Jan. 22, 1957 R. G. YOUNG, JR 2,778,390

SPOUT FOR FILLING NOZZLE IN COMBINATION WITH TIGHT FILL CONNECTION

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Fig. 1.

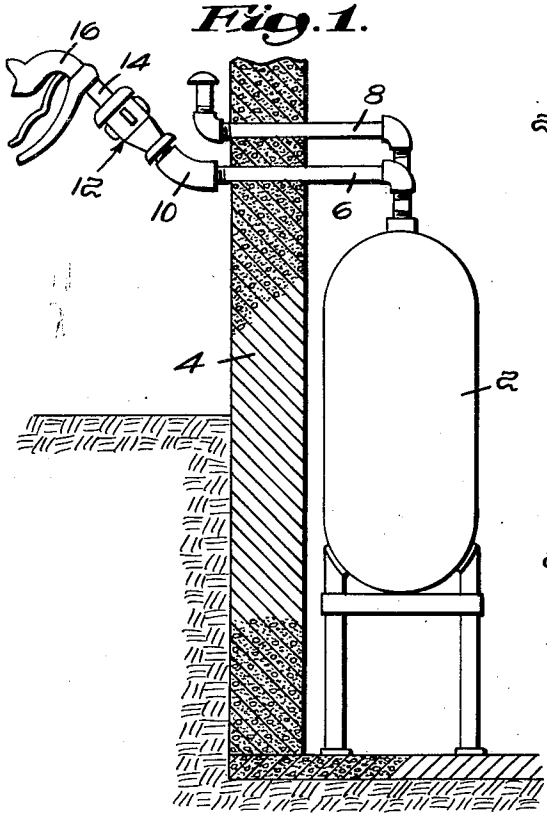


Fig. 2.

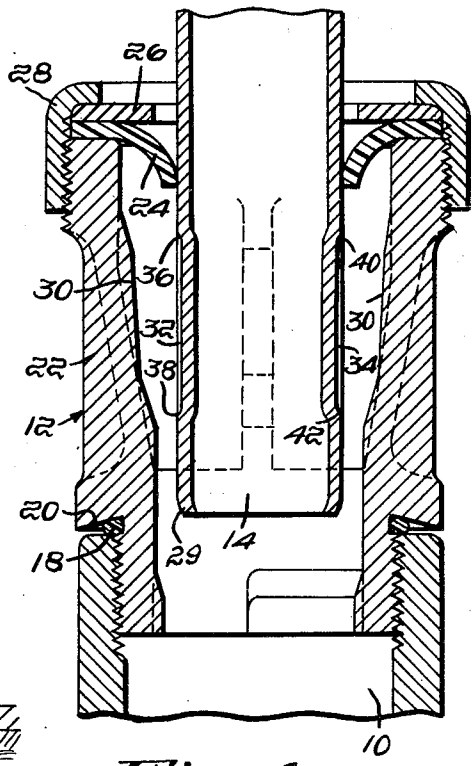
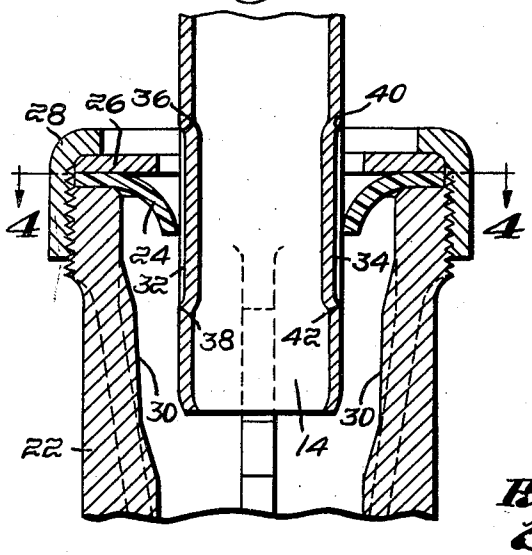
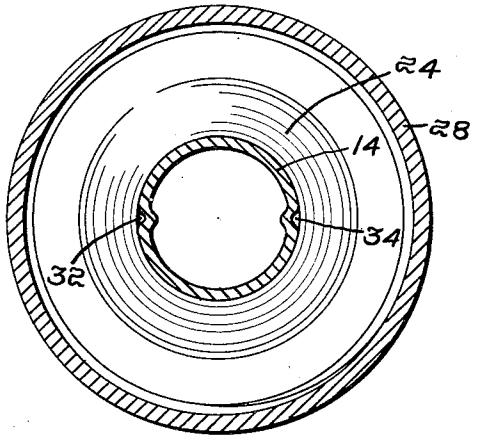


Fig. 4.

Fig. 3.





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Fig. 5.

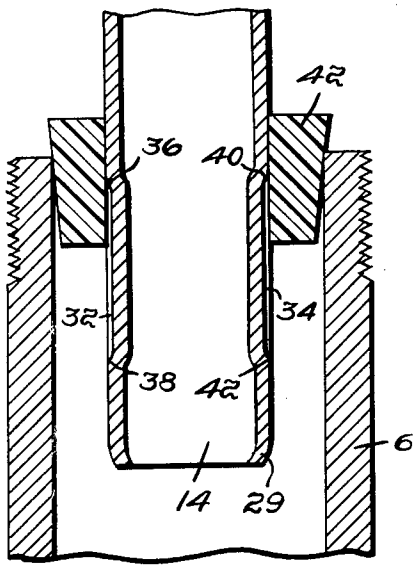


Fig. 6.

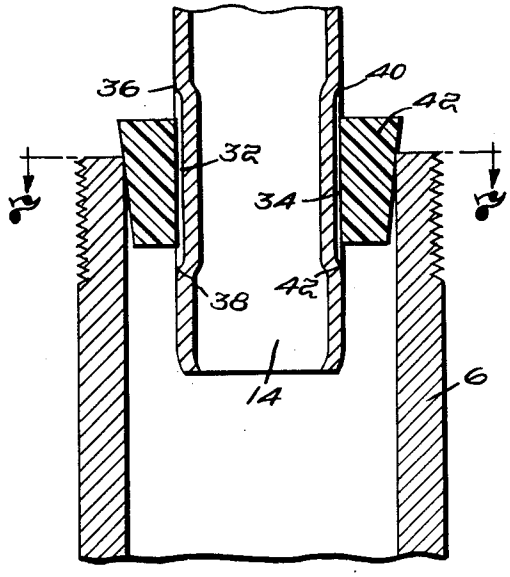
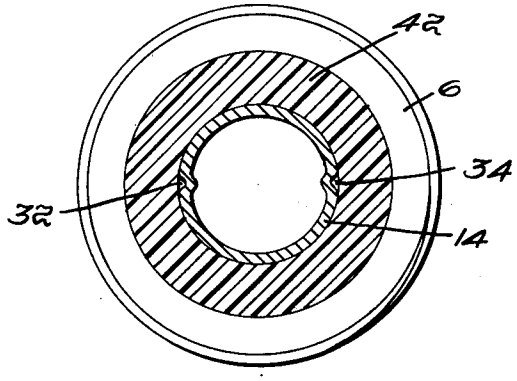


Fig. 7.



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SPOUT FOR FILLING NOZZLE IN COMBINATION WITH TIGHT FILL CONNECTION

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3 Claims. (Cl. 141—310)

This invention relates to the filling of tanks with liquids. While the invention is of general application, its present immediate use has been particularly concerned with the filling of household fuel oil tanks with fuel oil coming to the tank by hose from a tank truck.

As will be well understood by those persons having to do with the household delivery of fuel oil, there is now in general use a device commonly known in this field as a tight fill connection. The object of the tight fill connection is to make it possible for fuel oil to be delivered to the tank at high rates of fill without danger of leakage or spillage. According to the earlier practice, the spout of the hose line nozzle was placed in the open end of the fill pipe with the fuel oil flowing by gravity to the tank. Due to back pressures in the fill pipe and tank, any attempt to speed up the filling rate beyond the normal gravity flow would result in the oil blowing back to spill on the ground outside of the house.

The tight fill connection provided a remedy for the foregoing condition as it made it possible for the rigid spout of the nozzle to be fitted securely within an opening in a flexible diaphragm of a specially designed coupling structure affixed to the outer end of the fill pipe. By this arrangement, the nozzle could be opened to maximum capacity and the oil driven into the tank at the maximum rate available by the pump on the tank truck.

The tight fill connection just described is now in general use wherever high rate filling of tanks is desired. One disadvantage, however, inherent in the tight fill connection system, is that there is necessarily produced upon the closing of the nozzle when filling is completed, a negative pressure in the spout and upper end of the fill pipe. This negative pressure increases the force necessary to withdraw the stiff spout after filling of the tank has been completed from the flexible member of the tight fill connection, and in addition, there is considerable likelihood that a quantity of fuel oil retained in the spout because of the negative pressure condition therein will be spilled to the ground as the spout comes free.

The reason for the negative pressure condition developing in the spout upon the closing of the nozzle is this. The relatively long run from the outside end of the fill pipe to the tank requires an appreciable wait before the gas in the top of the tank can work its way up the fill pipe to the nozzle to relieve the negative pressure. In other words, upon the closing of the nozzle, the fill pipe from the spout on down for a considerable distance is filled solidly with liquid that had, up to the instant of the closing of the nozzle, been moving in the direction of the tank. Any attempt to withdraw the spout while this condition prevails results in a further increase in negative pressure which tends to draw fuel oil back through the fill pipe as the spout is removed. Thus, unless the operator is quite careful, some spillage will occur when the spout is finally separated from the tight fill connection.

With the foregoing in mind, an object of the present invention is to provide a rigid spout construction which will automatically break the negative pressure condition

at the spout as the spout is being removed from the tight fill connection, thus permitting the oil in the fill pipe and spout to run on freely to the tank. In this way when the spout is freed, all liquid will have left the spout and upper end of the fill pipe so there can be no spillage.

Another object of the invention is to provide a spout of such construction that it may be used equally well with differing types of tight fill connections so long as the connection be of the kind which frictionally grips the exterior of the spout tightly enough to prevent leakage during the filling, but which at the same time, permits longitudinal movement of the spout therein by a pulling and/or twisting movement.

These and other objects of the invention will become more apparent as the description proceeds with the aid of the accompanying drawings in which—

Fig. 1 is a side elevation of the general organization showing a filling nozzle, spout, tight fill connection, fill and vent pipes and a tank located within a building.

Fig. 2 is an enlarged cross-sectional view of the upper end of a fill pipe, a tight fill connection and the end of a spout inserted therein.

Fig. 3 is a view similar to Fig. 2 with the spout moved outwardly to a position which permits the breaking of the negative pressure.

Fig. 4 is a horizontal section on the line 4—4 of Fig. 3, showing the relation of the two longitudinal depressions in the spout to the flexible element of the tight fill connection.

Fig. 5 is a cross-sectional view of a simplified tight fill connection utilizing a flexible plug or gasket.

Fig. 6 is a view similar to Fig. 5 with the spout withdrawn to a position at which the negative pressure may be broken.

Fig. 7 is a horizontal sectional view on the line 7—7 of Fig. 6 showing the negative pressure breaking passages in the spout.

Referring to Fig. 1, there is shown a fuel oil tank **2** mounted in the usual manner in the cellar of a building **4**. Tank **2** has a fill pipe **6** and a vent pipe **8** leading through the wall to exterior positions. The outer end of fill pipe **6** terminates in an elbow **10** or any other suitable threaded element and to which has been screwed a tight fill connection **12**. A spout **14** of the nozzle **16** is shown inserted in normal delivery position with connection **12**.

Referring now to the more detailed views of Figs. 2, 3 and 4, it will be seen that the end of the elbow **10** has affixed thereto by suitable threads the tight filled connection **12**. This may be screwed to the position shown by hand and an O-ring **18** is provided to make a liquid tight seal between the end of elbow **10** and the shoulder **20** of the casing **22** which constitutes the main body portion of the connection **12**.

At the upper end of the casing 22 is a circular flexible gasket **24** secured in position by a circular washer or annular ring **26** and the screw threaded inwardly flanged clamping nut **28**. The circular opening through the flexible element **24** is of such size that the stiff spout **14** may be forced therein by the operator causing the flexible element or disk to be stretched interiorly and bent downwardly as indicated in Figs. 2 and 3 in which position it will make a liquid tight seal with the circular exterior of the spout. To facilitate entry of the nozzle the end is turned inwardly slightly as at **29**. The casing **22** has interior webs or fins **30** which may be of varying dimensions and capable of supporting the end of the spout against excess lateral movement.

The principal feature of the invention will now be explained. It will be observed in Figs. 2, 3 and 4 that the spout **14** has a pair of oppositely disposed longitudinally extending external grooves or depressions **32** and

34. These depressions, which may be of any convenient number, are made by a suitable tool which causes the proper size indentation to be made in the spout. The depressions while shown in the drawings as running parallel to the longitudinal axis of the spout could take a spiral or other circuitous path so long as the upper and lower portions of the depressions are spaced longitudinally of the spout a sufficient distance to straddle the flexible member through which the spout is inserted. In other words, on examining Fig. 3, it will be noticed that the upper end 36 of depression 32 is above the flexible element 24 while the lower end 38 is below, and similarly the upper and lower ends 40 and 42 of depression 34 straddle the flexible element 24.

As can be seen in Fig. 2, when the rigid spout 14 is located as shown with the depressions or channels 32 and 34 within the casing 22, the flexible element 24 will be in tight sealing engagement with the spout about its entire circumference and external atmospheric air cannot flow to the interior of casing 22 upon the development of any negative pressure therein occurring under the circumstance explained above. For this reason, it has heretofore been somewhat difficult to withdraw spout 14 the distance of its inserted length through flexible element 24 after the fuel supply has been shut off with the fill pipe 6 and casing 12 remaining full of fluid.

However, upon moving spout 14 of the present invention upwardly a limited distance, it will be observed that the upper ends 36 and 40 of the depressions 32 and 34 will arrive at and pass the flexible element 24 whereby atmospheric air may then flow readily along the depressions 32 and 34 to reach the interior of casing 22. In this way, any negative pressure within the casing and fill pipe 6 is immediately relieved and three desirable results are at once achieved. First, all remaining fluid in the fill pipe and spout can forthwith flow freely to the tank 2, secondly, the spout can be withdrawn from the flexible element 24 with greater ease, and thirdly, when the spout finally comes free of the flexible element 24 no liquid will be in the spout and hence, there can be no spillage.

The invention is utilized with a different type of tight fill connection in the constructions shown in Figs. 5, 6 and 7. In this case, the nozzle 14 is positioned within a large stopper 42 made of some suitable flexible material such as neoprene. This stopper is of such dimensions that it may be readily plugged into the outer end of the fill pipe 6 or any other screwed on fitting such as the elbow 10 to provide a tight seal between the end of the pipe and the spout 14. With the spout in the position shown in Fig. 5, there is a tight connection and filling can proceed in the normal manner. When filling is stopped and the spout is to be removed, the operator may slide it upwardly a short distance within the stopper 42 to the position shown in Fig. 6 in which the upper and lower ends of the depressions 32 and 34 will be above and below the upper and lower surfaces of the stopper. In this position the outside atmosphere may flow through the depressions to relieve any negative pressure that may be present within pipe 6. After the negative pressure has been relieved, the operator may then remove the stopper 42 and spout together from the end of the pipe.

It will be understood, of course, that in the ordinary case the tight fill connection 12 shown in Figs. 1, 2, 3, and 4 is screwed to the end of the fill pipe at the time of each delivery and prior to the insertion of spout 14 therein. After the delivery has been completed and the spout removed from the tight fill connection, the latter is then unscrewed and carried by the operator to the next house where the filling operation is repeated. In some cases, however, the tight fill connection may be left permanently attached to the end of the fill pipe.

It will further be understood that while the preferred form of the invention contemplates air passages formed by areas depressed below the surface of the spout, air passages could be formed with equal facility by providing raised longitudinally extending portions which when in engagement with the surrounding flexible element would create air passages between the crest of the raised portions and the normal spout surface. Thus, when the term depression is used in the claims, it contemplates that type of deformation of the spout surface which will permit the passage of air when the deformed portion is engaged by and straddles the flexible element.

From the foregoing description and explanation of the invention, it will be seen that I have provided a nozzle spout construction which may act in cooperation with another unit to make a tight connection therewith during the delivery of liquid, but which by a small longitudinal movement relative to the tight connection may change the connection to one in which air may flow from the atmosphere to the interior of the fill pipe. Thus, the spout by itself and in combination with a tight fill connection of a type which makes contact with the exterior of the spout is believed to constitute the invention which is appropriately claimed hereinafter.

It is my intention to cover all changes and modifications of the example of the invention herein chosen for purposes of the disclosure which do not constitute departures from the spirit and scope of the invention.

I claim:

1. A filling connection comprising, an outer fixed cylindrical pipe open at its upper end, an inner movable cylindrical pipe open at its lower end of less diameter than said outer pipe and fitting into said outer pipe and being movable therein from an intermediate position to a fully inserted filling position, resilient sealing means between the inner surface of said outer pipe and the outer surface of said inner pipe, said sealing means being carried by one said pipe and resiliently pressing against the surface of the other said pipe throughout the travel of said inner pipe from said intermediate position to said filling position, a longitudinally extending groove on the surface against which said sealing means presses, said groove being longer axially of said pipes than said sealing means when the said pipes are in said intermediate position, and said groove terminating short of said sealing means when said pipes are fully engaged in said filling position whereby a tight seal is provided for filling and negative fluid pressure may be vented when said inner pipe is withdrawn from said outer pipe to said intermediate position.

2. The filling connection defined in claim 1 further characterized by said sealing means being connected to said outer pipe, and defining centrally of said outer pipe an opening of smaller diameter than the outside diameter of said inner pipe.

3. A filling connection comprising, an outer fixed cylindrical pipe open at its upper end, an inner movable cylindrical pipe open at its lower end of less diameter than said outer pipe and fitting into said outer pipe and being movable therein from an intermediate position to a fully inserted filling position, a flexible sealing element mounted near the upper end of said outer pipe and defining centrally thereof an opening of smaller diameter than the outside diameter of said inner pipe whereby said sealing element presses against said inner pipe throughout the travel of said inner pipe into said outer pipe, a longitudinally extending groove on the outer surface of said inner pipe, said groove being longer axially of said inner pipe than the area thereon against which said sealing element presses and straddling said sealing element when said pipes are in said intermediate position, and said groove terminating short of said sealing element when said pipes are fully engaged in said filling position whereby a tight seal is provided for filling and negative fluid pressure may be vented when said inner pipe is withdrawn from said outer pipe to said intermediate position.

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