A connector is provided for use with an orifice with internally-retained cap. Unlike conventional connectors, the invention provides a passage for the restraint that retains the associated cap internal to the orifice and a fitting which engages the method used for the cap to seal the orifice. As a result the invention may be used to safely engage any neck, whether threaded, keyed or otherwise sealable, of any vessel, whether by threading, being keyed, or having a press-fit connection. The connector may also be eccentrically constructed so that it may be aligned nonconcentrically to the orifice.
CONNECTOR FOR FLUID TRANSFER FOR USE WITH AN ORIFICE WITH INTERNALLY-RETAINED CAP

CROSS-REFERENCE TO RELATED APPLICATIONS

[0001] This application claims the benefit of U.S. Provisional Patent Application No. 60/744,763 entitled, "Connector For Fluid Transfer For Use With Internally-Retained Cap" filed on Apr. 13, 2006 in the United States Patent and Trademark Office.

STATEMENT REGARDING FEDERALLY SPONSORED RESEARCH OR DEVELOPMENT

[0002] Not Applicable.

FIELD OF INVENTION

[0003] The invention pertains to connectors that may be used in conjunction with the neck of any container having a cap which interlocks to the container neck and which is retained in connection with the container by means of a restraint internal to the container.

BACKGROUND OF THE INVENTION

[0004] Conventional connectors are well known in the art. Such connectors may be used in conjunction with funnels or hoses, in connection with canisters intended for tanks for containing fuels, or in connection with any other container intended to contain liquids or free-flowing solid particles, such as waste and sewage. Also well known are difficulties associated with connectors, particularly funnels or hoses, where the associated container cap is retained in connection with the container by means of a restraint internal to the container. Funnels are typically constructed to contain a significant volume above the orifice through which the material flows into the container below. Such volume often makes the funnel and connector unstable and subject to tipping, and slipping. Likewise hoses may create loads which cause the connector to be unstable. When the orifice through which the funnel or hose transports material contains a cap retained by an internal restraint, typically a chain, the funnel does not completely seat against the orifice, rendering the funnel or seat even more unstable. Fuel or other material may therefore not be transported through the funnel or hose but escape onto the outer surface of the vessel, which is particularly undesirable. For instance, in marine fueling applications, a common problem is "back splash" of fuel out of the orifice which results in the escape of fuel onto the outer surface of the vessel and into the water. It would therefore be advantageous for a connector to securely seat by rotation onto or within an orifice associated with a cap retained by a restraint internal to the container. It may also be desirable for the connector to securely seat without the need for rotation and without interference from the cap restraint, so that the connector may insert freely into the connecting portion of the orifice and securely seat to the orifice by a press-fit connection without interference by the cap restraint.

SUMMARY OF THE INVENTION

[0005] The invention disclosed herein provides a connector which includes a connecting base and a passage to permit the cap-retaining restraint to freely pass therethrough so that the connector may rotate freely along the connecting portion of the orifice and securely seat to the orifice without interference by the cap restraint.

BRIEF DESCRIPTION OF THE DRAWINGS

[0006] So that the manner in which the described features, advantages and objects of the invention, as well as others which will become apparent, are attained and can be understood in detail, more particular description of the invention briefly summarized above may be had by reference to the embodiments thereof that are illustrated in the drawings, which drawings form a part of this specification. It is to be noted, however, that the appended drawings illustrate only typical preferred embodiments of the invention and are therefore not to be considered limiting of its scope as the invention may admit to other equally effective embodiments.

[0007] In the drawings:

[0008] FIG. 1 is a depiction of a connector terminating in a funnel for use with an internally-threaded orifice together with an internally-threaded orifice and cap retained by a chain.

[0009] FIG. 2 is a depiction of a connector terminating in a funnel, for use with an internally-threaded orifice, initially engaged with an internally-threaded orifice and cap retained by a chain.

[0010] FIG. 3 is a depiction of a connector terminating in a funnel, for use with an internally-threaded orifice, fully engaged with an internally-threaded orifice and cap retained by a chain.

[0011] FIG. 4 is a depiction of a connector terminating in an eccentric funnel, for use with an internally-threaded orifice, fully engaged with an eccentrically threaded orifice and cap retained by a chain.

[0012] FIG. 5 is a depiction of a connector mated to a hose for use with an internally-threaded orifice together with an eccentrically threaded orifice and cap retained by a chain.

[0013] FIG. 6 is a depiction of a connector for communicating with a tube or hose for use with an internally-threaded orifice having a pressure relief valve affixed thereto.

[0014] FIG. 7 is a depiction of a connector terminating in a funnel having a press fit connector.

DESCRIPTION

[0015] FIG. 1 depicts the preferred embodiment of the instant invention prior to installation where the connector 10 includes a conventional funnel. Alternatively, a hose may be used rather than a funnel, as illustrated in FIG. 5. The connector 10 includes a piping section 20 which may be a funnel of any shape, but in the case of funnels is most typically conic. Piping section 20 may alternatively be an eccentric funnel, such that it is not concentric with conduit 100 when sufficiently engaged. An engaging section 30 is positioned adjacent to and communicates with piping section 20. Engaging section 30 has a lower edge, an upper edge, height, and thickness. Engaging section 30 includes fitting 40, which use any interlocking method known in the art, but which is most often threading. In the preferred embodiment, connector 10 is used in conjunction with a conduit 100 that has internal threads 140. Other interlocking methods, such as a keyed cap, are also well known in the art and may be the interlocking method of fitting 40.
Engaging section 30 includes a passage 50 sized to accommodate the restraint 130, typically a chain 120, which retains the cap 110 in conduit 100 of the container. One end of restraint 130 is affixed internal to the container. Passage 50, which has a lower edge, an upper edge, width and height, may be a channel or slot or of any shape. In the preferred embodiment passage 50 extends above fitting 40. In an alternative embodiment passage 50 does not extend above fitting 40 but instead stops within fitting 40 at a minimum position to permit connector 10 to rotate without restraint 130 binding between connector 10 and conduit 100. In both instances the lower edge of passage 50 is co-planar to the lower edge of the engaging section 30 and the width of passage 50 is greater than the thickness of the restraint 130. In a further alternative embodiment passage 50 does not extend through engaging section 30 but rather is a channel at the minimum depth to accommodate restraint 130 so that restraint 130 does not bind between connector 10 and conduit 100.

In the preferred embodiment passage 50 includes a further passage 60 sized to tightly accommodate restraint 130. In the preferred embodiment passage 50 and further passage 60 are parallel to the centerline of conduit 100. Alternatively passage 50 and further passage 60 may be aligned diagonal to the centerline, may be constructed in a curved fashion, or may be configured in other shapes so long as restraint 130 may pass therethrough without preventing operation of fitting 40.

The preferred embodiment also includes a gasket 70 sized to, or fitting about, engaging section 30 to seal against fluid communication from within piping section 20. An external lip 80 is located intermediate piping section 20 and engaging section 30 that seals directly above conduit 100 and provides the surface against which gasket 70 rests. The exterior edge of external lip 80 extends beyond the exterior edge of conduit 100. A keyway 90 may be included on external lip 80 and aligned with passage 50 or further passage 60 so that restraint 130 may pass through keyway 90 and not interfere with external lip 80 seating atop conduit 100. Passage 50, further passage 60, and keyway 90 may be resized to accept any particular restraint 130.

FIG. 2 depicts the preferred embodiment of the instant invention initially engaged during installation. In the preferred embodiment fitting 40 is interlocked with threads 140 of conduit 100. Fitting 40 may be constructed of carbon-injection or other anti-static material to provide an electrical grounding connection to conduit 100 in operation. Likewise connector 10 may be entirely composed of carbon-injection or other anti-static material to provide an electrical grounding connection to conduit 100 in operation. After cap 110 is removed from conduit 100 and immediately prior to installation of connector 10, restraint 130 passes through passage 50 of engaging section 30. Connector 10 is then engaged with conduit 100, rotating during such engagement until sufficiently engaging conduit 100, as shown in FIG. 3. Once sufficiently engaged, gasket 70 seats against conduit 100 and prevents escape of material from connector 10.

As depicted in FIG. 4, piping section 20 may be eccentric, such that it is not concentric with conduit 100 when connector 10 is sufficiently engaged but which may be normal to the ground, particularly where conduit 100 is not normal to the ground.

Connector 10 is removed in the opposite fashion. Fitting 40 of connector 10 is disengaged from conduit 100, freeing restraint 130. Conduit 100 may then be closed by cap 110.

In a further embodiment engaging section 30 is removably attachable to piping section 20 such that various engaging sections 30, each with its own fitting 40 of the particular style and size desired, may be interchangeably attached to piping section 20 depending on the method by which cap 110 attaches to conduit 100. Engaging section 30 may be connected to piping section 20 by various systems known in the art including threaded connections and press-fit connections.

In a further alternative embodiment, connector 10 is used in connection with an external pump which provides a vacuum. Passage 50 is sufficiently sized to restraint 130 to provide a substantially lower flow rate through passage 50 than the flow rate through piping section 20, such that a sufficient pressure differential may exist across connector 10 to draw fluid through conduit 100. Additionally, passage 50 may be lined with flexible material so as to permit restraint 130 to pass therethrough while further reducing the flow rate through passage 50. In a her embodiment further passage 60 may also be sized to restraint 130 and may even be lined with flexible material so as to further reduce the flow rate therethrough.

In a further alternative embodiment, connector 10 is used in connection with an external conduit 100 wherein cap 110 attaches to the exterior of conduit 100 by threads or other methods known in the art. In this embodiment, fitting 40 is located on the interior of engaging section 30. Passage 50 extends through engaging section 30 to the point above conduit 100 when connector 10 is fully engaged while a gasket 70 sized to the interior of engaging section 30 may be included to seal against fluid communication from within piping section 20.

In a further alternative embodiment, depicted in FIG. 6, a pressure relief valve 200 is affixed to piping section 20. Alternatively a ball valve, a manual valve or the like may be substituted. When a typical fueling nozzle is inserted into connector 10, the pressure relief valve 200 allows for pressure adjustment, thus increasing the sensitivity of the typical fueling nozzle. Consequently, the automatic shut-off typical of such fueling nozzles is engaged to prevent overfill. Additionally, as typical fueling nozzles are notorious for not working properly with all fueling operations, including in particular marine applications, due to the size and distance of the tank, as well as the vent, the inclusion of pressure relief valve 200 more accurately attains a proper fill level.

In an alternative embodiment, depicted in FIG. 7, fitting 40 may be a press-fit connection sized to conduit 100 and may be used in conjunction with conduit 100 regardless of whether threads 140 are present. As result the portion of fitting 40 may be inserted into conduit 100 to provide a tight fit, which may be by a slightly conical shape or may be by creating friction with a surface such as foam or rubber which may expand to fit the inner diameter of conduit 100 regardless of the inner diameter. The covering may also be carbon-injected so as to provide an electrical grounding between the connector 10 and conduit 100.

In a further embodiment, an attachment point 96 may be located on connector 10 to retain cap 110 and/or restraint 130 against connector 10 during engagement of connector 10 to conduit 100. As a result, cap 110 and
restraint 130 do not rub against the body surrounding conduit 100 during installation, use, or removal. Further, the use of attachment point 96 may provide grounding of connector 10 to conduit 100 during use.

[0028] In a further embodiment, not shown, any intermediate connector or adapter intended for use with a conduit 100, such as that depicted in U.S. Pat. No. 5,433,163 issued to McKerian, may be altered to include passage 50.

[0029] As can be understood by one skilled in the art, connector 10 may also be used to safely engage any threaded or keyed conduit 100, or any other conduit 100 having a cap associated therewith, regardless of whether the restraint 130 is affixed internal or external to the conduit 100.

[0030] The terms and expressions which have been employed in the foregoing specification are used therein as terms of description and not of limitation, and there is no intention, in the use of such terms and expressions, of excluding equivalents of the features shown and described or portions thereof.

I claim:

1. A connector for engagement with a container having a cap, said container having a conduit, said conduit having an exterior edge, said cap interlocking with said conduit, said cap retained in connection with said container by restraint affixed internal to said container, said restraint having thickness, said connector comprising: a piping section; an engaging section, said engaging section having a lower edge, an upper edge, height, and thickness, said engaging section having an interlocking fitting, said engaging section having a passage said passage having a lower edge, an upper edge, width and height, said passage lower edge co-planar with said engaging section lower edge, said passage upper edge proximate said engaging section upper edge, said passage has width greater than said restraint thickness, an external lip, said external lip intermediate said piping section and said engaging section, said external lip having an exterior edge extending beyond said exterior edge of said conduit, said external lip having a keyway on said exterior edge, said keyway aligned with said passage, said keyway sized to said restraint.

2. The connector of claim 1, wherein said keyway is greater than said restraint thickness; said passage extends through said engaging section, and further comprising: a gasket, said gasket fitting about said engaging section, said gasket adjacent said external lip.

3. The connector of claim 2, wherein said width of said passage reduces to said restraint thickness proximate said passage upper edge.

4. The connector of claim 3, wherein said connector is composed of anti-static material.

5. The connector of claim 1 wherein said piping section includes a funnel.

6. The connector of claim 1 wherein said piping section is removably attached to said engaging section.

7. The connector of claim 6 further comprising: a flexible liner, said flexible liner adjacent said passage.

8. The connector of claim 1 further comprising: a valve for adjusting pressure through said connector.

9. The connector of claim 1 further comprising: an attachment point, said attachment point affixed to said piping section, said attachment point retaining said cap.

10. A connector for engagement with a container having a cap, said container having a conduit, said conduit having an exterior edge, said cap interlocking with said conduit, said cap retained in connection with said container by restraint affixed internal to said container, said restraint having thickness, said connector comprising: a piping section; an engaging section, said engaging section having a lower edge, an upper edge, height, and thickness, said engaging section having an interlocking fitting, said engaging section having a passage said passage having a lower edge, an upper edge, width and height, said passage lower edge co-planar with said engaging section lower edge, said passage upper edge proximate said engaging section upper edge, said passage has width greater than said restraint thickness.

11. The connector of claim 1, wherein said width of said passage reduces to said restraint thickness proximate said passage upper edge.

12. The connector of claim 12, wherein said connector is composed of anti-static material.

13. The connector of claim 10 wherein said piping section is removably attached to said engaging section.

14. The connector of claim 10 further comprising: a flexible liner, said flexible liner adjacent said passage.

15. The connector of claim 10 further comprising: a valve for adjusting pressure through said connector.

16. The connector of claim 10 further comprising: an attachment point, said attachment point affixed to said piping section, said attachment point retaining said cap.

17. A connector for a container having an interlocking cap retained in connection with said container by an internally-affixed restraint, comprising:
a piping section; an engaging section having an interlocking fitting and a passage; and an external lip having a keyway sized to said restraint and aligned with said passage. F

* * * * *