June 4, 1946. L. W. VIZAY 2,401,674

FLUID TRANSFER DEVICE

Filed May 29, 1941 2 Sheets-Sheet 1

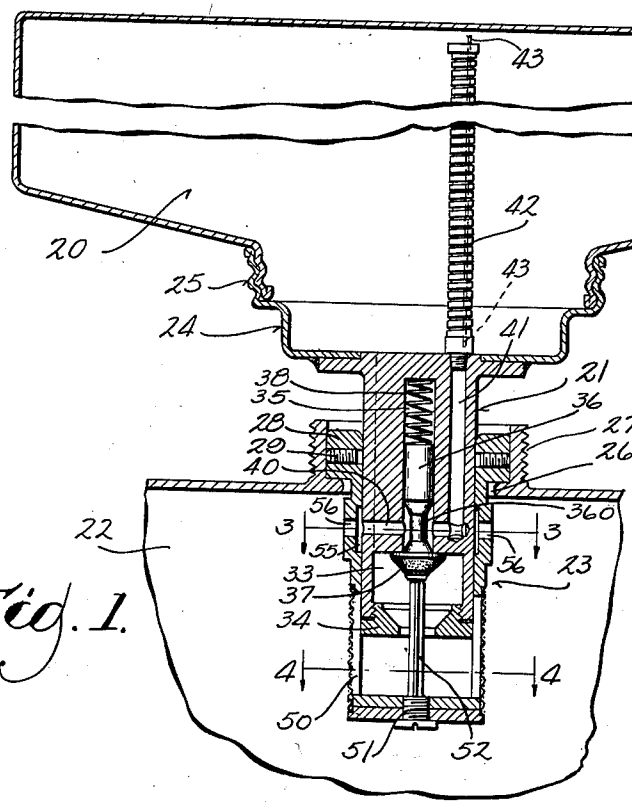

Fig. 1.

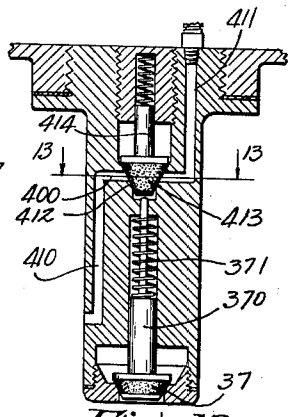

Fig. 12.

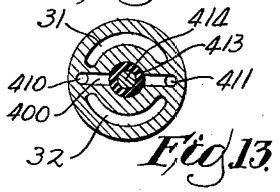

Fig. 13.

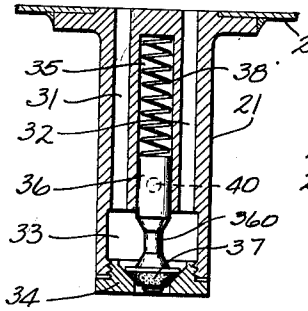

Fig. 2.

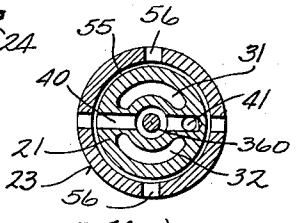

Fig. 3.

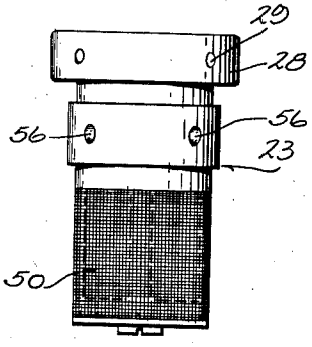

Fig. 5.

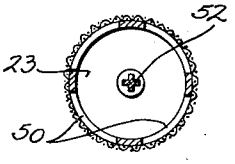

Fig. 4.

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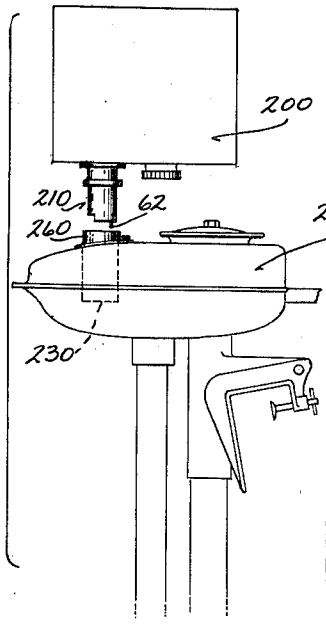

Fig. 11.

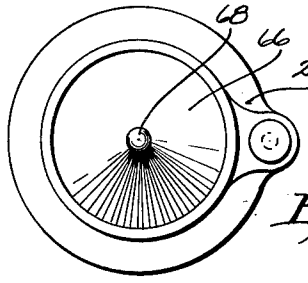

Fig. 10.

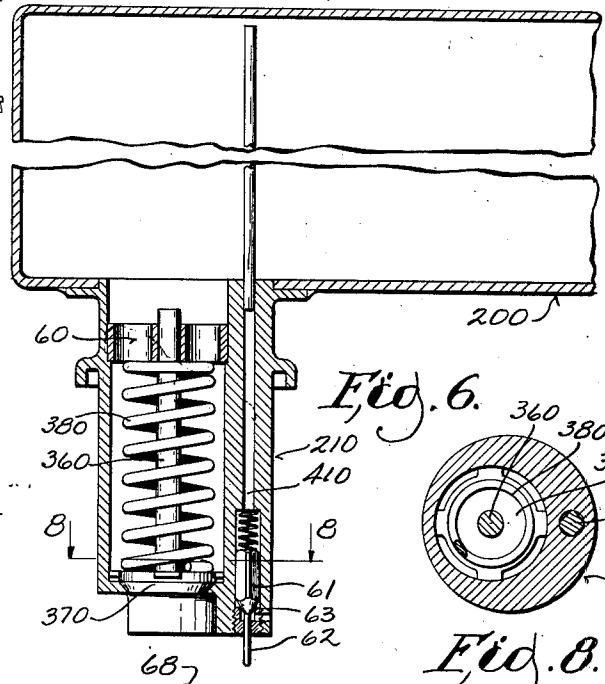

Fig. 6.

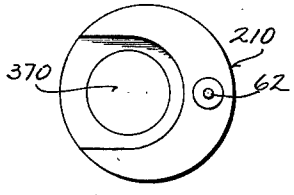

Fig. 9.

Fig. 8.

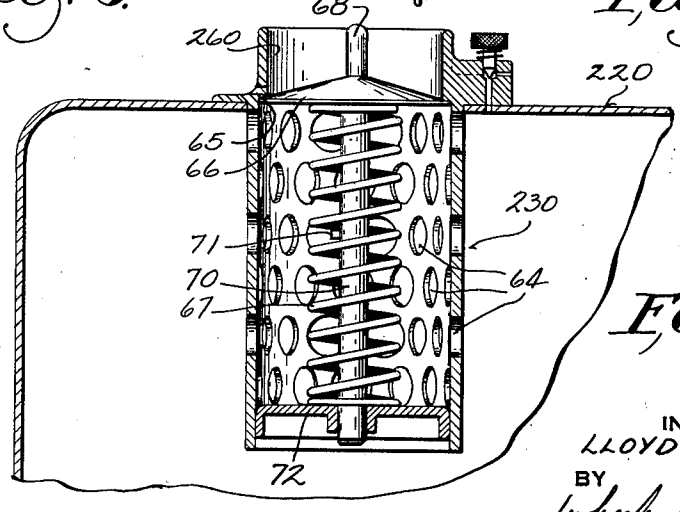

Fig. 7.

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FLUID TRANSFER DEVICE

Lloyd W. Vizay, Milwaukee, Wis.

Application May 29, 1941, Serial No. 395,728

12 Claims. (Cl. 284—18)

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My invention relates to improvements in fluid transfer devices.

The object of my invention is to provide practical, safe, and speedy means for transfer of fluids from one container to another.

More particularly, it is an object of my invention to provide equipment for a supply tank and for a receiving tank whereby the two may be joined for fluid delivery without wastage and without danger of explosion in cases where the fluid is flammable.

Another object of my invention is to provide a practical valved counter-flow duct for gas relief during liquid transfer in a device of the character herein described.

In the drawings:

Figure 1 is a vertical section through my fluid transfer device, and through fragmentary portions of an inverted supply tank, and of a receiver tank, the respective parts of my fluid transfer device being in complete engagement for fluid transfer between the tanks.

Figure 2 is a vertical section through my supply tank connector and showing the valve in closed position.

Figure 3 is a section on line 3—3 of Figure 1.

Figure 4 is a section on line 4—4 of Figure 1.

Figure 5 is a side elevation of my receiver tank connection.

Figures 6 and 7 are vertical section views of a supply tank and a receiver tank, and alternative forms of connection for accomplishing the purposes of my invention, the connectors for the respective tanks being shown in readiness for interengagement.

Figure 8 is a section on line 8—8 of Figure 6.

Figure 9 is a bottom view of the connector shown in Figure 6.

Figure 10 is a top view of the connector shown in Figure 7.

Figure 11 is a side elevation of a supply tank and the top portion of an outboard motor, the tank of which is fitted with my receiving connector.

Figure 12 is a vertical section through a supply connector provided with an alternative form of bleed valve.

Figure 13 is a section on line 13—13 of Figure 12.

Like parts are designated by the same reference characters throughout the several views.

While my fluid transfer equipment is usable wherever transfer of fluid from one receptacle to another is to be accomplished, it is particularly usable where fluids are to be transferred under

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adverse conditions, as for instance where fuel is to be delivered from a supply container or tank to an outboard motor as illustrated in Figure 11, or where flammable or explosive fluids or gases are to be delivered from one container to another under conditions where spillage or wastage is highly undesirable.

As shown in my drawings, a supply tank 20 is illustrated as a fuel supply container for gasoline or suitable liquid fuel for an outboard motor, but it will be apparent from the following description that the connectors embodying my invention may be used in connection with any fluid transfer hoses or conduits, as well as tanks, for accomplishing delivery of fluid from one container or conduit to another.

Supply tank 20 is provided with a male connector 21, and the receiving tank 22 is provided with a female receiving connector 23. Each of the connectors 21 and 23 is relatively permanently associated mechanically with its tank, but, as shown in Figure 1, the tank 20 may be provided with a threaded cap 24 to be received at 25 upon the tank, and the cap 24 may have my connector 21 permanently secured thereto. I have shown also in Figure 1 a filler opening 26 flanged at 27 to receive any form of cap as is common fuel-tank practice on automotive devices, and I provide my connector 23 with a hub 28 in which Allen screws 29 may be adjusted to fix the connector tightly and relatively permanently in the mouth of the filler opening 26.

The male connector 21 has two conduits 31 and 32 extending longitudinally through the upper portion of the connector to a valve chamber 33 formed in the extended part of a connector. These conduits carry the principal fluid transfer, as for instance fuel from tank 21 to tank 22 under the control of a master valve, described below. A valve seat plug 34 partially closes the extended end of this chamber but provides a valve seat and port to control all fluid delivery from the conduits 31 and 32 and the chamber 33.

Axially of the connector 21, I provide a valve stem bore 35 to receive the stem 36 of master valve 37 and a spring 38 at the interior end of the bore 35 biases this valve to closed position against the seat in plug 34.

Transversely of the male connector 21, I provide an air bleed bore 40 which as shown in Figure 3 almost completely traverses the male connector 21, but is not in communication with either of the arcuate conduits 31 and 32. Longitudinally of the connector 21 I provide an air bleed bore 41 extending from the air bleed bore 40 to

flexible air bleed conduit 42 which is provided interiorly with a relatively stiff piano wire 43, thus providing for air bleed from the top of tank 22 to the upper portion of the supply tank 20 under certain conditions to be described below. Air bleed bore 40 and air bleed bore 41 with flexible tube 42 and ports 56 comprise a breather tube.

Female receiving connector 23 is generally tubular in its configuration and of such interior dimension as to receive the connector 21 as shown in Figure 1. Screened ports at 50 pass fluid into the tank 22 as it is received from the conduits 31 and 32 and the valve chamber 33 through the valve seat plug 34.

In the lower end of the connector 23 I provide a plug 51 with an upstanding valve stop 52 which is of such height as to extend into connector 23 to abut the master valve 37. When the connectors 21 and 23 are in complete telescopic engagement, the valve 37 is open as shown in Figure 1 to permit delivery of fluid from tank 20 to tank 22.

When the engagement of the connectors is complete, the master valve head at 37 abuts the wall of the chamber 33 to limit the telescopic inter-engagement of the connectors, and in this position, a relieved portion 360 of valve stem 36 registers with the bleed bore 40 to permit air or gases to pass through the bore 40 to bore 41. The gases thus relieved from tank 22 are received into the bore 40 from a manifold 55 formed in the interior wall of the connector 23 and in communication, through ports 56, with the upper portion of the tank 22.

The parts thus far described operate as follows. When the supply tank 20 is full of fuel in readiness for delivery to tank 22, the master valve 37 is closed against its seat in the plug 34, and the relieved portion 360 of valve stem 36 is out of registry with bleed bore 40, thus completely closing the tank 20 against waste and against possible ignition. As the male connector 21 is inserted telescopically in the female connector 23, there is a certain amount of telescopic engagement before the valve stop 52 contacts the master valve 37, thus a complete safe connection is established for fluid transfer from the tank 20 before the valve is opened. In the final movement toward engagement of the parts, the stop 52 opens the master valve 37 and also brings the relieved portion 360 of the valve stem 36 into registry with the bore 40 so that as fluid passes from the tank 20 through the conduits 31—32, and through the chamber 33 through valve seat plug 34, and through the screened openings 50 into tank 22 the required air bleed to permit of the transfer of the fluid is being accomplished through ports 56, manifold 55, bores 40 and 41, and flexible tube 42.

When the tank 22 is full, supply tank 20 may be removed, and before the connectors are completely telescopically disengaged, the master valve 37 will be closed in its retreat from stop 52, and the air bleed will likewise be closed because of registry of the full sized stem 36 across the bore 40. As the connectors 21 and 23 are completely separated, there can be no waste or loss of fuel.

While I have found a bleed valve constructed as a slide valve such as 36—360 in Figure 1 to be satisfactory for most service, it is sometimes necessary that the bleed valve positively prevent fluid from passing through the bleed conduits at the time the supply tank is inverted in readiness for application to a receiving tank. I, therefore, provide a positive non-leaking valve for this purpose

as shown in Figures 12 and 13 wherein conduit 410 and conduit 411 are drilled longitudinally and blocked off, as illustrated in the drawings, so as to pass fluid into and across a transverse conduit 400 in a manner somewhat similar to the bleed conduits 40 and 41 in Figure 1, but it will be noted that my conduit 400 traverses the seat 412 of a tapered plug valve 413 which I mount upon a stem 414 which is separate from stem 370 of the valve 37. Each of these stems 370 and 414 has its own spring biasing its respective valve to closed position, but I provide a stem rod 371 to abut valve 413 and open it when valve 37 is opened, but I provide a smaller clearance, for instance one-sixteenth of an inch clearance, between the end of the stem rod and the valve 413 so that an initial hand pressure may be placed upon the valve 37 on stem 370 to release accumulated gas pressure as so desired before the supply tank is inverted for a fluid transfer to a receiving tank. By so doing, I not only relieve excess pressure in a supply tank, but I also leave the valve 413 closed so as to prevent an accumulation of fluid or liquid in the bleed conduits 400 and 410.

The construction shown in Figures 1 to 5, inclusive, is satisfactory for most fluid transfer problems, but obviously upon disconnection of the connectors 21 and 23, means such as an ordinary screw cap or other suitable closure member must be used to close the tank 22. Under the peculiar problems of some equipment such as outboard motors where the tank 20 is mobile and subject to movement which would cause splashing of fuel through the filler opening 260, I provide the construction shown in Figures 6 to 11, inclusive, for the purpose broadly of providing safety of delivery and prevention of splashing and loss before and after the transfer of fluid to the receiving tank 220.

In this construction my connectors 210 and 230 are telescopically engageable so as to connect a supply tank 200 with a receiving tank 220. A master valve 370 on a valve stem 360 guided in a spider 60 is urged to closed position by spring 380. At one side of the connector 210, I provide a bleed bore 410 with a spring biased bleed valve 61, the stem 62 of which protrudes beyond the connector 210 so that any pressure upon the end of the stem 62 will dislodge the valve 61 from its seat at 63.

In the tubular connector 230 of the receiving tank 220, I provide many apertures 64 for delivery of fluid into the receiving tank, but near the top of the connector I provide a seat 65 for a valve 66 to close the filler opening 260. This valve 66 is urged to closed position by a spring 67 which is weaker than spring 380 in the supply tank connector 200.

Thus, when the connectors are telescopically moved into engagement, a receiver valve opening stub 68 on the top of valve 66 is in position to contact master valve 370, but the first valve movement in the progressive telescopic engagement of the connectors is the opening of bleed valve 61, the extended stem 62 of which contacts valve 66. Then, as the connector engagement progresses, the weaker spring 67 is compressed and valve 66 opens, but not until the telescopic engagement has sufficiently progressed so that no splashing or loss of fuel from tank 220 is possible. In the further progress of the telescopic engagement when the stem 70 of valve 66 has moved sufficiently so that a stop 71 engages spider 72 to prevent further movement of

valve 66, master valve 370 is opened and delivery of fluid to the receiver 220 is accomplished.

In the meantime, the valve 61, to bleed off air to the top of tank 220, is open, and complete delivery of fuel is made possible.

When the supply tank and its connector are removed after a filling operation, the valve 66 is closed in the final intermovement of the parts, thus preventing splashing and spilling of liquid even though the receiving tank is jostled as it would be on a military vehicle such as a tank or truck.

I claim:

1. In a device of the character described, fluid transfer conduits provided with connectors, said connectors being provided with telescopically mated members, one of said members being provided with a valve closure device having a strong spring biasing the valve closure to closed position, the other of said connectors being provided with a valve closure member having a weaker spring biasing it to closed position, said valve closure devices being positioned to abut one another upon the telescopic engagement of the connectors, and a separate air bleed valve mounted on one of said connectors and provided with an actuator extending outwardly of its connector to a position to be engaged in the telescopic mating of said connectors by means carried by the other connector, whereby to open the bleed valve in the telescopic movement of engagement of the connectors.

2. A device of the character described comprising a delivery fitting and a receiving fitting having parts adapted for telescopic movement in effecting a coupling relationship between said fittings and in releasing such coupling relationship, valve seats in the respective fittings, valves normally closed against the seats of the respective fittings, each of the respective valves being biased to its seat and the respective valves being movable in opposite directions from their respective seats, the bias of the valve of the receiving fitting to its seat being less than the bias of the valve of the delivery fitting to its seat, and means connected with one of the valves and engageable with the other in the telescopic movement of said parts toward a position of coupling between said fittings, said means being adapted to dislodge the valve of the receiving fitting from its seat before the valve of the delivery fitting is open, the receiving fitting being provided with stop means limiting the opening movement of the receiving fitting valve when the telescopic engagement between said parts is sufficient to establish a seal between said fittings, whereupon the continued telescopic movement between said parts will effect the opening of the valve of the delivery fitting.

3. In a device of the character described, the combination of a delivery fitting and a receiving fitting having parts adapted for telescopic movement in effecting and releasing an operative coupling between said fittings, valve seats in the respective fittings, valves in the respective fittings normally closed against the seats and movable in opposite directions from the respective seats, each of said valves being biased to its seat and the bias of the valve of the delivery fitting to its seat being stronger than the bias of the valve in the receiving fitting to its seat, means limiting the opening movement of the valve of the receiving fitting, and means connected with one of the valves and engageable with the other in the course of telescopic movement between said parts in a direction toward completion of the coupling between said fittings, said means being adapted to dislodge the valve of the receiving fitting from its seat before the valve of the delivery fitting is open and to dislodge the valve of the delivery fitting upon the engagement of the receiving fitting valve with said stop means, the initial telescopic movement between said parts in a direction to break the coupling between said fittings being adapted first to permit the seating of the delivery fitting valve subject to the bias thereon, and secondly to permit the seating of the receiving fitting valve subject to its bias.

4. In a device of the character described for holding a liquid under pressure and for effecting a coupling for the delivery of such liquid to a receiver, the combination of a delivery fitting having a male coupling part provided near its delivery end with a valve seat, of a receiving fitting having a female coupling part provided near its receiving end with a valve seat, valves in the respective parts normally engaged with the respective seats and biased for such engagement, said valves being provided with means mounting them for movement in opposite directions from their respective seats, the direction of opening movement of the delivery fitting valve being opposite to the direction of flow between the delivery fitting and the receiving fitting, a relatively strong spring biasing the delivery fitting valve toward its seat, a relatively lighter spring biasing the receiving fitting valve toward its seat, one of said valves being provided with a portion engageable with the other for limiting the approach of said valves to each other in the engagement of the male coupling part telescopically in the female coupling part whereby said valves are both forced open in the ultimate telescopic coupling position of said parts, the receiving fitting being provided with means limiting the opening movement of the receiving fitting valve against the spring bias to which it is subject, whereby to force the opening of the delivery fitting valve after the receiving fitting valve has been opened and to permit the closing of the delivery fitting valve prior to the closing of the receiving fitting valve in the disengaging movement of said parts.

5. A coupling comprising a pair of fittings having male and female telescopically movable coupling parts each provided with a valve seat, valves seating outwardly against the respective seats and adapted to be opened in opposite directions, a strong spring biasing one of said valves to its seat, a relatively weaker spring biasing the other valve to its seat, means limiting the unseating movement of the valve having the weaker spring, and means connected with one of said valves and engageable with the other upon telescopic association of said parts in a coupling direction for first dislodging the valve with the weaker spring to the limit of movement permitted by said stop means and for subsequently dislodging the valve with the stronger spring in the continued telescopic movement of said parts, said parts being devised to effect a substantial seal between said fittings before either of said valves is dislodged and to effect a substantially complete seal between said parts before the valve with the stronger spring is dislodged from its seat.

6. A coupling for effecting a transfer of liquid from one normally closed container to another, said coupling comprising a delivery fitting connected with one of said containers and subject to the pressure of liquid therein, a receiving fit-

ting connected with the other of said containers, seat means in the respective fittings, valve means biased to engagement with respective seat means and opening in opposite directions from the respective seat means, a relatively strong spring biasing the valve of the delivery fitting to its seat, a relatively lighter spring biasing the valve of the receiving fitting to its seat, stop means limiting the unseating movement of the valve last mentioned, and means connected with one of said valves and engageable with the other in association of said couplings, and means for the successive unseating of the respective valves, whereby the receiving fitting valve is first opened to the limit permitted by the stop means, and the delivery fitting valve is then opened, said fittings comprising means for effecting a preliminary seal prior to the opening of the receiving fitting valve, and a substantially complete seal prior to the opening of the delivery fitting valve.

7. The device of claim 6 in which at least the delivery fitting is provided with a separate duct comprising an air bleed and with the valve means for the opening of said duct in the operative connection of said fittings.

8. In a coupling device for effecting the transfer of a liquid from one normally closed receptacle to another, the combination with a delivery coupling provided with valve seat means, and a receiving coupling provided with valve seat means, of a delivery conduit leading to a valve seat means of the delivery coupling, a vent conduit leading to a valve seat means of the delivery coupling, valve means in the respective conduits biased toward the respective seat means, seat means in the receiving coupling, valve means biased thereto, means for effecting a coupling seal between said couplings, and means operative in the effecting of such seal for opening the several valve means successively, the valve means controlling the vent conduit being first opened, the valve means of the receiving coupling being second opened and the valve means controlling the delivery coupling being last opened.

9. In a device of the character described, the combination with delivery and receiving fittings having male and female coupling parts adapted for axial telescopic movement to effect a coupling between said fittings, the male part of the delivery fitting having separate liquid and vent conduits and separate seats and separate valves controlling communication therethrough, each of said valves being biased for movement to its respective seat and mounted to open from the seat into the conduit controlled thereby, the receiving fitting being provided with a seat, and a valve biased for movement to said seat and mounted for movement from said seat in a direction opposite to the movement of the valves first mentioned from their respective seats, a relatively light spring providing the bias for the seating of the vent conduit valve, a relatively stronger spring providing the bias for the seating of the

receiving coupling valve, and a relatively strongest spring providing the bias for the seating of the liquid conduit valve of the delivery fitting, said valves having means directly engageable in the coupling movement of said parts for dislodging the respective valves from their respective seats, the receiving fitting having means for limiting the opening movement of its valve whereby the vent valve is first opened in a coupling engagement of said parts and the receiving fitting valve is next opened and the liquid conduit valve of the delivery fitting is last opened, said parts being adapted to permit a substantially complete seal before the opening of the last mentioned valve.

10. In unitary combination, a supply tank and a delivery fitting rigidly connected with the tank to provide support therefor, said fitting comprising conduit means for the discharge of liquid and the admission to said tank of exchange air, said tank being completely closed save for said conduit means whereby to require exchange air as a prerequisite to the discharge of liquid, valve means normally closed to complete the sealing of said tank and controlling the liquid discharge and air admission means aforesaid, said fitting comprising a male coupling part adapted for telescopic sealing association with a complementary female coupling part.

11. In combination, a fitting having a liquid discharge conduit means and a separate exchange air admission conduit means and separate valves for the respective conduit means, said valves being normally closed and said fitting comprising a male coupling element adapted to be received telescopically into a complementary coupling element, and a tank mechanically mounted on said fitting and having its interior in communication with the respective conduit means, said tank being otherwise completely closed, whereby to depend upon exchange air for the complete release of liquid therein contained.

12. In a coupling of the character described, the combination with a male coupling element comprising a conduit having a terminal valve seat substantially at its extreme end, of a valve normally engaged with said seat and exposed at the end of the conduit, the valve opening inwardly from said seat into said conduit, means biasing said valve to said seat, the location of the valve substantially at the extreme end of the conduit precluding flow from the end of the conduit upon the seating of the valve, said element being provided with a separate gas exchange conduit, valve means controlling the gas exchange conduit, a tank mechanically connected with the coupling element for support thereby and with which the respective conduits of said element communicate, said tank being completely closed above said element, and said element being provided with an upward tubular extension of the gas exchange conduit into said tank.

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