

[54] **FILLER NOZZLE VAPOR SEAL AND COLLECTOR**

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[51] Int. Cl. **B65b 1/04, B65b 3/04, B67c 3/00**

[58] Field of Search **141/52, 287, 290, 312, 141/392**

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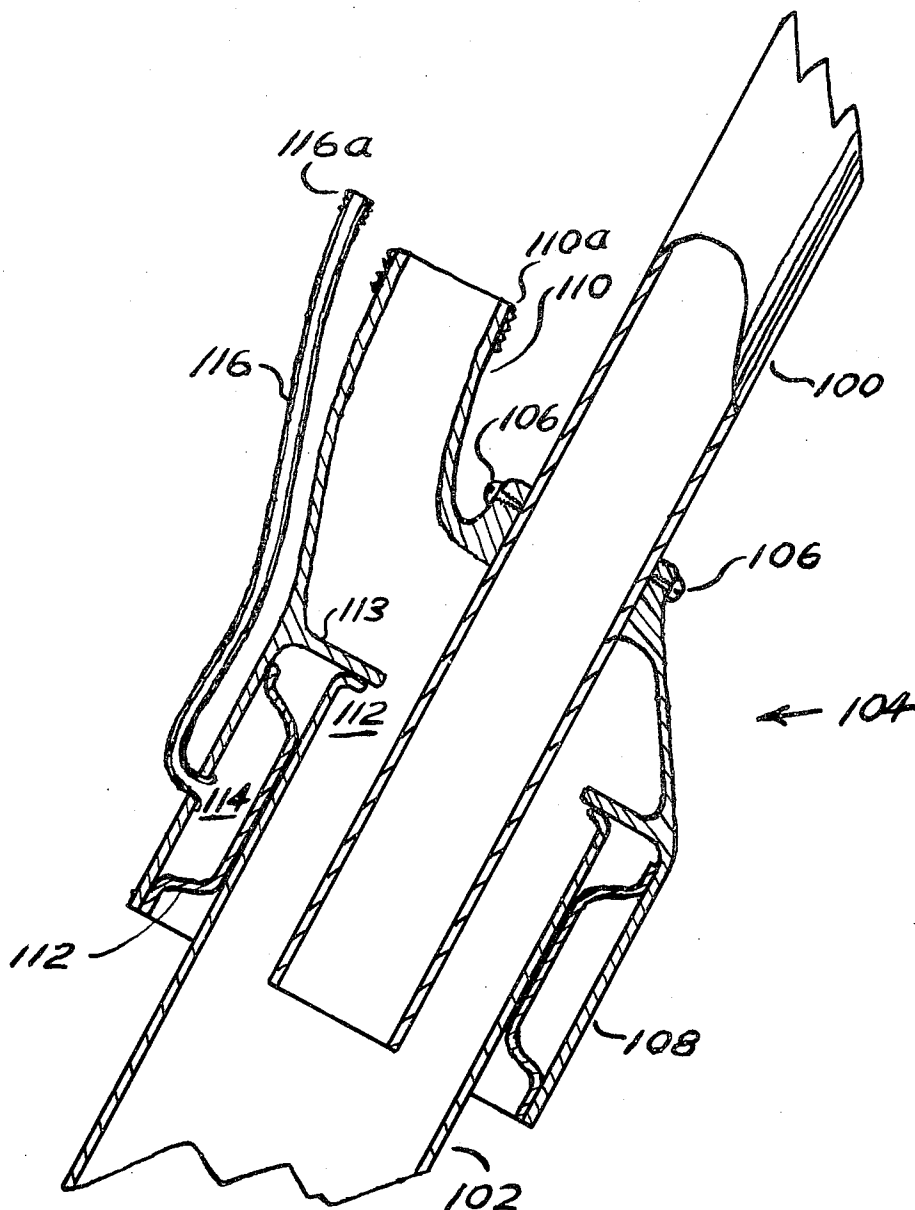
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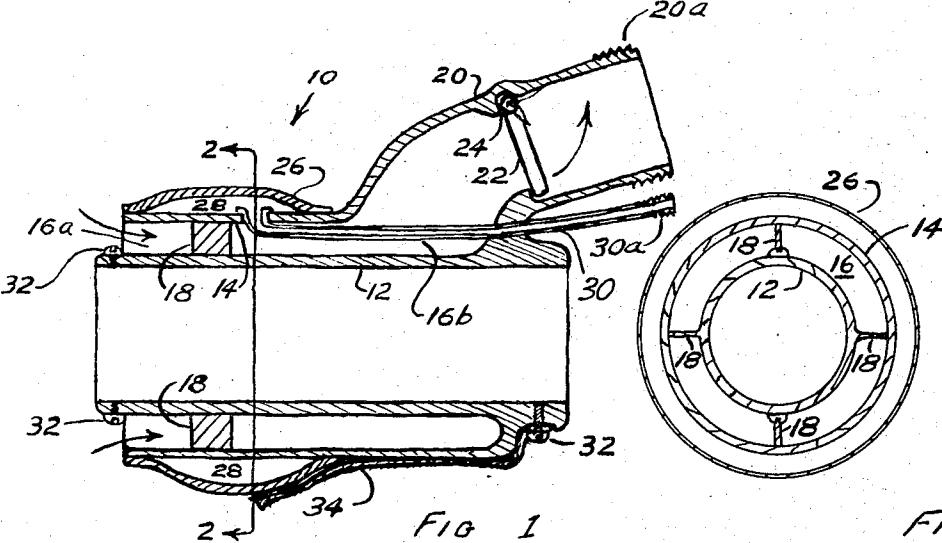
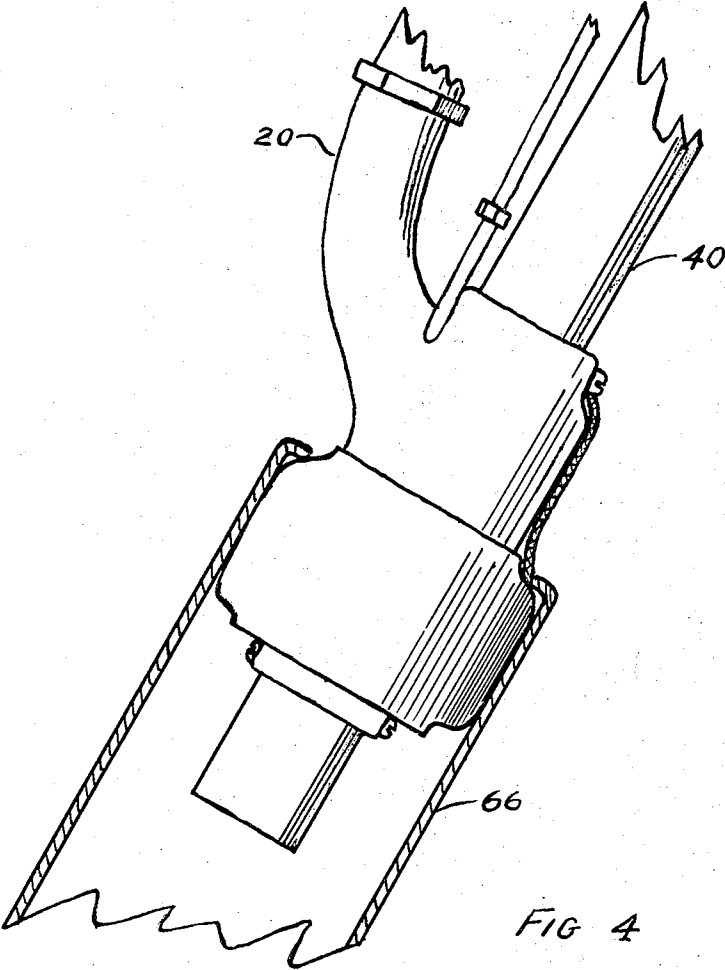
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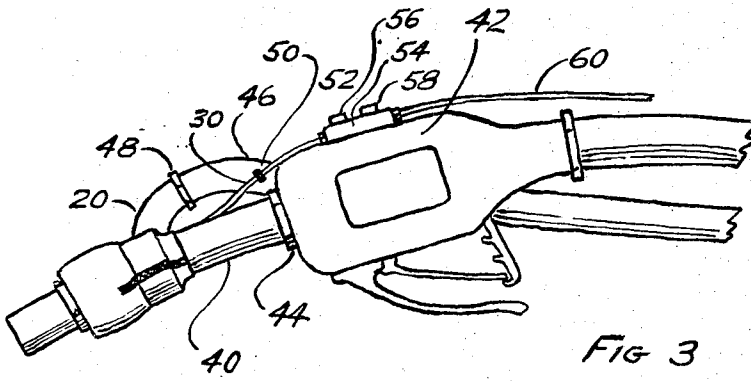
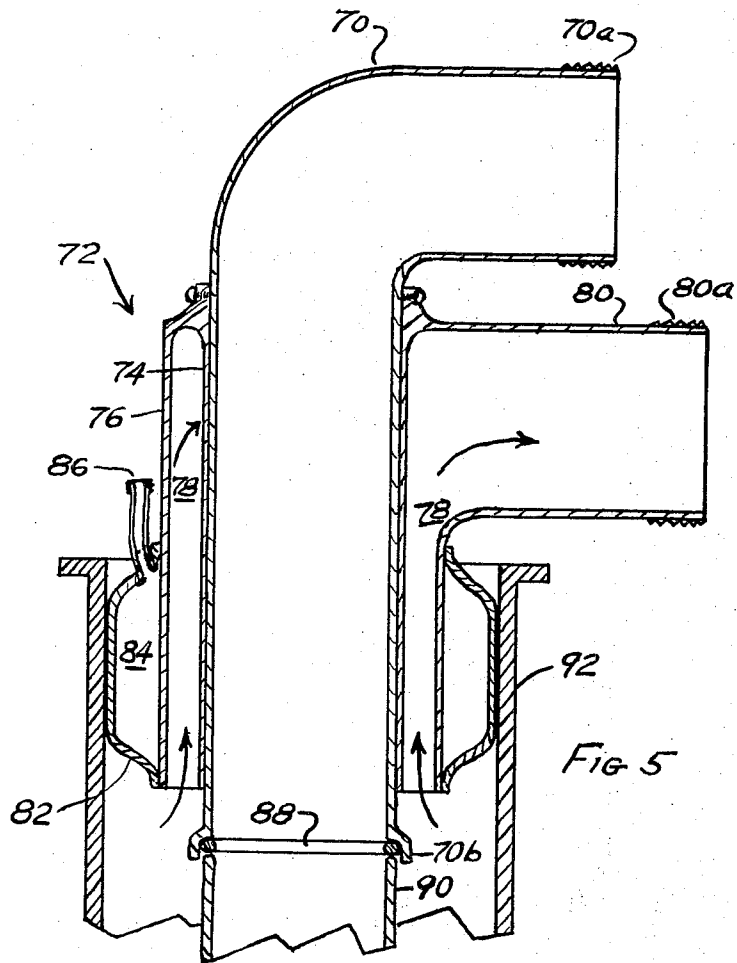
[57] **ABSTRACT**

A filler nozzle vapor seal and collector for use in filling gasoline tanks forms a positive seal with the tank to thereby prevent vapor escape and hold the nozzle firmly in position while filling.

2 Claims, 6 Drawing Figures



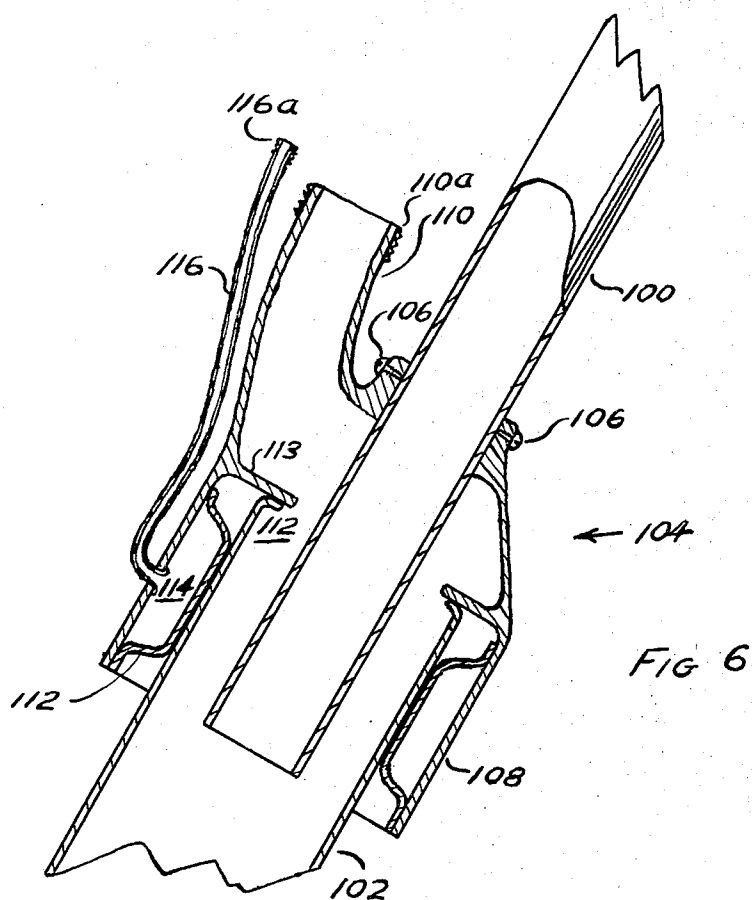




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FILLER NOZZLE VAPOR SEAL AND COLLECTOR**BACKGROUND OF THE INVENTION****A. Field of the Invention**

The invention relates to filler nozzles and comprises a filler nozzle vapor seal and collector for use in filling gasoline tanks.

B. Prior Art

Tanks which are to be filled from a reservoir which is not permanently connected to the tanks are generally provided with fill pipes into which a nozzle connected to the reservoir discharges a fluid with which the tank is to be filled. As the fluid fills the tank, it displaces air within the tank. The air is generally vented to the atmosphere and it carries with it vapors of the fluid being discharged into the tank. These vapors contribute to losses in the filling process; more importantly, however, when cumulated, they represent a significant source of pollution of the atmosphere. For example, each time an automobile gasoline tank is filled with fuel, a certain amount of the fuel escapes as vapor during the filling process and adds contamination to the atmosphere. Although the amount contributed during any individual filling is small, the amounts contributed by the filling of large numbers of automobiles, especially in major urban centers, is not insignificant. In addition to the air pollution caused by the filling of automobile gasoline tanks, that caused by the filling of industrial gasoline, chemical or other industrial type storage tanks also contributes to pollution, especially in crowded areas.

In industrial applications, the filler nozzle is often especially designed to mate closely with the filler pipe. This frees the attendant from the need for continually holding the filler nozzle in the fill pipe during filling. However, it does not significantly minimize the vapor escape from the tank since the same quantity of air must be displaced while filling the tank and thus the same quantity of vapor must ultimately escape.

In nonindustrial applications, such as in the filling of individual automobile gasoline tanks at retail gasoline stations, a variety of sizes and configurations of the gasoline fill pipes prevents a close mating of the filler nozzle and the fill pipe. Accordingly, there is somewhat more difficulty in maintaining the filler nozzle in the fill pipe independent of the attendant. Typically, a wire coil is placed around the filler nozzle and this coil is secured against the inner lip, if any, of the fill pipe. However, in some cases the inner lip is absent or is of insufficient depth to seat the coil and the filler nozzle sometimes slips, resulting in a loss of gasoline and further air pollution. Of course, even when the filler nozzle is properly held within the filler pipe, the gasoline vapors displaced by the incoming fuel are vented to the atmosphere and thereby contribute to pollution.

SUMMARY OF THE INVENTION**A. Objects of the Invention**

Accordingly, it is an object of the invention to provide an improved filler nozzle.

Further, it is an object of the invention to provide an improved gasoline filler nozzle.

Another object of the invention is to provide a filler nozzle that forms an effective vapor seal with a fill pipe into which the nozzle is thrust.

Yet a further object of the invention is to provide an improved filler nozzle that is readily adapted to firmly engage a large variety of fill pipes.

Yet a further object of the invention is to provide an improved filler nozzle vapor seal and collector.

BRIEF DESCRIPTION OF THE INVENTION

The filler nozzle vapor seal and collector of the present invention is adapted to surround the conventional cylindrical filler nozzle and has inner and outer cylindrical walls concentric with the filler nozzle and spaced apart from each other to form a generally hollow chamber between them. The forward end of this chamber is open to the passage of air or vapors, while the rearward end communicates with a vapor escape outlet through a check valve. A cylindrical segment of resilient material is positioned around the outer cylindrical wall and has its leading and trailing edges secured thereto to form a closed air chamber. Air is admitted into this chamber by means of a pressurizing line leading through a wall of the chamber.

The vapor seal and collector is positioned on the forward end of the filler nozzle, preferably not more than a few inches back from the discharge end of the nozzle. A vent line which is to carry the collected gasoline vapors from the tank being filled back to the collector (generally the collector will be the supply tank from which the fluid supply is being drawn) is connected to the vapor escape outlet and a source of pressurized air or other fluid is connected to the pressurizing line to thereby inflate the air chamber.

Initially, the air chamber is deflated so that the filler nozzle and the forward end of the vapor seal and collector containing the air chamber can be thrust into the fill pipe of the tank being filled. Thereafter, the air chamber is inflated. This presses the resilient walls firmly against the inner walls of the fill pipe and locks the nozzle firmly within the fill pipe, so that it will not dislodge itself; further, it forms a positive seal between the vapor seal and collector and the inner wall of the fill pipe, so that vapors displaced by the incoming liquid are constrained to pass through the vapor collector channel and thence back to the fluid source. Thus, pollution which would otherwise be caused by the escape of these vapors into the atmosphere is prevented.

A conductive metallic braid connected to the filler nozzle or other metallic portion of the filling mechanism extends over at least a portion of the resilient wall of the seal. Accordingly, when this wall expands against the inner wall of the fill pipe, the metallic braid is firmly pressed against the fill pipe to form a secure grounding path. This further increases the safety and utility of the vapor seal and collector described herein.

The vapor seal and collector of the present invention is advantageously applied as an adaptor to existing filler nozzles, and accordingly, this is the form described as the preferred embodiment herein. However, it may also advantageously be formed as a part of the nozzle itself and in this case, the inner wall vapor seal and collector may be formed by the nozzle wall itself.

DETAILED DESCRIPTION OF THE INVENTION

The foregoing and other and further objects and features of the present invention will be more readily understood from the following detailed description of the invention when taken in conjunction with the accompanying paragraphs in which:

FIG. 1 is a side sectional view of the vapor seal and collector of the present invention;

FIG. 2 is an end sectional view along the lines 2—2 of FIG. 1;

FIG. 3 is a view of the vapor seal and collector of FIG. 1 disposed on the filler nozzle of a conventional gasoline dispensing apparatus;

FIG. 4 is an enlarged view of the forward portion of the filler nozzle showing the nozzle positioned within the interior of a fill pipe;

FIG. 5 is a vertical sectional view of a filler pipe vapor seal and collector of a type suited to industrial applications; and

FIG. 6 is a view in sections of an alternative form of filler nozzle vapor seal and connector in accordance with the present invention.

In FIG. 1 and 2, a preferred embodiment of a filler nozzle vapor seal and collector which is especially adapted for fitting conventional filler nozzles is shown. It comprises an inner cylindrical wall 12 and an outer generally cylindrical wall 14 concentric with the inner wall and spaced from it to form a vapor passageway 16. Ribs 18 space the inner and outer walls apart. One end 16a of passageway 16 is open to admit vapor; the other end 16b communicates with a connector 20 having a threaded portion 20a for connection to a vapor venting line. A check valve 22, pivoted about a pivot 24, prevents return of the vented vapors.

A cylindrical segment 26 of a resilient material such as rubber is attached at its leading and trailing edges to the forward end of the vapor seal and collector 10. The segment 26 forms an air chamber 28 with the wall 14. Access is provided to chamber 28 by means of a fluid line 30 extending through the wall of connector 20, through a portion of the chamber 16, and thence through the wall 14 into the chamber 28. The line 30 has a threaded portion 30a for connection to a source of pressurized air or other fluid (not shown). Set screws 32, extending through the wall 12, fasten the vapor seal and collector 10 to a filler nozzle as shown in FIGS. 3 and 4. A braided grounding strap 34 extends from one of these screws to the resilient wall 26 and provides a ground path between the nozzle and a fill pipe when the nozzle is inserted into the fill pipe.

Referring now to FIG. 3, the vapor seal and collector 10 is shown positioned on the forward end of a conventional filler nozzle 40. Nozzle 40 is typically attached to a conventional filler nozzle handle 42 by a lock nut 44. The vapor escape connector 20 is coupled to a vapor venting line 46 by a coupling nut 48. Commonly, the line 46 leads to the tank or reservoir from which fluid is being supplied to the nozzle 40 and the vapor is thus returned to this tank. The line 30 is connected by a nut 50 to a line 52 which leads to a source of pressurized air or other fluid for inflating chamber 28 (FIG. 1). A control valve 54, shown secured on top of handle 41, is connected in series with the line 52. Valve 54 has a pair of valve actuators or buttons 56 and 58, respectively. Button 56, when depressed, connects line 52 to an air pressure line 60 which in turn is connected to a source of pressurized air or other fluid (not shown); this inflates chamber 28. Button 58, when depressed, vents the air in chamber 28 to the atmosphere and thus deflates the chamber.

FIG. 4 shows the vapor seal and collector of the present invention attached to the forward end of the nozzle 40 and positioned inside the entrance throat of a filler

pipe 66 leading to a fluid storage tank. The chamber 28 is shown inflated; this presses the wall 26 firmly against the interior wall of the fill pipe 66 to thereby seat the nozzle 40 in the fill pipe. Further, it seals the space between the exterior wall of the nozzle 40 and the interior wall of the fill pipe 66, and thus prevents the escape of vapors from the pipe. Accordingly, those vapors which are displaced by the fluid discharged into the fill pipe from the nozzle 40 are constrained to flow through the passageway 16 into the vapor escape connector 20 for transfer to a vapor collector.

Referring now to FIG. 5, the use of the vapor seal and collector of the present invention in connection with industrial filler nozzles is illustrated. As shown therein, a filler nozzle 70 has a vapor seal and collector connected around its forward end in accordance with the present invention. The vapor seal and collector 72 has the usual cylindrical inner wall 74 surrounding the nozzle 70 and outer wall 76 spaced from the inner wall and defining a vapor passageway 78 between the two walls. The outer wall 76 has a vapor escape connector 80 formed in it; the connector 80 has a threaded segment 80a for connection to a vapor collector. A resilient outer segment 82 is connected circumferentially around the wall 76 and forms an air chamber 84 which is inflated and deflated by means of an air line 86 extending through the wall of segment 82.

The nozzle 70 has a threaded portion 70a at one end for connection to a source of gasoline or other fluid and has a lip 70b at the other end. An O-ring seal 88 is fitted into this lip for mating with an inner fill pipe 90 which is positioned sufficiently far below the throat of an outer fill pipe 92 to allow the resilient wall 82 to fit within the outer fill pipe and forms a positive seal with it when chamber 84 is inflated. The pipe 90 extends to a point near the bottom of the tank being filled to enable a head of liquid to be maintained in the nozzle 70 and the inner fill pipe 90 and thus assists in drawing off the liquid at a rapid rate from the liquid source.

In operation, the lip 70b of nozzle 70 is fitted over the inner fill pipe 90. The chamber 84 is then inflated. This secures the nozzle 70 firmly within the outer fill pipe 92; additionally, it blocks off any vapor escape path around the nozzle and instead forces the vapors displaced by the filling fluid to rise into the chamber 78 and thence out through the connector 80 for collection by a vapor collector (not shown).

In the embodiments of the invention so far described, the resilient wall segment which secures the filler nozzle in the filler pipe and which seals it against escape of vapors extends between the filler nozzle itself and the inner wall of the fill pipe. This embodiment is especially advantageous in delivering fuel to the tanks of current automobiles, since the fill pipes of these automobiles frequently terminate merely flush with the outer surface of "skin" of the automobile and thus present little exterior surface with which to form an effective seal. In some automobiles, however, as well as in many other applications, a well-defined, fully exposed fill pipe is presented and it is possible to form an effective seal with the outside surface of the fill pipe. The alternative embodiment of my invention shown in FIG. 6 does just this.

In FIG. 6, the forward end of a filler nozzle 100 is shown projecting into a fill pipe 102. A vapor seal and collector 104 is positioned around the forward end of the filler nozzle 100 and is secured to the filler nozzle

by means of screws 106. The vapor seal and collector comprises an outer generally cylindrical shell 108 terminating in a tubular portion 110 having a threaded segment 110a for attachment to a vapor collection source (not shown). A fluid passageway 112 (the term fluid being defined herein to include vapor) is formed between the filler nozzle 100 and the rearward portion of the shell 108, on the one hand, and the interior wall of the fill pipe 102, on the other hand. A lip 113 in the form of a generally cylindrical ring extends out from the interior wall of the shell 108 toward the nozzle 100. Forwardly of this lip a resilient wall 112 extends around the interior of the shell 108 and has its edges fastened to this shell to form an air-tight seal therewith. The wall 112 and shell 108 define an expansible chamber 114. A line 116 terminating in a threaded segment 116a leads to the chamber 114 and provides means by which air or other fluid may be admitted to, or drawn from, the chamber to expand it and contract it, respectively.

The vapor seal and collector of FIG. 6 operates in a manner similar to that shown in, and described in connection with, FIGS. 1 through 5. That is, the forward end of the nozzle 100 is inserted into the fill pipe 102 with the chamber 114 initially deflated. Air or other fluid is then supplied through the line 116 to inflate the chamber 114 and press it firmly against the fill pipe 102 to thereby form a seal between the fill pipe 102 and shell 108. However, in the present case, this seal is formed on the outside of the fill pipe. This is especially advantageous when the fill pipe is of small diameter so that there is very little clearance between the nozzle and the interior wall of the fill pipe. The lip 113 limits the travel of the nozzle 100 into the fill pipe 102. This insures that the nozzle is not placed so far into the fill pipe that the vapor passageway 112 is inadvertently closed off.

The vapor seal and collector of the present invention is advantageously formed from a molded high-impact plastic, while the resilient wall is preferably formed from a material, such as rubber, which is highly flexible yet strong. The grounding strip may be incorporated in the outer surface of this wall. As noted previously, the vapor seal and collector may be formed as a separate attachment for fitting to filler nozzles or may be formed integral with the filler nozzle itself. In the latter case, the inner wall of the seal and collector may be formed by the filler nozzle itself.

It will be clear from the foregoing that the present invention is expected to find its greatest utility in prevent-

ing the escape of fumes such as gasoline vapor or chemical vapors. However, it will be understood by those skilled in the art that it may also advantageously be applied to prevent the escape of dust or other residue in connection with the transfer of any fluent material from a filler nozzle into a filler pipe.

From the foregoing, it will be seen that I have provided an improved filler nozzle and, more particularly, a filler nozzle vapor seal and collector. The vapor seal and collector is readily fitted onto an existing fluid filler nozzle and may just as readily be formed integral with them. It quickly and efficiently seals off the normal vapor escape route from a fill pipe into which the filler nozzle is inserted and additionally securely holds the nozzle in place during the filling process. It is applicable to both industrial and non-industrial uses, and may be used to collect the vapors from any type of liquid being transferred from a filler nozzle to a fill pipe.

Having described and illustrated the preferred embodiment of my invention, I claim:

1. A filler nozzle efflux seal and collector for preventing uncontrolled escape of efflux from a fluent material being transferred from the filler nozzle to a fill pipe into which the nozzle is inserted comprising:

A. A circumferentially extending housing having closed side and rear walls and an open front wall, said side walls surrounding said nozzle at the forward end thereof and being radially spaced therefrom at a distance greater than the width of the fill pipe to thereby form an efflux passageway between the interior of said housing and the exterior of said nozzle, said rear wall being connected to said nozzle and supporting said side wall,

B. a resilient chamber positioned on the inner surface of said housing at the forward end thereof and surrounding said fill pipe once the nozzle has been inserted therein, said chamber being expansible between the inner surface of the housing and the outer surface of the fill pipe to provide a fluid-tight seal between said fill pipe and said housing to thereby close off the forward end of said efflux passageway, and

C. means forming an aperture in the rear wall of said housing whereby efflux passing into said passageway from said fill pipe may be vented therefrom.

2. A filler nozzle efflux seal and collector according to claim 1 which includes a rib on the interior of said housing rearwardly of said resilient chamber to limit the extension of said nozzle into said fill pipe.

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