United States Patent [19]

Lindberg

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[54] **FLUID FILLING SYSTEM**

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[52] **U.S. Cl.** **141/94,** 141/266, 141/368, 141/392

[51] **Int. Cl.** **B67c 3/00**

[58] **Field of Search** 141/94, 250, 165, 263, 141/264, 266, 269, 279, 276, 286, 311, 312, 363, 364, 365, 368, 372, 390, 391, 392

[56] **References Cited**

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[57] **ABSTRACT**

A fluid filling system which includes a dispensing pipe and means for sealing the pipe to a storage tank. Fluid dispensing slots are cut in the lower end of the pipe for directing the input fluid horizontally so as not to stir up sediment which may have accumulated at the bottom of the tank. The sealing means includes a lug for engaging the inside surface of the tank, a sealing disk for clamping on the upper portion of entrance conduit, and a holding pawl for positioning the sealing disk on the pipe.

8 Claims, 5 Drawing Figures

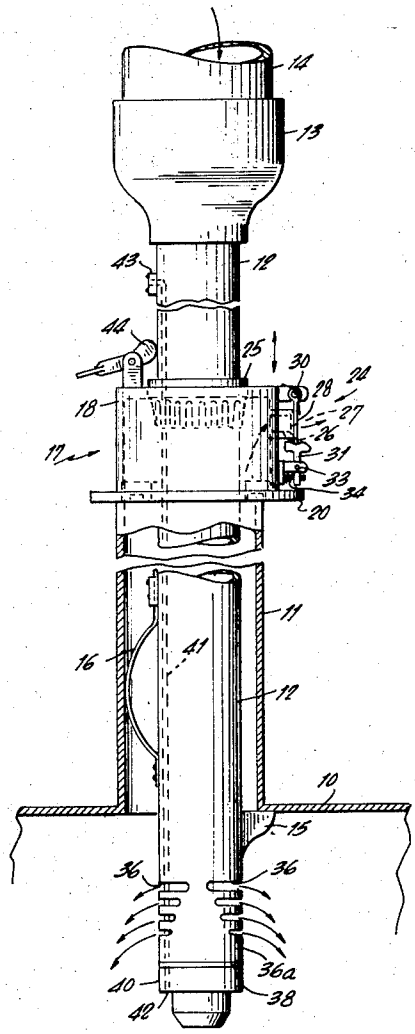


FIG. 1

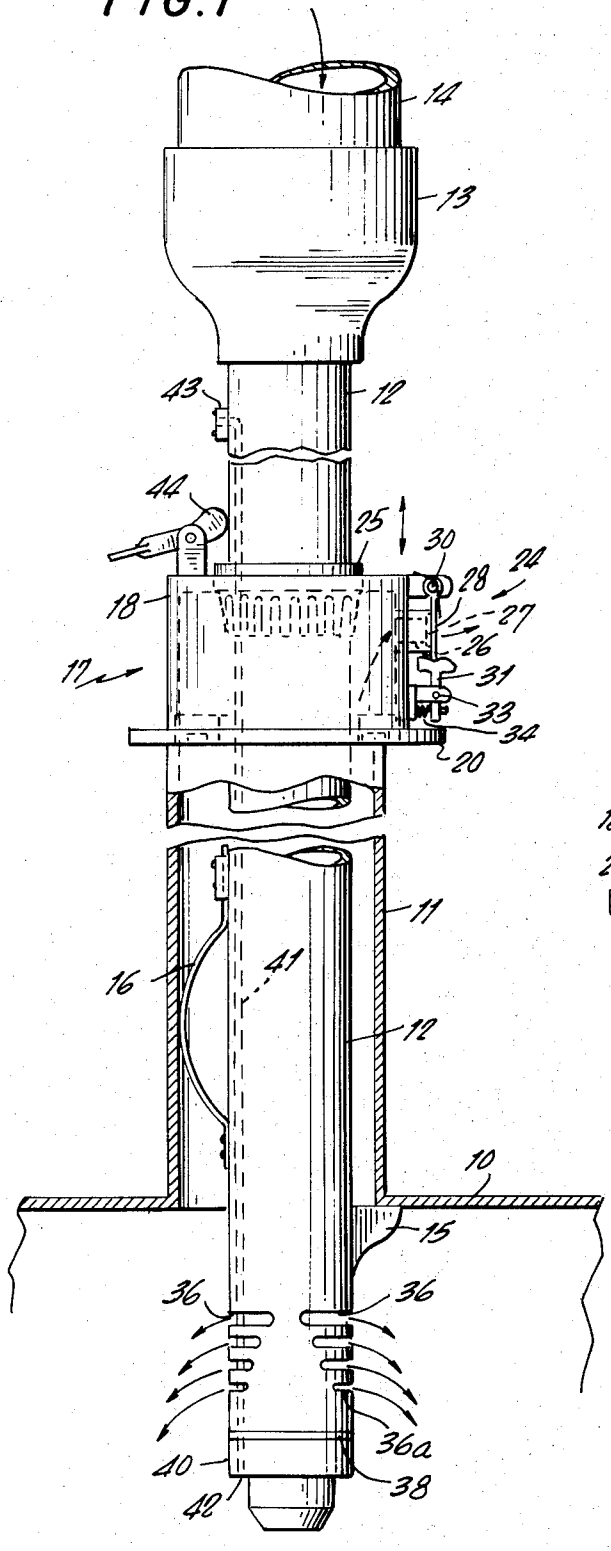

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FIG. 2

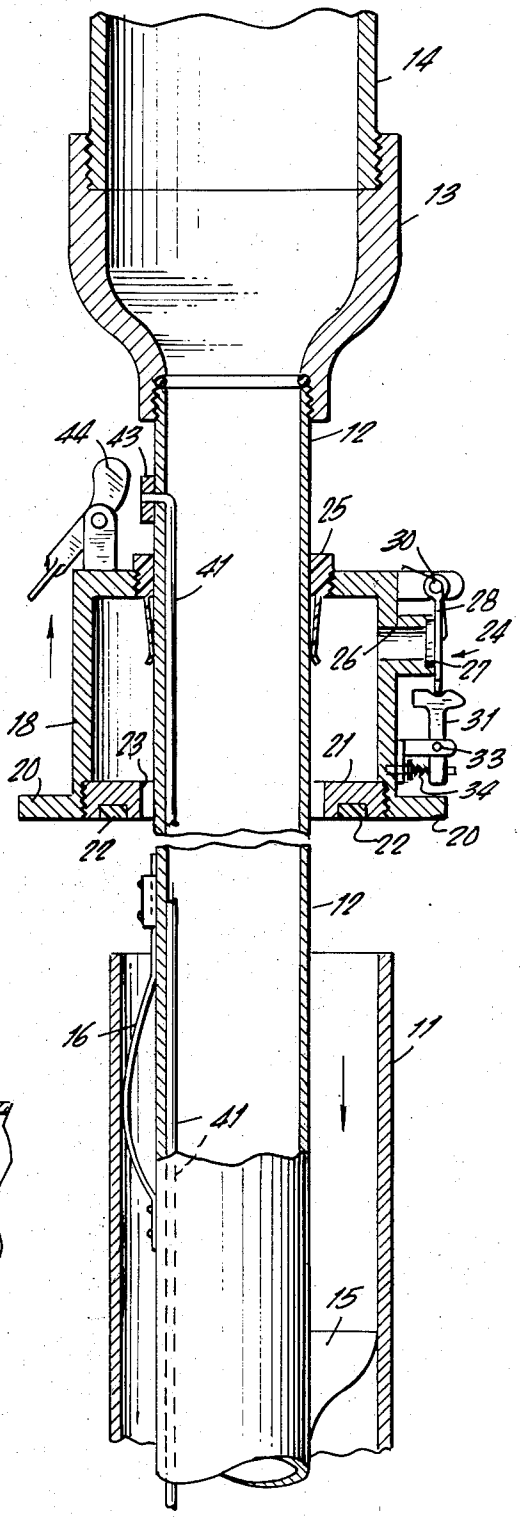
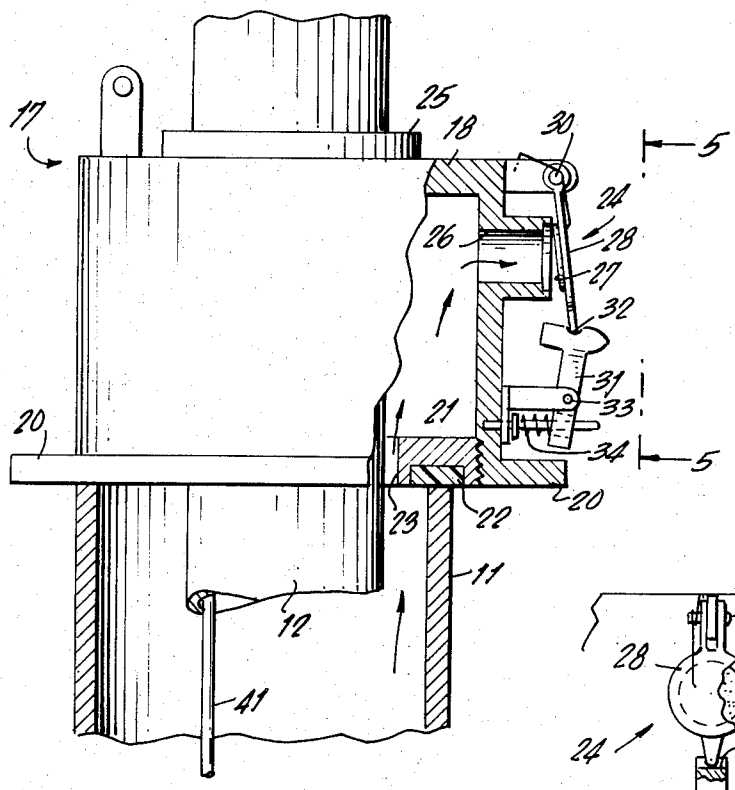

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FIG. 3



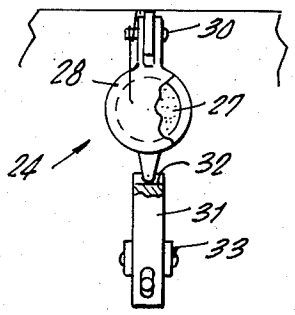
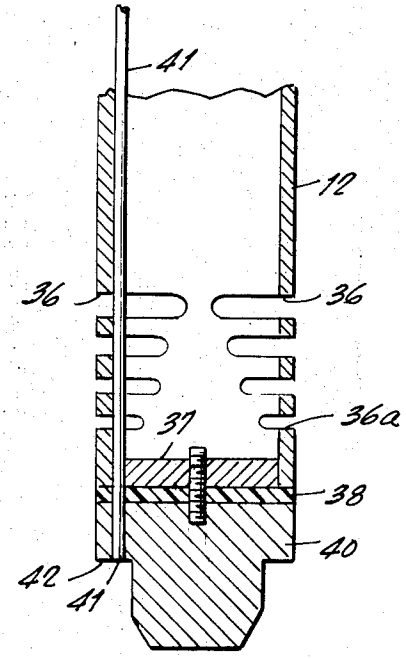


FIG. 5

FIG. 4



FLUID FILLING SYSTEM

BACKGROUND OF THE INVENTION

The present invention is directed specifically, but not exclusively to stationary fuel tanks which may be installed in a home or in a supply depot. The usual form of operation includes periodic filling with fuel through a top entrance pipe and fluid withdrawal, either periodic or continual from an output pipe positioned a short distance above the tank bottom. After continued use, considerable sediment accumulates in the bottom of the tank and it is highly desirable to leave this sediment in its undisturbed condition during the fuel filling or withdrawal operations. The expense of frequent tank cleaning can be saved and the damage done by dirt drawn off with the fluid can be reduced by not disturbing the sediment.

One of the main sources of sediment contamination is the stirring and mixing action produced by the filling operation, particularly when a large stream of pressurized fluid is directed into the storage tank from a top filling pipe.

The present invention eliminates this mixing action by the use of a unique form of spray head secured to the exit end of the filling pipe, and means to keep the dispensing hose well above the bottom of the tank. The lower end portion is closed and a plurality of horizontal slits are cut in the sides of the pipe so that the entering fluid is diverted into a plurality of horizontal fan-shaped sprays which distribute the fluid over a large area and produce substantially no currents in the fluid in the bottom of the tanks.

It is an important part of the tank filling operation to leave a small volume of air at the top of the tank to allow for temperature changes in volume. For the best results in filling operations, this air space should be a constant volume, large enough to be safe, but not too large to sacrifice storage space. Such an air space is automatically produced by a novel arrangement of a positioning lug, a slidable sealing disk, and the usual whistle alarm.

Other features and further details of the invention will be disclosed in the following description, taken in connection with the accompanying drawings.

BRIEF DESCRIPTION OF THE FIGURES

FIG. **1** is a side view of the main filling pipe secured in place in the entrance conduit of a storage tank. Some parts are in section.

FIG. **2** is a cross sectional view of the upper portion of the filling pipe and the entrance conduit and before being positioned in its filling position.

FIG. **3** is a partial cross sectional view, to an enlarged scale, of the details of the vent valve.

FIG. **4** is a cross sectional view of the bottom portion of the filling pipe showing the position and extent of the transverse slots in the pipe.

FIG. **5** is a side view of the vent valve shown in FIG. **3** and is taken along line **5—5** of that FIGURE.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring now to the FIGURES, a storage tank **10** is shown in FIG. **1** with an entrance conduit **11.** A main filling pipe **13** is shown inside the entrance conduit **11** being connected at its upper end to a coupling fixture

13 and a flexible supply hose **14.** Near the lower end of the filling pipe **12** a lug **15** is secured to the pipe surface to locate and position the pipe in the tank. A resilient means, which may be a flat spring **16,** is secured to the opposite side of the pipe to hold the lug **15** in place during filling, but to permit its removal after each filling operation.

Near the upper end of the filling pipe **12** a slidable sealing fixture **17** is mounted for partially sealing the upper edge of the entrance conduit **11.** The fixture **17** includes a cup shaped casting **18** of metal having a lower flange portion **20.** A lower closure disk **21** is threaded to the fixture **18** and supports a sealing gasket insert **22** made of resilient plastic material such as neoprene. The closure disk **21** is formed with a central bore **23,** larger than the outside diameter of the main filling pipe **12** so that air may pass freely from the tank **10,** up through the space between the pipe **12** and conduit **11,** then through the bore **23** to a closure valve **24.** A plastic seal **25** is threaded into the opening in the upper portion of the fixture **17** so that air cannot escape through the space between pipe **12** and unit **17.**

The closure valve **24** is normally closed at the start of the filling operation and will remain closed if the tank being filled has a vent of its own. If the tank **10** has no vent, or if its vent is closed, the pressure within the tank will open the vent valve **24** and permit air to escape. The vent valve **24** includes a cylindrical opening **26** closed by a valve cap **27.** The cap **27** is supported by a lever **28,** hinged on a pin **30,** with its lower end supported by a toggle lever **31.** The toggle lever is formed with an upper notch **32** (see FIGS. **4** and **5**) which engages the lower end of the lever **28.** Lever **31** is hinged on a pin **33** and is yieldably held by a helical spring **34** to hold the valve in a closed position. When the valve is closed, considerable force is required to open it, but when opened, as shown in FIG. **5,** the toggle action retains the valve in its opened condition, no matter what the subsequent pressure in opening **26.**

The lower portion of the filling pipe **12** is formed with a series of transverse slots **36** (see FIGS. **1** and **4**) for directing the input fluid laterally into horizontal streams. The lowest slot **36A** is the narrowest and is designed to send a relatively high velocity fan-shaped stream into the space adjoining the pipe. The upper slots are made progressively wider and longer. The fluid streams projected from these slots contain more fluid but having a lower velocity. The downward velocity of the upper streams is further reduced by coming into contact with the stream coming from the lowest slots **36A.** The net result is a widely distributed fluid spray which is deposited on the surface of the fluid in the tank without causing turbulence, or disturbing the tank fluid body. The bottom of the filling pipe **12** is closed by a metal disk **37** held in place by several peripheral screws (not shown). Directly below disk **37** is a plastic disk **38** made of neoprene or some similar material for sealing this portion of the filling pipe from leakage. Below the plastic disk **38** is a relatively large metal nut **40** designed to protect the other components from wear and abrasion. When the filling pipe **12** is removed from the tank after a filling operation, it may be stored in a compartment resting on the nut.

The usual whistle tube **41** is mounted inside the filling pipe **12** to warn of a filled or the approach of a filled tank. The lower end of this tube **41** terminates in the

nut 40 in an offset portion 42 where it is substantially free from abrasion and accumulation of dirt. The upper end of the whistle tube 41 terminates in a whistle device 43.

The operation of the delivery system is as follows: The filling pipe 12 is entered into the entrance conduit 11 and pushed down until the lug 15 is below the inside surface of the tank 10. Then the filling pipe is raised until the lug 15 limits against the inside surface of tank 10. Next, the sealing fixture 17 is lowered until it is in contact with the upper edge of conduit 11, and the retaining pawl 44 placed in contact with the pipe 12. The fluid is now turned on and the tank 10 is filled by the fan-like streams. At the end of the filling cycle, when the whistle stops, the fluid is turned off, the filling pipe is manually canted against the force of spring 16 to release lug 15, and the filling pipe is removed.

Having thus fully described the invention, what is claimed as new and desired to be secured by Letters Patent of the United States, is:

1. A fluid filling system for supplying fluid to a storage tank comprising: a vertical main filling pipe for insertion into the storage tank through an entrance conduit; a retaining lug secured to said pipe for position the pipe in the tank at a desired height; a resilient means secured to said pipe on the opposite side from the lug for urging the lug into retaining position against the inside surface of the tank; a resilient sealing disk slidably mounted on the outside surface of the filling pipe for sealing contact with the upper edge of the entrance conduit; and a plurality of transverse slots formed in the lower portion of the filling pipe for directing input fluid into substantially horizontal streams.

2. A fluid filling system as claimed in claim 1 wherein the lowest slot in the filling pipe is narrower than any of the slots above it.

3. A fluid filling system as claimed in claim 1 wherein the slots in the filling pipe are formed with widths which get progressively wider as their distance from the bottom of the pipe increases.

4. A fluid filling system as claimed in claim 1 wherein said filling pipe is closed at its lower end by a nut containing a protected opening for admitting air to a whistle alarm.

5. A fluid filling system as claimed in claim 1 wherein a slidable sealing fixture is mounted on the filling pipe and includes said sealing disk, a cylindrical body secured to the sealing disk, and an upper resilient seal mounted between the outside surface of the filling pipe and an upper washer connected to the sealing disk.

6. A fluid filling system as claimed in claim 5 wherein said sealing fixture includes a normally closed vent valve which opens to permit the escape of air from the tank when the pressure of air in the tank exceeds a predetermined valve.

7. A fluid filling system as claimed in claim 5 wherein said sealing fixture includes a rockable pawl for making contact with the outside surface of the filling pipe and holds the sealing fixture in a desired sealing position.

8. A fluid filling system as claimed in claim 5 wherein said vent valve is coupled to a toggle arm which holds the valve in its opened position after being opened by internal pressure.

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