Sept. 13, 1938. A. H. GALBRAITH 2,129,924

UNDERGROUND TANK SYSTEM

Original Filed June 15, 1934

Fig. 4

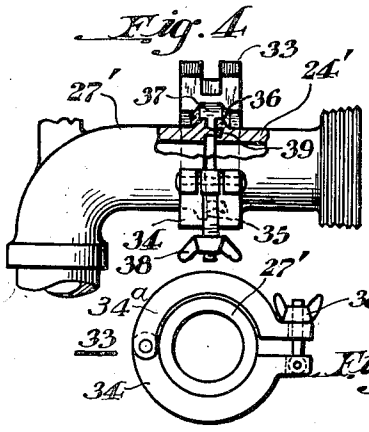
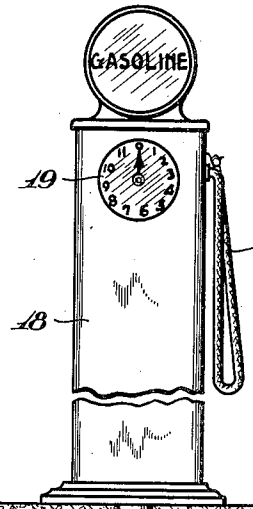


Fig. 5



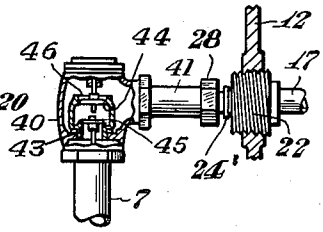


Fig. 6

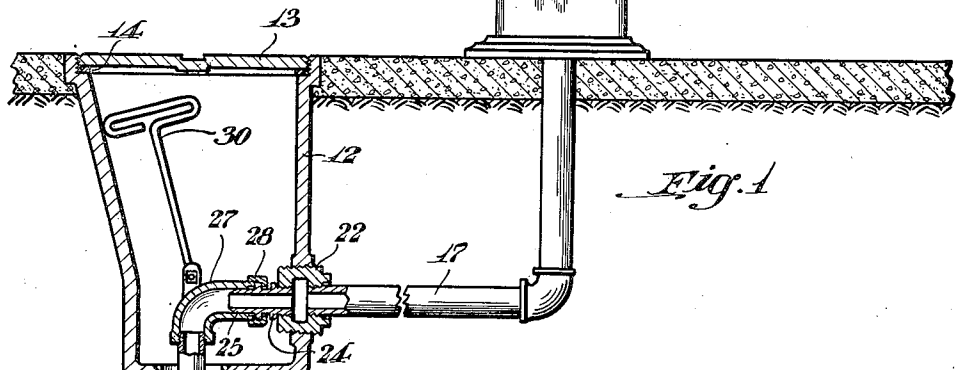


Fig. 1

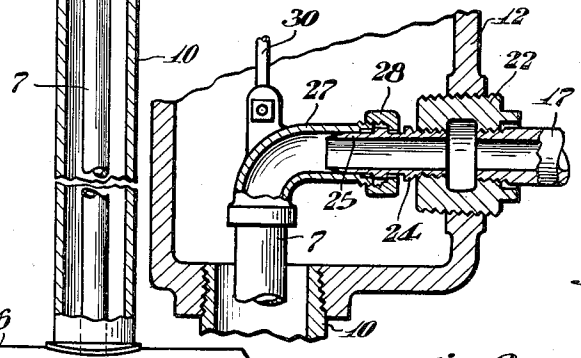


Fig. 3

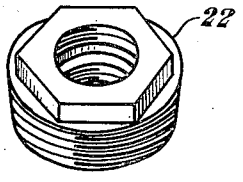
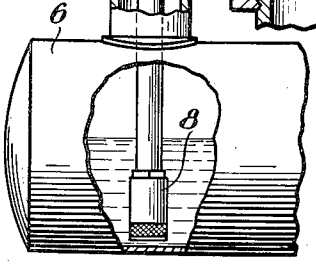


Fig. 2



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UNDERGROUND TANK SYSTEM

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7 Claims. (Cl. 137—78)

This invention relates to the provision of a removable valve structure for underground liquid storage tanks, and more particularly to the connections permitting the ready detachment of the vertical suction pipe for removal without requiring excavation.

One object of my invention is to provide a simple and inexpensive fitting which is accessible from the ground level for detachment of the vertical suction pipe and removal thereof.

A further object is to combine in a common connection to a subterranean tank, a filling pipe terminating adjacent the ground level in an enlargement, and a suction line extending up through the filler pipe and through a side wall of the enlargement, with a make and break connection accessible from the ground level through the enlargement of the filler pipe.

In the accompanying drawing,

Fig. 1 represents in vertical section, with parts in elevation, an underground liquid storage tank provided with connections embodying one form of my invention;

Fig. 2 is a detail perspective view of a double-tapped bushing insertible in the side wall of the enlargement of the well casing;

Fig. 3 is a detail view of the fitting employed in the embodiment of my invention shown in Fig. 1 for facilitating ready attachment and detachment of the vertical pipe carrying the foot valve;

Fig. 4 is a detail view partly broken away of a modified form of fitting;

Fig. 5 is an end view of the clamp used in the embodiment of my invention shown in Fig. 4; and

Fig. 6 is a detail view of a modification of the invention according to which a check valve is disposed in the angle which is disconnectible together with the vertical suction pipe.

Underground liquid storage tanks, such for example as gasoline or oil tanks, are commonly discharged by a pump to which a suction line runs from the tank. The suction pipe extends vertically from the tank to a level about one or two feet below the ground level, and then extends horizontally to a point adjacent the pump where it again turns vertically and emerges from the ground. The usual foot valve at the lower end of the suction pipe is subject to clogging or other interruption of its proper operation, so that frequently these foot valves must be removed. Various so-called foot valve extractor fittings are on the market; but these are quite complicated and are accordingly expensive.

Referring to Fig. 1 of the drawing, the subterranean tank is shown at 6, and a vertical pipe 7 carrying a foot valve 8 is provided for withdrawing liquid from storage. The pipe 7 extends vertically through a well, and it is generally expedient to provide some sort of well casing, the casing as illustrated in Fig. 1 taking the form of a pipe 10. Adjacent the ground level this casing is formed with an enlargement 12 closed by a removable cover 13 seating on a gasket 14.

A discharge conduit such as the piping 17 leads to the pump 18 which is herein illustrated as provided with the usual meter 19 and hose 20 for discharging into the tank of an automobile. The conduit or piping 17 has a projecting inlet extending inwardly through a side wall of the enlargement 12 of the well casing. In the form illustrated, a double-tapped bushing 22 is threaded in an opening in a side wall of the enlargement 12, the piping 17 being threaded into the bushing 22 on one side and a fitting such as a union 24 being threaded into the other side of the bushing.

The fitting 24 is of peculiar character, the purpose of the peculiarity in its form being to facilitate ready connection of the vertical pipe 7 so as to suspend the same in the well. The fitting takes somewhat the form of a pipe union; but the portion mounted in the side wall of the enlargement 12 does not terminate in abutting relation with the other part of the union but instead projects as shown at 25. The other portion 27 of the union is bent into the form of an elbow, and is coupled to the first portion by the usual threaded sleeve or nut 28. The vertical pipe 7 is threaded into the depending end of the elbow portion 27.

It is apparent that by unscrewing the nut 28 the elbow portion 27 can be detached by sliding to the left, as viewed in Fig. 1. A handle and connecting rod 30 is attached to the elbow portion 27 for lifting the vertical pipe 7 and foot valve 8 up through the well for insertion and/or overhauling. The enlargement 12 is made of sufficient size to permit a workman to manipulate a wrench on the nut or threaded sleeve 28 for tightening up or releasing the union. As the piping 17 leads away from the well at a level of from one to two feet below the ground, the enlargement 12 makes the fitting 24 readily accessible from the ground level. When the foot valve is to be restored, the pipe 7 is lowered into the well, and at this time the projecting end 25 comes particularly into play. The extremity of this projecting end is preferably tapered, as illustrated more particularly in Fig. 3, so as to

assist in guiding the elbow portion as the projecting end 25 enters the portion 27. The two portions are telescoped until the threads on the portion 27 can be easily engaged by the nut or threaded sleeve 28. The mechanic can at this time give his undivided attention to rotating the nut or sleeve with his wrench, as the telescoping of the portions 25 and 27 maintains the parts in alignment. This is a material improvement over the use of the ordinary pipe union which necessitates that the parts be maintained in alignment when threading the nut or sleeve onto the other portion of the union. As the pipe 7 and foot valve 8 may have considerable weight, it is a relief to the mechanic to have the pipe 7 suspended from the projecting portion 25 when he is tightening up the fitting 24.

The connections thus far described introduce a novel construction for filling subterranean tanks. In the above description it has been pointed out that it is preferable to employ a casing in the well within which the pipe 7 is suspended. Using for this casing a pipe 10, such as a four or five inch pipe, opens up the possibility of filling the tank 6 through this well, thus making the pipe 10 a filling pipe. The enlargement 12 aids in such practice, as there is no free opening through the sides of the enlargement 12 permitting leakage of the liquid with which the tank is being filled. The pipe 7 reduces the effective flow capacity of the pipe 10 when used as a filling pipe; but as my improved construction eliminates one of the connections to the storage tank, the expense of the somewhat larger pipe 10 is more than compensated. The cover 13 and gasket 14 seal the filling pipe so as to prevent the escape of fumes. From the above description of the construction shown in Fig. 1, it will be apparent that it is not necessary to withdraw the pipe 7 or to make any disconnection otherwise than the removal of the cover 13 when using the pipe 10 as a filling pipe.

My invention is not limited to the details of the arrangement illustrated in Figs. 1 and 3. For instance, it may under some circumstances be preferable to employ welding instead of the double-tapped bushing 22. In such case, in one side of an opening in the wall of the enlargement 12 will be welded the piping 17, and in the other side of the opening will be welded the fitting 24. Or the fitting 24 may be formed on the end of a length of piping 17 and this piping welded in the opening in the wall of the enlargement 12.

Another form of fitting is illustrated in Figs. 4 and 5; and as shown the portion 24' corresponds in position and function to the portion 24. Instead of connecting the portion 27' to the portion 24' by a nut or threaded sleeve, a clamp 33 is employed for connecting and disconnecting the portions 24' and 27'.

The lower half 34 of the clamp is preferably formed integral with the portion 24'. A flange 35 is formed on the end of the portion 27'; and a flange 36 is formed on the upper half of the portion 24'. The interior of the clamp 33 is grooved as indicated at 37. The lower half 34 receives the lower half of the flange 35, whereby the portion 27' is hooked or hung suspended with the vertical pipe 7 depending in the well. The upper half 34a of the clamp is pivoted to the lower half 34, and may be swung over the flanges 35 and 36 for clamping and wedging the ends of the portions 24' and 27' toward each other when the pipe 7 has been hung in the well as above described.

A wing nut 38 is operable for drawing together the parts of the clamp 33 for clamping the portions 24' and 27' together with a gasket 39 interposed for preventing leakage at the joint. The portion 27' corresponds in function and position to the portion 27 of the embodiment shown in Fig. 1, being formed as an elbow into whose depending end the pipe 7 is threaded. A connecting rod and handle 30 will be secured to the portion 27' as in the first embodiment.

In Fig. 6 is illustrated an embodiment of my invention according to which the valve is disposed at the top of the vertical pipe 7 suspended in the well. This means that no foot valve is required and that a check valve is interposed in the suction line where it is readily accessible from the surface of the ground.

A fitting 24' having a portion mounted in the side wall of the enlargement 12 furnishes in this embodiment a readily detachable connection for an angle check valve 40, said portion of the fitting 24' being threaded into a double-tapped bushing 22, the piping 17 being threaded into the other side of the bushing. The nut 28 of the fitting 24' couples the above mentioned portion to a short length of pipe or a nipple 41. The outer end of this pipe 41 is threaded into the outlet of the angle check valve 40. The internal arrangement of the angle check valve may be such as will best suit the conditions under which the installation is to operate; and as shown there is provided a lower seat 43 and a superimposed seat 44. A poppet 45 cooperates with the lower seat and a second poppet 46 cooperates with the upper seat, thus giving a double check action. The pipe 7 is threaded into the inlet to the angle check valve 40. As is clear from the description of the embodiment shown in Figs. 1 and 3, the nut or sleeve 28 may be readily loosened to permit detachment of the assembly including the pipes 7 and 41 and the angle check valve 40, this assembly being disposed where it can be easily reached. Although no rod and handle is shown, the same may be provided if desired; but obviously the assembly may be caught and pulled upwardly by a hook, or other grapple, or even by hand.

While I have illustrated and described certain preferred embodiments of my invention it will be understood that the invention may be otherwise embodied and practiced within the scope of the following claims.

I claim:

1. A connection for a subterranean tank comprising a well casing having an enlargement adjacent its upper end, piping for discharging liquid, said piping having a projecting inlet extending inwardly through the well casing adjacent its upper end, a vertical pipe in the well, a detachable connection telescoping with the projecting inlet for hanging said vertical pipe from said projecting inlet and placing said vertical pipe and said inlet in communication, said connection comprising means accessible from the ground level through said enlargement adjacent the upper end of the well casing and engageable with said projecting inlet for securing the vertical pipe thereto while hung therefrom, and a foot valve carried at the lower end of said vertical pipe.

2. In combination with a subterranean tank, a well casing, a pipe extending vertically in the casing, a foot valve carried at the lower end of

said pipe, and a fitting mounted in a wall of the casing and communicating with a discharge conduit, said fitting having a projecting portion adapted to telescope with the upper end of said pipe to suspend the same in the casing and attachment means engageable with the upper end of the pipe for drawing the same along said projecting portion into sealing engagement with the fitting.

3. In combination with a subterranean tank, an upwardly extending casing connected to the tank and arranged to serve for filling the same, said casing having an enlargement adjacent the ground level, a suction pipe carrying a foot valve inserted into the tank through said casing, a discharge conduit having an inlet to which the suction pipe is adapted to be connected, mechanism for detachably connecting the suction pipe to said inlet, said mechanism being so accommodated within said enlargement as to afford free access to said enlargement for the nozzle of a filling conduit, and a closure for the casing.

4. In combination with a subterranean tank, an upwardly extending casing connected to the tank and arranged to serve for filling the same, said casing having an enlargement adjacent the ground lever, a suction pipe carrying a foot valve inserted into the tank through said casing, a discharge conduit having an inlet to which the suction pipe is adapted to be connected, the internal cross-section of the casing being sufficiently larger than the external cross-section of the suction pipe to afford a filling passageway extending to the tank substantially as large as the passageway afforded by the suction pipe, mechanism for detachably connecting the suction pipe to said inlet, said mechanism being so accommodated within said enlargement as to afford free access to said enlargement for the nozzle of a filling conduit, and a closure for the casing.

5. In combination with a subterranean tank, an upwardly extending casing connected to the tank and arranged to serve for filling the same, said casing having an enlargement adjacent the ground level, a fitting having one portion at the end of a conduit leading through the side of the enlargement to a pump, a suction pipe carrying a foot valve inserted into the tank through said casing and having at its upper end a mating portion of said fitting, said fitting being so disposed in said enlargement as not to substantially interfere with flow of fluid to the tank during filling, and a closure for the casing.

6. In combination with a subterranean tank, a well casing connected to the tank and extending upwardly therefrom to a desired height, a discharge pipe arranged within the casing and extending into the tank, a discharge conduit extending through a wall of said casing and means for detachably connecting the pipe to the conduit and interposed between them, said means having a projecting portion adapted to cooperate with the upper end of the discharge pipe to suspend the pipe in the casing, the internal cross section of the casing being sufficiently larger than the external cross section of the discharge pipe to afford a filling passage extending to the tank of a cross sectional area at least as great as the cross sectional area of the discharge pipe.

7. In combination with a subterranean tank, a well casing connected to the tank and extending upwardly therefrom to a desired height, a discharge pipe arranged within the casing and extending into the tank, a discharge conduit extending through a wall of said casing, and means for detachably connecting the pipe to the conduit and interposed between them, said means having a projecting portion adapted to cooperate with the upper end of the discharge pipe to suspend the pipe in the casing, the internal cross section of the casing being sufficiently larger than the external cross section of the discharge pipe to afford a filling passage extending to the tank of a cross sectional area at least as great as the cross sectional area of the discharge pipe, the upper end of said casing being large enough to afford free access from the upper end thereof to the means connecting the pipe and conduit.

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