11.

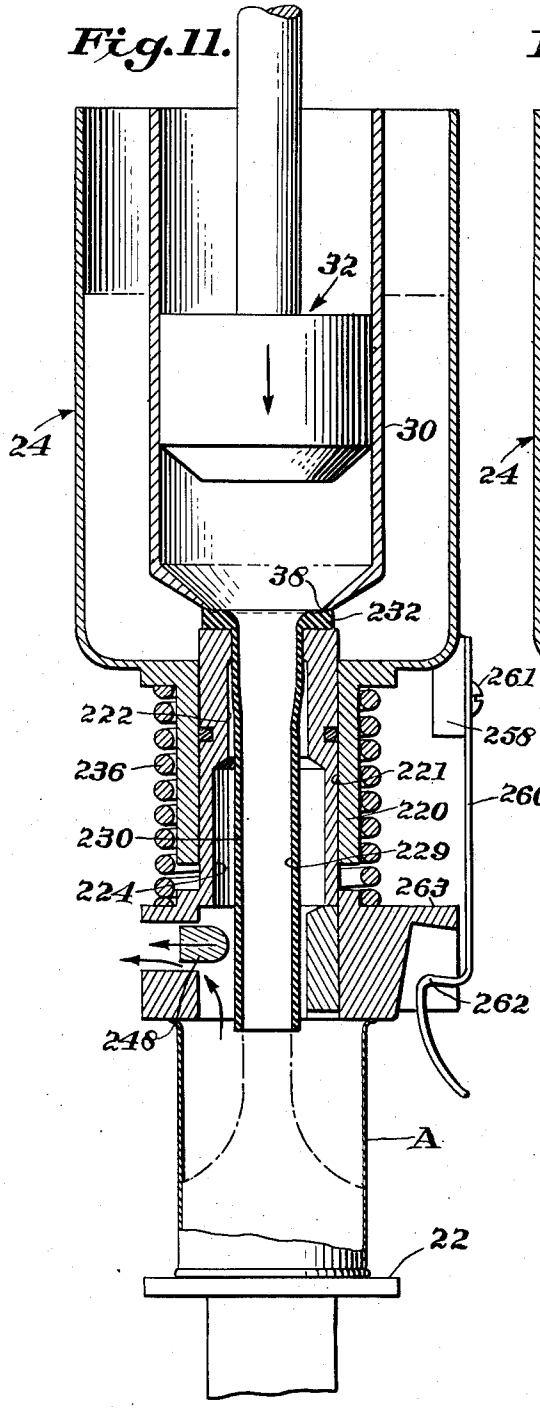
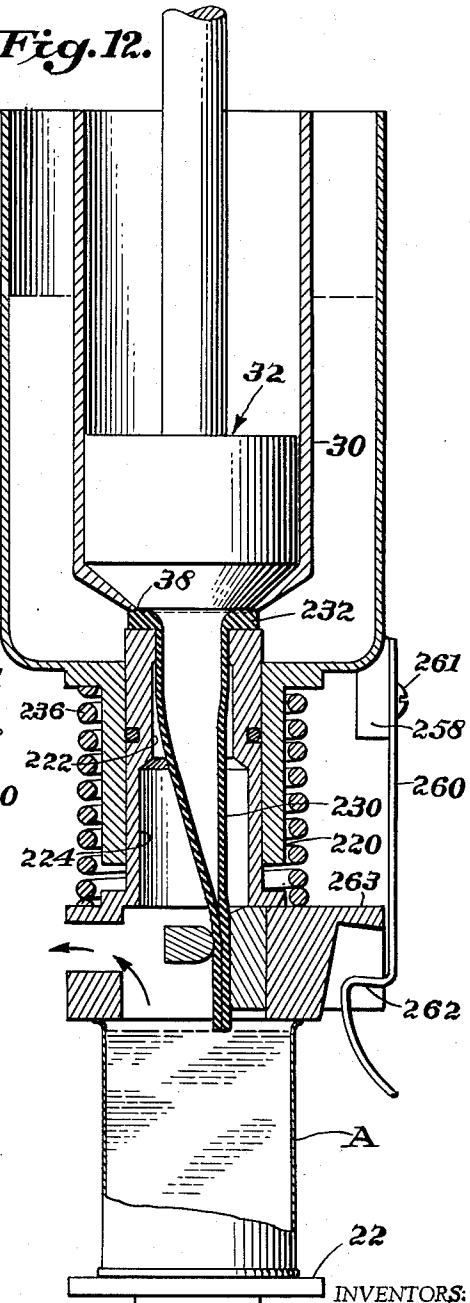


Fig. 12.



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Sept. 4, 1956 L. F. PAHL ET AL 2,761,605

PISTON TYPE FILLING MACHINE

Filed July 16, 1954 12 Sheets-Sheet 9

Fig. 13.

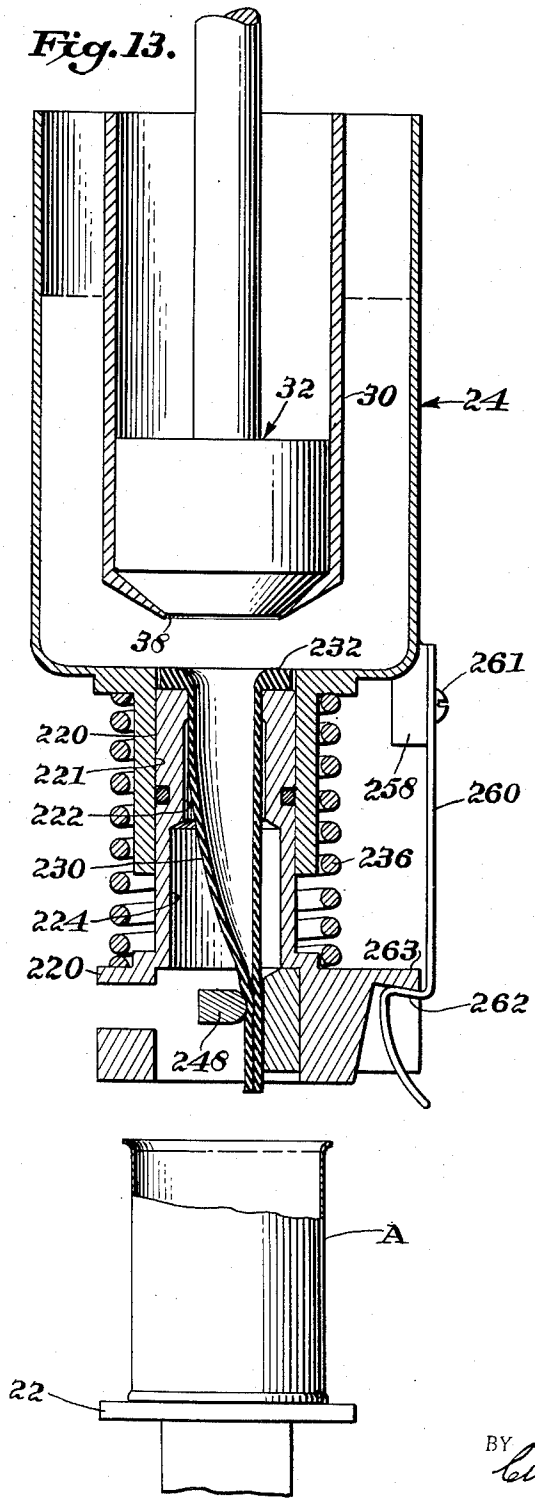


Fig. 14.

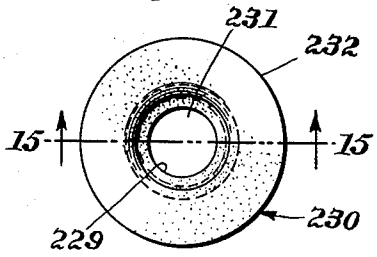
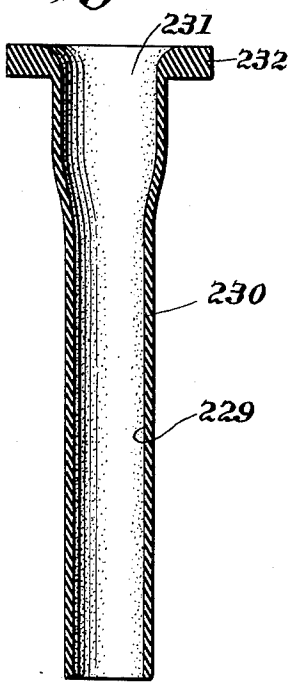


Fig. 15.



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Sept. 4, 1956 L. F. PAHL ET AL 2,761,605

PISTON TYPE FILLING MACHINE

Filed July 16, 1954 12 Sheets-Sheet 10

Fig. 16.

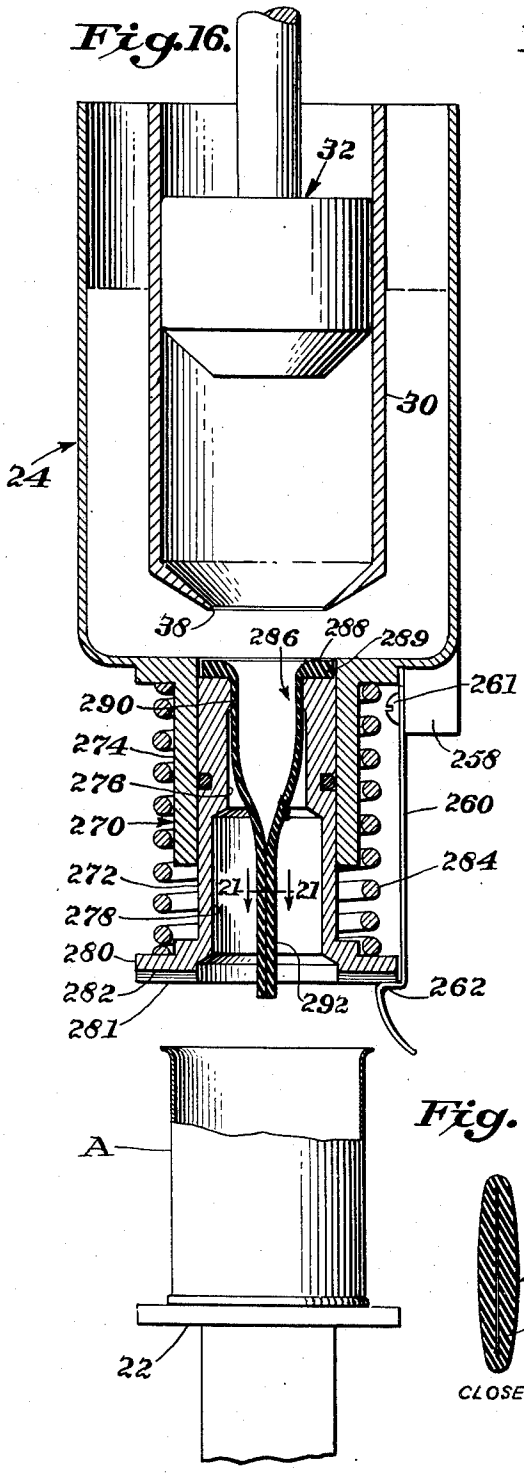


Fig. 17.

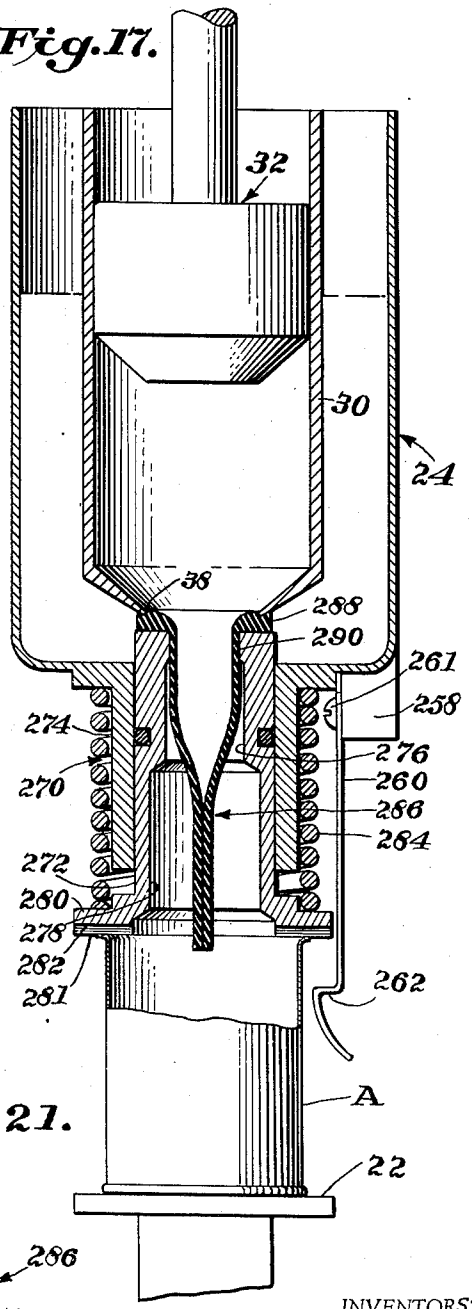
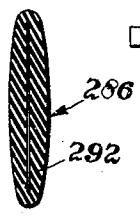


Fig. 21.



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Sept. 4, 1956 L. F. PAHL ET AL 2,761,605

PISTON TYPE FILLING MACHINE

Filed July 16, 1954 12 Sheets-Sheet 11

Fig. 18.

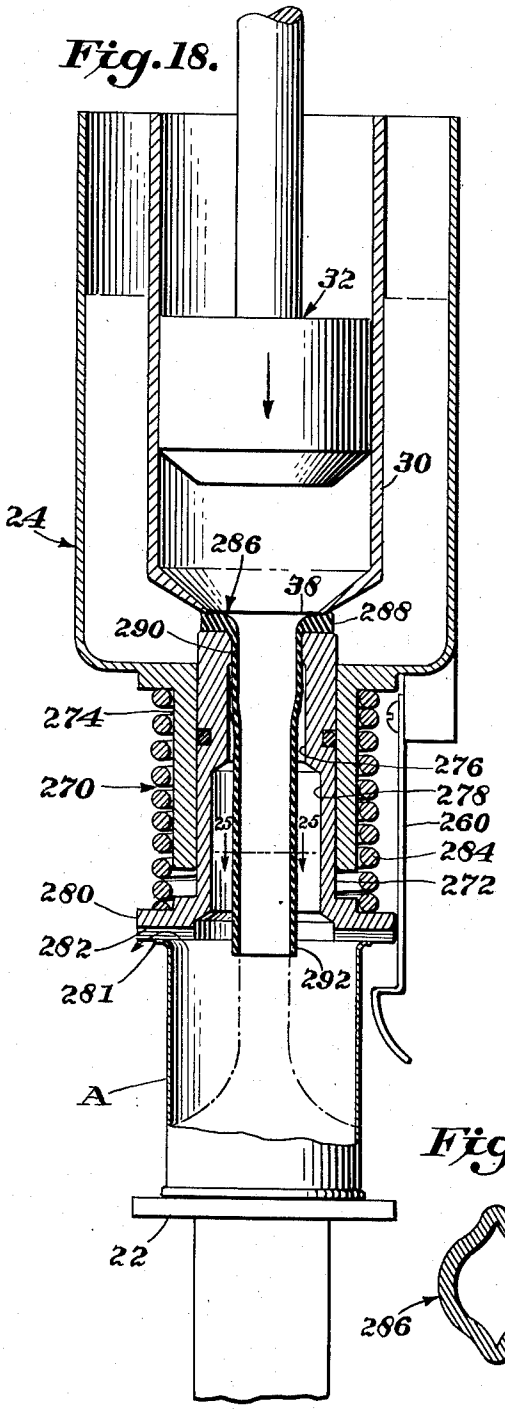


Fig. 19.

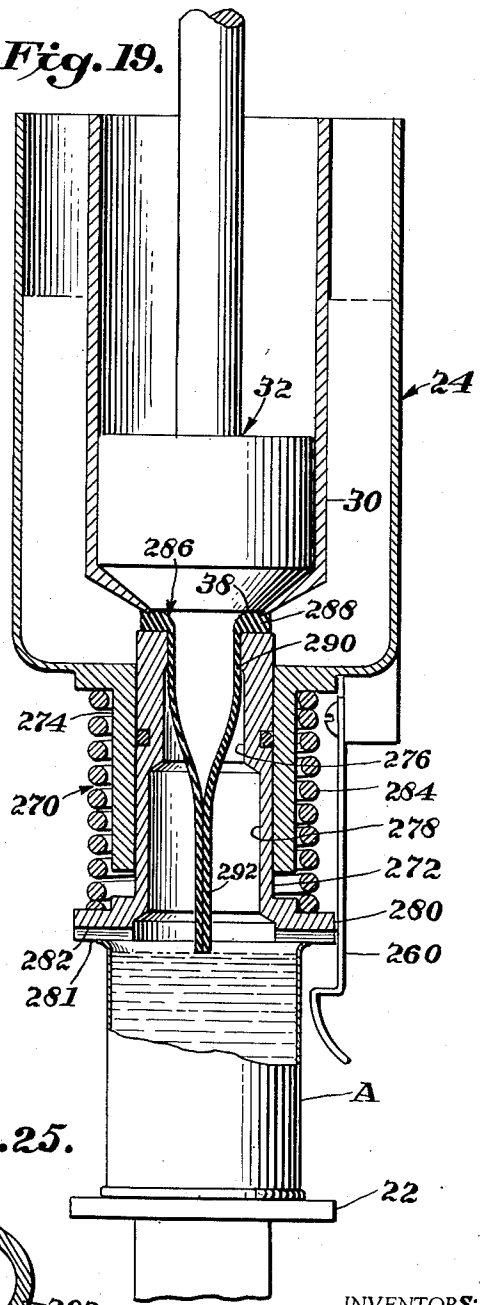


Fig. 25.

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Sept. 4, 1956 L. F. PAHL ET AL 2,761,605

PISTON TYPE FILLING MACHINE

Filed July 16, 1954 12 Sheets-Sheet 12

Fig. 20.

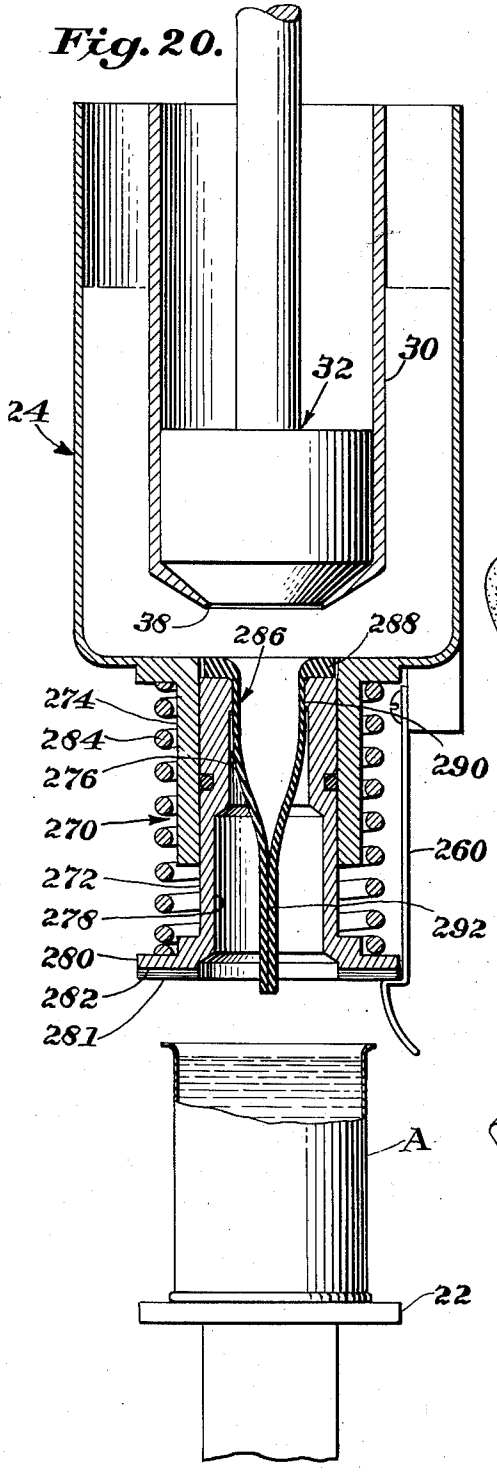
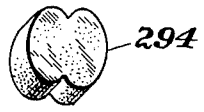


Fig. 23.



END CUT OFF

Fig. 22.

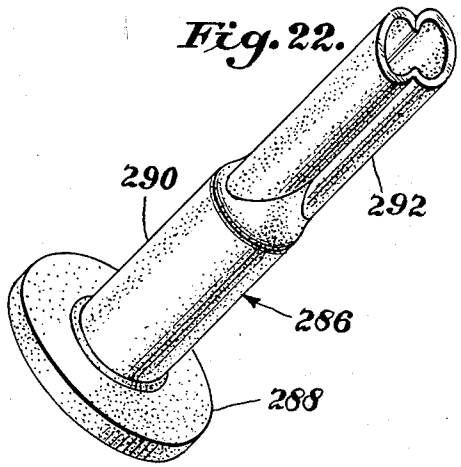
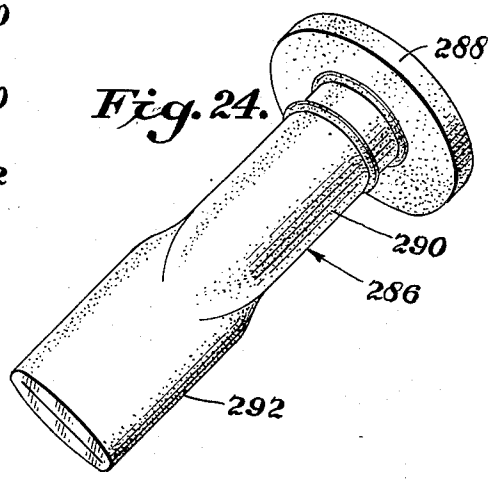


Fig. 24.



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United States Patent Office 2,761,605 Patented Sept. 4, 1956

2,761,605

PISTON TYPE FILLING MACHINE

Leo F. Pahl, Frederick E. Fauth, and Carl L. Day, Baltimore, Md., assignors to Crown Cork & Seal Company, Inc., Baltimore, Md., a corporation of New York

Application July 16, 1954, Serial No. 443,763

52 Claims. (Cl. 226—98)

The present invention relates to apparatus for filling containers with either a viscous or thin flowable product and, more particularly, to a filling machine capable of dispensing a measured charge of the product rapidly to a container.

Difficulties heretofore have been encountered in filling containers to a desired level with flowable products other than thin liquids. Where the product being dispensed was a heavy viscous liquid, such as a garnished soup, heavy cream or ketchup, or was a viscous flowable material such as, mayonnaise, salad dressing, peanut butter, grease or various paste products, it was often difficult to maintain the level of the product in the reservoir constant and, consequently, containers were either over or under filled. Further, any solids mixed with the flowable product being dispensed, which caught on the filling valve seat when the filling valve closed, caused excessive leakage of the filling valve.

The prior filling machines used for dispensing food products of the above-mentioned type, were not of such simplicity in design as to provide a high degree of sanitation. In other words, the filling valves of prior filling machines had many crevices in which bacteria could collect. Also, any metal worn during use almost invariably could be deposited in containers during the filling cycle. Finally, these prior filling machines were provided with filling valves incapable of being quickly removed for cleaning.

An object of the present invention is the provision of a filling machine capable of filling containers at high speeds with all types of flowable products. The term "flowable product" as used in this specification is to include thin liquids, as well as more viscous materials.

Another object of the present invention is the provision of a filling machine which will accurately fill containers to a desired level regardless of the quantity of the flowable product in the reservoir thereof.

Still another object of the present invention is the provision of a system for supplying to a rotary filling machine compressed air with oil entrained therein, the air being used to actuate a piston type charging cylinder. The invention comprehends an arrangement to isolate the air from the product being dispensed and whereby the air cannot be exhausted to the atmosphere immediately surrounding the machine to thereby mix with the food product in the reservoir.

Ancillary to the preceding object, it s a further object of the present invention to provide a filling machine having a reservoir which is isolated or sealed off from the operating elements of the machine.

A further object of the present invention is the provision of a filling machine which readily can be converted to fill either bottles or cans. In other words, it is merely necessary to replace the quickly removable filling valve of the filling head by a filling valve having the proper container engaging means. The word "container" as used throughout the specification is to include both cans and bottles.

A still further object of the present invention is the provision of a rotary type filling machine having a rotating reservoir with a stationary cover, the inlet to the reservoir for the flowable product being provided in the stationary cover.

Another object of the present invention is the provision of a filling machine which may be easily adjusted to accommodate containers of various height.

Ancillary to the preceding object, an object of the present invention is to provide a filling machine which will deliver a measured charge of a product to the container being filled and which may be adjusted to vary the volume of product dispensed depending upon the size of the container being filled or the level of fill desired in a container.

Still another object of the present invention is the provision of a simplified means of lubricating the cam which controls the air valve for operating the piston in the charge measuring cylinder.

Another object of the present invention is the provision of a filling valve which will only operate when there is a container therebeneath. This feature of the invention prevents a product being dispensed onto the filling table when no container is present. Hence, the sanitation of the filling machine will be increased and unsightly appearance of spilled products on the filling table will be eliminated.

Still another object of the present invention is the provision of a filling valve wherein the moving parts have a minimum of metal to metal surface contact, thus, materially decreasing the change of foreign matter being deposited in the containers being filled.

A further object of the present invention is the provision of a filling valve operable by engagement with a container to cooperate with a charge measuring cylinder in the reservoir of a filling machine in order to trap the charge in the measuring cylinder. In other words, if there is no container present beneath the filling valve, the filling valve will not trap the charge in the charge measuring cylinder and the charge dispensed therefrom will flow back into the reservoir.

A still further object of the present invention is the provision of a self-closing type of filling valve which will be operated by the presence of the material being dispensed from a charge measuring cylinder.

An object of the present invention is the provision of a filling valve which may be quickly and easily removed from a filling machine, the filling valve having its parts so arranged that they may be easily cleaned when removed.

These and other objects of the present invention will appear more clearly in the following specification, claims and drawings in which:

Figure 1 is a cross-sectional view of a portion of the filling machine of the present invention including a portion of the central column, the reservoir and one of the filling heads in the reservoir. The piston of the charge measuring cylinder is in its upward position, the cylinder being fully charged while the filling valve is closed.

Figure 2 is a cross-sectional view similar to Figure 1 but showing the right half of the top portion of the filling machine. In this view, the filling valve is opened and the piston of the charge measuring cylinder is in its extended position having dispensed with the charge from the measuring cylinder.

Figure 3 is a cross-sectional view of the lower portion of the filling machine including the lower rotating turret, one of a plurality of container supporting platforms mounted on the rotating turret, and the stationary table.

Figure 4 is an enlarged fragmentary cross-sectional view of the upper rotating turret, disclosing in detail the means for operating the charge measuring cylinder.

Figure 5 is an enlarged fragmentary cross-sectional

view of one of the filling heads mounted in the reservoir and disclosing its filling valve in the closed position.

Figure 6 is an enlarged fragmentary view of one of the air valves for controlling air to one of the air cylinders which operates one of the charge measuring cylinders. The valve is shown in the position for raising a piston in a charge measuring cylinder.

Figure 7 is a view similar to Figure 6 but showing one of the air valves in a position for lowering a piston in a charge measuring cylinder.

Figure 8 is a diagrammatic view of the sequential operation of one of the filling valves, the charge measuring cylinder for the valve and the position of its piston being omitted.

Figure 9 is a view taken on the line **9—9** of Figure 8 and including the charge measuring cylinder and the relative position of the piston therein.

Figure 10 is a view taken on the line **10—10** of Figure 8 and including the charge measuring cylinder. The filling valve in this position is closed but in engagement with the valve seat on the charge measuring cylinder.

Figure 11 is a view taken on the line **11—11** of Figure 8 and including the charge measuring cylinder. The filling valve in this position is shown as open and the piston in the charge measuring cylinder is shown as descending and dispensing the charge.

Figure 12 is a view taken on the line **12—12** of Figure 8 and including the charge measuring cylinder. The charge has been dispensed and the filling valve is closed but not lowered with respect to the charge measuring cylinder.

Figure 13 is a view taken on the line **13—13** of Figure 8 and including the charge measuring cylinder. In this position the filling valve is closed and lowered from the charge measuring cylinder and the piston in the charge measuring cylinder is beginning its upward stroke to recharge the cylinder.

Figure 14 is a top plan view of the valve rubber disclosed in Figures 9 to 13 inclusive.

Figure 15 is a cross-sectional view of the valve rubber of Figure 14 taken on the line **15—15**.

Figures 16 through 20 inclusive are sequential views of the operation of a filling head and are similar to the views in Figures 9 to 13 but showing a modified form of a self-closing filling valve wherein the filling valve is operated by the pressure of the product being dispensed from the charge measuring cylinder.

Figure 21 is a cross-sectional view of the filling valve rubber taken on the line **21—21** of Figure 16.

Figure 22 is a perspective view of the filling valve rubber used in the filling valve disclosed in Figures 16 to 20 as molded with the end cut off.

Figure 23 discloses a perspective view of the end which has been cut off of the molded valve rubber of Figure 21.

Figure 24 discloses a perspective view of the molded valve rubber of Figure 22 turned inside out and ready for use in the filling valve disclosed in Figures 16 to 20.

Figure 25 is a cross sectional view of the filling valve rubber taken on the line **25—25** of Figure 18.

General description

The filling machine of the present invention as disclosed in Figures 1 to 3 inclusive is of the rotary type for filling containers with any flowable material or product including thin liquids, as well as viscous liquids. More particularly, the machine is adapted for use in filling containers with food products, such as mayonnaise, peanut butter, garnish soups, syrup, sauces, salad dressing, or the like, where it is of the utmost importance that the machine be so designed as to meet high sanitary requirements. In other words, the machine has been so designed that it may be readily cleaned before or after each use and, further, there is no chance of contamination of the product being dispensed by the working parts of the machine or from dust or other impurities in the surrounding atmosphere. However, although the particular use of the apparatus is for dispensing food products, it is well within the scope of the present invention that the apparatus may be used to dispense other viscous products, such as toilet creams, tooth paste, oil, grease, liquid soap, heavy and thin flour paste, or the like.

Referring specifically to the drawings, the filling machine of the present invention, in its preferred form, includes a stationary frame or table generally indicated by the numeral **10** as best shown in Figure 3, and a rotary structure **12** mounted on the frame **10** for rotation with respect thereto, as best shown in Figures 1 and 2. Rotary structure **12** includes an upper rotating turret **14** and a lower rotating turret or container supporting table **16**. Upper rotating turret **14** is connected to container supporting table **16** by means of a vertical central column **18** which is adapted to support and rotate upper turret **14** with the rotatable container supporting table **16**. The lower turret or container supporting table **16** is provided with a plurality of container supporting platforms **20** mounted on its periphery for vertical movement with respect thereto. A circumferential cam member **22** mounted on stationary frame **10** is adapted to engage a cam follower **23** mounted on each of the vertically movable can supporting platforms to cause them to rise and lower as table **16** rotates.

Upper turret **14** includes a doughnut-shaped reservoir **24** having a plurality of filling heads generally indicated **26** mounted therein in vertical alignment with container supporting platforms **20**. Each of the filling heads **26** includes a filling valve **28** vertically movable by a container with respect to reservoir **24** and a charge measuring cylinder **30** positioned in alignment with and above the filling valve **28**. Charge measuring cylinder **30** is adapted to deliver a measured charge of the product being dispensed to filling valve **28** after the valve has been raised vertically by a container on the container supporting platform. Each charge measuring cylinder includes a piston **32** mounted therein and connected to and operated by an air operated piston **34**.

Concentric tubing is provided centrally of vertical column **18** and is adapted to supply compressed air to either side of each of the air operated pistons **34** and to exhaust air from the other side of pistons **34** out and away from the machine depending on the cycle of operation. A more detailed description of the means for controlling movement of pistons **32** in charge measuring cylinders **30** will follow later in the specification but it will suffice to say at this time that a cam operated air valve **36** connected to each of the pistons **34** will sequentially supply air alternately to one side or the other of pistons **34** to control movement of pistons **32**.

It will be noted in Figure 1 that filling valve **28** is adapted to move vertically with respect to reservoir **24** and to seat against a valve seat **38** on the discharge end of charge measuring cylinder **30**. Filling valve **28** when in its elevated position, as shown in Figure 2, will then be opened by a fixed cam **40** mounted in any suitable manner on the stationary frame **10**. When filling valve **28** is open, piston **32** will descend on its downward stroke in charge measuring cylinder **30** and force the product trapped therein by filling valve **28** through the valve into a container generally indicated A.

The operation of the filling machine may be briefly described generally as follows.

Containers A are fed to the machine by a suitable conveyor (not shown) and are positioned on each of the vertically movable platforms **20** as the platforms pass by the infeed station of the machine. The infeed station of the present invention can be similar to that disclosed in United States Patent No. 2,596,987 issued May 20, 1952, to Carl L. Day and Leo F. Pahl or it may be of some other suitable design. After receiving a container A, platform **20**, which is carried by rotating table **16** of the

rotating structure 12, will be raised by the cam member 22 so that the container will engage filling valve 28 and raise the same vertically. When filling valve 28 has seated itself against valve seat 38 on the discharge end of charge measuring cylinder 30, the valve will then be in position to be opened by cam 40 fixed to stationary frame 10. After filling valve 28 is opened, piston 32 in charge measuring cylinder 30 will be actuated by the air operated piston 34 which will in proper timed sequence receive compressed air on its upper side from the concentric air tubes positioned in the central column 18. As piston 32 descends, the product in charge measuring cylinder 30 will be forced from its discharge end through the open valve 28 into container A. After structure 12 has rotated a predetermined distance, piston 32 in charge measuring cylinder 30 will be in its fully extended position and filling valve 28 will be closed and container A lowered therefrom by the container platform 20. After filling valve 28 has become disengaged from valve seat 38, piston 32 will return to its charge dispensing position and at the same time will re-charge measuring cylinder 30 by drawing the flowable product from reservoir 24 through the discharge end of the cylinder into the measuring chamber. Container A having been filled is then transferred from the container supporting platform 20 at a discharge station to a take off conveyor (not shown) where it is then transferred to a container closing apparatus or the like. The discharge or outfeed station may be of the type disclosed in the aforementioned Day and Pahl patent or it may be of some other suitable design.

Should there be a break in the line of containers being supplied to the filling machine by the infeed conveyor, container supporting platform 20 will rise but because there is no container present on the platform, filling valve 28 will not rise. Since filling valve 28 will not rise when this condition occurs, it will not be able to engage cam 40 and, consequently, will not be open while the upper turret is rotating. However, piston 32 of charge measuring cylinder 30, which is operated by a separate mechanism from that of filling valve 28, will move downwardly in the cylinder but will dispense the charge in the cylinder through its discharge end back into the reservoir. Therefore, as is now evident, the filling machine will continue to operate satisfactorily even though a container is not present on one of the platforms during a sequence of operation.

Although the filling machine just described is a preferred embodiment of the invention, it is to be understood that certain changes or modifications to the filling machine could be made and still be within the scope of the invention. Since the previous description of the filling machine and its operation has been merely general, a more detailed description of the filling machine will follow and be divided under separate headings related to various parts of the apparatus. A detailed description of the filling machine structure and its component parts will be given under the heading "Filling Machine Structure." The charge measuring cylinder and its component parts including its control and operation will be described in detail under the heading "Charge Measuring Cylinder and Control." The filling valve disclosed in Figures 1, 5 and 9 through 15 inclusive is the preferred form of valve used in cooperation with the charge measuring cylinder. This valve, as well as a summary of its operation in conjunction with the operation of the charge measuring cylinder, will be described in detail under the heading "Filling Valve." Figures 16 through 24 inclusive disclose a modified form of filling valve for use with a charge measuring cylinder and the valve disclosed in these figures is particularly adapted for use in dispensing thick flowable material, such as peanut butter, heavy paste and creams. A detailed description of the modified filling valve and its operation will appear under the heading "Modified Form of Filling Valve."

Filling machine structure

The filling machine frame 10, a portion of which is shown in Figure 3, may be of any suitable design for supporting the rotary structure 12 including the upper and lower turrets 14 and 16 respectively. Frame 10, which is supported on suitable standards (not shown), is provided with a base member 42 having an upper surface on which is mounted the stationary, arcuate shaped cam 22. Cam 22 is supported adjacent lower rotating turret 16 by means of vertical standards or posts 44 which are fixed to the upper surface of base member 42 by means of studs 11 or the like. A downwardly facing cam surface 21 is provided on cam 22 and is adapted to engage cam followers 23 mounted on each of the vertically movable container supporting platforms 20. Because each of the container supporting platforms 20 is normally urged upwardly by suitable springs 25, cam 22 through cam followers 23 will control the raising and lowering of the container supporting platforms.

Centrally positioned and fixed to the base member 42 is a vertical hollow collar or sleeve member 46 which rotatably supports vertical central column 18. As previously mentioned, central column 18 supports the rotating structure 12 but it will be noted that the lower turret 16 is welded to column 18 as indicated at 19 while upper turret 14 is detachably secured to central column 18 by means of lock ring 90. A more detailed description of lock ring 90 and its purpose will follow later in the specification. Suitable bearings 48 are supported by the collar 46 and permit vertical column 18 to rotate with respect to stationary frame 10. A lubrication fitting 27 mounted on lower turret 16 provides for means for conveniently lubricating bearings 48.

As shown in Figure 3, frame 10 is provided with a bell-shaped casting 50 bolted to the lower surface of base member 42 as indicated at 52. Casting 50 rotatably supports a plurality of sprocket wheels 54 which are connected together by means of an endless chain 56. Sprocket wheels 54 are adapted to receive elevating screws (not shown) which support filling valve cam 40 shown in Figures 1 and 2. Because the details of the elevating mechanism are similar to those disclosed in Patent No. 2,329,954 issued September 21, 1943, to Robert J. Stewart and Henry H. Franz, it is not believed necessary to repeat them in this specification.

Mounted centrally of casting 50 and extending upwardly through vertical central column 18 is piping generally indicated at 60 for supplying and exhausting compressed air to and from air operated pistons 34 in upper rotating turret 14. Piping 60 comprises an outer air tube 62 which is keyed to the casting 50, as indicated at 64, and an inner air tube 66. The lower end of outer tube 62 is exteriorly threaded, as indicated at 63, and is adapted to be received in an elevating sprocket 58 rotatably supported in casting 50 by suitable bearings 59. Mounted centrally of the outer air tube 62 is inner air tube 66 for supplying compressed air to each of the air operated pistons 34. Both the outer and inner air tubes 62 and 66 respectively terminate at their lower ends into a T-fitting 70 having the outlets 72 and 74. Outlet 72 of T-fitting 79 is in communication with the interior of tube 66 through passage 71 while outlet 74 is in communication with the space between tube 66 and the tube 62 through passage 73. Flexible tubings 76 and 78 are connected to the outlets 72 and 74 respectively of the T-fitting 70. Flexible tubing 76 and 78 run from T-fitting 70 to a control panel (not shown) for the filling machine. Suitable controls are provided on the control panel for admitting compressed air from an air compressor apparatus to the tubing 76 and for exhausting air from tubing 78 to the air compressor apparatus.

The upper ends of air tubes 62 and 66 terminate in and are connected to an air distributor generally indicated at 80. Details of air distributor 80 and its pas-

sages for distributing air to and from each of the air valves 36 will follow in the specification after the description of the upper and lower turrets 14 and 16 is completed.

As previously mentioned, the vertical central column 18 is rotatably mounted in base member 42 of frame 10 by means of bearings 48 or the like. Vertical central column 18 extends upwardly from the surface of base member 42 and is provided with a radially extending flange 43, Figure 3, which supports lower rotating turret or container supporting table 16. Table 16, which is rigidly supported on flange 43 of vertical central column 18 by welding as indicated at 19, is provided with a plurality of vertically movable container supporting platforms 20 mounted on its periphery. As previously mentioned, each platform 20 is provided with a cam follower 23 which cooperates with the cam surface 21 of stationary cam 22 to raise and lower the platform with respect to table 16 and frame 10.

The lower end portion of central column 18 extends below the lower end of sleeve 46 and is provided with a drive gear 82 which is keyed thereto, as indicated at 84. Drive gear 82 is adapted to engage suitable driving means to rotate it and thereby rotate the central column and the rotary structure 12 mounted thereon.

Referring to Figure 4, the upper end of central column 18 receives a sleeve 86 which depends downwardly from upper rotating turret 14. Sleeve or collar 86 is keyed to central column 18, as indicated at 88, thereby providing the drive for the upper rotating turret 14. The lower end of sleeve 86 is adapted to be locked against vertical movement with respect to central column 18 by means of a lock ring 90, shown in Figure 3.

The upper end of sleeve 86 supports upper rotating turret 14 which includes doughnut-shaped reservoir 24 and a valve casing 92. Valve casting 92 is attached to the flanged upper end 93 of sleeve 86 by means of the bolts or studs 94 while reservoir 24 is attached to an outer peripheral flange 95 of valve casing 92 by means of the bolts or studs 96. Suitable bearings 98 are provided between air tube 62 and valve casing 92 so that the valve casting and reservoir may rotate with respect to air tube 62. It will also be noted that a suitable gasket or sealing ring 100 surrounds tube 62 below bearing 98 and forms a seal between the tube and casing 92 whereby compressed air in the interal passages of valve casing 92 will not be able to leak past the bearing down through the vertical column and out into the atmosphere surrounding the machine. Another gasket or sealing ring 101 is provided on the upper end of air distributor 80 and forms a seal between the distributor and valve casing 92 above the air passages in the distributor and valve casing. Lock rings 103 and 105 retain seals 100 and 101 respectively in place on the valve casting.

In Figures 1 and 2, it will be seen that doughnut-shaped reservoir 24 is provided with an outer wall 102, base wall 104 and an inner wall 106. Depending upwardly from the inner wall 106 and integral therewith is a cone-shaped cover member 108. The cover member provides a cover for the valve casing and its associated mechanism for operating the charge measuring cylinders. Centrally positioned on cover member 108 of reservoir 24 is an upwardly depending standard or post 110 having a depression 112 in its upper end. Depression 112 receives a ball bearing 114 on which a reservoir cover 116 is pivotally supported. As best shown in Figures 1 and 2, cover 116 of the reservoir is provided with a centrally positioned and downwardly extending sleeve member 118 having a block 120 in its upper end. A suitable hook 122 or the like is threaded into the block 120. Cover 116 is adapted to be supported by the ball 114 and post 110 and to remain stationary while reservoir 24 rotates. Sleeve 118 of cover 116 fits over the post 110 on the reservoir and prevents cover 116 from tilting on a horizontal axis.

Mounted adjacent the periphery of cover 116 is an inlet tube 124 which is connected to a pipe 126 by means of a hexagonal nut 127 leading from a source of supply of the flowable product to be dispensed. It will now be evident that as the upper turret rotates, carrying with it the reservoir 24, the reservoir cover 116 will remain stationary on ball bearing 114. The flowable material being supplied through pipe 126 and inlet tube 124 will be evenly distributed on the interior surface of the rotating reservoir. By providing a stationary cover through which the product to be dispensed is supplied to the reservoir, the reservoir can be kept closed and the vertical column of the machine utilized for supplying compressed air to operate the air operated pistons which in turn operates pistons 32 in charge measuring cylinders 30. When it is desired to clean out the inside of the reservoir, it is merely necessary to hook a hoist onto hook 122 and lift the cover 116 vertically off of post 110 of reservoir 24.

The level of flowable material in reservoir 24 does not have to be maintained at a constant level throughout operation of the filling machine. However, the level of flowable material in reservoir 24 is maintained between upper and lower limits. A high-low probe device, generally indicated at 402, is provided to control the upper and lower limits of the flowable material in reservoir 24. Device 402 is provided with a high level probe 404 and a low level probe 406. Probes 404 and 406 actuate a relay (not shown) that controls the off-on position of a four-way solenoid air valve (not shown) which in turn supplies air to a double acting rotary air cylinder (not shown). The rotary air cylinder is coupled mechanically to a rotary plug type of flow control valve (not shown) mounted in the pipe 126 and controls the flow of material to reservoir 24. When the level of flowable material in reservoir 24 touches the high level probe 404, the relay will be so actuated as to cause the four-way solenoid valve to actuate the double acting rotary air cylinder to close the plug type flow control valve. When the level of flowable material drops below the lower tip of the low level probe 406, the relay is actuated so as to cause the solenoid air valve to actuate rotary air cylinder to open the flow control valve and permit the flow of material through pipe 126 into reservoir 24. The flowable material will be supplied into reservoir 24 until such time that the level of the material in the reservoir will rise and touch the lowermost point of the high level probe 404 when, as previously stated, the flow of material will be stopped. A manually operated plug valve (not shown) may also be provided in the inlet pipe 45 for completely shutting off the flow of material when the machine is shut down and for controlling the rate of flow of material when the machine is in operation. In other words, the manual valve can be opened a specific amount to control the rate of flow through it so that the demand of filling of the reservoir is close to the rate of flow through the manual valve and, thus, prevents the probe level control device 402 from being actuated on short intervals.

Reservoir 24 supports a plurality of filling heads 26 in vertical alignment with each of the container supporting platforms 20. Filling head 26 includes charge measuring cylinder 30 positioned within the reservoir and filling valve 28 depending below the reservoir. For present purposes of description, it will suffice to say that containers A are placed upon the container platform 20 as the container platform is rotating with the table or lower turret 16. The container platform will be caused to raise vertically by cam 22 to bring the container into sealing engagement with the valve 28. A sequence of operations then occur which include opening of valve 28 and discharging of a measured charge from charge measuring cylinder 30 through the valve into the container as the machine rotates. After the container is filled, the valve is closed and the container is lowered

by the container platform and removed therefrom. The charge measuring cylinder will be re-charged from the product from the reservoir and the operation can be repeated on the next container which is placed upon platform 20.

When it is desired to convert the apparatus from one size container to another size container, it is merely necessary to release the lock ring 90 and rotate one of the sprockets 54. Rotation of sprocket 54 will cause rotation of sprocket 58 through means of endless chain 56. By rotating sprocket 54, the elevating shafts (not shown) will cause the valve cam 40, as best shown in Figures 1 and 2, to raise or lower. On the other hand, the rotation of sprocket 58 about the piping 60 will cause the piping 60 to raise vertically since the piping is keyed to the casting 50 of frame 10, as indicated at 64. When the piping 60 raises or lowers, it will carry with it upper rotating turret 14 through bearing 98, best shown in Figures 1, 2 and 4. After upper rotating turret 14 and stationary valve cam 40 are adjusted to a proper height, it is merely necessary to lock the lock ring 90 into position so that the sleeve 86 will be locked with respect to vertical central column 18.

Charge measuring cylinder and control

Each of the charge measuring cylinders 30 has been previously described as being positioned in the reservoir above and in alignment with filling valves 28 and container supporting platforms 20. As best shown in Figures 1 and 2, each of the charge measuring cylinders 30 is vertically positioned within the reservoir and are cylindrically shaped and opened at both ends. The lower end of charge measuring cylinder 30 is provided with inwardly tapered wall 128 defining a discharge opening 130. The inner periphery of wall 128 is provided with the valve seat 38 which will be described in more detail in connection with the filling valve. As shown in Figure 5, charge measuring cylinder 30 is provided with a reduced lower end portion 132 extending downwardly from tapered wall 128 below discharge opening 130 which is adapted to fit into a bore 134 in the lower wall 104 of reservoir 24. Lateral openings 131 are provided in the reduced portion 132 of cylinder 30 and are positioned above the lower wall 104 of reservoir 24 when charge measuring cylinder 30 is in place in reservoir 24 so that the interior of the reservoir will be in communication with the interior of cylinder 30. A suitable seal 136, such as the O-ring seal shown in Figure 5, is provided between the lower wall 104 of reservoir 24 and reduced portion 132 of cylinder 30.

In order to positively retain charge measuring cylinder 30 in place within reservoir 24, the outer surface of reduced portion 132, which extends below the lower wall of the reservoir, is provided with threads 133 which receive a nut 234. Although the preferred form of the invention discloses the charge measuring cylinder as being provided with a reduced portion extending through the lower wall of the reservoir and retained therein by means of a nut threaded thereto, as shown in Figures 1, 2 and 5, it is well within the scope of the present invention to support the charge measuring cylinders within reservoir 24 in any convenient manner, such as by brackets extending from the inner surfaces of the vertical walls of the reservoir. If the charge measuring cylinders are so supported from within the reservoir, it will merely be necessary to position the discharge ends thereof from the bottom wall of the reservoir as shown in Figures 9 to 13. The principle of operation will be identical.

Mounted in each of charge measuring cylinders 30 for reciprocating movement is a piston 32 which is provided with a piston head 140 having a circumferential groove 142 therein. Mounted in groove 142 is an O-ring 144 or the like which provides for sealing engagement with the walls of the charge measuring cylinder. The purpose of providing an O-ring is to eliminate metal to metal contact between the piston and the walls of cylinder 30, as well as to provide for easy maintenance when the sealing surface becomes worn. However, it is within the scope of the present invention that the cylinder and/or piston be made of plastic material in order to obtain the same results. Piston 32 also includes a piston rod 146 which extends upwardly from piston head 140 and out of charge measuring cylinder 30. Piston rod 146 in turn is connected to a crank arm 148, as best shown in Figures 1 and 2 and crank arm 148 in turn is connected to a piston rod 150 which supports the air operated piston 34. In order to protect the product in reservoir 24 from the mechanical working parts of the filling machine, a rubber bellows type boot 152 is connected between crank arm 148 and the cover 108 of reservoir 24. Boot 152, which surrounds piston rod 150 is adapted to close or seal off the interior of the reservoir from the air operated piston 34 and its associated mechanisms.

The mechanism for operating each of the charge measuring cylinders 30 has been previously described briefly as including air operated pistons 34 mounted in the valve casing 92, cam operated valves 36 also mounted in valve casing 92 for distributing air to one side or the other of piston 34 and an air distributor 80 supported on the upper end of piping 60 for distributing and exhausting air from the piping to the pistons 34. Referring specifically to Figure 4, it will be noted that air distributor 80, which is mounted on the upper end of piping 60 and held in place by a lock nut 153, is constructed of two concentric members 155 and 157 for use in assembly and disassembly. Outer member 157 is held rigid with respect to inner member 155 by means of a tapered pin 159. Air distributor 80 is provided with a central bore 154 which is in communication with the passage in the inner air tube 66. Bore 154 which is closed at its upper end is also in communication with a series of radially extending passages 156, which communicate with a circumferential groove 158 in the peripheral wall of air distributor 80. Groove 158 serves as a manifold for distributing compressed air to air valves 36 and piston 34. Air distributor 80 is also provided with a second horizontal passage 160 which is in communication with the space between the outer air tube 62 and the inner air tube 66. An internal vertical passage 162 in air distributor 80 communicates with passage 160 and also communicates at its upper end with a radially extending passage 164. Passage 164 in turn communicates with a second circumferential groove 166 in the peripheral wall of air distributor 80, which also serves as a manifold, but for exhaust air. It will be seen that compressed air can travel from a source of compressed air through the flexible tube 76 in Figure 3 into the central air tube 66 upwardly into bore 154 of air distributor 80 and from there by distributor outwardly through the radially extending passages 156 to the manifold or groove 158. Exhausted air will flow from the manifold or groove 166 through the passages 164, 162 and 160 of air distributor 80 into the space between air tubes 66 and 62 respectively down to the T-connection 70 (Figure 3) where it is distributed through the outlet 74 into the flexible tubing 78 and back to the source of compressed air or to atmosphere at a position remote from the filling machine.

Valve casing 92, which is supported on flange 93 of vertical central column 18, for rotation with respect to the outer air tube 62 by means of bearings 98, is provided with a plurality of air passages communicating and cooperating with passages in air distributor 80. The description of the air passages, valves, and piston mechanisms positioned in valve casing 92 will be made from the periphery of the casing inward toward air distributor 80.

Valve casing 92 is provided around its periphery with a plurality of vertical bores 168, one bore being provided for each of the charge measuring cylinders 30 in reservoir 24. Bore 168 provides a chamber in which air

operated piston 134 is adapted to reciprocate vertically. A member 170 is provided at the upper end of each of the bores 168 and is bolted to valve casing 92 as indicated at 171. Member 170 is provided with a bore 172 through which piston rod 150 extends upwardly through cover 108 of reservoir 24 and is connected to connecting arm 148. A suitable sealing ring 174 is provided in the upper end of the bore 172 to seal against the leakage of compressed air therefrom. Member 170 is provided with a passage 176 on its lower face which is adapted to communicate with the interior of the chamber formed by the bore 168 and a passage in valve casing 92 to be described later. A second member 178, similar to the member 170, is bolted to the casing 92, as indicated at 179, so as to cover the lower end of bore 168. Member 178 is provided with a bore 180 therethrough through which an extension 182 of piston rod 150 can extend downwardly and out of the chamber formed by bore 168. A suitable seal 184 is also provided in the member 178 to seal against compressed air leaking from the chamber formed by bore 168 into the atmosphere surrounding the filling machine. A passage 186 is also provided in the upper face of member 178 for communication with the chamber formed by seal 168 and a passage in valve casing 92 to be described hereinafter.

Mounted interiorly of each of the bores 168 in valve casing 92 is a downwardly extending passage 188 closed at its lower end which is in communication at its upper end with the previously mentioned passage 176 in member 170. Passage 188 in turn is in communication with an inwardly extending radial passage 190. Also mounted interiorly of bore 168 is a second passage 192 in vertical alignment with passage 188 and extending upwardly in valve casing 92. Passage 192 is closed at its upper end and has its lower end in communication with the passage 186. The upper end of passage 192 communicates with an inwardly extending radial passage 194 in valve casing 92. Positioned in valve casing 92 between passages 188 and 192 and air distributor 80 is a vertical bore 196 which houses a four-way air valve generally indicated at 36. Passages 190 and 192 communicate with bore 196 at their inner ends. Four-way air valve 36, as best shown in Figures 4, 6 and 7, is of the type which includes a valve stem 198 having spaced reduced portions 200. Valve stem 198 is adapted to form seals with spaced valve seats 202 mounted in the bore 196. The sequence of operation of the machine will determine the position of the valve stem and, consequently, the position of the reduced portions 200 will determine the direction of the flow of air through the passages 190 and 194.

Valve casing 92 is provided with radially extending passage 204 communicating with the circumferential groove 166 in air distributor 80. The inner end of passage 204 is in communication with groove 166 while the outer end of passage 204 is in communication with bore 196, which houses four-way valve 36. A second radially extending passage 206 positioned below passage 204 is in communication at its inner end with the circumferential groove 158 in air distributor 80 and at its outer end with bore 196. There is still a third radially extending passage 208 positioned below the passages 204 and 206 and it is in communication with the passage 160 in air distributor 80 at its inner end while its outer end communicates with bore 196.

Mounted on the upper end of valve stem 198 is a cam follower 210 which cooperates with an arcuate shaped cam 212 mounted on the upper end of air distributor 80. Cam 212 is stationary while the cam follower 210 rotates with the rotating turret 14. Cam 212 is provided with a groove 214 in its upper surface and with vertical passages 215 extending downwardly from the groove and opening onto the working face 217 of the cam. A lubricant retainer 216, such as a felt pad or the like, is soaked with a suitable lubricant, and is adapted to be fitted into groove 214. The lubricant will drain from pad 216 through the passages 215 onto the working surface 217 of cam 212 and, thus, lubricate the cam and cam follower 210.

As is evident from Figure 4, cam 212 is stationary with respect to frame 10 and to the piping 60 because it is clamped to air distributor 80. Thus, when upper rotating turret 14 of the machine rotates, cam 212 will cause valve 36 to be moved downwardly against the tension of spring 218, which normally urges the valve upwardly. Through a sequence of operation of valve 36, which will be explained more fully later in the specification, air will be supplied to one side of piston 34 and then to the other side. The air which must be exhausted from the chamber formed by bore 168 for each stroke of piston 34 is exhausted through valve 36 to the space between tubes 62 and 66. Since it may be necessary to adjust the timing of valves 36 with respect to the operation of the filling valves 28, cam 212 may be adjusted by merely loosening it from distributor 80 and rotating it to a desired position.

To adjust the level of fill of containers A, it is necessary to adjust the stroke of piston 32 in charge measuring cylinder 30. The present invention provides for a single adjustment of the stroke of all pistons 32 whereby level of fill of all filling heads 26 is adjusted, and a unitary or vernier adjustment of a single piston whereby level of fill in a single filling head is adjusted. As previously mentioned, each piston rod 150 is provided with extension 182 which extends out of the chamber formed by bore 168. The lower end of extension 182 is threaded, as indicated at 183 in Figure 4, and receives an adjustment nut 185. Adjustment nut 185 is locked in position by a second nut 187. The upper surface of nut 185 bears against a stop 189 which is the periphery of an adjustment ring 191. Travel limit or adjustment ring 191 is provided with a smooth bore 400 which is adapated to slide over the external threads 87 on sleeve 86. In other words, adjustment ring 191 can be moved vertically on sleeve 86 so as to adjust the stroke of pistons 34 which determine movement of piston 32. To hold adjustment ring 191 in a desired position on sleeve 86, a suitable back-up nut 193 is threaded onto sleeve 86. Back-up nut 193, which functions as a jack nut for moving adjustment ring 191 vertically, is provided with pivotal arms 195 having inwardly extending projections 197 which are adapted to engage a circumferential groove 199 on the hub of adjustment ring 191.

When it is desired to adjust the level of fill in containers, it is first necessary to make an adjustment for an accurate charge in each piston by means of the adjustment nut 185 on the extensions of each of the piston rods 150. This adjustment will limit the upward stroke of piston rod 182. Then when it is desired to change the level of fill in all containers, the filling charges in each of the filling cylinders is adjusted simultaneously by means of the adjustment ring 191. More specifically, the pivotal arms 195 on backup nut 193 are pivoted out of engagement with adjustment ring 191, thus, permitting the ring to be moved vertically upwardly or downwardly. The back-up nut 193 is now free to be screwed upwardly or downwardly on threads 87 as may be desired. Rotation of back-up nut 193 will cause vertical movement of adjustment ring 191 and, consequently, adjustment of the upward stroke of all pistons 34. Once the desired adjustment has been made, the pivotal arms 195 are again clamped into position so that they engage the groove 197 of adjustment 191 so as to lock the adjustment ring in the adjusted position.

If, during operation of the filling maching, it is noted that one container is not filling to a proper level, an individual vernier adjustment of the air operated piston for that particular filling head, which is out of adjustment, can be made. To accomplish an individual adjustment of a filling head, it is merely necessary to back-off lock nut 187 and adjust nut 185 up or down the exten-

sion 182 as the situation requires. This in effect will limit the stroke of piston 32 for the particular filling head which is out of adjustment.

Filling valve

Referring specifically to Figure 5, it will be noted that the filling valve 28 of filling head 26 is positioned in the bore 221 of reduced end 132 of charge measuring cylinder 30. Valve 28 includes an elongated cylindrical member 220 having a bore 222 therethrough. Member 220 is provided with an enlarged counter-bore 224 at the lower end thereof. A laterally extending projection 226 is provided on element 224 for supporting a valve operating member generally indicated at 228. Mounted within bore 222 of cylindrical member 220 is a valve rubber or element 230 which is shaped substantially similar to that disclosed in Figures 14 and 15. The valve element 230, which is made of a resilient rubber material, is provided with a circumferential flange 232 at its upper end which is adapted to rest on the upper end of cylindrical member 220.

As previously mentioned, charge measuring cylinder 30 is retained within reservoir 24 by providing the lower reduced portion 132 which extends through bottom wall 104, with threads 133 that receive nut 234. A circumferential shoulder 235 is provided on the lower surface of nut 234 and a spring 236 is interposed between this shoulder and a flange 240 on cylindrical member 220. Thus, spring 236 will normally urge the vertically movable member 222 away from valve seat 38 on charge measuring cylinder 30.

In order to prevent valve assembly 28 from falling out of its position within bore 221 of reduced portion 132, a laterally extending projection 242 is provided on the lower end of valve member 220 and a stop element 244 is threaded into the bottom wall 104 of reservoir 24. Stop element 244 is provided with a pivotal arm 246 which has enlarged end 247 that engages the projection to limit the downward movement of the valve assembly. By providing a stop assembly such as shown in Figure 5, the operator of the filling machine can easily change the valve assembly to clean the same by merely pivoting arm 246 to the dotted line position shown in Figure 5 so that the valve assembly as a unit will be free for removal from the reservoir. When arm 246 is in the dotted line position of Figure 5, spring 236 will urge the valve assembly out of bore 221 into the operators hand.

Valve rubber 230, as shown in Figures 14 and 15, is cylindrically shaped and provided with the circumferential flange 232 at its upper or intake end. The discharge end of valve rubber 230 is of slightly smaller diameter than the intake end. In its relaxed position, valve rubber 230 is provided with a bore 231 through which the product being dispensed can flow unobstructed. To close valve rubber 230, it is merely necessary to pinch the tube and this causes flow therethrough to stop. The mechanism for closing-off valve rubber 230 includes a lever arm 248 mounted on a pivot pin 250 vertically positioned in projection 226. Lever arm 248 is normally urged into contact with valve rubber 230 to close the same by means of a spring 252 mounted on pivot pin 250 and having its opposite ends bearing against member 220 and the lever arm 248. Mounted on the outer end of lever arm 248 is a cam follower or roller 254 which is adapted upon a particular sequence of operation to engage stationary cam 40 mounted on frame 10. In other words, when the container A is raised by a container supporting platform of Figure 3, the container will engage the lower surface 256 of member 220 and will make contact therewith. Further upward movement by the container supporting platform will cause the container to lift the valve assembly vertically until the circumferential flange 232 of valve rubber 230 engages valve seat 38 forming a seal therewith. When the valve assembly is in this raised position, cam follower 254 will be in horizontal alignment with and in the path of cam 40 and, thus, as the machine rotates, cam follower 254 will engage and be actuated by cam 40 to open valve element 230 against the tension of spring 252. Once the pressure of the lever arm 248 has been relieved from valve rubber 230, it will assume its relaxed position and as the filling machine rotates, the piston in charge measuring cyinder 30 will begin to descend and cause the product trapped in the chamber of charge measuring cylinder 30 to flow through valve rubber 230 into the container. The air in the container will be exhausted or vented from the container to atmosphere through the space occupied by the lever arm 248, as shown by the arrows in Figures 11 and 12.

A modified means of retaining valve assembly 28 in position within bore 131 is disclosed in Figure 9 of the drawing. A projection 258 may be provided on reservoir 24 and a spring element 260 may be bolted thereto, as indicated at 261. The downwardly extending spring element is provided with an off-set portion 262 adapted to fit under a laterally extending projection or flange 263 on member 230 so as to limit downward movement of the valve assembly. When it is desired to replace the valve assembly, it is merely necessary to displace the spring element to one side so that the valve assembly will be clear to drop from its position in the filling head. It will be noted in Figure 10 that valve assembly 28 has been raised vertically by a container. In this position, flange 263 will lift off of the off-set portion 262 of spring element 260. When the container is lowered, the off-set portion 262 will act as a stop to limit downward movement of valve assembly 28.

The operation of the apparatus thus far described is as follows:

Referring specifically to Figures 1 and 3, container A is positioned on one of the container supporting platforms 20 at the infeed station of the filling machine as it continuously rotates. The container supporting platform which is normally urged upwardly by suitable spring means is allowed to travel upwardly by the contour of cam 22. As the container supporting platform raises vertically, the container will engage the lower surface 256 of valve assembly 28. Valve assembly 28 is raised vertically against the tension of spring 236 until such time that the circumferential flange 232 of valve rubber 230 engages and seals against the valve seat 38 positioned on the discharge end of charge measuring cylinder 30. A charge of the flowable product in the charge measuring cylinder will be trapped therein. Referring now to Figures 8 to 13 inclusive which show the sequence of the filling operation, it will be noted that as the upper turret 14 rotates, cam follower 254, which is now in alignment with and in the path of the stationary cam 40 will engage the cam to pivot lever arm 250 out of engagement with valve rubber 230. After lever arm 250 is pivoted out of engagement with valve rubber 230, piston 32 in charge measuring cylinder 30 starts on its downward stroke forcing the product trapped in the chamber of cylinder 30 to be dispensed through valve rubber 230.

In more detail and as shown in Figure 8, stationary cam 40 is of such length as to be in the path of cam followers 254 for a period of approximately 180° of rotation of the filling machine. If it is desired to open or close assembly 28 for a longer or shorter period of time, cam 40 can be made either longer or shorter as the situation requires. In Figure 9 and the upper right hand portion of Figure 8, the valve assembly 28 and the piston 32 of charge measuring cylinder 30 are shown in a position during the first stage of the filling cycle. In this position, container A has just been placed on container supporting platform 22 but the container has not been raised into engagement with valve assembly 28. Figure 10 represents a position of the filling head just prior to opening of valve rubber 230. In other words, filling valve 28 has been raised into sealing engagement with valve seat

38 on the discharge end of cylinder 30, trapping a charge of the flowable product in the cylinder. Cam follower 254 is now in the path of cam 40 and the piston 32 in charge measuring cylinder 30 has not yet begun to descend.

When the filling head reaches a position such as shown in Figure 11, valve rubber 230 has been opened and pisotn 32 in charge measuring cylinder 30 has begun its downward operation. Referring now to Figures 1 and 4, it will be clear that the compressed air travelling upwardly through the air tube 66 will pass outwardly through the passage 156 in air distributor 80 to the pressure passage 206 in the valve casing 92. Valve 36 will have been operated by cam 212 to the position shown in Figure 7 and, consequently, the air under pressure travelling through passage 206 will be directed by the valve through passage 190 to passages 188 and 176 to the upper side of piston 34. This position of valve 36 causes piston 34 to then move downwardly within its chamber formed by bore 163 which in turn causes piston rod 150 to move the crank arm 148, piston rod 146 and piston 32 downwardly in the charge measuring cylinder. The air on the lower side of piston 34 is exhausted through the passages 186, 192, 194, 208 and 160 to the space between the air tubes 62 and 66.

After the charge has been dispensed from the chamber of cylinder 30 through valve assembly 28, the filling head reaches the position shown in Figure 12. In this position, cam follower 254 has become disengaged with cam 40 causing lever arm 248 to pinch valve rubber 230 closed. Also it will be noted that piston 32 has reached the limit of its down stroke, but container A and valve assembly 28 are still in their elevated position.

Figure 13 discloses the relative position of the filling head just after container A has been lowered from engagement with valve assembly 28. It will be noted that valve assembly 28 has also been lowered from its elevated position. After the above occurs, piston 32 in charge measuring cylinder 30 is caused to make its return stroke by the valve 36 being actuated by cam 42 to a position such as shown in Figures 1 and 6. In this position, air under pressure enters from air tube 66 to the passage 156 and distributor 80 and from there it passes through the pressure passage 206 and is directed by valve 36 to the passages 194, 192 and 186 to the underside of piston 34. Piston 34 rises vertically causing the piston 32 in charge measurig cylinder 30 to also rise vertically and to draw the product from the reservoir through the passage 131 into the interior of the chamber defined by cylinder 30. The air on the upper side of piston 34 is exhausted through passages 178, 188 and 190 to the valve 36 where it is directed to the passage 204 and the groove 164 and passage 162 in air distributor 80 to the space between air tubes 62 and 66.

If there is a break in the continuous feeding of containers to the filling machine, the container supporting platform is still raised vertically as the filling machine rotates but since there is no container on the platform, valve assembly 28 will not be raised into sealing engagement with the valve seat 38. Because valve assembly 28 does not rise under this condition of operation, its cam follower 254 will not be in the path of stationary cam 40 and, hence, valve rubber 230 will not be opened. However, the just-mentioned operation of piston 32 for discharging the product from the interior of cylinder 30 will be repeated but instead of the product being trapped and dispensed through valve rubber 230 onto the table, the product will pass outwardly through passages 131 back into the reservoir. The up-stroke of piston 32 will cause the product in reservoir to be redrawn into cylinder 30 and the filling machine will be ready for receiving a container the next time it passes the infeed station of the filling machine.

Modified form of filling valve

Figures 16 through 25 inclusive disclose a modified form of filling valve which may be used in the filling machine of the present invention in place of the filling valve 28 disclosed in Figures 1 to 15 inclusive. The modified form of valve has been found to be particularly useful in dispensing viscous liquids, such as mayonnaise, mustard or the like, but it may also be used for other types of flowable products. When the modified form of filling valve assembly, generally indicated by the numeral 270 is used in the filling machine just previously described, it is not necessary to provide the machine with stationary cam 40 and valve operating member 228 because the modified form of valve is self-closing and operable by pressure of the product being discharged from charge measuring cylinder 30. Referring specifically to Figures 16 to 20 inclusive, the modified form of valve 270 includes an enlongated cylindrical element 272 mounted for vertical movement in the bore 271 of a downwardly depending boss 274 positioned in the bottom wall of reservoir 24. Boss 274, as shown in Figure 16, is integral with the reservoir, however, the boss could be similar to that disclosed in Figure 5 in that it could be a portion of the charge measuring cylinder 30 extending through an aperature in the bottom of the reservoir. Cylindrical member 272 is provided with a bore 276 which has an enlarged counter bore 278 at one end thereof. The lower end of cylindrical member 272 is provided with a circumferential and laterally extending flange 280 provided with a downwardly facing container engaging surface 281. At least one radial groove 282 is provided in container engaging surface 281 so that container A will be vented to atmosphere when in sealing engagement with surface 281.

Cylindrical member 272 is normally urged away from reservoir 24 by means of a spring 284 which is positioned between flange 280 and the lower wall of the reservoir. Spring element 260 depending downwardly from the lower wall of reservoir 24 is provided to limit the downward movement of cylindrical element 272 in the same manner as spring element 260 limits the downward movement of the valve assembly 28 in Figure 9. It also provides an easy means of removing valve assembly 270 for cleaning or replacement. Spring element 260 can be moved laterally out of engagement with flange 280 leaving valve assembly 270 free to be removed vertically from reservoir 24. Stop element 244 disclosed in Figure 5 may be used with valve assembly 270 instead of spring 260 if so desired.

Supported by cylindrical member 272 and extending downwardly through its bore is a modified form of valve rubber 286 which is self-closing and operable to open by the pressure of product being dispensed from charge measuring cylinder 30 in reservoir 24. Referring specifically to Figure 24, it will be noted that valve rubber 286 is provided at its upper end with a laterally extending circumferential flange 288 which is adapted to seat against the upper edge of cylindrical member 272. The body portion of valve rubber 286 is substantially cylindrical, as indicated at 290 whereas the lower portion 292 takes a ribbon-like form and is normally pressed tightly together by the internal stresses in the walls of that portion of the valve rubber.

The method of manufacturing valve rubber 286 includes the use of a single cavity mold which will mold the valve rubber into the form disclosed in Figures 22 and 23. It will be noted that the lower portion 292 of valve rubber 286 is molded into the form of a figure eight. After the valve rubber has been molded, the lower closed end 294, shown in Figure 23, is cut from the valve rubber and then the valve rubber is turned inside out. The internal stresses caused by the molding of the lower portion of valve rubber into the form of a figure eight will cause that portion of the valve rubber to act in an opposite direction thereby causing the lower portion 292 to normally take the flat ribbon-like shape as disclosed in Figures 24 and 21. The valve rubber has sufficient stress in the lower portion 292 to prevent leakage from

the head of the liquid product in the reservoir 24 of the filling machine. However, as soon as sufficient pressure has been applied on the product, the valve rubber will open, taking the shape shown in Figures 18 and 25, and permit the product to be dispensed from the reservoir into the container.

Referring to Figures 16 to 20 inclusive, which show the cycle of fill of a filling machine incorporating valve assembly 270, it will be noted that valve rubber 286 is positioned within the bore 276 of cylindrical member 272 so that the lower portion 292 extends slightly below container engaging surface 281. The flanged portion 288 of valve rubber 286 abuts against the upper edge 289 of cylindrical member 272 and supports and retains the valve rubber in position.

Referring specifically to Figure 16, it will be noted that the piston 32 is in its uppermost position in the charge measuring cylinder 30. Valve assembly 270 is in the downward position abutting against the stop 262 of spring 260 with the valve rubber 286 closed. Figure 21 shows, in cross section, the closed ribbon-like portion 292 of the valve rubber 286. In this position container A has just been positioned upon container platform 22 and is about to rise into container sealing engagement with the container sealing surface 281 of cylindrical member 272. Referring now to Figure 17, it will be noted that the container has been elevated and that it has carried with it valve assembly 270 including valve rubber 286 to a position where flange 288 of the valve rubber has seated and sealed against the valve seat 38 on the lower or discharge end of charge measuring cylinder 33. In this position, piston 32 is ready to dispense the charge of the product which has been trapped in cylinder 30 into container A. Referring next to Figure 18, piston 32 has started its downward movement in charge measuring cylinder 30 and is forcing the trapped charge through the valve rubber 286 into container A. While the material is being dispensed into container A, the air within container A is venting through the groove 282, as indicated by the arrow in Figure 18. The lower portion of valve rubber 286 will take the position shown in Figure 25 when the product is flowing therethrough.

In Figure 19 the piston 32 is at the lowermost position within cylinder 30 and the product within the cylinder has been dispensed into container A filling the same. It will be noted that as soon as the pressure of the product being dispensed is removed from the valve rubber, the lower portion 292 of the valve rubber will close because of the internal stresses in that portion of the valve rubber. In Figure 20, the filled container A has been lowered from engagement with valve assembly 270, the valve rubber 292 is closed and has been lowered away from sealing engagement with the valve seat 38 on charge measuring cylinder 30.

Filled container A is ready to be removed from container supporting platform 22 at the outfeed station of the filling machine, and piston 32 is ready to make its return stroke within charge measuring cylinder 30. It is obvious that the upward stroke of piston 32 will draw the product from the interior of reservoir 24 into the charge measuring cylinder through its discharge and thereby re-charge the cylinder.

The self-closing feature of valve rubber 286 permits operation of the machine even though there is a break in the continuous feed of containers and no container is present on the platform. In other words, the charge within the charge measuring cylinder will not be dispensed through valve rubber 286 should there be no container on the platform when piston 32 makes its downward stroke. Just as in the previously described apparatus of Figure 1, if no container is present on the container supporting platform, the valve assembly will not operate because it is not elevated and the flanged portion 282 of valve rubber 286 will not engage the valve seat 28. Consequently, when piston 32 starts its downward movement it will merely force the product out of the discharge end of cylinder 30 back into the reservoir.

Although the valves disclosed in Figures 1 and 16 have been described as being incorporated in a rotary type of filling machine, it is believed obvious to one skilled in the art that these valves could be used in a single head machine or in a straight line machine.

Although the valve rubbers 230 and 286 of Figures 15 and 24 respectively have been disclosed as being made of a resilient rubber, it is within the scope of the present invention to manufacture the valve rubber of any elastomeric material. In other words, any material, such as synthetic rubbers, plastics or the like, which have the properties of rubber, can be used in the filling valves of the present invention.

The terminology used in the specification is for the purpose of description and not limitation, the scope of the invention being defined in the claims.

We claim:

1. In a container filling machine, a stationary frame, a vertical central column, a rotary structure including a container supporting table and a superposed reservoir rotatable on said column, container supporting platforms mounted on said table and filling heads mounted on said reservoir in vertical alignment with the platforms, each of said filling heads including a filling valve and means positioned within said reservoir for feeding a charge to said filling valve, a plurality of cylinders supported by said rotary structure, one of said cylinders being associated with each of said filling heads, a piston movable in each cylinder and having a connecting rod extending into said reservoir and connected to said means for feeding a charge to said valve for actuating the same, a source of fluid pressure, and means including fluid valves and piping connected to said source of fluid pressure and extending through said column to said rotary structure to control said pistons.

2. A machine of the character described in claim 1 wherein said pistons and fluid valves are vertically reciprocal with respect to said rotary structure, and including a cam mounted encircling at least part of said central column and in the path of movement of said fluid valves with said rotary structure to control the movement of said valves.

3. A filling machine of the character described in claim 1 wherein said pistons and fluid valves are vertically movable with respect to said rotary structure and are positioned between said filling heads and said central column and concentric with respect to the latter.

4. A filling machine of the character described in claim 1 wherein said pistons and fluid valves are vertically movable with respect to said rotary structure and wherein the piping extending through said central column is concentric defining an inner passage and an outer passage whereby fluid pressure can be supplied from said source to one side of said piston through one of the passages while the fluid on the other side of said piston is exhausted through said central column through the other of the passages away from containers being filled.

5. A filling machine of the character described in claim 1 wherein said valves selectively supply fluid pressure from the piping in said central column to one side of said piston while exhausting fluid on the other side of said piston to piping in said central column and then supply fluid pressure to the other side of said piston.

6. A filling machine of the character described in claim 1 wherein said pistons and fluid valves are vertically movable with respect to said rotary structure, said piping extending through said column being concentric to provide a fluid pressure passage and a fluid exhaust passage, and wherein said pistons and said fluid valves are positioned between said filling heads and said central column.

7. A machine of the character described in claim 1 including means to move said reservoir vertically with

respect to said container supporting table, and means to adjust the quantity of charge fed by said charge feeding means.

8. In a container filling machine, a stationary frame, a vertical central column, a rotary structure including a container supporting table and a superposed reservoir rotatable on said column, said reservoir being keyed to said column for vertical movement with respect to said table, container supporting platforms mounted on said table and filling heads mounted on said reservoir in vertical alignment with the platforms, each of said filling heads including a filling valve and means for feeding a charge to said filling valve, a plurality of cylinders supported by said rotary structure, one of said cylinders being associated with each of said filling heads, a piston movable in each cylinder to actuate said charge feeding means, a fluid valve associated with each piston, a source of fluid pressure, means connecting said source of fluid pressure to each fluid value and including piping extending through said column to said rotary structure, and means to simultaneously vertically adjust said means including piping in said central colunm and said reservoir with respect to said table.

9. A machine of the character described in claim 8 wherein said pistons and fluid valves are mounted on said rotary structure and are movable vertically with respect thereto, and are positioned between said filling heads and said central column.

10. A machine of the character described in claim 8 wherein means are provided to lock said reservoir with respect to said table.

11. A machine of the character described in claim 8 including means to simultaneously adjust the quantity of charge fed by each of said charge feeding means.

12. In a container filling machine, a stationary frame, a vertical central column, a rotary structure including a container supporting table and a superposed member including a reservoir rotatable on said column, container supporting platforms mounted on said table and filling heads mounted on said reservoir adjacent its periphery and in vertical alignment with the platforms, means for dispensing a flowable material from said filling heads, a cover for said reservoir, said cover being stationary with respect to said reservoir and having an inlet positioned adjacent the reservoir's periphery whereby flowable material is evenly distributed to the reservoir as the same rotates.

13. In a container filling machine, a stationary frame, a vertical central column, a rotary structure including a container supporting table and a superposed member including a reservoir rotatable with said column, container supporting platforms mounted on said table and filling heads mounted on said reservoir in vertical alignment with the platforms, each of said filling heads including a filling valve and means for feeding a charge to said valve, a plurality of cylinders supported on said superposed member, one of said cylinders being associated with each of said filling heads, a piston movable in each cylinder for actuation of the charge feeding means in its associated filling head, a source of fluid pressure, means to control said pistons, said means including piping extending through said column to said pistons and a fluid valve vertically movable with respect to said superposed member for controlling the application of fluid pressure to said pistons, a cam mounted centrally of said central column in the path of movement of said fluid valves with said superposed member to control their movement, and means on said cam for lubricating the same.

14. A machine of the character described in claim 13 wherein said cam is provided with a groove on its upper surface and with substantially vertical passages communicating said groove with the lower working surface, said groove being provided with a lubricant retainer whereby lubricant is permitted to drain through said passages onto the surface of said cam.

15. In a container filling machine, a stationary frame, a vertical central column, a rotary structure including a container supporting table and a superposed reservoir rotatable on said central column, container supporting platforms mounted on said table and filling heads mounted on said reservoir in vertical alignment with the platforms, each of said filling heads including a filling valve and means positioned within said reservoir for feeding a charge to each filling valve, a plurality of cylinders supported on said rotary structure, one of said cylinders being associated with each of said filling heads, a piston movable in each cylinder for actuation of said charge feeding means, a source of fluid pressure, means including fluid valves and piping extending through said column from said source of fluid pressure to said rotary structure to control said pistons, and means mounted on said structure for simultaneously adjusting the stroke of each of said pistons with said cylinder whereby the quantity of charge fed by said charge feeding means can be varied.

16. A machine of the character described in claim 13 wherein said pistons and said fluid valves are vertically reciprocal with respect to said rotary structure, and wherein said means for simultaneously adjusting the stroke of each of said pistons includes a travel limit ring vertically adjustable on said rotary structure.

17. A machine of the character described in claim 16 including means to individually adjust the stroke of each of said pistons.

18. A machine of the character described in claim 17 wherein said means to individually adjust the stroke of each of said pistons includes an adjustment nut threadedly mounted on the end of the piston rod of each of said pistons and engageable with said travel limit ring.

19. In a container filling machine, a stationary frame, a vertical central column, a rotary structure including a container supporting table and a superposed turret rotatable with said central column, container supporting platforms mounted on said table, said turret including a reservoir having filling heads mounted thereon in vertical alignment with the platforms, each of said filling heads including a filling valve and means for feeding a charge to the valve, a plurality of cylinders supported by said turret, one of said cylinders being associated with each of said filling heads, a piston movable in each cylinder to actuate said charge feeding means, said piston having a piston rod connected thereto and extending into said reservoir and connected to said charge feeding means, a source of fluid pressure, means including piping extending through said column to said turret to control said pistons, and means in said reservoir covering the portion of the piston rod extending therein.

20. A machine of the character described in claim 19 wherein said means to cover said piston rod includes an expansible bellows boot.

21. In a container filling machine, a stationary frame, a vertical central column, a rotary structure including a container supporting table and a superposed reservoir rotatable about said column, container supporting platforms mounted on said table for vertical movement and filling heads mounted in said reservoir in vertical alignment with the platforms, each of said filling heads including a filling valve movable vertically by a container and means positioned within said reservoir for feeding a charge to each filling valve when the same is moved vertically by a container, said means for feeding a charge to the filling valve including a charge measuring cylinder open at least at its lower end to said valve and having a piston reciprocal therein, a plurality of cylinders supported in said rotary structure, one of said cylinders being associated with each of said filling heads, a piston movable in each cylinder, means connecting said last-mentioned piston with the piston in said charge measuring cylinder, a source of fluid

pressure, and means including fluid valves and piping extending through said column to said rotary structure from said source of fluid pressure to control the pistons in the cylinders supported by said rotary structure.

22. A machine of the character described in claim 21 wherein the charge measuring cylinder within said reservoir is open at the lower end to said valve and to the interior of said reservoir, said valve when actuated by a container closing off the opening of said charge measuring cylinder to the interior of the reservoir.

23. In a container filling machine, a frame, a vertically movable container supporting platform on said frame, a superposed reservoir having a filling head in alignment with said platform, said filling head including valve means movable vertically by engagement with a container, means opening said valve means after the same is moved vertically by a container, and means within said reservoir dispensing a measured charge of a flowable product through said valve means after said valve means is moved vertically and is opened, said valve means also controlling the charge and exhausting of the flowable product from said last mentioned means.

24. A container filling machine of the character described in claim 23 wherein said charge dispensing means includes means to actuate the same in timed relationship with the movement of said supporting platform and wherein said charge dispensing means will dispense the charge to the interior of said reservoir when said valve means is in a lowered position due to an absence of a container on said container supporting platform.

25. In a container filling machine, a frame, a vertically movable container supporting platform on said frame, a superposed reservoir having a filling head in alignment with said platform, said filling head including a filling valve and a charge measuring cylinder mounted within said reservoir in alignment with the filling valve, said measuring cylinder having one end thereof in open communication with said filling valve and with the interior of said reservoir, means for dispensing a charge from said cylinder, said valve having vertical movement with respect to said reservoir upon engagement by a container to close off communication of said cylinder with the interior of the reservoir, and means to open said valve after vertical movement thereof.

26. In a filling machine of the character described, a reservoir, a boss projecting from said reservoir and having an axial bore therethrough communicating with the interior of the reservoir, valve means supported in the bore of said boss for vertical reciprocal movement with respect thereto, said valve means including a sleeve member having a bore therethrough and a resilient deformable tubular element supported in the bore of said sleeve member, said tubular element being normally closed to transfer of a flowable product therethrough, and means for opening said valve means after vertical movement thereof by a container.

27. A filling machine of the character described in claim 26 including means positioned within said reservoir and in alignment with said valve means for dispensing a measured charge through said valve means when the valve means is elevated by a container.

28. In a container filling machine, a reservoir having an aperture in the bottom wall thereof, a measuring cylinder mounted in said reservoir and having a portion thereof extending through said aperture, said measuring cylinder including passageways in its lower end communicating with the interior of the reservoir and a valve seat positioned above said passageways, valve means mounted in the portion of said measuring cylinder extending through the aperture of the reservoir, said valve means being movable vertically with respect to said measuring cylinder to seat against the valve seat of said measuring cylinder and thereby close off the passageway of the cylinder to the interior of said reservoir, means including a piston in said cylinder for dispensing a charge from said cylinder through said valve means when said valve means is raised vertically, and means for opening said valve means.

29. A filling machine of the character described in claim 28 wherein said valve means include a sleeve element having a bore therethrough, a resilient deformable tubular element mounted in the bore of said sleeve element, said tubular element being provided with a flange at its upper end to seat against the valve seat in said measuring cylinder, and means for limiting the downward movement of said valve element.

30. A machine of the character described in claim 29 wherein said means for limiting the downward movement of said valve means includes a projection on the sleeve element of said valve means, a member extending downwardly from said reservoir and having a pivoted arm connected thereto, said arm having a stop member thereon for engaging the projection on said sleeve element.

31. A filling machine of the character described in claim 29 wherein said means for limiting the downward movement of said valve means includes a projection on the sleeve element of said valve means, and a spring element connected to said reservoir and adapted to engage said projection.

32. In a container filling machine of the character described, a frame, a vertically movable container supporting platform on said frame, a superposed reservoir having a filling head in alignment with said platform, a cam, said filling head including a filling valve adapted to be engaged by a container on said platform and moved vertically, said filling valve including means to open the same when moved vertically, said means including a cam follower adapted to engage said cam when the valve is moved vertically upwardly by the container.

33. In a container filling machine, a stationary frame, a vertical central column, a rotary structure including a container supporting table and a superposed reservoir rotatable on said column, vertically movable container supporting platforms mounted on said table and filling heads mounted on said reservoir in vertical alignment with the platforms, a cam mounted on said stationary frame, a filling valve in each of said filling heads, said filling valve being movable vertically upon engagement by a container on the container supporting platforms, said valve including means to open the same when moved vertically by the container, said means including a cam follower which is adapted to engage said cam when said valve is raised vertically.

34. In a container filling machine, a stationary frame, a fixed cam mounted on said frame, a vertical central column, a rotary structure including a container supporting table and a superposed reservoir rotatable on said column, vertically movable container supporting platforms mounted on said table and filling heads mounted on said reservoir in vertical alignment with the platforms, each of said filling heads including a filling valve movable vertically upon engagement by a container on the container supporting platforms, said filling valve including a sleeve element, a deformable tubular element mounted in the bore of said sleeve element, a pivoted finger adapted to engage said tubular element to clamp the same closed, said pivoted finger being in the path of and engaging said fixed cam to open said tubular element when said filling valve is raised vertically and said pivoted finger being out of the path of said fixed cam when said filling valve is in a lowered position.

35. In a device of the character described, a reservoir having an aperture in the lower wall thereof, valve means mounted in said aperture and adapted to be moved vertically by a container, said valve means including a sleeve member having a bore therethrough, and a deformable tubular element mounted in the bore of said sleeve and having one end thereof extending downwardly therefrom, said deformable tubular element being provided with a circumferential flange for engaging and being supported

by the upper end of said sleeve, and said tubular element being normally closed to the passage of flowable material from said reservoir to a container when said valve means is in a lowered position and being open when said valve means is raised vertically by a container.

36. A device of the character described in claim 35 wherein said tubular element is closed by means of an arm pivotally engaging the same, said arm being adapted to engage a fixed cam when said valve means is raised by a container.

37. A device of the character described in claim 35 wherein said tubular element is normally closed by its inherent internal stresses and is opened by pressure applied to the flowable material in said reservoir.

38. In a device of the character described in claim 35 wherein means are provided for detachably retaining said valve means in said reservoir, said last-mentioned means also limiting the downward movement of said valve means.

39. A device of the character described in claim 38 wherein said means to retain said valve means in said reservoir and to limit the downward movement of said valve means includes a lateral projection on said sleeve, and a member pivotally connected to said reservoir and having a stop at its lower end, the stop of said member adapted to engage the projection on said sleeve.

40. A device of the character described in claim 38 wherein said means for retaining said valve means in said reservoir and for limiting the downward movement of said valve means includes a flange on said sleeve, and a spring member rigidly connected to said reservoir, said spring member having its free end bent to engage the undersurface of said projection.

41. In a valve for use in filling containers, an elongated deformable tubular member having a laterally extending circumferential flange at one end thereof, said tubular member being of substantially constant diameter for a portion thereof and then tapering into a remaining longitudinal portion having a cross-sectional form of a figure eight, said tubular member being turned inside out so the longitudinal portion having the figure eight cross-sectional form assumes a form of a flat band having an interior wall thereof pressing tightly together by internal stresses.

42. A device of the character described in claim 41 wherein said tubular member is made of rubber.

43. A device of the character described in claim 41 wherein said tubular member is made of an elastomeric material.

44. In a device of the character described, a reservoir, a boss mounted on said reservoir and having a bore therethrough communicating with the interior of the reservoir, a charge measuring cylinder mounted within said reservoir in alignment with the bore of said boss, the end of said charge measuring cylinder being open and spaced from the bore of said boss, means for dispensing a measured charge from said charge measuring cylinder, valve means mounted in the bore of said boss, said valve means being movable with respect to said reservoir upon engagement by a container to seat against the end of said cylinder thereby isolating the interior of the cylinder from the interior of the reservoir, and said valve means being opened after being elevated by the container.

45. A device of the character described in claim 44 wherein said valve means includes a sleeve having a container engaging flange and a passage therethrough, a deformable tubular element provided with a circumferential flange at one end thereof for engaging the end of said sleeve opposite its container engaging end, said tubular element having a longitudinal portion adjacent said flange substantially circular in cross section and a lower longitudinal portion tapered into a flat ribbon-like form, said ribbon-like form being normally closed and opened by pressure of the flowable material dispensed from said charge forming cylinder.

46. A device of the character described in claim 45 wherein means are provided on the container engaging end of the sleeve of said valve whereby the container is vented to atmosphere.

47. In a container filling machine, a frame, a container supporting platform mounted on said frame, a superposed reservoir for a flowable product and having a filling head in alignment with said platform, said filling head including a filling valve and a charge measuring cylinder mounted within said reservoir in alignment with the filling valve, said measuring cylinder being at least partially submerged in the flowable product in said reservoir and having one end thereof in open communication with said filling valve and with the interior of said reservoir, means for trapping a charge in said cylinder, and means for dispensing the trapped charge from said cylinder through said valve.

48. A filling machine of the character described in claim 47 wherein said means for trapping a charge in said cylinder includes a valve seat mounted on the discharge end of said cylinder and a sleeve element movable vertically into engagement with the valve seat to close off the interior of said cylinder with the interior of said reservoir.

49. A filling machine of the character described in claim 48 wherein said sleeve element supports said filling valve and wherein said filling valve is operable after said sleeve element has been moved vertically.

50. In a container filling machine, a stationary frame, a vertical central column, a rotary structure including a container supporting table and a superposed member including a reservoir rotatable on said column, container supporting platforms mounted on said table and filling heads mounted on said reservoir in vertical alignment with the platforms, means for dispensing a flowable material from said filling heads, a cover for said reservoir, said cover being stationary with respect to said reservoir, and being supported by said superposed member, and said cover being provided with an inlet to the reservoir for the flowable material to be dispensed.

51. In a container filling machine, a stationary frame, a vertical central column, a rotary structure including a container supporting table and a superposed member including a reservoir rotatable on said column, container supporting platforms mounted on said table and filling heads mounted on said reservoir in vertical alignment with the platforms, means for dispensing a flowable material from said filling heads, a cover for said reservoir, said cover being stationary with respect to said reservoir, said superposed member being provided with a centrally and upwardly disposed element, said cover having a centrally downwardly disposed sleeve, and bearing means mounted between said cover and said upwardly disposed element whereby said reservoir structure can rotate with respect to said stationary cover.

52. In a container filling machine, a frame, a container supporting platform mounted on said frame, a superposed reservoir for a flowable product and having a filling head in alignment with said platform, said filling head including a filling valve movable vertically by a container on said container supporting platform and a charge measuring cylinder mounted within said reservoir in alignment with the filling valve, said charge measuring cylinder having one end thereof in open communication with said filling valve and with the interior of said reservoir, means including means movable vertically with said filling valve for trapping a charge in said cylinder, and means for dispensing the trapped charge from said cylinder through said valve.

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