

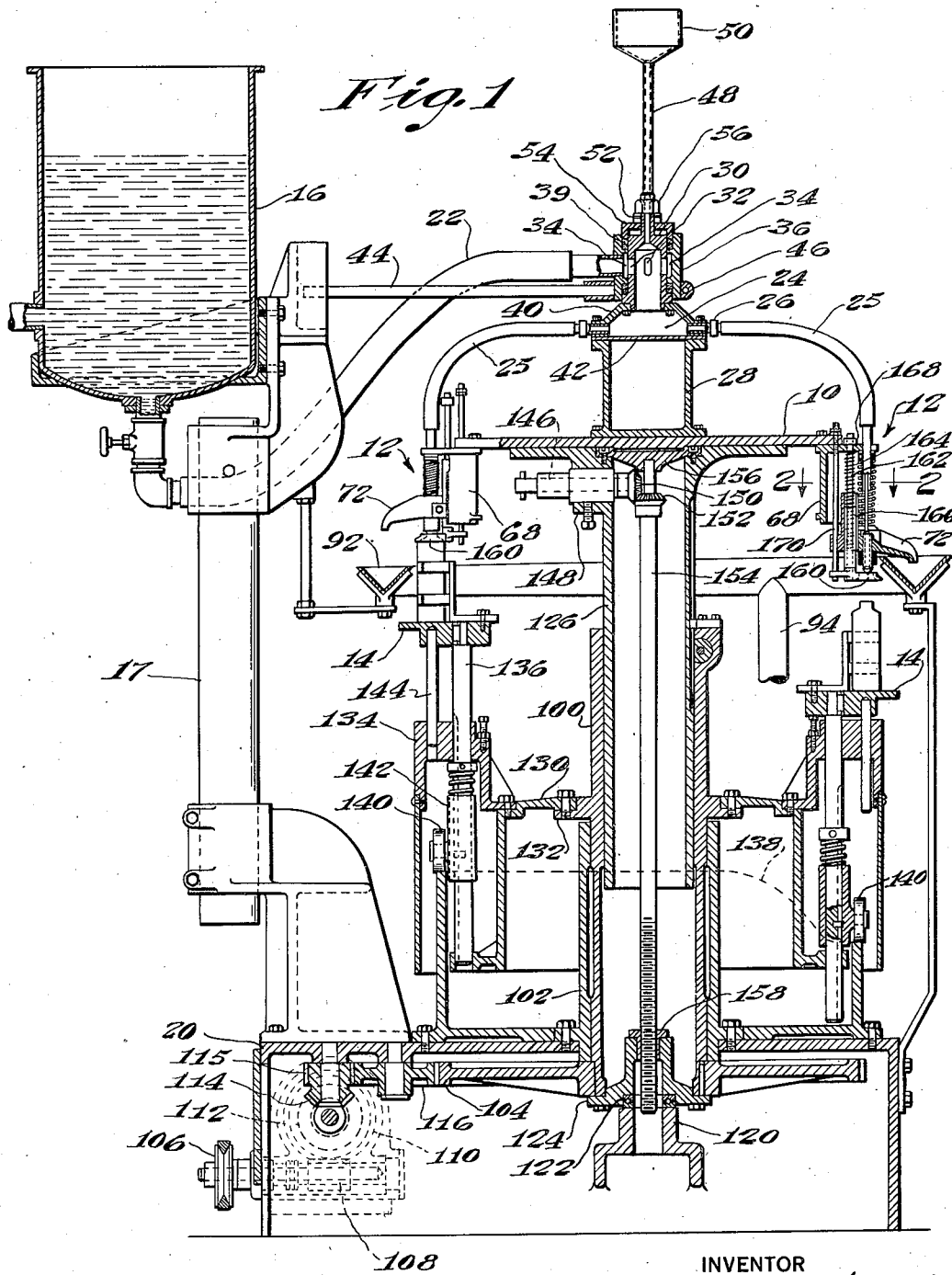
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CONTAINER FILLING MACHINE

2,172,102

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2 Sheets-Sheet 1



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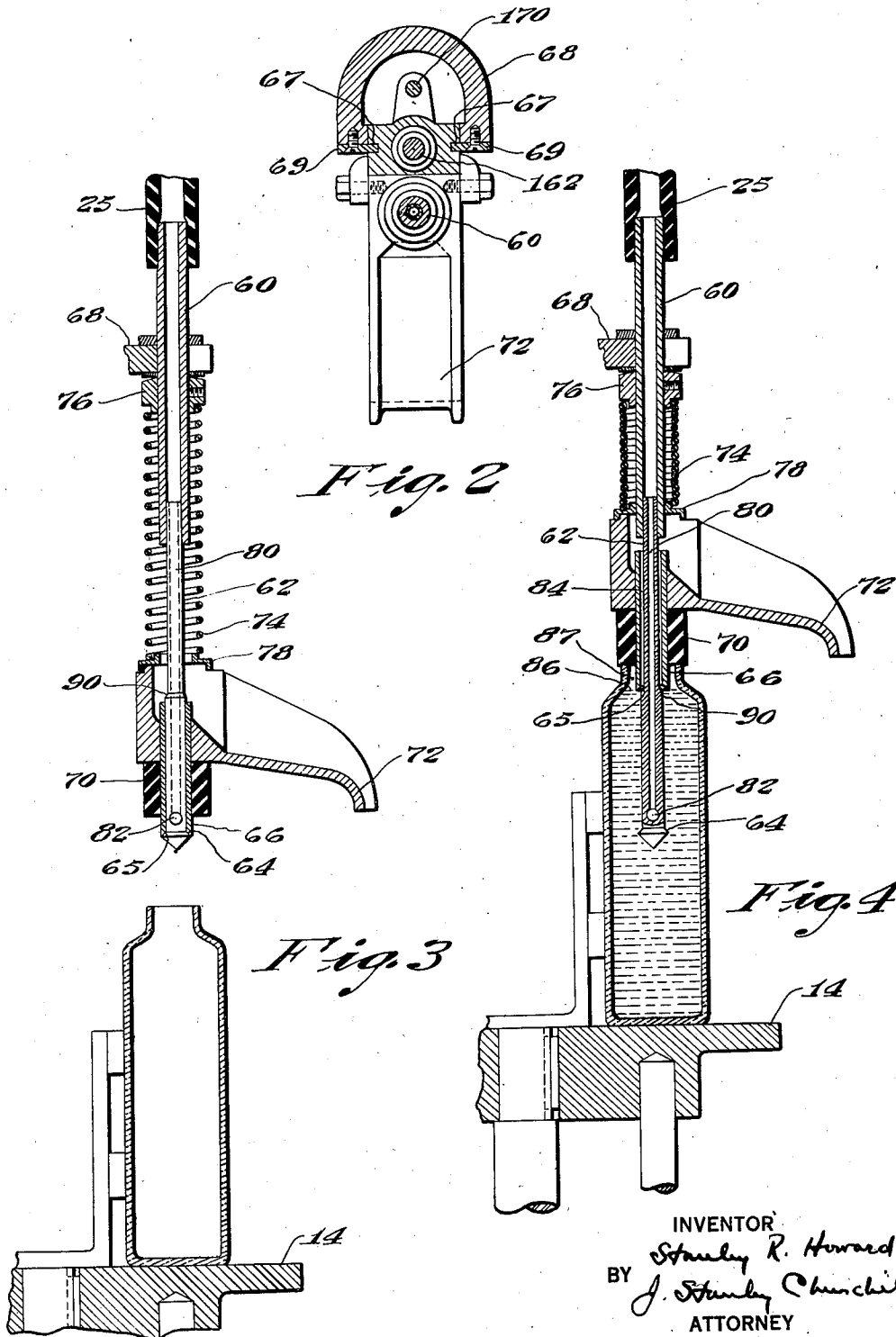
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UNITED STATES PATENT OFFICE

2,172,102

CONTAINER FILLING MACHINE

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19 Claims. (Cl. 226—119)

This invention relates to a container filling machine.

The object of the invention is to provide a novel and improved container filling machine which is capable of filling the containers in a superior and highly efficient and rapid manner.

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

In the drawings illustrating the preferred embodiment of the invention, Fig. 1 is a longitudinal sectional view illustrating a bottle filling machine embodying the present invention; Fig. 2 is a sectional plan view on the line 2—2 of Fig. 1; and Figs. 3 and 4 are detail views in cross-section of the filling nozzles in different positions of operation.

In general, the present invention contemplates a container filling machine having a filling nozzle through which the liquid is supplied to the container, and having an outlet passage permitting the escape of excess air and liquid. The machine may be of the vacuum or pressure type. Provision is made for positively clearing the outlet passage of liquid and air, or of foam at the end of the filling operation. The outlet passage may be formed between an outer and an inner tube comprising the filling nozzle and provision is preferably made for closing and clearing such passage by a piston or enlarged portion of the inner tube arranged to be moved through the outer tube. Provision is also preferably made for mechanically preventing dripping from the filling nozzle at the end of the filling operation.

Referring now to the drawings, for the purpose of illustration, the invention is illustrated as embodied in an automatic rotary type filling machine, and only sufficient portions of the complete filling machine have been herein illustrated as will enable the invention to be understood. In general the machine illustrated in the drawings comprises a rotatable disk 10 to which is secured, to rotate therewith, a plurality of filling units 12. In its preferred form, the machine is provided with a series of bottle elevating platforms 14, which are arranged to elevate the bottles into sealing engagement with the filling units 12, during rotation thereof, to fill the containers, and thereafter to lower the bottles away from the filling units 12 preparatory to the discharge of the filled bottles from the machine. The machine may and preferably will be provided

with an incoming and an outgoing conveyor (not shown) together with the usual means (not shown) for presenting the bottles to be filled to the platforms 14 and for removing the bottles from the platforms after the filling operation has been completed.

Referring now particularly to Fig. 1, the machine, as herein illustrate, is provided with a liquid supply tank 16, supported on a standard 17 from the machine base 20. The supply tank 16 is supported above the level of the filling units 12 so that the liquid may flow from the bottom of the tank, through a flexible tube 22 and into a distributing chamber 24 by gravity. The distributing chamber 24 is provided with a plurality of flexible tubes 25 through which the liquid is permitted to flow to each individual filling unit 12. The distributing chamber 24 is mounted upon a cylindrical support 28 secured to the rotatable disk 10 and comprises an upper section 30 adapted to receive the liquid through apertures 32 from a cylindrical chamber 34 in a stationary outer sleeve 36 to which the supply tube 22 is connected. The usual packing rings 39 are provided to seal the connection. The lower section 40 is secured to the upper section 30 and is provided with a plurality of adapters 26 to which the tubes 25 are connected. A gasket 42 between the cylindrical support 28 and the lower section 40 forms the bottom of the distributing chamber. In order to prevent rotation of the outer sleeve 36 a rod 44 is provided which extends from a ring 46 clamped to the outer sleeve to a stationary part of the machine.

In order to dissipate any excessive foam which may be formed within the chamber 24 during the operation of the machine, an air vent is provided and as herein shown comprises a tube 48 leading from the upper section 30 of the chamber provided with a funnel shaped receptacle 50 at its upper extremity. In operation the foam rises in the tube 48 and gathers in the receptacle 50 and when the foam reverts back to its liquid form it flows back through the tube to the chamber 24. A thrust bearing 52 is provided between a cap 54, which closes the top of the stationary outer sleeve 36, and a nut 56 secured to the upper section 30 to permit the tube 48 to rotate with the upper section 30.

Referring now to Figs. 3 and 4, each filling unit 12 comprises a tube 60 to which one of the flexible tubes 25 is connected, an inner tube 62 provided with a valve 64 at its lower end, and an outer tube 66 slidably fitted over the lower end of the inner tube 62 and provided with a valve

seat 65 with which the valve 64 cooperates. The inner tube 62 is formed integrally with the connecting tube 60 which is relatively stationary with respect to the rotatable disk 10. The tube 60 is supported in a bracket 68 which is secured to the underside of the disk 10. A sealing collar 70 is fastened to the lower end of the slidable tube 66 and a spout 72, for the discharge of surplus liquid is secured to the outer tube 66 above the sealing collar 70. A coil spring 74 which encircles the integral tube 60, 62, is positioned between a collar 76 fixed to the tube 60 and a flange 78 mounted on top of the spout 72.

From the description thus far it will be seen that the coil spring 74 normally urges the valve seat 65 into engagement with the valve 64 to hold it closed until the elevator platform 14 is raised, as will be described, to present the mouth of the container into sealing engagement with the collar 70. Further movement of the elevator 14 with relation to the filling unit 12 will open the valve and permit the liquid to flow through the passageway 80 in the inner tube 62 and into the bottle through an opening 82 at the lower end of the inner tube 62. During the flow of the liquid into the bottle the air is permitted to escape through the cylindrical passageway 84 between the inner tube 62 and the outer tube 66 which is exposed at this time. Liquid continues to flow into the bottle until it reaches the level indicated at 86 or the bottom of the outer tube 66 whereupon any surplus liquid flows upwardly through the passageway 84 and down the spout 72. It will be noted that the liquid cannot rise substantially above the level 86 in the bottle because of the fact that an air lock is formed in the area 87 around the nozzle, the only escape being the passageway 84 above referred to. Upon the elevator being lowered, the spring 74 which has been contracted is permitted to expand and holds the mouth of the container in sealing engagement with the nozzle until the filling tube 62 is withdrawn. During this movement the passageway 84 through which the surplus liquid is forced is immediately cut off and entirely cleared out by the enlarged portion forming a piston 90 which fits snugly into the passageway 84 so that any liquid which may remain in the passageway is forced upwardly and outwardly into the spout 72 and as the operation continues additional liquid is permitted to enter the container through the opening 82 to compensate for the liquid displaced by the tube 62. At the end of the stroke the opening 82 is cut off upon entering the tube 66 and the valve 64 is seated whereupon the seal between the collar 70 and the container is broken. Provision is made for disposing of the surplus liquid and, as herein shown, the spouts 72 empty into a circular trough 92, which is provided with a drain 94. Suitable connections including a pump, not shown, may be used to return the liquid to the supply tank 16.

Referring now to Fig. 1, the machine as herein illustrated is provided with a perpendicular rotatable tube 100, supported in a housing 102 secured to the machine base 20. The rotatable tube 100 is provided with a large gear 104 fast on the lower end thereof which is arranged to be driven through connections including a motor, not shown, belted to a pulley 106, worm wheel 108 and gear 110, bevel gears 112, 114, a gear 115 formed integral with the bevel gear 114 and an idler gear 116 which meshes with the large gear 104 above referred to. The rotatable tube 100 is supported at its lower end by an ex-

tension 120 from the base 20 and an antifriction bearing 122 fitted into a supporting member 124 which is secured to the bottom of the tube 100. The rotary disk 10 to which the filling units 12 are secured is mounted on a flanged tube 126 which is telescopically fitted and clamped to the rotatable tube 100 as illustrated. A ring 130, supported on a flange 132 extending from the rotatable tube 100, is adapted to support the elevating units 14 which are slidably mounted in a supporting bracket. As herein shown, the platforms 14 are mounted on vertical rods 136 which are arranged to be elevated and lowered by an annular cam 138 cooperating with cam rolls 140 mounted on members 142 to which the vertical rods are fixed. A guide rod 144 extending from the platform and slidably fitted in the supporting bracket 134 is provided for each elevating unit to retain the platforms in alignment with the filling units.

Provision is made for vertical adjustment of the rotatable disk 10 to adapt the machine to handle various heights of bottles and as illustrated herein a short shaft 146 mounted in a bearing 148 in the flanged tube 126, and arranged to be manually rotated, is provided with a bevel gear 150 which meshes with a bevel gear 152 at the upper end of a vertical rod 154. The vertical rod 154 is supported in a bearing 156 at its upper end and the lower end is threaded to fit into a bushing 158 fixed in the supporting member 124.

The usual guides 160 to align the bottle necks with the nozzles are provided for each unit and as shown in Fig. 1, each guide is supported on the end of a rod 162 which is arranged to slide vertically in the bracket 68. A coil spring 164 encircling the rod 162 between the bracket 68 and a collar 166 normally urges the guide downwardly being held in its adjusted position by a collar 168 affixed to the rod 162 above the bracket 68. A second rod 170 is provided to retain the guide alignment. As herein shown, see Fig. 2, the spout 72 is adapted to slide vertically in the bracket 68 being provided with grooves 67 into which tongues 69 are arranged to fit.

From the description thus far it will be seen that the construction of the filling nozzle is such that all the air and excess liquid remaining within the passageway 84 is removed at the end of each filling operation. When the outer tube 66 is lowered over the piston 90 all the surplus liquid is forced out of the passageway 84 thus clearing the vent for the subsequent filling operation. In this manner the passageway 84 is kept clear of any liquid which might be apt to congeal or coagulate and close the air vent and thereby prevent efficient operation of the filling nozzle. In the operation of the machine, the liquid entering the bottle from the chamber 24 and through the passageway 80 and opening 82 flows gently into the bottle and as the liquid enters the bottle the air is permitted to escape through the passageway 84. When the liquid reaches the lower end of the outer tube 66, the surplus liquid will flow through the passageway 84 and into the spout 72. It will thus be seen that the filling operation is performed in a gentle manner without any agitation of the liquid and with no intermingled air thereby eliminating any possibility of creating foam within the bottle.

From the foregoing description it will be observed that the present invention facilitates the filling of various containers such as bottles with those liquids which possess an inherent tendency

to congeal or coagulate when left exposed to the air for any length of time, thus enabling the machine to be used with advantage in filling bottles with various liquids such as liquid soap, shampoo and others which have heretofore presented much difficulty. In addition, it will be observed that present construction of filling nozzle provides a positive seal preventing all dripping from the nozzle after the filling operation has been completed.

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

Having thus described the invention, what is claimed is:

1. In a container filling machine, in combination, a filling nozzle through which liquid is supplied into the container, means forming an outlet passage from the container through which air and excess liquid may pass, and means for mechanically forcing liquid from said outlet passage at the end of the filling operation.

2. In a container filling machine, in combination, a filling nozzle through which liquid is supplied into the container, means forming an outlet passage from the container through which air and excess liquid may pass, and means for closing and entirely clearing said outlet passage at the end of the filling operation.

3. In a container filling machine, in combination, a filling nozzle through which liquid is supplied into the container, an outer nozzle surrounding the filling nozzle and forming therewith an outlet passage for the escape of the air and excess liquid from the container during the filling operation, said filling nozzle having an enlargement movable through said outlet passage for entirely clearing the same at the end of the filling operation.

4. In a container filling machine, in combination, a filling nozzle, means for supplying liquid thereto, said filling nozzle comprising an inner tube connected with said liquid supply means, an outer tube forming with the inner tube an outlet passage open to the atmosphere, the lower portion of said inner tube being of a size and shape to form a piston to fit the outer tube, and means for effecting relative movement of the filling tube and outer tube at completion of the filling operation whereby to cause the piston to entirely clear the outlet passage.

5. In a container filling machine, in combination, a filling nozzle adapted to project into the container and having an orifice through which the liquid is supplied thereto, means forming an outlet passage for the escape from the container of air and excess liquid, means for closing the outlet passage when the container has been filled to a predetermined level said filling nozzle being adapted to supply additional liquid into said container in an amount sufficient to substantially compensate for the displacement caused by the liquid supply tube in the liquid within the container, said outlet closing means being arranged with respect to said liquid supply orifice so that the outlet passage is cut off a substantial length of time before the liquid supply is cut off and being capable of entirely clearing said outlet passage when the filling operation is terminated.

6. In a container filling machine, in combination, a filling nozzle comprising an inner tube through which liquid is introduced into the container and an outer tube through which air and

excess liquid is permitted to escape from the container during the filling operation, said inner tube being provided with an enlarged portion at its lower end of a size and shape to form a piston fitting said outer tube, means for sealing the mouth of the container, and means for relatively moving the outer and inner tubes at the end of the filling operation to cause the piston to entirely remove excess air and liquid from the outlet passageway.

7. In a container filling machine, in combination, a filling nozzle comprising an inner tube through which liquid is introduced into the container and an outer tube through which air and excess liquid is permitted to escape from the container during the filling operation, said inner tube being provided with an enlarged portion at its lower end of a size and shape to form a piston fitting the air and excess liquid passageway formed between the outer tube and upper portion of the inner tube, a valve formed on the end of said inner tube, a valve seat formed on the end of the outer tube for cooperation with the valve, and means for effecting relative movement of the inner and outer tubes at the completion of the filling operation to cause the piston to entirely remove excess air and liquid from the outlet passage and to close said valve.

8. In a container filling machine, in combination, a filling nozzle adapted to project into the container and having an orifice through which the liquid is supplied thereto, means forming an outlet passage for the escape of air and excess liquid, means for closing the outlet passage when the container has been filled to a predetermined level, said filler nozzle being adapted to supply additional liquid into said container in an amount sufficient to substantially compensate for the displacement caused by the liquid supply tube in the liquid within the container, and means for cutting off the supply of liquid to the container when the liquid supply tube has been removed from the liquid in the container, said outlet closing means being arranged with respect to said liquid supply orifice so that the outlet passage is cut off a substantial length of time before the liquid supply is cut off and being capable of entirely clearing said outlet passage when the filling operation is terminated.

9. In a container filling machine, in combination, a filling nozzle, and means for supplying liquid thereto, said filling nozzle comprising an inner tube adapted to extend into the container below the normal filling level thereof, and through which the liquid is introduced into the container, means extending into the container during the filling operation and forming an outlet passage, means for sealing the mouth of the container during the filling operation whereby an air lock is formed for limiting the filling of the container, a valve on said inner tube and valve seat on said liquid outlet forming means for cooperation with said valve whereby drippage from the filling nozzle is prevented when the nozzle is withdrawn from the container, said inner tube being provided with means for closing and entirely clearing said outlet passage when the filling operation is terminated.

10. In a container filling machine, in combination, a filling nozzle and means for supplying liquid thereto, said nozzle comprising an inner liquid tube adapted to extend into the container and provided with a valve, an outer tube through which said inner tube is extended, a spring for yieldingly urging downward movement of the

outer tube with respect to the inner tube, said outer tube being adapted to terminate within the bottle at the normal filling level thereof and cooperating with the inner tube to provide an outlet passage through which air and excess liquid may pass, means for sealing the mouth of the bottle whereby to form an air lock above the liquid to thereby prevent the container from being filled to above its normal filling level, a valve seat at the end of said outer tube, a valve cooperating therewith when the filling nozzle is withdrawn from the container, said inner tube being provided with means for closing and entirely clearing said outlet passage when the filling operation is terminated.

11. In a container filling machine, a filling nozzle comprising an outer tube, an inner tube forming a liquid supply passage extended through the outer tube and spaced therefrom to form an outlet passage and a valve operative to close both the outlet and liquid passages when the filling operation is completed, said inner tube being provided with means for entirely clearing the outlet passage at the end of the filling operation.

12. In a container filling machine, a filling nozzle comprising an outer tube, an inner tube forming a liquid supply passage extended through the outer tube and spaced therefrom to form an outlet passage and a valve operative to automatically close both the outlet and liquid passages when the filling operation is completed, said inner tube being provided with means for entirely clearing the outlet passage at the end of the filling operation.

13. In a container filling machine, a filling nozzle comprising an outer tube, adapted to extend into the container, an inner tube forming a liquid supply passage extended through the outer tube and spaced therefrom to form an outlet passage and a valve operative to automatically close both the outlet and liquid passages when the filling operation is completed, and means for sealing the container whereby an air lock is formed to prevent filling of the container above the end of the outlet tube, said inner tube being provided with means for entirely clearing the outlet passage at the end of the filling operation.

14. In a container filling machine, in combination, a filling nozzle and means for supplying liquid thereto, said nozzle comprising an inner liquid tube adapted to extend into the container and provided with a valve, an outer tube through which said inner tube is extended, a spring for yieldingly urging downward movement of the outer tube with respect to the inner tube, said outer tube being adapted to terminate within the bottle at the normal filling level thereof and cooperating with the inner tube to provide an outlet passage through which air and excess liquid may pass, and means for sealing the mouth of the bottle whereby to form an air lock above the liquid to thereby prevent the container from being filled to above its normal filling level and a valve for closing both inner and outer tubes when the nozzle is withdrawn from the container, said inner tube being provided with means for entirely clearing the outlet passage at the end of the filling operation.

15. In a container filling machine, in combination, a filling nozzle and means for supplying liquid thereto, said filling nozzle comprising a tube adapted to extend into the container below the normal filling level thereof, and through which the liquid is introduced into the container, means extending into the container during the filling operation and forming an outlet passage, means for sealing the mouth of the container during the filling operation whereby when the container has been filled to the level of the end of said outlet forming means, an air lock is formed terminating the filling operation, and means provided on said filling tube for closing and entirely clearing said outlet passage when the filling tube is withdrawn.

16. In a container filling machine, in combination, a filling nozzle, a liquid supply line connected therewith and a foam expansion chamber connected with the liquid supply line and extending above the filling nozzle for permitting foam to rise therein prior to reaching the filling nozzle, said filling nozzle being provided with an outer tube forming therewith a passage for the escape of air and surplus liquid and means for closing and entirely clearing said passage when the filling operation is terminated.

17. In a container filling machine, in combination, a filling nozzle, container supporting means adapted to hold a container in filling position, a liquid supply line operatively connected with the filling nozzle and a foam expansion chamber connected with the liquid supply line and into which foam may expand prior to reaching the filling nozzle, said filling nozzle being provided with an outer tube forming therewith a passage for the escape of air and surplus liquid and means for closing and entirely clearing said passage when the filling operation is terminated.

18. In a container filling machine, in combination, a filling nozzle, a liquid supply tank, connections between liquid supply tank and filling nozzle including a liquid supply line and a foam expansion chamber into which foam may rise prior to reaching the filling nozzle, said foam expansion chamber extending upwardly above the liquid supply line, said filling nozzle being provided with an outer tube forming therewith a passage for the escape of air and surplus liquid and means for closing and entirely clearing said passage when the filling operation is terminated.

19. In a container filling machine, in combination, a filling nozzle, a liquid supply tank, piping connections between the liquid supply tank and filling nozzle including an expansion chamber extending above the liquid supply line, said chamber being open to the atmosphere and in open communication with the liquid supply line whereby foam may rise into the chamber from the liquid supply line and when thereafter converted into liquid form may automatically return to said liquid supply line, said filling nozzle being provided with an outer tube forming therewith a passage for the escape of air and surplus liquid, and means for closing and entirely clearing said passage when the filling operation is terminated.

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