March 5, 1940. J. H. EARL 2,192,736

DEVICE FOR FILLING TANK TRUCKS AND THE LIKE

Filed Dec. 15, 1937

Fig. 1

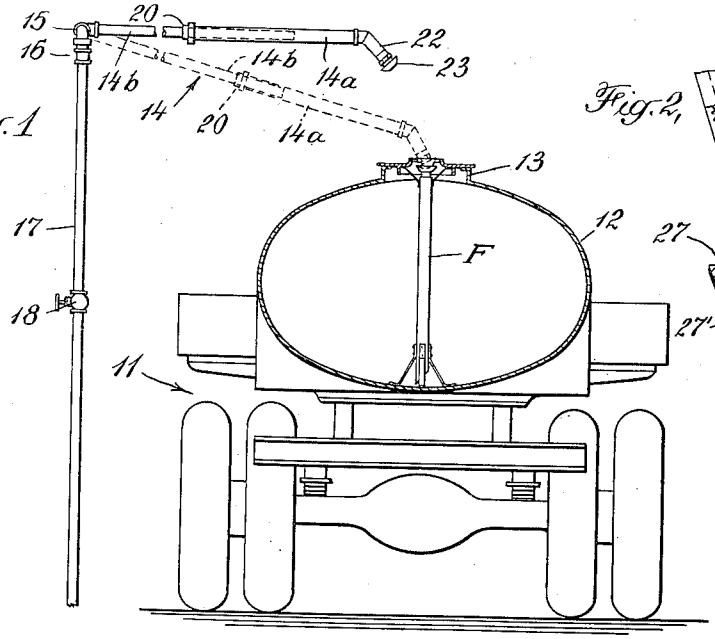


Fig. 2

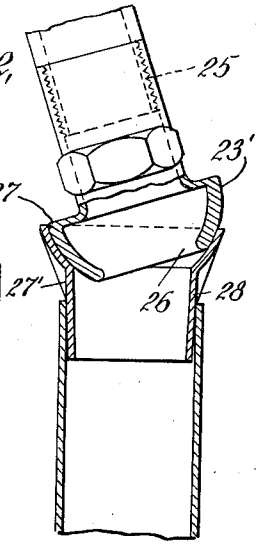


Fig. 3

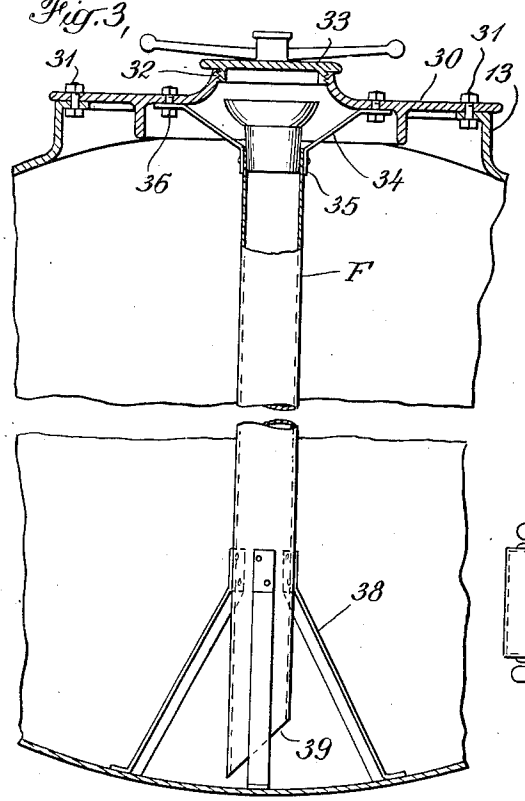


Fig. 4

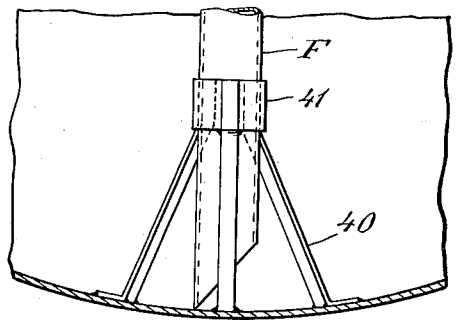
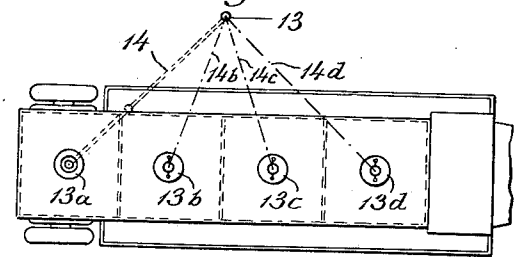


Fig. 5.



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DEVICE FOR FILLING TANK TRUCKS AND THE LIKE

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4 Claims. (Cl. 226—93)

This invention has to do in a general way with devices for transferring liquids from storage into tanks for transportation. It is more particularly concerned with improved means for filling tank trucks such as are used in the transportation of volatile liquids like gasoline.

As is well known to those familiar with the art, tank trucks of this character vary in capacity and in their over-all height above the ground, and the tanks thereon are usually provided with a plurality of cells or compartments, each of which is equipped with a manhole through which it can be filled with liquid to be transported.

The usual equipment at a bulk station which is employed in filling these tank trucks comprises a swing pipe mounted for pivotal movement about vertical and horizontal axes, such swing pipe communicating through a valve connection with the storage tank and having on its discharge end a downwardly inclined portion, or elbow, which will rest on the edge of the manhole while the tank is being filled. Inasmuch as the stream of discharged liquid travels through the atmosphere for a substantial distance into the tank, there is in the case of volatile liquids, such as gasoline, a substantial evaporation loss, which, because of its inflammable nature is hazardous to the workman filling the tank. This evaporation, encountered in the usual tank-filling operations, has led to the development of various tank-filling devices in which an attempt has been made to convey the discharged liquid in a closed conduit to a point beneath the surface of the liquid in the tank. For example, the swing-pipe, instead of terminating in a relatively short elbow, has been provided with a depending leg of a length such that it will extend to the bottom of the average tank. In order to make the device sufficiently flexible to take care of different positions of the manhole with respect to the point of attachment for the swing-pipe, the swing-pipe has been made longitudinally extensible, and the depending leg has been attached thereto through a flexible coupling, such as a section of hose. Although such a device is successful in delivering the liquid into the tank below the fluid level therein, the flexible section presents several obvious disadvantages. The device is awkward to handle, and when the depending leg is withdrawn from the liquid in the tank, there is always a certain amount of drainage which gives rise to a loss of liquid, part of which will drain onto the exterior surface of the tank. Another attempt which has been made to solve the problem of evaporation loss consists in the provision of a fill-pipe which extends through the top wall portion of the tank away from the manhole, the upper end of such fill-pipe being provided with a mechanical connection such as a bayonet joint, which can be fixedly attached to the discharge end of the swing-pipe. Such an arrangement necessitates a flexible connection of some kind in the discharge end of the swing-pipe so as to permit the two sections of the connection being brought into the proper alignment, irrespective of the position which the tank occupies with respect to the point to which the swing-pipe is supported. The flexible section here is subject to wear and as a consequence will soon develop leaks, and the positive mechanical connection between the swing-pipe and the tank is an item to be avoided, since quick movement of the truck in case of emergency would be delayed by the time required to effect its disconnection.

It is a primary object of this invention to provide an apparatus for filling tank trucks of the class described, which is comprised of substantially rigid members and is adapted to form a substantially sealed connection between the swing-pipe and fill-pipe or drop-pipe extending into the tank, without the use of any clamping means. It is a further object of this invention to provide an apparatus of the class described in which the fill-pipe section of the combination may be mounted, as a permanent installation within the tank, beneath the conventional manhole opening. It is a further feature of a preferred embodiment of this invention to provide a fill-pipe which has its discharge opening located near the bottom of the tank so that such opening is submerged beneath the liquid of the tank, thereby reducing evaporation losses during the filling operation to a minimum.

It is a further feature of this invention that the fill-pipe section, which, as stated above, is normally a permanent feature within the tank, is so positioned as to be readily accessible and at the same time does not in any way interfere with placing the cover on the filling opening. It is also a feature of the device that the fill-pipe can be readily removed with the manhole covering for the purpose of inspecting and cleaning the tank.

It is one of the primary objects of this invention to provide a combination swing-pipe and fill-pipe for the purpose described above which is equipped with cooperative means forming a sealed connection, such means being so constructed that a substantially sealed joint can be obtained throughout a wide range of angles be-

tween the swing-pipe and the fill-pipe. This last-mentioned feature permits filling tank trucks of various heights without any adjustment and without the need for flexible hose sections in the conduit, and it also permits filling the various tank compartments without moving the truck.

The details in the construction of certain preferred embodiments of my invention, together with other objects attending its production will be best understood from the following description of the accompanying drawing, which is chosen for illustrative purposes only and in which:

Figure 1 is an elevation with parts in section, showing a preferred embodiment of my invention and illustrating the manner in which it is to be used;

Figure 2 is a fragmentary elevation with parts in section illustrating the details in the construction of the sealed joint which is formed between the swing-pipe and the fill-pipe in a preferred embodiment of my invention;

Figure 3 is a fragmentary sectional elevation illustrating further details in the manner of mounting the fill-pipe within the tank;

Figure 4 is a fragmentary section illustrating a modified form of support for the lower end of the fill-pipe; and

Figure 5 is a diagrammatic view illustrating the manner in which the device contemplated by this invention may be employed to fill the various tank compartments without moving the truck.

More particularly describing the invention as herein illustrated, reference numeral **11** indicates a tank truck which carries a tank, **12**, such tank being formed with a series of cells or compartments, each of which has a manhole, **13**, formed in the top portion of the tank.

Reference numeral **14** indicates what I have termed a swing-pipe, which is connected through a horizontal swing connection, **15**, and a vertical swing connection, **16**, to a pipe, **17**, provided with a valve, **18**. This last-mentioned pipe, communicating with a bulk storage tank, constitutes what I may term the source of liquid which is supplied to the swing-pipe. The swing-pipe **14** is preferably made in two telescoping sections, **14***a* and **14***b*. The outer section **14***a* is provided with a stuffing box, **20**, to form a vapor-tight seal between the two sections. The swing-pipe, being longitudinally adjustable, can be readily extended or foreshortened to take care of the position which the truck occupies and, more importantly, to reach the various tank compartments without shifting the truck.

The free end of the swing-pipe is provided with a downwardly depending discharge portion, **22**, which may be formed by bending the section **14***a* of the swing-pipe or by a separate elbow connection, and this discharge portion is equipped with a discharge head, **23**, which constitutes one section of the joint or connection contemplated by this invention.

The discharge head **23** may be formed integrally with an elbow member which comprises the discharge end **22**, or it may, as shown in Figure 2, be comprised of a separate section threadedly connected to the discharge end as indicated at **25**. The discharge head **23** is comprised of a ball-like member, **23'**, having a discharge opening, **26**, therethrough, the outer surface of such member being ground to fit in sealing engagement with a ground socket-like opening, **27**, provided in the upper end of a fill-pipe generally indicated by the reference letter, **F**.

This fill-pipe **F** is preferably mounted within the tank beneath the manhole opening, and while the socket-like opening **27** may be formed integrally on the upper end of the fill-pipe **F**, I consider it preferable to provide this opening in a separate fitting, **27'**, which has a slightly tapered section, **28**, adapted to fit within the upper end of the fill-pipe **F**.

The outer spherical surface of the ball-like head **23'** and the inner spherical surface of the socket-like opening **27** are so dimensioned relative to the passages through the respective connections as to have sealing contact over their entire periphery and at the same time leave a substantially uninterrupted passage through the joint formed thereby over a substantial range of positions of the swing-pipe in both horizontal and vertical planes. In other words, the sizes of the two sections forming the joint are such that vapor-tight sealing will be formed between the two members with tanks of various elevations and with the fill-pipes in the different compartments which are at various distances and various angular positions with respect to the point **16** to which the swing-pipe is attached to the source of liquid **17**.

As has been previously pointed out, I consider it an important feature of this invention that the fill-pipe is permanently mounted within the tank and the mounting or support for the fill-pipe is such that it can be readily removed with the manhole cover to facilitate inspection and cleaning of the tank and can be easily and quickly installed without the necessity of steaming the tank, thus making field installations safe and practicable; also that the fitting which cooperates with the discharge head to constitute the sealed connection is located within the tank so as not to interfere with closing the filling opening.

Figure 3 illustrates one preferred manner of mounting the fill-pipe within the tank. In this figure it will be observed that the manhole cover, **30**, secured to the tank in any suitable manner, such as by means of bolts, **31**, has a filling opening, **32**, within which a cap, **33**, is threaded. The fill-pipe **F** is shown as being provided with a series of bracket members, **34**, welded or otherwise attached to the upper end of the fill-pipe as indicated at **35**, such bracket members being secured to the under-surface of the manhole cover by means of bolts, **36**. The socket fitting on the top of the fill-pipe is located below the cap **33**, and in this embodiment the lower end of the fill-pipe is provided with a series of divergent legs of a non-ferrous metal, **38**, shaped so as to engage the bottom of the tank, and the bottom of the fill-pipe is cut on an angle, as indicated at **39**, to permit a rapid delivery of the liquid and eliminate back pressure and at the same time provide a discharge opening which is normally located below the liquid level in the tank. With this arrangement it will be seen that by removing the bolts **31** the fill-pipe can be lifted from the tank with the manhole cover **30**. In the embodiment shown in Figure 4 I provide the bottom of the tank beneath the manhole cover with a tripod, **40**, permanently secured in the bottom of the tank, such tripod having a collar, **41**, at its upper end, through which the fill-pipe **F'** can be lowered into engagement with the bottom of the tank.

Figure 5 shows a plan view of a tank truck

provided with 4 compartments, each of which is equipped with a manhole indicated at 13a, 13b, 13c, and 13d, respectively. With a filling apparatus of the type contemplated by this invention a tank truck of this character can be positioned so that the center of the tank is substantially opposite the pivot point 17 for the swing-pipe 14, and by adjusting the length of the swing-pipe all four of the tank compartments, each of which is equipped with a fill-pipe of the class described above, can be filled without moving the truck. This is clearly illustrated by the dotted lines, 14b, 14c, and 14d, of Figure 5. This result is obtainable primarily because I employ a ball and socket connection between swing-pipe and fill-pipe. Since the swing-pipe is substantially rigid, its weight is sufficient to provide a substantially vapor-tight seal with this ball and socket connection, and the size and shape of the ball and socket are such that such seal is obtained over a substantial range of positions, as has been previously pointed out.

It will be understood that while I have herein described and illustrated certain preferred embodiments of my invention, the invention is not limited to the precise details of construction illustrated herein but includes within its scope such changes and modifications as fairly come within the spirit of the appended claims.

I claim:

1. Apparatus for filling tanks with fluids comprising, a source of fluid supply, a tank to be filled, a fixed conduit connected to said source, a rigid conduit pivoted to said fixed conduit for universal movement with respect thereto, a fill pipe mounted in said tank and extending adjacent the upper end thereof, and a joint between said fill pipe member and said rigid conduit member, said joint comprising means defining a socket-like end on one of said members and means defining a ball-like discharge end on the other of said members, the weight of said rigid conduit being so disposed with respect to said pivot point as to substantially maintain a seal between said members by gravity.

2. Apparatus for filling mobile tanks with fluids comprising, a source of fluid supply, a mobile tank to be filled, a fixed conduit connected to said source, a rigid conduit pivoted to said fixed conduit for universal movement with respect thereto, said rigid conduit being longitudinally extensible, a fill pipe mounted in said tank and extending adjacent the upper end thereof, and a quick detachable joint between said fill pipe member and said rigid conduit member, said joint comprising means defining a socket-like end on one of said members and means defining a ball-like discharge end on the other of said members, the weight of said rigid conduit being so disposed with respect to said pivot point as to substantially maintain a seal between said members by gravity.

3. Apparatus for filling tanks with fluids comprising, a source of fluid supply, a tank to be filled, a fixed conduit connected to said source, a rigid conduit pivoted to said fixed conduit for universal movement with respect thereto, a fill pipe mounted in said tank and extending adjacent the upper end thereof, and a joint between said fill pipe member and said rigid conduit member, said joint comprising means defining a socket-like end on one of said members and means defining a ball-like discharge end on the other of said members, said pivot point being above said joint so that part of the weight of the rigid conduit is taken at the joint to maintain the same.

4. Apparatus for filling tanks with fluids comprising, a source of fluid supply, a tank to be filled, a fixed conduit connected to said source, a longitudinally extensible rigid conduit pivoted to said fixed conduit for universal movement with respect thereto, and a fill pipe fixedly mounted in said tank having a socket-like opening at its upper end, said rigid conduit having a downwardly inclined discharge portion having a ball-like head thereon, the weight of said rigid conduit being so disposed with respect to said pivot point as to permit the maintenance of a joint between said ball-like head and said socket-like opening by gravity.

JOHN H. EARL.