Dec. 2, 1952 R. E. BODENDOERFER ET AL 2,620,113

RECEPTACLE FILLING NOZZLE WITH FILLING AND VENT VALVES

Filed Dec. 19, 1949

2 SHEETS--SHEET 1

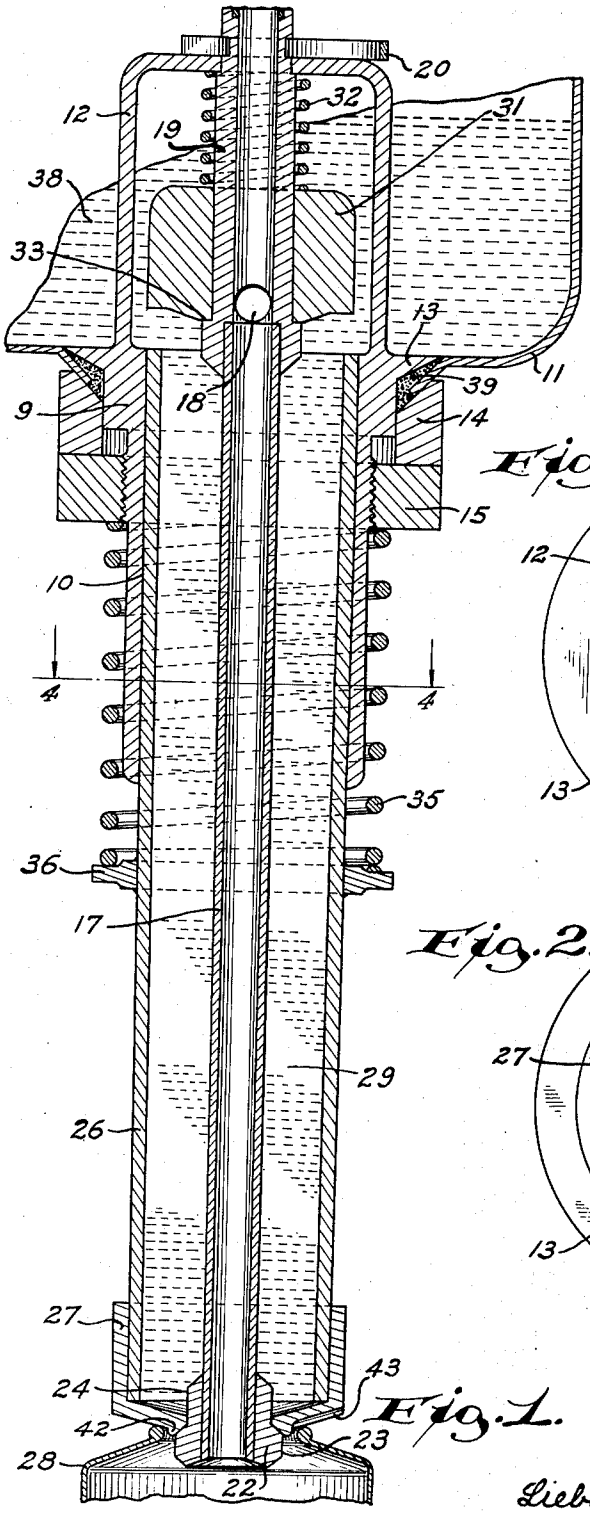


Fig. 1.

Fig. 4.

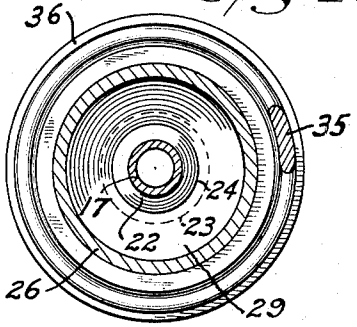


Fig. 3.

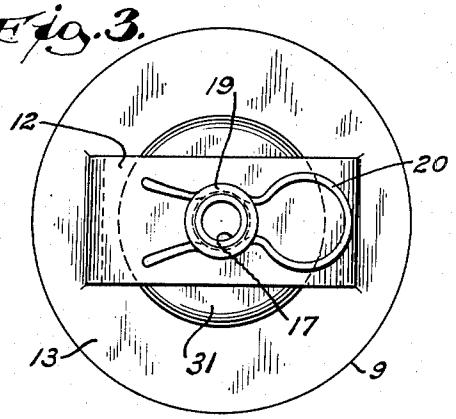
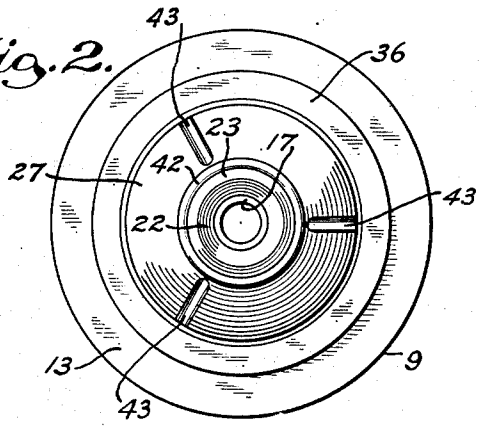


Fig. 2.



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Fig. 5.

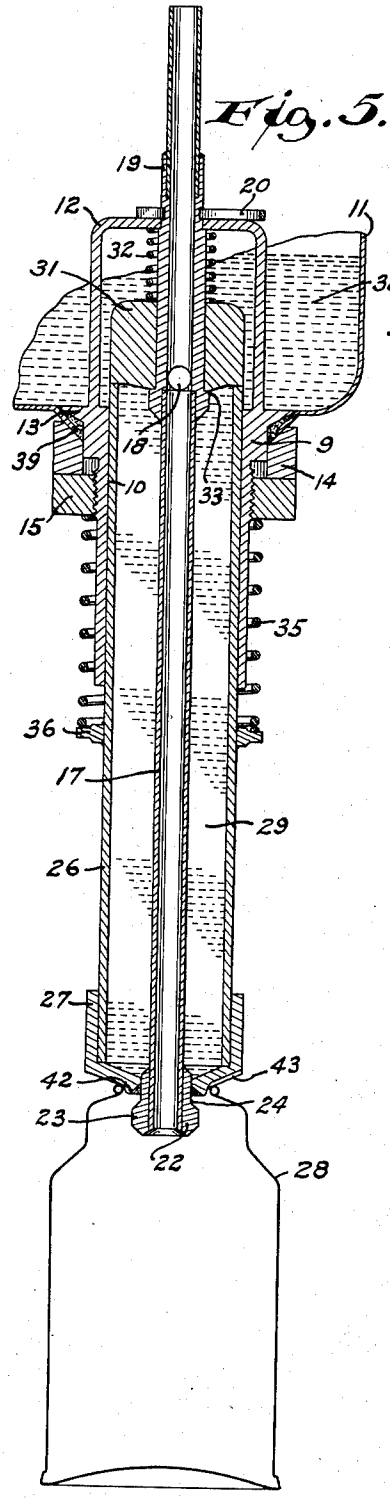


Fig. 6.

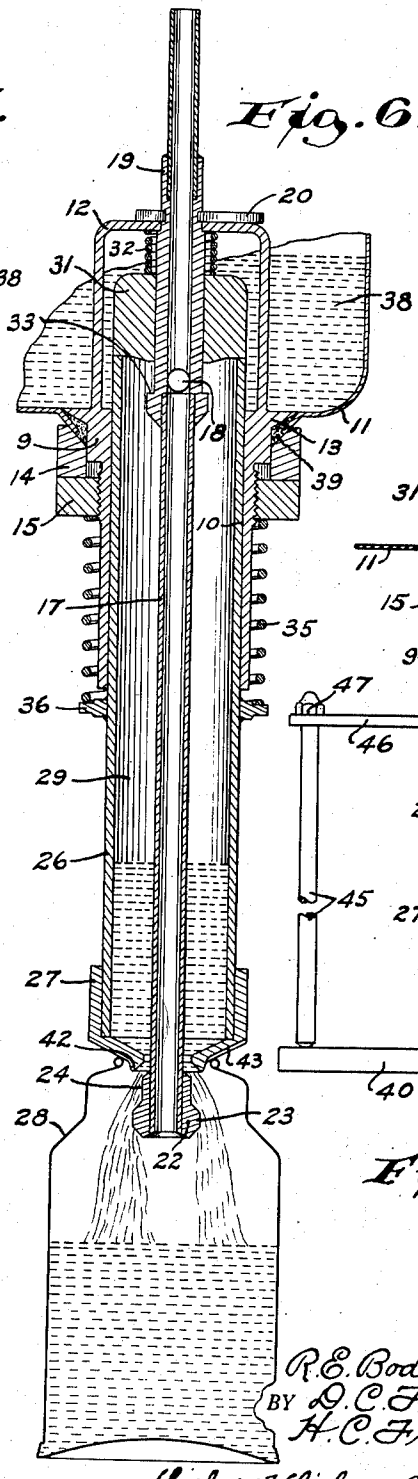
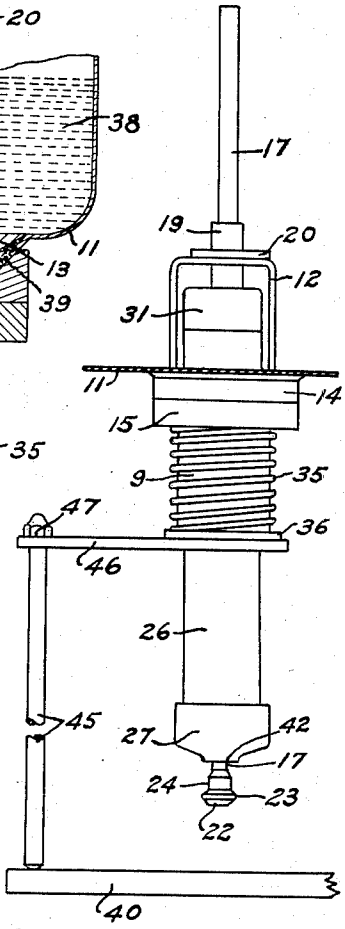


Fig. 7.



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UNITED STATES PATENT OFFICE

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RECEPTACLE FILLING NOZZLE WITH FILLING AND VENT VALVES

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12 Claims. (Cl. 226—98)

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Our present invention relates in general to improvements in the art of dispensing fluent materials in pre-measured batches, and relates more especially to improvements in the construction and operation of apparatus for delivering accurately measured batches of fluent substance such as relatively thick or heavy liquids, to successive receptacles.

The primary object of our invention is to provide an improved fluent material dispensing nozzle which is simple and durable in construction, highly efficient in operation, and readily cleanable.

Many different types of nozzles for delivering liquid from a supply tank to successive receptacles movable toward and away from the tank during the receptacle filling operations, have heretofore been proposed and used commercially to handle diverse liquids, but most of these prior devices are objectionable especially when used to dispense semi-fluent substances such as thick cream or the like. When handling such commodities, the prior nozzles are either too complicated to operate without considerable attention, or they cannot be quickly and easily dismantled for cleaning and thereafter reassembled, or they fail to produce accurate measurement and rapid delivery of the successive batches. Then too, most of these prior liquid filling nozzles are not adapted to cooperate with semi-rigid receptacles such as paper containers, so that none of the previous filling nozzle assemblages are entirely satisfactory for all conditions of use.

It is, therefore, an important object of the present invention to provide an improved fluent material measuring and dispensing nozzle which is adapted to function effectively when handling relatively thick and sluggish liquids, and to rapidly deliver accurately premeasured batches thereof to successive receptacles of various types.

Another important object of our invention is to provide an improved liquid batch dispensing nozzle assemblage which may be conveniently installed for cooperation with standard receptacle feed mechanisms, and thereafter quickly dismantled for cleaning and subsequently reassembled.

A further object of this invention is to provide an improved gravity type liquid dispensing unit comprising a relatively few simple but sturdy parts which are effectively cooperable during normal operation to insure accurate measurement and prompt delivery of the successive batches of commodity.

Still another object of the invention is to provide a liquid filler nozzle adapted to effectively cooperate with either rigid receptacles formed of metal, glass or the like, or with relatively non-rigid containers formed of paper or similar material, and which is most effectively vented to insure rapid discharge of the successive commodity batches by gravity and without waste.

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An additional object of our present invention is to provide an improved gravity filler nozzle which may be manufactured and sold at moderate cost for the purpose of dispensing accurately premeasured batches of diverse materials, and which functions automatically and with minimum attention.

These and other objects of the invention will be apparent from the following detailed description.

A clear conception of the features constituting our present improvement, and of the construction and operation of a commercial nozzle embodying the same, may be had by referring to the drawings accompanying and forming a part of this specification wherein like reference characters designate the same or similar parts in the various views.

Fig. 1 is a relatively large central vertical section through a typical commercial liquid batch dispensing nozzle showing the same cooperating with a fragment of a commodity supply tank to receive a batch of liquid therefrom, and also showing a fragment of a rigid receptacle about to cut off communication between the measuring chamber and the supply source;

Fig. 2 is a bottom view of the filling nozzle unit shown in Fig. 1, with the receptacle omitted;

Fig. 3 is a top view of the same filling nozzle unit shown in Figs. 1 and 2, but removed from the supply tank;

Fig. 4 is a transverse horizontal section through the same nozzle unit, taken along the line 4—4 of Fig. 1 and looking downwardly;

Fig. 5 is a somewhat reduced central vertical section through the nozzle assembly of Fig. 1, but showing the rigid receptacle diagrammatically and in the act of completely cutting off the liquid supply from the tank to the measuring chamber, but with the discharge valve still closed;

Fig. 6 is a section through the unit, similar to that of Fig. 5, but showing the liquid delivery valve wide open and discharging a batch of commodity to the rigid receptacle; and

Fig. 7 is a further reduced elevation of the nozzle unit with the liquid discharge valve wide open as in Fig. 6, and also showing an attachment

for opening the valve when filling non-rigid receptacles.

While the invention has been shown and described as being especially adapted for the specific purpose of dispensing measured batches of relatively thick fluent commodity such as whipping cream, the improvement is more generally applicable for diverse other purposes; and it is contemplated that specific descriptive terms used herein be given the broadest possible interpretation consistent with the disclosure.

Referring to the drawings, the typical improved liquid dispensing assemblage shown therein, comprises in general a main casing 9 having an upright elongated bore 10 in open communication at its upper end with a liquid supply source or tank 11, the casing being provided near its upper end with a rigid bridge piece 12 spanning the bore 10 and with an integral flange 13 which may be firmly clamped to the tank bottom by means of a clamping ring 14 and a ring nut 15; an elongated upright vent tube 17 mounted centrally of the casing bore 10 and having its opposite ends in open communication with the atmosphere while its medial portion is provided with a transverse vent opening 18, the tube 17 having a section 19 which is fixedly but detachably secured to the bridge piece 12 by a spring clip 20; a commodity discharge valve 22 rigidly attached to the lower extremity of the vent tube 17 and having a lower outer flange 23 and a cylindrical external surface 24 above and terminating at the flange 23; an elongated upright commodity measuring sleeve 26 slidable vertically within the casing bore 10 and having a closure cap 27 at its lower end cooperable with the valve flange 23 and surface 24 and engageable by the successive receptacles 28 to control the delivery of liquid from the internal batch measuring chamber 29 of the sleeve; a closure element 31 for the upper end of the sleeve 26 slidably cooperable with the vent tube section 19 to control the admission of liquid to the chamber 29 and to also control the opening and closing of the vent opening 18; a relatively light helical spring 32 interposed between the bridge piece 12 and the element 31 for constantly urging the latter toward a stop shoulder 33 formed on the tube section 19; and a heavier helical spring 35 embracing the casing 9 and coacting at its lower end with a flange 36 secured to the medial portion of the sleeve 26, while its upper end reacts against the fixed ring nut 15.

All of the parts of the assemblage are preferably formed of rust-resistant material such as stainless steel, and the bore 10 of the unitary main casing 9 should be formed so that the batch measuring sleeve 26 will have a snug sliding fit therein. The commodity supply tank 11 should be abundantly supplied with liquid 38 to a level constantly below the upper extremity of the vent tube 17, and this tank 11 which is normally rotatable about a vertical axis, has an annular series of the improved nozzle units suspended therefrom in equally spaced relation to each other. The rings 14 and nuts 15 clamp the casing flanges 13 within openings in the tank bottom through packing rings 39 so as to avoid possible leakage of liquid 38, and when once properly installed the casings 9 are not ordinarily removed from the tank 11 unless they become damaged. The filler mechanism with which the improved nozzle assemblages are cooperable, also embodies an annular series of receptacle elevating and lowering supports or platforms 40, one of which is located beneath and in vertical alinement with each of the liquid dispensing nozzles, and all of which are revolvable with the tank 11, in a well known manner.

The sectional central vent tube 17 of each unit which carries the control valve 22 at its lower end and which passes upwardly through the measuring chamber of the unit and above the liquid level in the tank 11, is normally fixedly suspended from the bridge piece 12 of the casing 9 by means of the spring clip 20, but may be freely downwardly removed together with the sleeve 26, cap 27, closure 31, and springs 32, 35 upon removal of this retaining clip 20. The annular valve 22 may be secured to the lower end of the vent tube in any convenient manner, and the upper end of this valve 22 is preferably tapered as shown so that the valve will readily center itself within the bore of the closure cap 27 when closing, while the lower end of the valve 22 is oppositely tapered so as to insure ready entry of the valve within the open ended receptacles 28. The batch measuring sleeve 26 which is reciprocable within the casing bore 10 and which is constantly urged downwardly by the stiff spring 35, has its downward motion arrested by the flange 23 of the adjacent valve 22 as illustrated in Fig. 1, and the lower closure cap 27 should be sealed against possible leakage and has a lower annular lip 42 cooperable with the receptacle opening and is also provided with vent grooves 43 as shown in Figs. 1 and 3.

When the discharge valve 22 of each nozzle unit is closed, the upper closure element 31 rests against the vent tube shoulder 33 and seals the opening 18 as depicted in Fig. 1, and while the weight of this element 31 may be relied upon alone to thus close the vent opening 18, as in Fig. 7, a light helical spring 32 may also be provided for this purpose. This upper closure element 31 is adapted to engage the upper end of the sleeve 26 and to seal the chamber 29 from the interior of the tank 11 when the sleeve is initially elevated by a receptacle 28 and before the valve 22 is opened as in Fig. 5, and the sleeve 26 is also adapted to finally lift the closure element 31 so as to uncover the vent opening 18 whenever a measured batch of liquid is being discharged from the chamber 29. This unsealing of the vent opening 18 after the upper end of the sleeve 26 has been sealed from the liquid supply source quickly vents the chamber 29 to the ambient atmosphere through the upper extremity of the vent tube 17, and the interior of the sleeve elevating receptacle is simultaneously vented upwardly through the entire length of the tube 17.

While rigid metal receptacles 28 such as shown in Figs. 1, 5 and 6 are adapted to directly engage the lower caps 27 of the sleeves 26 so as to elevate the latter and to compress the springs 32, 35; non-rigid receptacles may also be handled by the improved nozzle units by utilizing an attachment such as shown in Fig. 7. In this assemblage, the sleeve and receptacle lifting and lowering supports 40 are caused to cooperate with the sleeves 26 of the corresponding nozzles through one or more rigid rods 45 coacting with brackets 46 firmly secured to the sleeves adjacent to the rigid flanges 36 thereof. Each of the rods 45 is of a length adapted to accommodate the height of the particular type of non-rigid receptacle being handled, and the rods 45 are detachably secured to the brackets 46 by means of clamping nuts 47 so that they may be readily replaced by

shorter or longer rods 45 whenever the type of receptacle is altered.

During normal operation of the receptacle filling machine, and after the improved nozzle units have been properly installed, the supply tank 11 should be abundantly supplied with liquid 38, and this tank and the receptacle supports 40 should thereafter be simultaneously revolved about the central vertical tank axis. The successive receptacle supports 40 will then be disposed in axial alinement with the adjacent nozzle assemblages and will rise and drop to elevate and lower the receptacles 28 which are delivered in succession thereto, in a well known manner.

When each liquid dispensing nozzle is in the position illustrated in Fig. 1, the batch measuring chamber 29 thereof is in open communication at its upper end with the liquid supply source and the commodity has then filled the chamber 29, while the empty receptacle has just been elevated into contact with the lower closure cap 27 of the sleeve 26. As the assemblage advances from the position of Fig. 1 to that shown in Fig. 5, the receptacle 28 will have been further elevated to lift the sleeve 26 sufficiently so as to engage the upper closure element 31, thus cutting off the source of liquid supply while still maintaining the vent opening 18 and the discharge valve 22 closed. Further advancement of the assemblage to the position depicted in Fig. 6, will cause the rising receptacle 28 to lift the sleeve 26 and the closure element 31 so as to simultaneously open both the upper vent opening 18 and the lower valve 22, thus permitting the measured batch of liquid 38 to gravitate freely into the receptacle while the air from within the latter escapes through the vent tube 17 and along the grooves 43. The upper spring 32 constantly urges the element 31 downwardly toward the upper end of the sleeve 26 and toward the abutment 33, and the lower spring 35 likewise constantly urges the sleeve 26 toward the receptacle support 40, so that the nozzle unit will be automatically restored to the position of Fig. 1, after each filling operation has been completed.

In this manner, the successive receptacles 28 are supplied with accurately pre-measured batches of the liquid commodity 38, in rapid succession without producing foaming of the liquid, or wasting commodity. In order to clean the various parts of each nozzle unit, it is only necessary to remove the single clip 20 whereupon the vent tube 17, valve 22, sleeve 26, and the springs 32, 35 are freely downwardly removable from the casing 9; and the parts may obviously be just as conveniently and quickly reassembled after cleaning has been effected. The lower closure cap 27 may also be readily removed from the sleeve 26 whenever necessary or desirable, and the relatively few simple parts of the unit may be accurately machined to insure most efficient operation. The capacity of the measuring chambers 29 may also be varied by applying sleeves 26 and lower vent tube sections of different lengths, and non-rigid receptacles may also be filled with the aid of the attachment shown in Fig. 7, thus making the units extremely flexible in adaptation.

From the foregoing detailed description of the construction and operation of our device, it will be apparent that we have in fact provided an improved liquid dispensing nozzle which besides being simple, compact and durable in construction, is also highly efficient in operation and adapted for diverse uses. The improved unit functions automatically to accurately measure and to rapidly deliver the successive batches of fluent commodity, without attention on the part of an operator, and may be maintained in highly sanitary condition wtih little effort. The improvement has gone into very successful commercial use especially when handling commodity such as whipping cream, and the nozzle units may be manufactured in quantity at moderate cost and effectively eliminate messy conditions due to leakage of the liquid.

It should be understood that it is not our desire to limit this invention to the exact details of construction or to the precise mode of operation of the nozzle units herein specifically shown and described, for various modifications within the scope of the appended claims may occur to persons skilled in the art.

We claim:

1. In a filling nozzle for delivering fluent commodity from a supply tank to successive receptacles movable toward and away from the tank during the receptacle filling operation, a casing having an upright bore communicating at its upper end with the supply tank, an upright tube fixedly mounted centrally of said casing bore and having its medial portion near the adjacent tank bottom provided with a transverse vent opening while its upper end above the level of the commodity and its lower end are in open communication with the atmosphere, a commodity discharge valve having a cylindrical surface and being fixedly suspended from the lower open end of said fixed tube, a commodity measuring sleeve slidable within said bore in spaced relation to said tube and having a lower end closure provided with a bore slidably cooperable with said cylindrical discharge valve surface, and a closure element engageable with the upper end of said sleeve and being slidably cooperable with said tube and co-acting with said opening to open the latter when said valve is opened to discharge commodity from said sleeve.

2. In a filling nozzle for delivering fluent commodity from a supply tank to successive receptacles movable toward and away from the tank during the receptacle filling operation, a casing having a downwardly directed bore communicating at its upper end with the supply tank, an elongated tube fixedly mounted centrally of said casing bore and having its medial portion near the adjacent tank bottom provided with a transverse vent opening while its upper end above the level of the commodity and its lower end are in open communication with the atmosphere, a commodity discharge valve having a cylindrical outer surface and being fixedly suspended from a lower portion of said fixed tube, a commodity measuring sleeve slidable within said bore in concentrically spaced relation about said tube and having a lower end closure provided with a bore slidably cooperable with said cylindrical surface to open and close said valve, and a closure element engageable with the upper end of said sleeve and being slidably cooperable with said tube and movable by said sleeve off of said opening to vent the interior of said sleeve when said valve is opened to deliver commodity from the sleeve.

3. In a filling nozzle for delivering fluent commodity from a supply tank to successive receptacles movable toward and away from the tank during the receptacle filling operation, a casing having a bore communicating at its upper end with the supply tank, an elongated tube fixedly mounted centrally of said casing

bore and having its medial portion near the adjacent tank bottom provided with a shoulder and a vent opening while its upper end above the level of the commodity and its lower end are in open communication with the atmosphere, a cylindrical commodity discharge valve fixedly suspended from a lower portion of said fixed tube, a commodity measuring sleeve slidable within said bore and having a lower end closure provided with an auxiliary bore slidably cooperable with said cylindrical valve, and a closure element normally resting upon said shoulder but being slidable on said tube and engageable with the upper end of said sleeve and being movable by the sleeve along said tube away from said shoulder and said opening to vent the interior of said sleeve whenever said valve is opened to deliver commodity from the nozzle.

4. In a filling nozzle for delivering fluent commodity from a supply tank to successive receptacles movable toward and away from the tank during the receptacle filling operation, a casing fixed to the tank and having a bore communicating at its upper end with the commodity supply, an elongated vent tube fixedly but detachably mounted centrally of said casing bore and having its medial portion near the adjacent tank bottom provided with a vent opening while its upper end above the level of the commodity and its lower end are in open communication with the atmosphere, a commodity discharge valve suspended from the lower open end of said tube and having a bottom flange and a cylindrical portion rising from the flange, a commodity measuring sleeve slidable within said bore and having a lower end closure engageable with said flange and provided with an auxiliary bore slidably cooperable with said cylindrical valve portion, and a closure element engageable with the upper end of said sleeve and being slidably cooperable with said tube to expose said opening to the atmosphere when said valve is opened.

5. In a filling nozzle for delivering fluent commodity from a supply tank to successive receptacles movable toward and away from the tank during the receptacle filling operation, a casing fixed to the tank and having a bore communicating at its upper end with the commodity supply, an elongated vent tube fixedly but detachably mounted centrally of said casing bore and having its medial portion near the adjacent tank bottom provided with a vent opening while its upper end above the level of the commodity and its lower end are in open communication with the atmosphere, a commodity discharge valve suspended from the lower open end of said tube and having a bottom flange and a cylindrical portion rising from the flange, a commodity measuring sleeve slidable within said bore and having a lower end closure engageable with said flange and provided with an auxiliary bore slidable cooperable with said cylindrical valve portion, a closure element engageable with the upper end of said sleeve and being slidably cooperable with said tube to expose said opening to the atmosphere when said valve is opened, and means for detachably connecting the tube to said casing to normally cause said tube and valve to support said sleeve and closure element.

6. In a filling nozzle for delivering fluent commodity from a supply tank to successive receptacles movable toward and away from the tank during the receptacle filling operation, a casing having a bore communicating at its upper end with the supply tank, an upright tube fixedly disposed centrally of said casing bore and having its medial portion near the adjacent tank bottom provided with a vent opening while its upper end above the level of the commodity and its lower end are in open communication with the atmosphere, means for detachably securing the upper portion of said tube to said casing, a commodity discharge valve suspended from the lower open end of said tube and having an outwardly projecting annular flange, a commodity measuring sleeve slidable within said bore and having a lower end closure cooperable with said valve flange to support the sleeve, and a closure engageable with the upper end of said sleeve and being slidably cooperable with said tube to vent the interior of said sleeve whenever said valve is opened, said tube and said sleeve being freely downwardly removable from within said casing upon release of said securing means.

7. In a filling nozzle for delivering fluent commodity from a supply tank to successive receptacles movable toward and away from the tank during the receptacle filling operation, a casing having a bore communicating at its upper end with the supply tank, an upright tube fixedly disposed centrally of said casing bore and having its medial portion near the adjacent tank bottom provided with a vent opening while its upper end above the level of the commodity and its lower end are in open communication with the atmosphere, means for securing said tube to said casing, a commodity discharge valve fixedly suspended from the lower open end of said fixed tube and having an outward projection thereon, a commodity measuring sleeve slidable within said bore and having a lower end closure cooperable with said valve projection, resilient means constantly urging said sleeve toward said projection, and a closure engageable with the upper end of said sleeve and being cooperable with said tube opening to vent the interior of said sleeve whenever said valve is opened.

8. In a filling nozzle for delivering fluent commodity from a supply tank to successive receptacles movable toward and away from the tank during the receptacle filling operation, a casing having a bore communicating at its upper end with the supply tank, an upright tube fixedly disposed centrally of said casing bore and having its medial portion near the adjacent tank bottom provided with a vent opening while its upper end above the level of the commodity and its lower end are in open communication with the atmosphere, means for securing said tube to said casing, a commodity discharge valve suspended from the lower open end of said tube and having an outward projection thereon, a commodity measuring sleeve slidable within said bore and having a lower end closure cooperable with said valve projection, resilient means constantly urging said sleeve toward said projection, and a closure engageable with the upper end of said sleeve and being slidably cooperable with said tube to vent the interior of said sleeve whenever said valve is opened, said tube and said sleeve and said closure being freely downwardly removable through said casing upon release of said securing means.

9. In a filling nozzle for delivering fluent commodity from a supply tank to successive receptacles movable toward and away from the tank during the receptacle filling operation, a

casing having a bore communicating at its upper end with the supply tank, an elongated tube fixedly disposed centrally of said casing bore and having its upper end above the level of the commodity and its lower end in open communication with the atmosphere, a commodity discharge valve fixedly secured to the lower open end of said fixed tube and having an external flange and cylindrical surface, a commodity measuring sleeve slidable within said bore and having a lower end closure provided with a bore slidable along said surface and being cooperable with said valve flange, a spring surrounding said sleeve and coacting with said casing to urge the sleeve toward said flange, and a closure element engageable with the upper end of said sleeve and being slidably cooperable with said tube to vent the interior of the sleeve whenever said valve is opened.

10. In a filling nozzle for delivering fluent commodity from a supply tank to successive receptacles movable toward and away from the tank during the receptacle filling operation, a casing having a bore communicating at its upper end with the supply tank, an upright tube fixedly disposed centrally of said casing bore and having its upper end above the level of the commodity and its lower end in open communication with the atmosphere, securing means attaching said tube to said casing, an externally flanged commodity discharge valve suspended from the lower open end of said tube, a commodity measuring sleeve slidable within said bore and having a lower end closure cooperable with the external flange of said valve, spring means for urging said sleeve toward said flange, and a downwardly urged closure engageable with the upper end of said sleeve and being slidably cooperable with said tube, said tube and said casing and said closure being freely downwardly removable through said bore upon release of said securing means.

11. In a filling nozzle for delivering fluent commodity from a supply tank to successive receptacles movable toward and away from the tank during the receptacle filling operation, a casing having a bore communicating with the supply tank, an upright tube fixedly disposed centrally of said casing bore and having its medial portion near the adjacent tank bottom provided with a vent opening while its opposite ends are in open communication with the atmosphere, means for securing said tube to said

casing, a commodity discharge valve fixedly suspended from the lower open end of said fixed tube and having an external flange, a commodity measuring sleeve slidable within said bore and having a lower end closure cooperable with said valve flange, resilient means constantly urging said sleeve toward said flange, and a weighted closure engageable with the upper end of said sleeve and being slidably cooperable with said tube to vent the interior of said sleeve whenever the sleeve is lifted to open said valve.

12. In a filling nozzle for delivering fluent commodity from a supply tank to successive receptacles, a rigid receptacle support connected to said tank and mounted for rotational movement therewith and also for vertical movement toward and from the tank during filling operation, a casing having a bore communicable with the supply tank, an upright tube fixedly disposed centrally of said casing bore and having its opposite ends in open communication with the atmosphere, a commodity discharge valve fixedly suspended from the lower end of said fixed tube and having a cylindrical outer surface, a commodity measuring sleeve slidable within said bore and having a lower closure bore cooperable with said valve surface, means for constantly urging said sleeve downwardly to close said valve, and a rigid connection between the receptacle raising support and said sleeve for moving the latter upwardly to open said valve when delivering commodity to non-rigid receptacles.

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