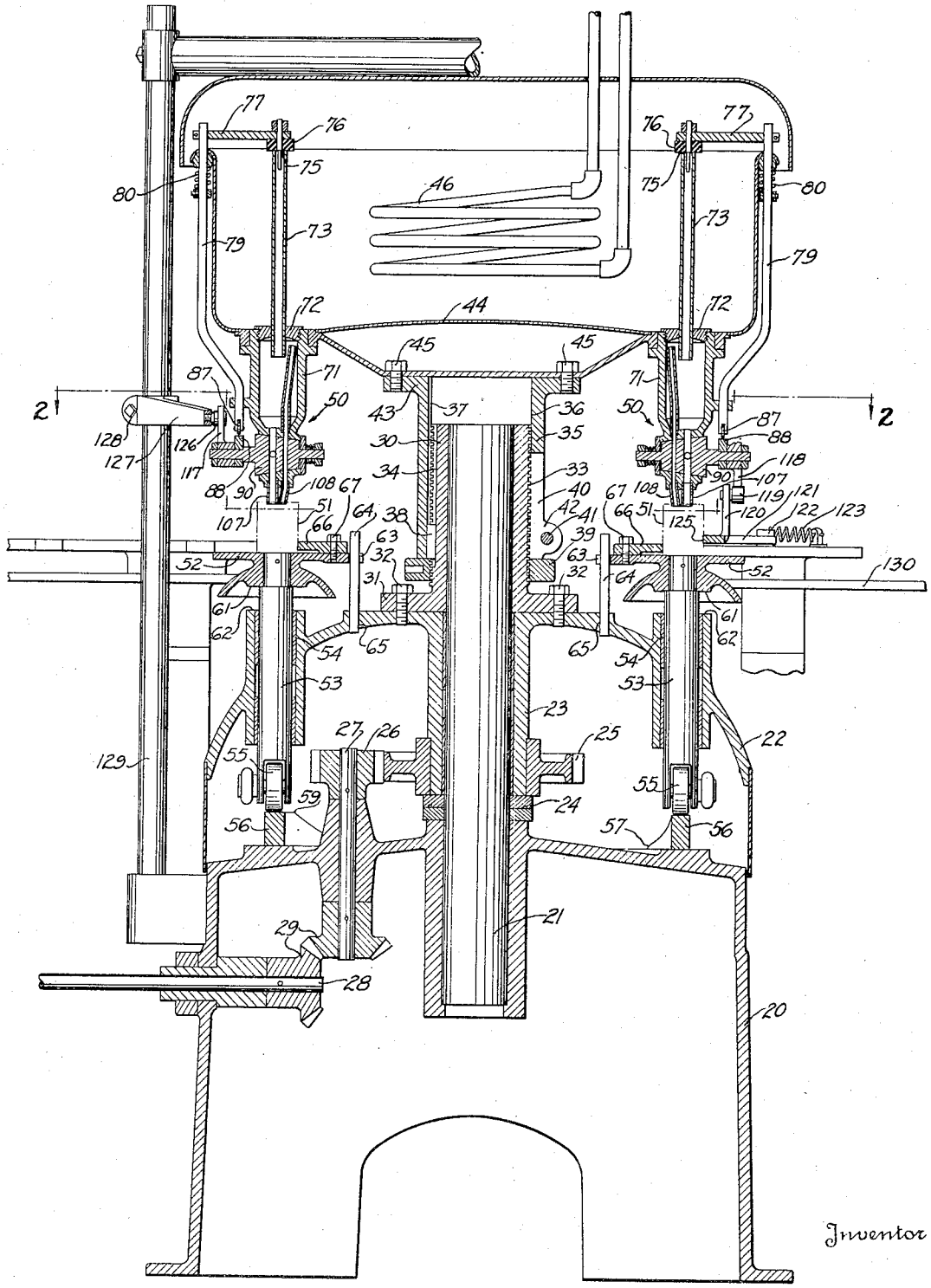
Oct. 17, 1944. C. E. KERR 2,360,565

FILLING MACHINE

Filed July 22, 1940 4 Sheets-Sheet 1



Inventor

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FIG. 1

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FILLING MACHINE

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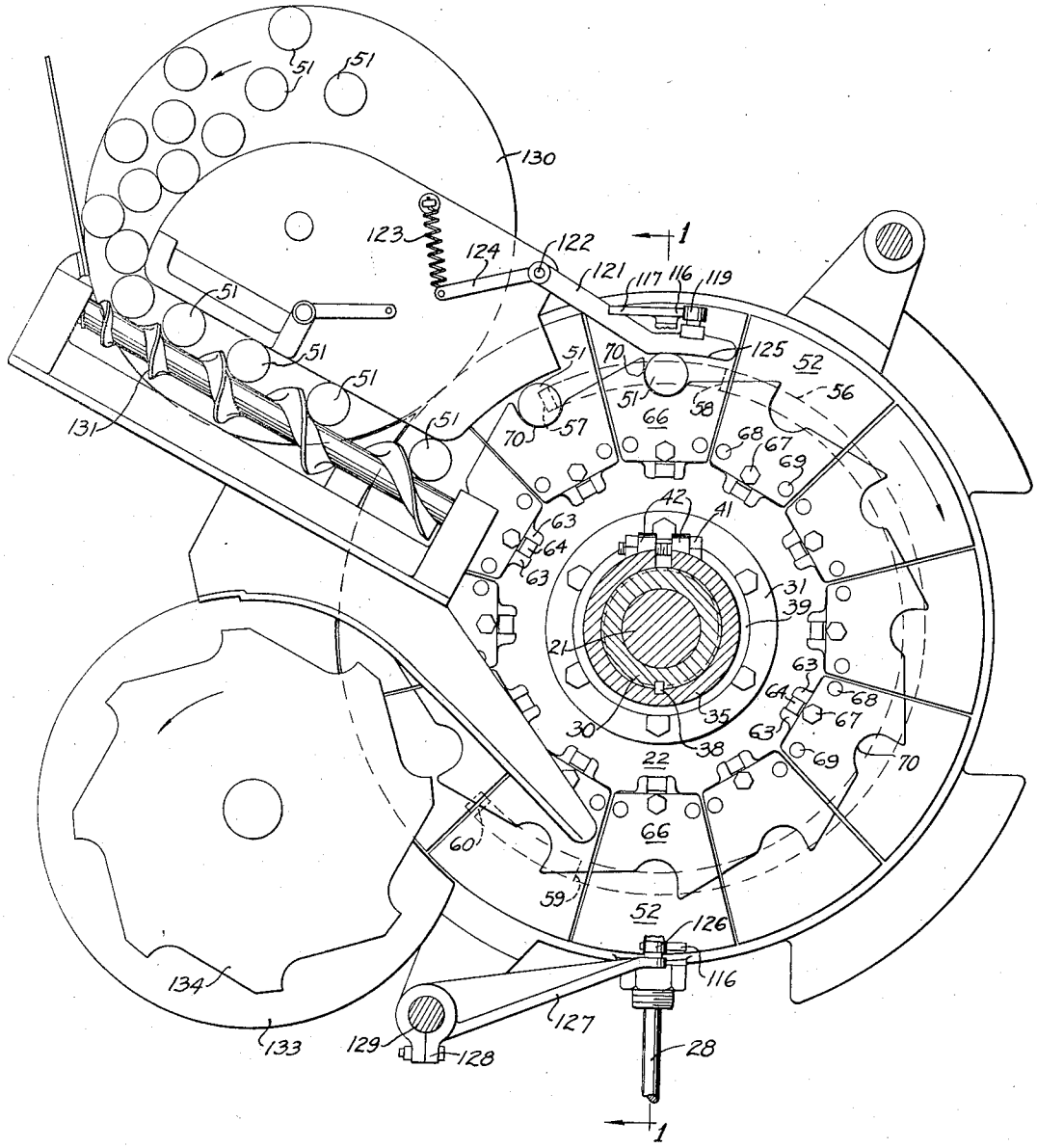


FIG. 2.

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FILLING MACHINE

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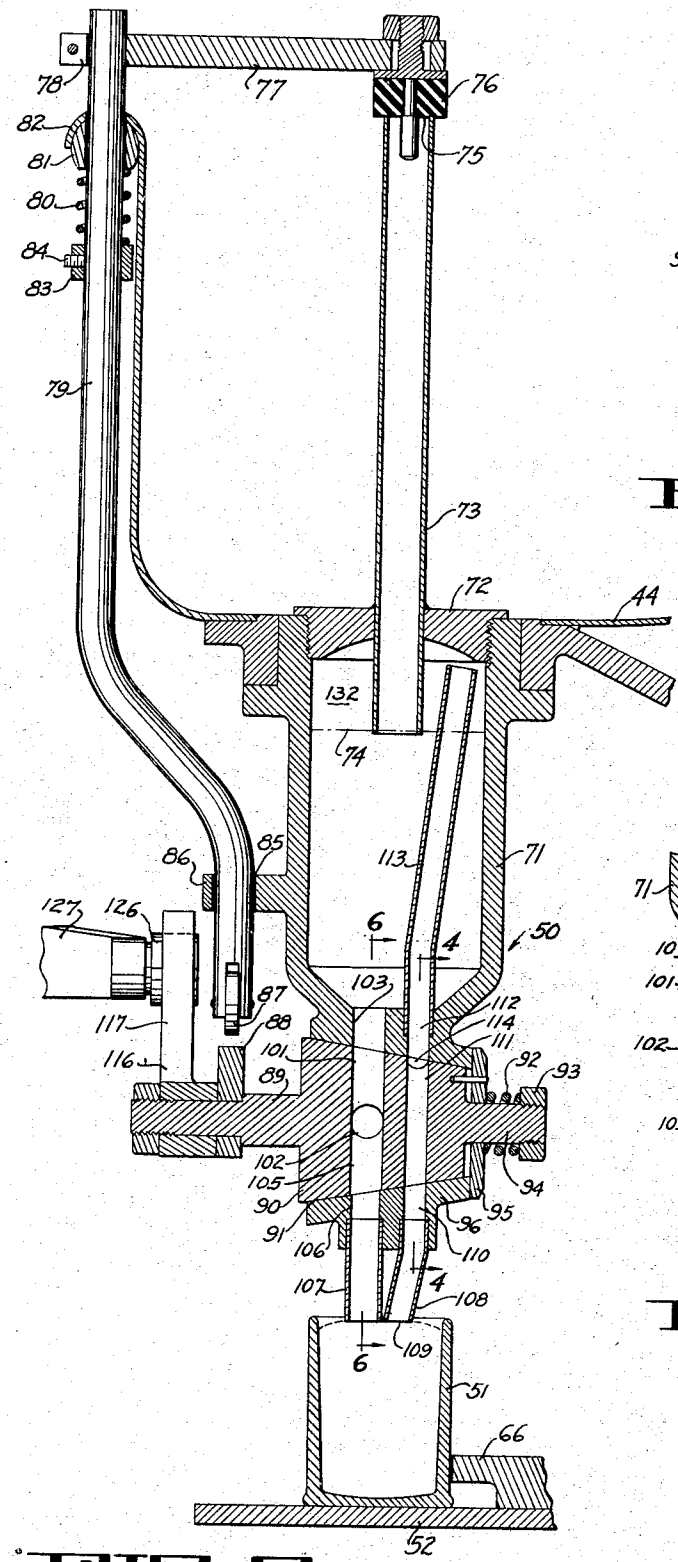


FIG. 3.

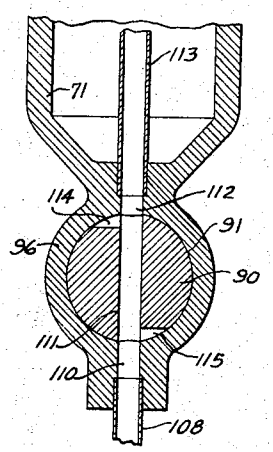


FIG. 4.

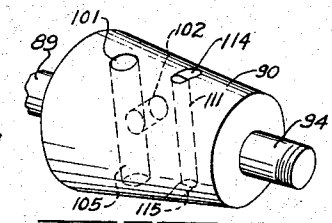


FIG. 5.

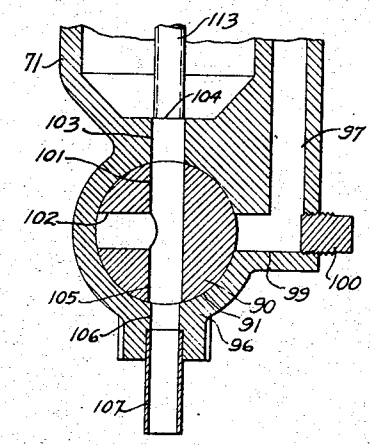


FIG. 6.

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FILLING MACHINE

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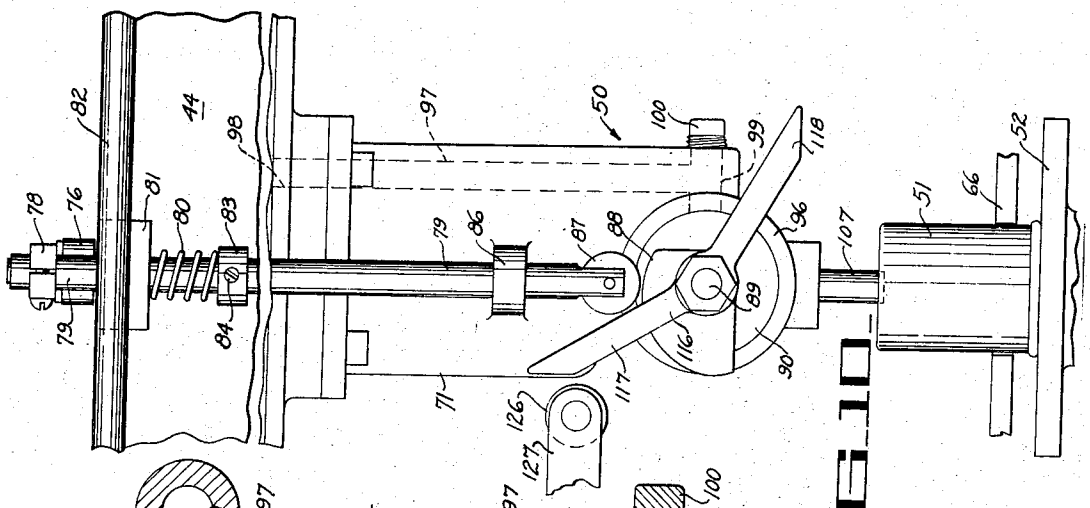


FIG. 10

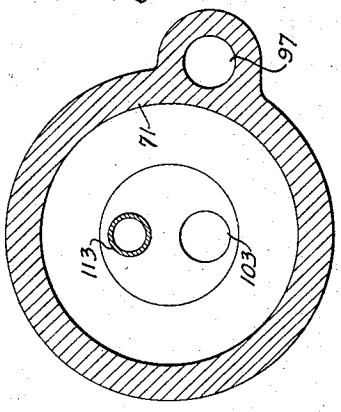


FIG. 8

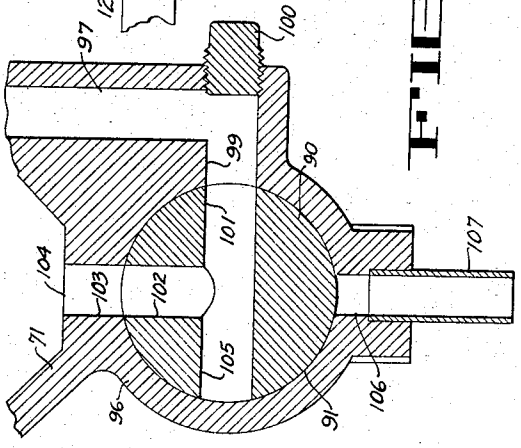


FIG. 7

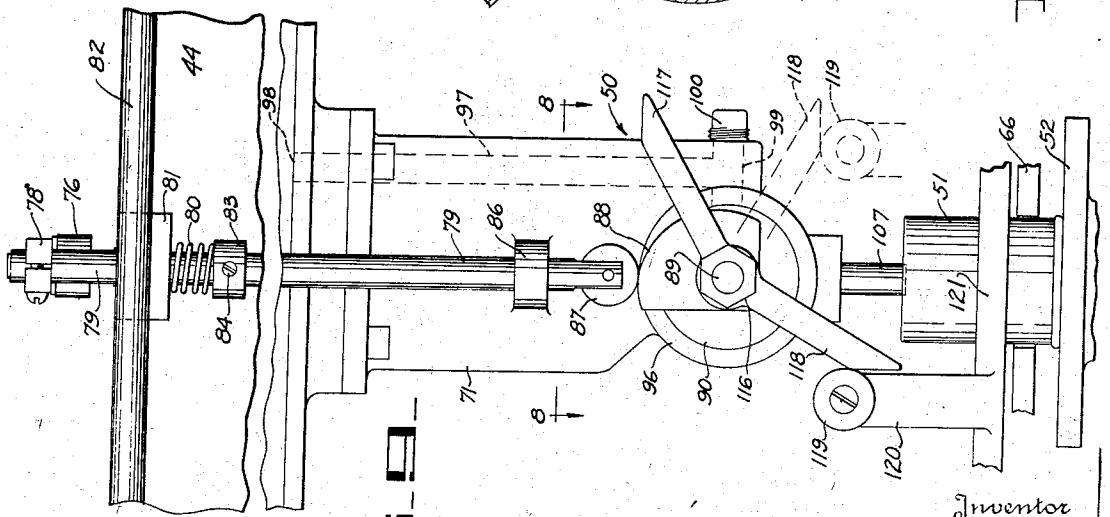


FIG. 9

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Patented Oct. 17, 1944

2,360,565

UNITED STATES PATENT OFFICE

2,360,565

FILLING MACHINE

Charles E. Kerr, Hoopeston, Ill., assignor to Food Machinery Corporation, San Jose, Calif., a corporation of Delaware

Application July 22, 1940, Serial No. 346,692

13 Claims. (Cl. 226—109)

This invention relates to machines for filling containers with liquid or substances which can be temporarily reduced to a liquid or free flowing state during the filling operation.

While the invention is of such character that it is applicable to a wide variety of machines of this general type, for purposes of this disclosure it will be shown herein as embodied in a machine especially designed for filling small glass jars with such normally viscid substances as petrolatum ointments, salves, creams, etc. It will be understood, however, that even this particular embodiment is itself capable of a great many different uses. For example, the containers may be of any suitable kind such as glass jars or metal cans, and the substance handled may be any liquid or substance which can be conveniently reduced to a liquid or freely fluent condition.

Heretofore in the industry for which this machine was designed, a continuous series of jars was fed into a machine which injected a measured fixed quantity of substance into each jar. This method was found to be quite unsatisfactory, because there is a considerable variation in the capacity of glass jars. The manufacturers of the jars have so far been unable to overcome this difficulty, because there is no known method of uniformly controlling the amount of shrinkage in the glass jars when they are cooled after being molded. The result was that oversized jars were underfilled by the machine and undersized jars were overfilled.

This necessitated the employment of extra labor to hand-fill the unfilled jars and to clean up the over-filled jars. The latter caused the most trouble, because the overflowed jars contacted adjacent jars and contaminated them as well as the moving belts running from the fillers to the capping machine, and the overflow thus reached the capping machine where it was transferred from jar to jar during the capping operation, even in some cases reaching the labelling machine, causing badly discolored labels.

One of the objects of the invention is to provide a machine capable of high-speed operation which will fill a continuous series of jars or other containers to a predetermined level regardless of variations in their size. By filling to a predetermined level the machine eliminates the high labor costs previously resulting from the messy conditions caused by overflow filling and it also eliminates underfilling so that the customer will always receive a full jar.

A further object of the invention is to provide a filling machine in which after-drip from the filling nozzles is eliminated, or practically so, thus avoiding contamination of the machine as well as variation in the level of material supplied to the containers. This latter is of considerable importance because it makes the machine practical for accurately filling very small containers, such as are frequently used for certain cosmetics and the like, which may run to as small as one-fourth ounce capacity.

Another object of the invention is to provide a machine adapted to fill containers with normally viscid materials, when reduced to fluidity, so as to obtain an attractive rounded or crowned surface on the filled material no matter what the height or capacity of the container.

In the drawings:

Fig. 1 is a vertical section through the machine, taken as indicated by the arrows 1—1 in Fig. 2, except that, for purposes of clarity, only two of the filling valves are illustrated.

Fig. 2 is a horizontal section taken as indicated by the arrows 2—2 in Fig. 1.

Fig. 3 is an enlarged view of the valve shown in section at the left side of Fig. 1.

Fig. 4 is a fragmentary section taken as indicated by the arrows 4—4 in Fig. 3.

Fig. 5 is a perspective view of the valve to illustrate the arrangement of the passages therein.

Fig. 6 is a section taken as indicated by the arrows 6—6 in Fig. 3.

Fig. 7 is a view similar to Fig. 6 with the valve shown in a different position.

Fig. 8 is a horizontal section taken as indicated by the arrows 8—8 in Fig. 9.

Fig. 9 is a side elevation of the valve in closed position.

Fig. 10 is a side elevation of the valve in open position.

The machine comprises a base 20 (Fig. 1) in which a vertical shaft 21 is supported. A table 22 is mounted for rotation about the axis of shaft 21. The hub 23 of the table 22 bears against a thrust bearing 24 and has secured thereto a gear 25 which is driven by a pinion 26 on a shaft 27 suitably journalled in the base 20. The shaft 27 is driven from a shaft 28 by bevel gears 29. The shaft 28 is driven from a source of power not shown.

A sleeve 30 encompassing the upper end of the shaft 21 has a flange 31 secured to the top of the table 22 by cap screws 32. The sleeve 30 is externally threaded with a square thread 33 and is splined at 34. A sleeve 35 has a bore 36 therein which is substantially the same diameter as the outside diameter of the threads 33, so that

the sleeves 30 and 35 have a telescopic fit. The sleeve 35 is splined at 37 and a key 38 engages in both the splines 34 and 37 to prevent relative rotation between the sleeves 30 and 35, to transmit rotation from the internal sleeve 30 to the external sleeve 35 and to permit the sleeve 35 to slide vertically with respect to the sleeve 30. This vertical adjustment of the sleeve 35 is effected by means of a nut 39 threaded on the threads 33 of the sleeve 30. In order to lock the sleeve 35 in any adjusted position on the sleeve 30 it is adapted to be clamped thereon. For this purpose a slot 40 is formed in the sleeve 35 and a bolt 41 passes through a pair of ears 42. This construction can be seen in Fig. 2.

The upper end of the external sleeve 35 (Fig. 1) has a flange 43 to which a tank indicated generally by the reference numeral 44 is secured by cap screws 45. A supply of the liquid or liquefied material to be filled in the containers is maintained in the tank 44. A heating coil 46 is suspended within the tank 44 for reducing viscid materials to the liquid state. The tank 44 may be raised and lowered with respect to the table 22 by loosening the clamping bolt 41 and turning the nut 39. The tank can then be maintained in its vertically adjusted position by again tightening the clamping bolt 41.

A series of substantially identical filling valves 50 are mounted on the tank 44 and are adapted, as will be presently described, to control the discharge of material from the tank into the jars. The jars indicated at 51 are supported on lift plates 52 which are carried on plungers 53. Suitable bearings 54 are provided in the table 22 to permit vertical reciprocation of the plungers 53 therein. Each plunger 53 has a roller 55 mounted in the lower end thereof. The rollers 55 follow a lift track 56 on the base 20.

Referring to Figs. 1 and 2, it will be noted that the track 56 begins at the point 57 and is inclined upwardly to a point 58. The intermediate portion of the track extending from 58 to 59 is level. From 59 to the end 60 the track is downwardly inclined. As the drive shaft 28 rotates, the table 22 and the tank 44 revolve in unison. When each of the rollers 55 encounters the beginning 57 of the track 56, the associated plunger 53 is raised as the roller traverses the upwardly inclined lift portion of the track, thus elevating the jar 51 into filling position under the valve 50. The jar is maintained in this filling position as the roller 55 traverses the level portion of the track 56 from 58 to 59. When the roller descends the downwardly-inclined portion of the track from 59 to 60 the jar is lowered away from the valve. During the travel of the roller 55 through space from the end 60 of the track to the beginning 57 thereof, the plunger and lift plate are supported in their lowermost position by engagement of the face 61 (Fig. 1) of a boss formed on the under side of the lift plate 52 with the upper end 62 of the bearing 54.

To prevent each plunger 53 from rotating in its bearing 54 each lift plate 52 is provided with a pair of lugs 63 (Fig. 2) which embrace a guide bar 64 which is secured in the table 22 at 65 (Fig. 1). To center the jar 51 on the lift plate 52 the centering plate 66 (Figs. 1 and 2) is attached to the lift plate by a cap screw 67 and positioned thereon by dowel pins 68 and 69. The centering plate 66 has an arcuate opening 70 into which the jar 51 fits.

The particular embodiment illustrated is designed to employ twelve of the filling valves 50 (Fig. 1), one of which is located above each of the lift plates 52. For the sake of clarity and simplicity, only two of these valves are shown in Fig. 1. Since all of the filling valves are of identical construction, only one will be described.

Referring to Fig. 3, an enclosed chamber 71 is mounted on the under side of the tank 44, but is not open to the tank. The material is transferred from the tank to the chamber by means presently to be described. The upper end of the chamber 71 is closed by a screw plug 72 having a vent pipe 73 mounted therein. The vent pipe extends down into the chamber 71 to the level indicated by the line 74.

The vent pipe 73 extends above the fluid level in the tank 44 and the outlet 75 in its upper end is adapted to be closed by a valve comprising a rubber seal 76 carried in the end of an arm 77, the other end of which is attached at 78 to a push rod 79. The push rod 79 is normally urged downwardly by a spring 80 interposed between a guide block 81 fitted in the curled rim 82 of the tank and a collar 83 secured to the push rod 79 by a set screw 84. The lower end of the push rod is guided in an aperture 85 formed in a lug 86 integral with the chamber 71. A roller 87 is mounted in the lower end of the push rod 79 and is adapted to be engaged by a cam 88 (Figs. 3 and 9) which intermittently pushes the rod upwardly to remove the seal 76 from the outlet 75 of the vent pipe 73.

The cam 88 is mounted on the stem 89 of a tapered valve 90 which is held in a complemental opening 91 by a spring 92 interposed between a nut 93 threaded on the valve stem 94 and a cover plate 95. The tapered opening 91 is formed in a valve body 96 which is cast integrally with the chamber 71.

Referring to Figs. 7 to 10 it will be noted that a passage 97 is formed in the valve unit 50. The passage 97 has an opening 98 into the tank 44. The lower end of the passage 97 communicates with a transverse passage 99, the outer end of which is closed by screw plug 100. The passage 99 (Fig. 7) is a port which communicates in one position of the valve 90 with the passage 101 formed therein. The passage 101 communicates with the passage 102 which can be brought into registry with a port 103 opening at 104 into the chamber 71. The position of the valve shown in Fig. 7 is the closed position.

The open position is shown in Fig. 6 where the valve 90 has been rotated 90° counterclockwise. In this position the passage 101 has been moved from communication with the port 99 to communication with the port 103, and the passage 105 has been moved into communication with the port 106 having a nozzle 107 connected thereto. An air vent pipe 108 (Fig. 3) is mounted in the valve body 96 with its mouth 109 in the same horizontal plane as the lower end of the nozzle 107. The upper end of the vent pipe 108 communicates with a port 110 in the valve body 96. In the open position of the valve shown in Fig. 3 the port 110 communicates with the passage 111 in the valve 90 and the other end of the passage 111 communicates with a port 112 which communicates with a vent pipe 113 extending upwardly in the chamber 71 above the level 74.

The arrangement of the fluid and air vent passages in the valve 90 is shown in the perspective view in Fig. 5. The air vent passage 111 (Figs. 4 and 5) in the valve 90 has enlarged

openings 114 and 115 at its ends to establish communication between the ports 110 and 112 as the valve 90 is being opened and before the passage 111 is actually in alignment with the ports for a purpose presently to be described.

In order to rotate the valve 90 (Figs. 3 and 9) a trip lever 116 is secured to the valve stem 89 and is provided with upper and lower actuating arms 117 and 118. As shown in Fig. 9 the valve 90 is in closed position and is about to be opened by contact of the lower arm 118 of the trip lever 116 with a roller 119. The roller 119 is mounted at the upper end of a vertical arm 120 formed integrally with a horizontally-disposed lever 121 pivoted at 122 (Figs. 1 and 2) on a fixed portion of the machine. A spring 123 is connected to the opposite end 124 of the lever 121 to urge the lever clockwise.

The lever 121 is part of a no-can-no-fill mechanism which operates as follows: When no can or jar is present on the lift plate 52 the arm 121 (Fig. 2) is swung clockwise by the spring 123 to remove the roller 119 from the path of the trip lever 116 to prevent opening of the valve. When a jar 51 is present on the lift plate 52 the outer wall of the jar engages the inner side 125 of the lever 121, swinging the lever 121 counterclockwise to position the roller 119 in the path of the trip lever 116. The jar is enabled to exert this pressure on the lever 121 by reason of the fact that it is seated in the arcuate opening 70 of the centering plate 66.

As shown in Fig. 9, the valve is moving to the left so that the trip lever is turned to the position shown in broken lines to open the valve. The valve remains open during 180° rotation of the table (Fig. 2). When the jar arrives at the opposite side of the machine the trip lever 116 engages a roller 126 mounted on a fixed arm 127 secured by a clamping hub 128 to an upright 129, which is part of the framework of the machine. In Fig. 10 the trip lever 116 is approaching the roller 126. When the upper arm 117 engages the roller the valve 90 will be rotated 90° clockwise to return it to the closed position shown in Fig. 9.

The operation of the machine will now be described. The tank 44 (Fig. 1) is supplied with the material to be filled. If the material is viscid the heating coil 46 is employed, otherwise not. The jars are introduced into the machine by a conventional feeding mechanism shown in Fig. 2 which comprises in general a rotary disc 130 on which the jars 51 are deposited. The screw 131 picks up the jars one by one, spaces them apart the required distance, and feeds them into the machine in a line. It will be understood that the feed screw 131 is operated in timed relationship with the table 22, so that the jars are introduced one by one onto the lift plates 52 and centered in the centering plates 66. As the table rotates in a clockwise direction the rollers of the lift plungers encounter the beginning 57 of the track 56, and as the roller travels from 57 to 58 the jar is lifted to its filling position where the end of the nozzle 107 (Fig. 3) and the mouth 109 of the vent 108 are positioned at the desired level with respect to the top of the jar.

This level is predetermined by the adjustment of the sleeve 35 (Fig. 1) which enables the tank 44 and its valves 50 to be raised or lowered with respect to the table 22 and lift plates 52. The adjustment depends to some extent on the material with which the jars are being filled and the height to which the fill is desired. If the material is of such a nature that it congeals on cooling it is usually desirable to obtain a crowned top to the fill, as indicated in broken lines in Fig. 3. This results from the fact that the warm material, when encountering the cold walls of the jar, begins to congeal near the wall of the jar and builds up in the center. The level at which the mouth 109 of the vent 108 is positioned determines the position of the top of the crown if the material is viscid, or, if it is normally liquid, determines the level of fill in the jar, as will be more apparent later in the description.

The opening of the valve is shown in Fig. 9, wherein passing the roller 119 the lever 116 is tripped to rotate the valve 90 through 90° so as to position the fluid and vent passages as shown in Fig. 3. When the valve 90 is opened the cam 88 is also rotated to remove it from engagement with the roller 87, as shown in Fig. 10, permitting the spring 80, which was under compression, to lower the push rod 79, causing the seal 76 (Fig. 3) to close the outlet 75 of the vent 73.

It will be understood that prior to this time the outlet 75 was open, providing an air vent for the chamber 71 and permitting the chamber to be filled with fluid from the tank 44 through the passage 97 (Fig. 9), port 99 (Fig. 7), passage 101, passage 102, and port 103. The chamber 71 was thus filled with fluid to the level 74 (Fig. 3) because when the fluid level reaches the end of the vent pipe 73 the air entrapped in the space 132 is placed under compression and the flow of fluid ceases.

By a comparison of Figs. 9 and 10 it will be noted that the contour of the cam 88 is such that the push rod 79 will be lowered at the beginning of the turning movement of the valve 90, so that the outlet 75 (Fig. 3) of the vent pipe 73 is closed at the beginning of the movement of the valve 90 and while the passage 101 (Fig. 6) is in an intermediate position between the ports 99 and 103.

Near the end of the valve movement the enlarged opening 114 (Fig. 4) of the vent passage 111 comes into communication with the port 112 and similarly the enlarged opening 115 establishes communication with the port 110. In this manner the vent pipes 108 and 113 are interconnected before the valve is fully opened. The result is that the compressed air in the space 132 (Fig. 3) above the fluid level 74 in the chamber 71 escapes down the vent 113 through the passage 111 and down the pipe 108. This is an important feature of the invention, because it makes for positive and efficient operation of the valve. The air release in the vent pipe 108 clears the pipe of any material that may be lodged in the lower end thereof in order to establish, in advance of the opening of the fluid passage 101, 105, a clear vent passage from the atmosphere up through the vent pipes to the top of the chamber 71.

When the valve 90 is finally opened, as shown in Fig. 6, fluid is released from the chamber 71 through the port 103, passages 101 and 105, port 106, and nozzle 107. The fluid is discharged from the chamber into the jar 51 as long as air can rise through the vent pipe 108. When the fluid level in the jar closes the mouth 109 of this vent the flow from the nozzle 107 ceases. In this manner the amount of material or fluid filled in the jar depends on the level at which the mouth 109 of the vent is located and the vent thus controls the fill to a predetermined level in the jar.

During the filling operation the jar is travel-

ling around on the table in a clockwise direction (Fig. 2). When the trip lever 116 encounters the roller 126 the valve is closed by clockwise rotation of the lever 116 (Fig. 10). At the same time the cam 88 is returned to the position shown in Fig. 9, lifting the push rod 79 to remove the seal 76 (Fig. 3) from the outlet 75 of the vent pipe 73. When the valve is closed, as shown in Fig. 7, the chamber 71 is refilled by fluid entering from the port 99.

After the valve is closed the jar is lowered away as the lift roller traverses the downwardly inclined portion of the lift track (Fig. 2) from 59 to 60. The jar is then removed from the machine by a discharge mechanism of conventional construction, which comprises a rotary disc 133 having a star wheel 134 for engaging the jars and removing them from the lift plates 52. After the valve 90 (Fig. 3) is closed there is no drip from the nozzle 107 because the supply of material is cut off by rotation of the valve and the short column of material is retained in the nozzle, which is of relatively small bore, by vacuum. When handling material, such as "Mentholatum," the nozzle 107 may have a bore of five-sixteenths inch diameter and the vent 108 a diameter of one-fourth inch.

The construction of the valve units 50 is particularly designed to handle materials like petrolatum which in spite of preheating tend to become viscid and congeal in the valve passage. In order to obtain rapid, accurate, and dependable operation of the valve to fill each jar to a predetermined level it is essential that the control vent be kept absolutely clear of the material. In this connection attention is particularly directed to two important features embodied in the valve.

First, the material is never allowed to enter the upper end of the control vent pipe 113. This is accomplished by extending the vent 73 (Fig. 3) down into the chamber 71 to limit the filling of the chamber to the level 74, and to provide the air space 132 in the top of the chamber. As a result, the material never enters the top of the vent pipe 113.

Second, the material is blown out of the mouth 109 of the control vent at the beginning of every filling operation. This is accomplished by providing the enlarged openings 114 and 115 (Figs. 4 and 5) at the ends of the vent passage 111 in the valve 90 so that just before the filling operation begins the air compressed in the space 132 in the top of the chamber 71 is released through the control vent to clean out any material which may have started to congeal and to clog the mouth 109.

This construction not only serves to maintain the vent in a clean and efficient operating condition to exercise a sure and sensitive control over the fill but it also serves to provide a maximum air vent at all times to insure rapid and positive discharge of the material into the jar.

While I have described a particular embodiment of the present invention, it will be obvious that various changes and modifications may be made in the details thereof without departing from the spirit of the present invention and the scope of the appended claims.

Having thus described my invention and in what manner the same may be used, what I claim as new and desire to protect by U. S. Letters Patent is:

1. In a machine for filling containers with fluid to a predetermined level, a tank, a valve unit comprising a chamber, means including a valve to admit fluid from said tank to said chamber, means to control the admission of fluid to said chamber including a vent having an inlet disposed below the top of the chamber to stop the filling of said chamber at a predetermined level and establish an air space at the top of said chamber, means including a valve normally tending to close said vent, and means including a cam actuated by said fluid admission valve to open said vent valve.

2. In a machine for filling containers with fluid to a predetermined level, a tank, a valve unit comprising an enclosed chamber, means including a valve to admit fluid from said tank to said chamber, a vent having an inlet in said chamber disposed below the top thereof to provide air under pressure at the top of said chamber when filled to the level of said inlet with fluid, means including a valve to release fluid from said chamber to a container positioned beneath the valve unit, a control vent having one end disposed in the top of said chamber above the fluid level therein and the other end disposed at the predetermined level of fill in the container, and a valve in said vent operable to open said vent before said fluid release valve is opened to release the compressed air in the top of said chamber through said control vent to clean out said other end of said control vent prior to the beginning of the filling operation.

3. In a machine for filling containers with fluid to a predetermined level, a tank, a valve unit, comprising a chamber having a filling control vent to determine the level of fill in said chamber and establish air under pressure in the top of said chamber, a normally-closed valve in said filling control vent, said unit having a fluid supply passage to conduct fluid from said tank to said chamber and a fluid discharge passage to conduct fluid from said chamber to a container positioned beneath the valve unit, said unit having an air vent control passage, one end of said air vent control passage being disposed in the air space at the top of said chamber and the other end being disposed at the predetermined level of fill in the container, a rotary valve operable in one position to open said fluid supply passage and to close said discharge and air vent control passages, said rotary valve being operable in a second position to close all said passages, and means responsive to actuation of said rotary valve to open the valve in said filling control vent when the rotary valve is in its first mentioned position and to close the valve in said filling control vent when the rotary valve is in its second position, said rotary valve also being operable in a third position to open only said air vent control passage to release compressed air therethrough from the top of said chamber, and in a fourth position to open said fluid discharge passage through which fluid is released from said chamber to the container until the fluid level in the container reaches the end of said air vent disposed therein.

4. In a machine for filling containers with fluid to a predetermined level, a tank for containing said fluid, a valve unit, comprising a chamber, means to admit fluid from said tank to said chamber, an air vent extending upwardly from said chamber and projecting above the fluid level in said tank, said air vent having its lower end opening into said chamber below the top thereof for enabling the fluid to trap a pocket of air under pressure in the chamber above said opening and stop further filling of the chamber when

the latter fills with fluid to a level such that said fluid closes said vent opening, means for closing said vent after said air pocket has been established, means including a valve to release fluid from said chamber into a container positioned beneath the valve unit, and a second vent positioned with an opening at the desired level of fill of said container and communicating with said chamber above the maximum fluid level established therein whereby air may be admitted to said chamber during the filling operation and said second vent may be cleared by the air in said pocket.

5. In a machine for filling containers with fluid to a predetermined level, a tank for containing said fluid, a valve unit comprising a chamber, means including a two-way valve operable alternately to admit fluid to said chamber from said tank and to release fluid from said chamber to a container positioned beneath the valve unit, a vent extending upwardly from said chamber and projecting above the fluid level in said tank, said air vent having its lower end opening into said chamber below the top thereof to stop filling of said chamber and trap a pocket of air under pressure in the chamber above said opening when fluid is admitted into said chamber from said tank and fills to a level such that said fluid closes said vent opening, means including a valve for said vent actuated in time with said two-way valve to close said vent when fluid is released from said chamber, and a second vent communicating between said chamber air pocket and a predetermined level in the container and controlled by said two-way valve for releasing the compressed air from said chamber air pocket, for controlling the release of fluid to the container from said chamber and for controlling fill of said container to a predetermined level.

6. In a machine for filling containers with fluid to a predetermined level, a tank for containing said fluid, a valve unit disposed below said tank comprising a chamber, means including a two-way valve operable alternately to admit fluid by gravity to said chamber from said tank and to release fluid from said chamber to a container positioned beneath the valve unit, an air vent extending upwardly from said chamber and projecting above the fluid level in said tank, said air vent having its lower end opening into said chamber below the top thereof to enable the fluid to trap a pocket of air under pressure in the chamber above the lower end of the vent and stop further filling of the chamber when the latter fills with fluid to a level such that said fluid closes the end of the vent, means including a valve for said vent actuated in time with said two-way valve to close said vent when fluid is released from said chamber, a second vent having an end communicating with the air pocket above the fluid level in said chamber to control the release of fluid to the container and for releasing the compressed air in said pocket through said second vent when said second vent is opened, the other end of said second vent being adapted to be positioned at the predetermined level of fill of the container to control fill thereof to said level and means for opening said second vent when fluid is to be released to the container.

7. In a machine for filling containers with fluid to a predetermined level, a tank for containing said fluid, a valve unit comprising a chamber, means including a two-way valve operable alternately to admit fluid to said chamber from said tank and to release fluid from said chamber to a container positioned in filling relation thereto, a vent extending upwardly from said chamber and projecting above the fluid level in said tank, said vent opening into said chamber below the top thereof to trap a pocket of air under pressure in said chamber above said opening and stop further filling of said chamber when the latter fills with fluid to a level such that the fluid closes said vent opening, means including a valve for said vent actuated in time with said two-way valve to close said vent when fluid is released from said chamber, a second vent communicating with the compressed air pocket above the fluid level in said chamber to control the release of fluid to the container, the mouth of said second vent being positioned at the predetermined level of fill in the container to control fill of the container to said level, and a valve for said second vent operable in time with said two-way valve to close said second vent when fluid is admitted to said chamber from said tank and to open said second vent to release the compressed air in said chamber pocket through said second vent to clear it and to admit air into said chamber to control flow of the fluid to the container.

8. In a machine for filling containers with fluid to a predetermined level, a tank for containing said fluid, a valve unit comprising an enclosed chamber, means including a valve to admit fluid from said tank to said chamber, a vent having an outlet above said chamber and an inlet in said chamber below the top thereof to stop further filling of the chamber and to trap a pocket of air under pressure at the top of said chamber when filled with fluid to a level such that said fluid closes said inlet of the vent, means to close said vent after said air pocket has been established, means including a valve to release fluid from said chamber to a container positioned beneath the valve unit, a control vent having one end disposed in the top of the chamber above the fluid level therein and another end positioned at the desired fill level of the container to control filling of the container to such level, and a valve in said control vent operable to open said control vent before said fluid release valve is opened to release the compressed air in the top of said chamber through said control vent.

9. In a machine for filling containers with fluid to a predetermined level, a tank for containing said fluid, a valve unit comprising a chamber, said unit having a fluid supply passage to conduct fluid from said tank to said chamber, said unit having a fluid discharge passage to conduct fluid from said chamber to a container positioned beneath the valve unit, said unit having an air vent extending above said chamber and having its lower end opening into said chamber at a level below the top of said chamber to stop further filling of the chamber and trap a pocket of air under pressure in said chamber above the fluid therein when the latter fills said chamber up to a level such that said fluid closes the opening in the lower end of said air vent, and a second vent communicating with said air pocket of said chamber, a mouth of said second vent being disposed at a predetermined level of fill in the container to control filling of the container to such level, a rotary valve operable in one position to close said fluid discharge passage and said second air vent and to open said fluid supply passage, said rotary valve being operable in a second position to close both said fluid passages and open said second vent, and means operable to close first men-

tioned air vent when the rotary valve is in said second position.

10. In a machine for filling containers with fluid to a predetermined level, a tank, a valve unit comprising a chamber, said unit having a fluid supply passage to conduct fluid from said tank to said chamber, said unit having a fluid discharge passage to conduct fluid from said chamber to a container positioned beneath the valve unit, said unit having an air vent, the upper end of which is above said chamber and the lower end of which opens into said chamber at a level below the top thereof to stop further filling of said chamber and trap a pocket of air under pressure in said chamber above the fluid therein when the latter fills said chamber up to a level such that said fluid closes the opening in the lower end of said air vent, and a second air vent communicating with the said air pocket in said chamber above the fluid level therein, a mouth of said second vent being disposed at the predetermined level of fill in the container to control filling of the container to such level, and control means including a rotary valve, means for actuating said control means and rotary valve to close said fluid discharge passage and said second air vent and to open said fluid supply passage and said first mentioned vent, and actuating means for subsequently actuating said control means and rotary valve to close both said fluid passages and said first mentioned vent and open said second air vent, said last named actuating means thereafter actuating the rotary valve to close said fluid supply passage and open said fluid discharge passage while said second air vent is open.

11. In a machine for filling containers with fluid to a predetermined level, a supply tank for the fluid, a fluid receiving chamber, means forming an inlet passage-way to feed fluid from said tank to said chamber, a feed vent extending upwardly from said chamber and projecting above the fluid level in said tank, said air vent having its lower end opening into said chamber at a distance below the top of said chamber for enabling said fluid to trap a pocket of air under pressure in the chamber above said vent opening and stop further filling of the chamber when the latter fills with fluid to a level such that said fluid closes the opening in the lower end of the feed vent, means forming a discharge passage-way for conducting fluid from said chamber into a container positioned in filling relation thereto, a discharge vent arranged to communicate between said chamber and the container, said discharge vent having an opening disposed in the chamber air pocket and another opening disposed at the desired level of fill of the container to stop admission of fluid to the container when the container fills with fluid to such level to close the latter opening, and valve means for controlling said inlet passage-way, feed vent, discharge passage-way, and discharge vent, said valve means being operable to close said feed vent and inlet passage-way when said compressed air pocket has been established and open said discharge vent and discharge passage-way to exhaust said compressed air in said chamber, through said discharge vent to clear out the latter, and to admit fluid to said container.

12. In a machine for filling containers with fluid to a predetermined level, a supply tank for the fluid, a fluid receiving chamber, means forming an inlet passage-way to feed fluid from said tank to said chamber, a feed vent having its outlet above said chamber and its inlet disposed in said chamber at a distance below the top of said chamber for enabling said fluid to trap a pocket of air under pressure in the chamber above said inlet and stop further filling of the chamber when the chamber fills with fluid to a level such that said fluid closes the inlet of the feed vent, means forming a discharge passage-way for conducting fluid from said chamber into a container positioned in filling relation thereto, a discharge vent arranged to communicate between said chamber and the container, said discharge vent having an opening disposed in the chamber above said feed vent inlet, and another opening disposed at the desired level of fill of the container to stop admission of fluid to the container when the container fills with fluid to such level to close the latter opening, and valve means for controlling said inlet passage-way, feed vent, discharge passage-way and discharge vent, said valve means being operable to open said feed vent and maintain said discharge passage-way and discharge vent closed when admitting fluid into said chamber and to close said inlet passage-way and feed vent when said compressed air pocket in said chamber has been established and before said discharge vent is opened, and to open said discharge vent in advance of said discharge passage-way when fluid is to be admitted to the container.

13. In a machine for filling containers with fluid to a predetermined level, a tank for containing said fluid, a valve unit comprising a chamber, means including a valve to admit fluid from said tank to said chamber, means to control the admission of fluid to said chamber including a vent extending upwardly from said chamber and projecting above the fluid level in said tank, said vent having its lower end opening into said chamber below the top thereof to stop the filling of the chamber at a predetermined level and establish an air space at the top of said chamber when the latter fills with fluid to a level such that said fluid closes the opening in said vent, a valve controlling said vent, and means responsive to actuation of the admission valve to open and close said vent valve.

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