Feb. 17, 1953 R. E. BODENDOERFER 2,628,759

RECEPTACLE FILLER

Filed Oct. 21, 1947 2 SHEETS—SHEET 1

Fig. 1.

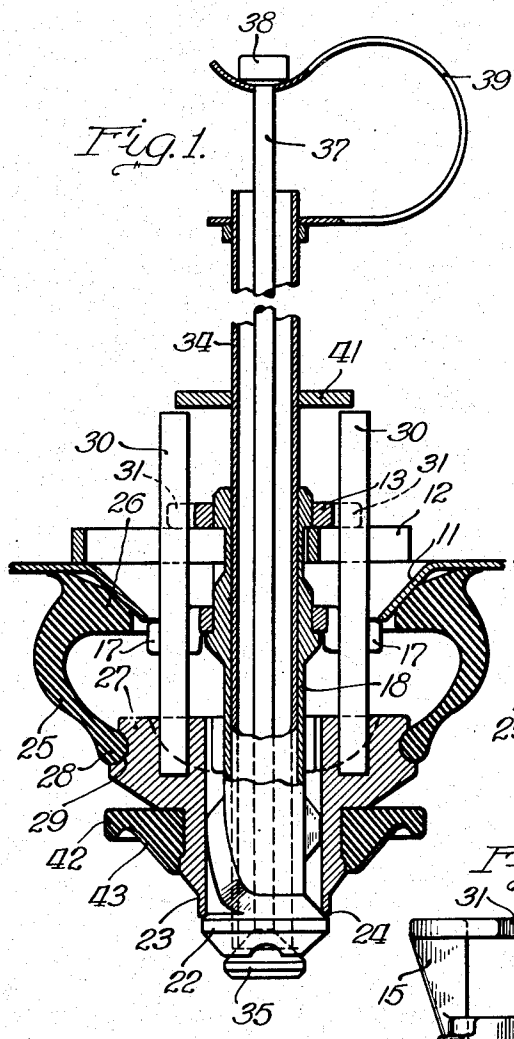


Fig. 11.

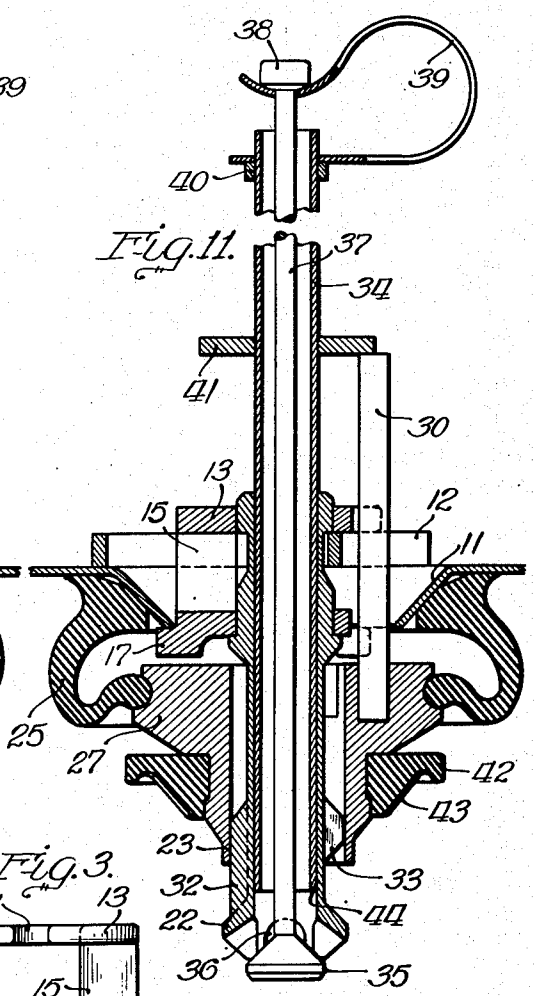


Fig. 3.

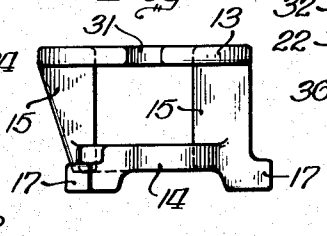


Fig. 2.

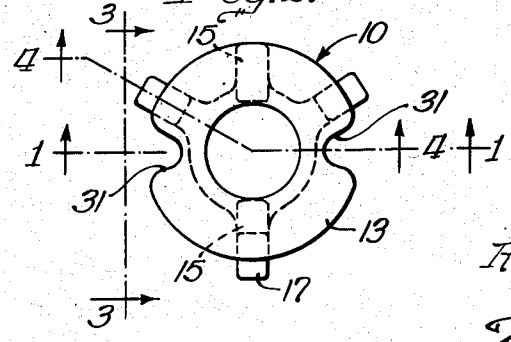
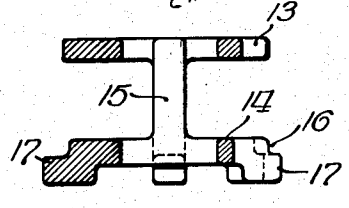


Fig. 4.



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RECEPTACLE FILLER

Filed Oct. 21, 1947 2 SHEETS—SHEET 2

Fig. 5.

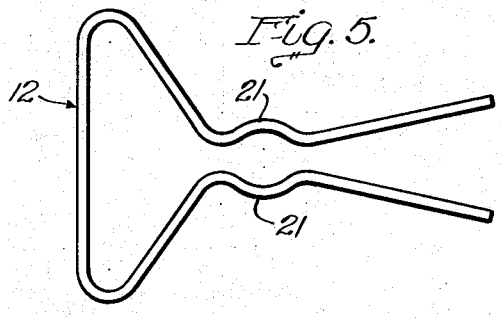
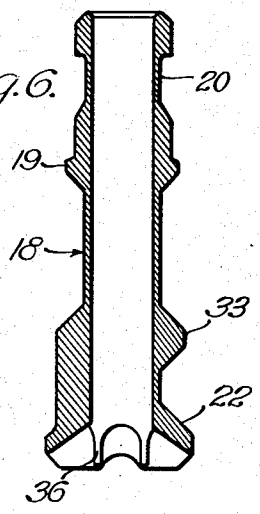


Fig. 6.



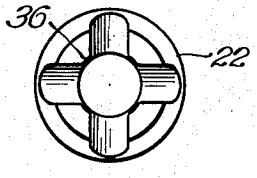


Fig. 7.

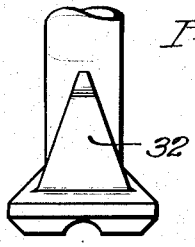


Fig. 8.

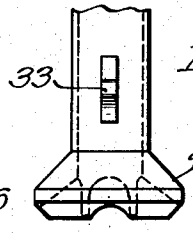


Fig. 9.

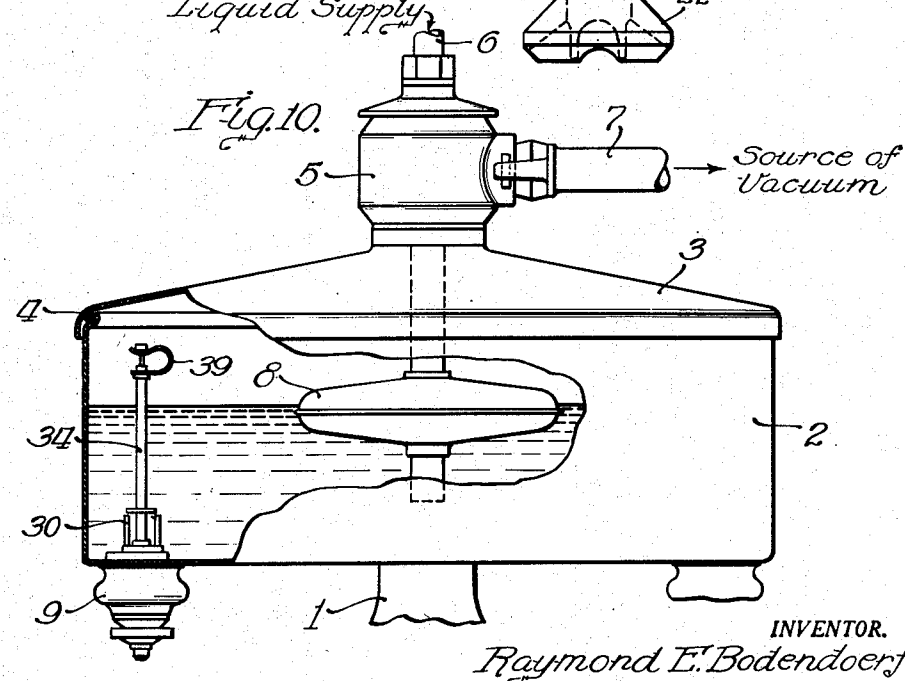


Fig. 10.

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Patented Feb. 17, 1953 2,628,759

UNITED STATES PATENT OFFICE

2,628,759

RECEPTACLE FILLER

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Application October 21, 1947, Serial No. 781,203

4 Claims. (Cl. 226—124)

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This invention relates to improvements in a device for filling receptacles, such, for example, as milk bottle containers.

The objects of this invention include the provision of improvements in a container filling machine, and the provision of improvements in the filling head therefor.

In the conventional type of bottle fillers, particularly milk bottle fillers, liquid is discharged from a reservoir through a filling head associated with an aperture in the lower wall of the reservoir. Such filling heads commonly include telescoped tubular liquid passages, which are extended one upon another to engage a valve element to seal the end of the thus formed liquid passage. In some instances, the liquid passage consists of a resilient bellows adapted to be sealed to a liquid supply tank about an aperture in the tank and to be sealed against a fixed valve element. In some instances a resilient bellows and a valve seat element are adapted to engage a fixed valve to seal the liquid passage with which they are associated.

Such types of valves are conventionally provided with bottle gasket or bottle seal elements to seal the discharge end of the valve against the mouth of a bottle or other type of container during the filling operation. Commonly, such valves are provided with vent tubes, through which the air, normally contained in the bottle at the commencement of the filling operation, may escape. The air usually escapes into the supply reservoir at an elevation above the level of the liquid in the reservoir. In such instances, in which such types of valves are used on a gravity type of container filling machine or on a vacuum type of container filling machine, it will be noted that upon the completion of the filling of the respective container liquor usually rises in the vent tube to the level of the liquid in the supply reservoir. When the filled container is removed from the filling valve, the liquid which has risen in the vent tube either drains therefrom into the container or, in the instance of vacuum type fillers, a portion of the liquid may be drawn through the vent tube into the liquid reservoir. In either instance, a portion of the liquid usually tends to drain from the vent tube into the already filled container.

To prevent such drainage, vent tube elements are frequently provided with valves, whereby to close the lower end of the respective vent tubes prior to the withdrawal of the filled container from the filling head. By this expedient, it is intended to prevent the over-filling of liquid into

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a container, or, in the instance of vacuum type container fillers or combined gravity-vacuum type container fillers, to prevent the withdrawal of excessive quantities of liquid from the filled container before the filling head is entirely withdrawn from the mouth of the container.

It has also been found that in the use of many types of filling heads for receptacle fillers, the frequently recurring task of assembling and disassembling the filling heads incidental to the cleaning operations, is quite sizable. This results from the fact that in most instances the means for attaching the filling heads to the liquid supply reservoir are rather cumbersome.

The primary objects of this invention, therefore, are to provide an improved container filler, usable as a gravity type container filler or usable as a vacuum type container filler or usable as a combined gravity vacuum type container filler, and improvements in the filling heads; in which each of the filling heads is provided with a fixed valve for the liquid discharge tube and a fixed valve for the air vent tube, in each of which filling heads there is provided an arrangement for establishing comparable movement between the liquid discharge tube and the air vent tube whereby to retract these tubes from their respective valves to thereby open the liquid discharge tube and to open the air vent tube substantially simultaneously and to effect the substantially simultaneous valve-engaging motion of the liquid discharge tube and the air vent tube; in which the valve may be substantially completely assembled as a unit prior to installation thereof in the liquid reservoir; in which the filling head is locked in position on the liquid supply reservoir by a single spring clip; and in which improved filling heads suitable guide means are provided to insure the proper relative reciprocatory motion between the valve elements and the liquid discharge tubes and the air vent tubes.

The foregoing and other objects of this invention will be more apparent, and will be more readily understood when read in connection with the drawings of the preferred embodiment of the present invention, which, without desire of limitation, will be described and illustrated as an improved type of milk bottle filler and filling heads therefor, in which:

Figure 1 is an elevational view, partially in section, of the preferred embodiment of an improved filling head, mounted in operative position in the lower wall of a liquid supply reservoir of a receptacle filler, and taken in a plane including line 1—1 of Figure 2 of the drawings.

Figure 2 is a plan view of the improved filling head support spider.

Figure 3 is an elevational view of the improved valve support spider, taken along line 3—3 of Figure 2 of the drawings.

Figure 4 is a sectional view, taken along line 4—4 of Figure 2 of the drawings.

Figure 5 is a plan view of an improved spring clip for retaining the improved filling head in operative position on a liquid reservoir.

Figure 6 is a sectional, elevational view of an improved tubular valve stem and the peripheral valve for the liquid dispensing tube of the improved filling head.

Figure 7 is a view of the lower surface of the improved tubular valve stem and valve shown in Figure 6 of the drawings.

Figure 8 is a partial, elevational view of the left-hand side of the improved tubular vent stem of Figure 6 of the drawings, illustrating the liquid deflector positioned above the peripheral valve element.

Figure 9 is a partial, elevational view of the right-hand side of the tubular valve stem shown in Figure 6 of the drawings, illustrating the peripheral bearing element positioned above the peripheral valve.

Figure 10 is an elevational view, partially in broken-away section, of the reservoir for liquid supply for the improved container filler, equipped with the improved type of filling head.

Figure 11 is an elevational view, partially in section, and comparable to the view shown in Figure 1 of the drawings, but taken in a plane including line 4—4 of Figure 2 of the drawings and illustrates the improved filling head with the valves in open position.

Referring to the drawings, in which like numerals are used to identify like elements, 1 represents a rotatable support for a supply reservoir 2 for milk or other liquid to be filled into containers, as illustrated in Figure 10 of the drawings. Reservoir 2 is provided with a lid or cover 3 resting on the gasket 4, placed about the mouth of the reservoir or tank 2, whereby to seal the tank cover 3 to the tank 2. The cover 3 is provided, centrally thereof and in axial alignment with the rotatable support 1, with a combined rotary fluid coupling 5 provided, having an axial inlet conduit 6 for the milk or other liquid to be supplied to the reservoir 2 and also having a peripheral discharge conduit 7 for connection to a suitable source of vacuum. The milk or other liquid supplied under the desired pressure from a suitable source of supply (not shown) through conduit 6 enters the liquid supply tank 2 through the float valve 8, whereby a predetermined level of the body of liquid in the reservoir 2 may be maintained. The predetermined pressure condition, such as sub-atmospheric pressure, may be maintained in the reservoir 2 above the level of the liquid therein by means of the connection 7 and a suitable source for the development and maintenance of the desired degree of pressure or vacuum (not shown).

As clearly illustrated in Figure 10 of the drawings, the tank 2 is preferably provided with a plurality of filling heads 9 communicating through ports or apertures in the lower wall of the reservoir with the interior portion of the reservoir containing the supply of liquid to be filled into the containers or receptacles. Upon an inspection of the broken-away portion of Figure 10 of the drawings, it is also apparent that each filling head 9 is provided with a vent tube

or stem, the upper end of which extends above the level of the liquid in the reservoir 2, thereby permitting the venting of air or other gases from the container being filled through the filling head 9 into the space above the level of the liquid in the reservoir 2, which space is preferably maintained under vacuum.

The improved filling head comprises a support spider 10 fitted into the reservoir 2 through an aperture in the lower wall thereof, defined by a downwardly directed flange 11. The spider 10 which is adapted to align itself in an associated filling head aperture is supported in fixed position and in axial alignment with an aperture in the lower wall of the reservoir 2 by a spring clip 12. The spring clip 12 extends through the spider 10 and engages the lower surface of the upper bearing element 13 thereof. A lower bearing element 14 of the spider 10 is supported in spaced relation to the upper bearing 13 by a plurality of spacers 15. The lower bearing 14 is provided with radially extending gripping arms 16, adapted to engage the inner edge of the downwardly and inwardly directed flange 11, defining the aperture in the lower wall of the reservoir 2. The engagement of the arms 16 and the inner edge of the flange 11 assures the automatic axial alignment of the spider 10 in the aperture defined by flange 11. Outwardly extending fingers 17 on the radial arms 16 overlap and engage the lower surface of the lower wall of the tank 2 about the aperture defined by the flange 11. By virtue of this arrangement the spider 10 is maintained in fixed position, and axial or lateral motion of the spider with respect to the flange 11 is prevented.

A tubular valve stem 18 is telescoped through the central apertures in and is supported by the support spider 10. A peripheral flange 19 near the upper end of the tubular valve stem 18 engages the lower face of the lower bearing element 14 of the spider 10. A peripheral groove 20 in the outer surface of the upper portion of the tubular valve stem 18 is adapted to receive the constricted arms 21 of the clip pin 12. The assembly of the tubular valve stem 18 and the support spider 10 in the manner just described provides for the fixed support of the valve stem 18 in the spider 10 in such a fashion as to prevent any relative axial or lateral motion between the valve stem 18, the spider 10 and the flange 11 of the liquid supply tank 2.

An outwardly extending peripheral valve 22 is formed integrally with and provided at the lower end of the valve stem 18, and when in operative position is supported below the aperture defined by the flange 11. A liquid dispensing tube 23, provided at its lower end with the valve seat 24, is telescoped over the tubular valve stem 18 in such a fashion that the seat 24 may be urged into sealing engagement with the peripheral valve 22. A resilient, slightly compressed, bellows 25, having aligned upper and lower ports, is provided intermediate the upper end of the liquid dispensing tube 23, and the adjacent lower face of the liquid supply reservoir 2, to establish a liquid passage from the interior of the reservoir 2 into the upper end of the liquid dispensing tube 23. The bellows 25 is provided with a compound, beveled flange 26 around the upper port therein to sealingly engage the lower wall of the liquid supply tank 2 and the downwardly directed flange 11, which defines the aperture in the wall of the supply tank 2. The lower port in the bellows 25 is tensioned about an enlarged

peripheral flange 27 at the upper end of the liquid dispensing tube 23, with the bead 26 defining the lower port of the bellows 25 tensioned and seated in a peripheral groove 29 in the flange 27.

Upwardly extending guide studs 30, fixed in the upper surface of the liquid dispensing tube 23, extend upwardly through the aperture defined by the flange 11 in the lower wall of the supply tank 2 and also extend through the peripheral stud guide slots or indentations 31 in the upper bearing 13 of the spider 10. A peripheral, substantially triangular shaped, curved liquid deflector 32 is provided on the outer curved periphery of the lower portion of the tubular valve stem 18, with the base of the deflector overlapping a portion of the upper surface of the peripheral valve 22. The deflector 32 may either be formed integrally with the valve stem 18 or appropriately secured thereto. The deflector 32 is of a thickness and has the necessary configuration to establish substantial contact with the adjacent surface of the inner periphery of the liquid dispensing tube 23. By virtue of this arrangement, liquid, when discharged through the dispensing tube 23, will be deflected away from that portion of the peripheral valve 22 immediately below the deflector 32, as a result of which the liquid dispensed from the tube 23 will be discharged from the side thereof opposite the deflector 32. A peripheral bearing element 33 is provided on the outer periphery of the lower portion of the tubular valve stem 18, substantially opposite from the deflector 32. The bearing 33 is of such a depth as to establish substantial contact with the adjacent surface of the inner periphery of the liquid dispensing tube 23. It should be observed that the deflector 32, combined with the bearing element 33, constitutes guide means for maintaining axial alignment between the tubular vent stem 18 and the liquid dispensing tube 23, and the valve and valve seat elements associated therewith.

By virtue of the provision of the resilient, compressible bellows 25, intermediate the upper end of the liquid dispensing tube 23, and the lower surface of the liquid supply reservoir 2, the valve seat 24 of the tube 23 is continually urged toward sealing engagement with the upper surface of the peripheral valve 22 at the lower end of the tubular valve stem 18. However, upon a sufficient application of upward pressure on the dispensing tube 23, the compressed but resilient bellows 25 will be further compressed to permit the retraction of the valve seat 24 away from sealing position on the peripheral valve 22, thereby opening the lower end of the liquid dispensing tube 23. As previously pointed out, proper alignment between the relative reciprocatory motion of the discharge tube 23 and the peripheral valve 22 is further maintained by the interaction between the guide studs 30, fixed to the upper end of the dispensing tube 23, and the guide stud slots 31 in the upper bearing 13 of the spider 10, in which spider 10 the vent tube 18 is secured locked.

A tubular vent stem 34 is telescoped into the tubular valve stem 18 with the adjacent surfaces of the walls thereof in substantial bearing and sealing engagement. The vent tube 34, however, is freely reciprocable within the tubular valve stem 18, and is so arranged that when the improved filling head 9 is mounted for operation on the liquid supply reservoir 2, the upper end of the vent stem 34 extends above the level of the body of the liquid maintained in the reservoir 2 and the lower end thereof is extendable into sealing engagement with the vent tube valve 35, or retractable therefrom into the tubular valve stem 18. The vent tube valve 35 is positioned immediately below the lower end of the tubular valve stem 18 and the valve 22 associated therewith and having the upper surface of the vent tube valve 35 in engagement with the spacing elements 36, extending downwardly from the lower end of the valve stem 18. By this arrangement it is possible to maintain the adjacent surface of the vent tube valve 35 spaced from the lower surface of the peripheral valve 32 and the lower end of the tubular valve stem 18.

The spacing elements 36 are preferably formed by milled cuts, or the like, in the lower surface of the peripheral valve 22 and the lower end of the tubular valve stem 18, with the face of the cut in the lower surface of the peripheral valve 22 extending upwardly and inwardly. This arrangement produces an undercut surface with respect to the peripheral valve 22, whereby to prevent the easy flow of liquid from the outer surface of the peripheral valve onto the milled portions of the under surface therefor. The milled cuts as just described permit the escape of air intermediate the peripheral valve 22 and the vent valve 35 into the combined, or sectional, vent tube, preferably formed by telescoping the tubular valve stem 18 and the tubular vent stem 34. The vent tube valve 35 is supported in operative position in abutment against the spacers 36 at the lower end of the tubular valve stem 18 by the vent tube valve stem 37. Valve stem 37 is provided at its upper end with an enlarged head 38 to overlappingly engage one end of a partially compressed, U-shaped spring 39 with the arms of one of the bifurcated ends of the spring 39 extended over the valve stem 37 and in abutment with the lower face of the enlarged valve stem head 38 and the arms of the other end of the bifurcated compressed spring 39 extending about the upper end of the vent tube 34 and abutting against the upper face of the compression flange 40 fixed to the upper end of the vent tube 34. The obvious result of the use of the resilient coupling or partially compressed spring 39 in the manner just described will be that the head 38 of the valve stem 37 and the flange 40 of the tubular vent stem 34 will be urged apart, with the result that the vent tube valve 35 will be maintained in contact with the spacers 36 at the lower fixed end of the telescoped sectional vent tube, comprised of the fixed tubular valve stem 18 and the movable tubular vent stem 34, and the lower end of the tubular vent stem 34 will be urged toward sealing engagement with the upper surface of the vent tube valve 35.

The actuation of the reciprocal, tubular vent stem 34 to retract the lower end of the tubular vent stem 34 away from sealing engagement with the vent tube valve 35 against the pressure of the partially compressed spring 39 is produced by the engagement of the peripheral flange 41 on the outer periphery of the vent tube 34 by the upper end of the guide studs 30 upon the upward motion of the studs 30, which occurs upon the upward motion of the liquid dispensing tube 23. Upon the retraction of the liquid dispensing tube 23 toward sealing engagement with the peripheral valve 22 and the corresponding downward motion of the guide studs 30, the compressed spring coupling 39 intermediate the upper end of the vent tube 34 and the upper end of the valve stem 37 will produce a downward motion of the vent tube 34 corresponding to the downward motion of the

liquid dispensing tube 23 until the vent tube valve seat 44 at the lower end of the vent tube 34 is again seated in sealing engagement upon the upper face of the vent tube valve 35.

The filling head 9 is provided with a resilient, preferably rubber, apertured bottle gasket 42, which is telescoped snugly over the outer periphery of the liquid dispensing tube 23, slightly above the valve seat 34, with the upper surface of the bottle gasket abutting against the lower adjacent surface of the peripheral flange 27 on the liquid dispensing tube 23. The lower surface of the bottle gasket 42 is provided with spaced indentations separated by intermediate and slightly raised ribs 43. This lower surface comprised of the indentations and spaced ribs 43 is deformable under pressure of the mouth of a container placed into filling position below the filling head 9 to fit closely to the mouth or adjacent surface of the container to be filled. As a result of such deformation of the lower surface of the bottle gasket 42, during the bottle filling operation, the elastically biased ribs 43 will, upon the release of such pressure, resume their original configuration, thereby moving the surface of the mouth of the bottle away from the surface of the indentations in the gasket 42, to provide an air bleed into the mouth of the receptacle after the liquid valve 22 and the air vent valve 35 are both in sealing engagement with the respective valve seats at the lower ends of the liquid dispensing tubes 22 and the tubular vent stem 34.

In the normal operation of the improved filler, as hereinbefore described, a container to be filled is moved into filling position below a filling head 9 with the mouth thereof telescoped over the lower ends of the liquid passage and air vent passage formed by the lower ends of the tubular vent stem 34, the valve stem 18 and dispensing tube 23, until the mouth of the container is in abutment with the lower surface of the bottle gasket 42. Upon the subsequent raising of the container, the resilient ribs 43 and adjacent resilient surface of the intermediate indentations in the lower face of the bottle gasket 42 will be compressed, to thereby seal the filling head 9 to the mouth of the container. As the upward motion of the container continues, the liquid dispensing tube 23 will be extended upwardly, thereby removing the valve seat 24 from sealing engagement with the peripheral valve 22, to open the end of the liquid dispensing tube 23, whereby to permit the flow of liquid from the interior of the reservoir 2 through the aperture defined by the flange 11 in the lower wall of the tank 2 through the compressed bellows 25 and through the liquid dispensing tube 23 over a portion of the surface of the peripheral valve 22 into the container which has been placed in filling position.

Concurrently with the upward extension of the liquid dispensing tube 23, and as a result of the concurrent upward motion of the guide studs 30, which promptly after the commencement of such upward motion abut against the peripheral flange 41 on the outer surface of the tubular vent stem 34, the vent stem 34 is extended upwardly, thereby moving the vent tube valve seat 44 from sealing engagement with the vent tube valve 35, and simultaneously retracting the lower end of the vent tube 34 into the tubular valve stem 18, to thereby form the telescoped, sectional air vent tube of the telescoped tubular valve stem 18 and vent stem 34 communicating with the interior of the container while in filling position. The retraction of the vent stem valve seat 44 from the vent valve 35 occurs substantially simultaneously with the retraction of the liquid dispensing tube valve seat 24 from the peripheral valve 22. As soon as the lower end of the vent stem 34 is opened, air is permitted to flow from the interior of the container being filled through-between the vent valve 35 and the lower milled surface of the peripheral valve 22 into the vent tube, comprised of the telescoped sections of the tubular valve stem 18 and the vent stem 34. The air escaping from the container through the vent stem 34 is discharged into the upper portion of the liquid reservoir 2, which preferably is maintained under sub-atmospheric pressure by means of the connection of the exhaust conduit 7 to suitable source of vacuum.

Upon the completion of the filling of the container, the container is again lowered to withdraw the mouth thereof from about the lower end of the filling head 9. As the container is being lowered, the pressure of the mouth of the container upon the bottle gasket 42 is released, and the compressed bellows 25 again urges the liquid dispensing tube 23 downwardly, until the valve seat 24 is again in sealing engagement with the upper surface of the peripheral valve 22. Concurrently with the downward motion of the liquid dispensing tube 23 and the corresponding downward motion of the studs 30, the resilient coupling or spring 39 again produces a corresponding downward motion of the tubular vent stem 34 until the valve seat 44 at the lower end thereof is again in seating engagement with the upper surface of the vent tube valve 35. Upon the continued retraction of the filled container from the lower end of the filling head 9, and the continued release of the pressure of the mouth of the container upon the bottle gasket 42, the elastically biased, resilient ribs 43 thereof will again resume their original undeformed contour, thereby removing the mouth of the bottle from the surface of the indentations intermediate the ribs 43, whereby to provide an air bleed into the mouth of the filled container, to permit the ready withdrawal of the container from the filling head 9.

The applicant's invention provides a unique and novel improvement in a filling head adapted for use on either a gravity type of receptacle filler, a vacuum type of receptacle filler, or a combined gravity-vacuum type of receptacle filler. The unique arrangement of guide means in a bellows type of valve, whereby to aid in maintaining the alignment between the liquid dispensing tube and the remaining portions of the filling head during the operation thereof, and wherein portions of the guide mechanism are also used for the actuation of the improved type of vent tube, and the improved air vent sealing arrangement, constitute a novel departure from the conventional type of filling head, and an improvement in a filling head which may be easily assembled into operative position and easily disassembled for cleaning, and whereby accurate and sanitary filling of containers may be achieved.

Having thus described and illustrated the preferred embodiment of this invention in an improved apparatus for filling receptacles, and a filling head therethrough, the invention is not to be restricted to the specifically illustrated embodiment thereof, as set forth in the drawings and as heretofore described, except insofar as necessary by the prior art disclosures and the appended claims.

The invention is hereby claimed as follows:

1. In a receptacle filling apparatus of the class

described, the combination of an inner annular member, an intermediate annular member and an outer annular member forming an annular flow passage therebetween, inwardly disposed valve means and outwardly disposed valve means at one end of said intermediate annular member against which the inner and outer annular members are adapted to seat and with respect to which said inner and outer annular members are axially retractable concurrently in the same direction, attaching means whereby the flow passage between said outer and intermediate annular members may be retained in engagement with a source of flowable material, and means for concurrently retracting said inner and outer annular members substantially concurrently.

2. In a receptacle filling apparatus of the class described, the combination of an inner annular member, an intermediate annular member and an outer annular member forming an annular flow passage therebetween, inwardly disposed valve means and outwardly disposed valve means at one end of said intermediate annular member against which the inner and outer annular members are adapted to seat and with respect to which said inner and outer annular members are axially retractable concurrently in the same direction, attaching means whereby the flow passage between said outer and intermediate annular members may be retained in engagement with a source of flowable material, and means for concurrently retracting said inner and outer annular members substantially concurrently, said latter means comprising the combination of an external projection on said inner annular member and a pin interposed and engageable between said projection and said outer annular member.

3. In a receptacle filling apparatus of the class described, the combination of an inner annular member, an intermediate annnular member and an outer annular member forming an annular flow passage therebetween, inwardly disposed valve means and outwardly disposed valve means at one end of said intermediate annular member against which the inner and outer annular members are adapted to seat and with respect to which said inner and outer annular members are axially retractable concurrently in the same direction, attaching means whereby the flow passage between said outer and intermediate annular members may be retained in engagement with a source of flowable material, and means for concurrently retracting said inner and outer annular members substantially concurrently, said latter means comprising the combination of an external projection on said inner annular member and a pin interposed and engageable between said projection and said outer annular member, said pin and said projection being adjustable one with respect to the other to permit partial retraction of said outer annular member before commencing retraction of said inner annular member.

4. A receptacle filling apparatus comprising the combination of an elongated body having a longitudinal passage therethrough, an air vent tube of greater length than said elongated body telescopically engaged within said longitudinal passage and axially retractable therein, and an outer shell of reduced length with respect to said elongated body and engaged therearound to form a flow passage therebetween, said elongated body having a peripheral lip at one end thereof against which said outer shell is adapted to seat to form a discharge valve, said elongated body having engaged therewith at the same end as the peripheral lip a centrally disposed valve member against which said air vent tube is adapted to seat to form an air escape valve, said elongated body being provided at the end thereof remote from the respective valves with means for attachment of said body to a suitable container, said outer shell being provided with a resilient collar at the end thereof remote from the discharge valve, said collar being adapted to bear against a suitable container when the elongated body is attached thereto, said air vent tube being provided with an external lateral extension remot from the air escape valve end thereof, and said outer shell being provided with a longitudinal member extending toward and adapted to engage said lateral extension on the air vent tube whereby said tube is caused to retract concurrently and in the same direction as the outer shell when the latter is retracted.

RAYMOND E. BODENDOERFER.

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