Feb. 2, 1943. H. L. BAER 2,310,051

FLUID FEEDING DEVICE

Filed Feb. 7, 1940

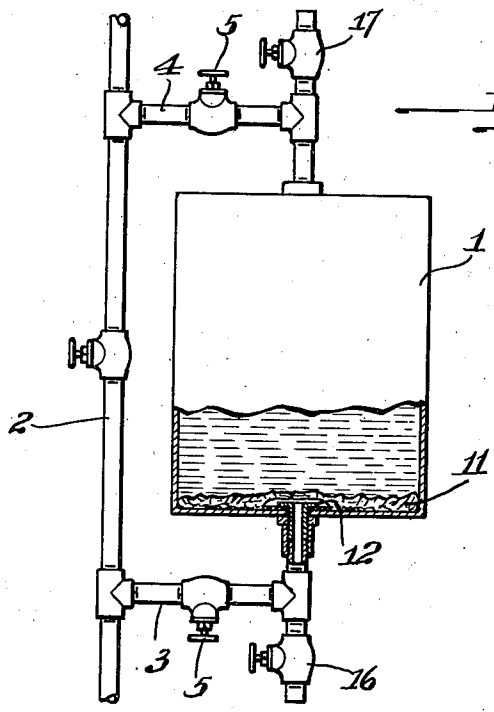


Fig. 1.

Fig. 2.

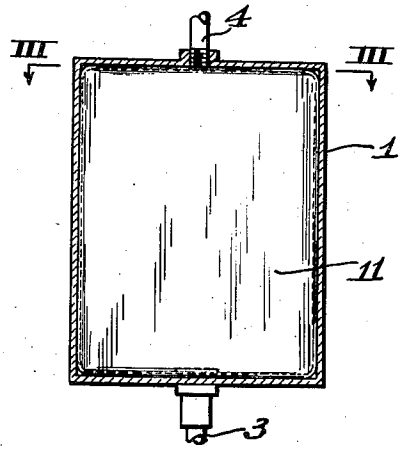
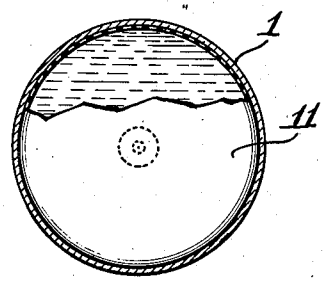


Fig. 3.



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FLUID FEEDING DEVICE

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1 Claim. (Cl. 210—38)

This invention relates to apparatus for feeding liquids out of tanks, and more particularly to apparatus for feeding liquids from tanks into fluid pressure lines and the like.

For example, in the treatment of flowing water to soften it or to prevent scale formation and corrosion in the pipes and tanks through which it flows, it is common practice to make use of what is known as a by-pass. This comprises a small tank having in its ends an inlet and an outlet connected by pipes to the water pressure line so that some of the water flowing through the line by-passes around through the tank. The tank is filled periodically with the desired liquid chemical for treating the water in the pressure line, and the water that is by-passed through the tank carries or feeds this chemical into the pressure line for that purpose. A serious disadvantage of such a by-pass is that the water that flows through the tank mixes with the liquid chemical therein, and as the volume of liquid decreases the volume of water increases. Consequently, the chemical is gradually diluted so that it becomes weaker and weaker as it is fed from the tank. Heretofore there has been no satisfactory way of preventing this dilution.

It is among the objects of this invention to provide means which operates by fluid pressure for feeding a fluid from a tank, which prevents the fluid from being diluted in the tank, which is simple and inexpensive in construction, which is easy to install, and which is dependable and highly satisfactory in operation.

According to this invention a tank has an outlet opening and an inlet opening adapted to be connected to a source of fluid under pressure. For example, these two openings may be connected to a fluid pressure line. Disposed in the tank is an expansible and collapsible or flexible member that divides the tank into two chambers sealed from each other, one chamber being in communication with the tank inlet and the other with the tank outlet. The latter chamber is adapted to receive the treating fluid that is to be fed from the tank. When pressure fluid enters the tank inlet it moves the major portion of the expansible and collapsible member toward the tank outlet and thereby forces the treating fluid out of the tank. Preferably, the expansible and collapsible member consists of a flexible bag whose opening is connected to the inlet of the tank. In such a case the tank is filled with the treating fluid while the bag is collapsed, and the pressure fluid is admitted to the bag which it slowly expands and thereby expels the treating fluid from the tank.

The preferred embodiment of the invention is illustrated in the accompanying drawing in which Fig. 1 is a side view, partly in section, of my apparatus showing the tank full of a fluid-treating liquid with the collapsed flexible member at the bottom; Fig. 2 is a vertical section through the tank showing the flexible member fully expanded; and Fig. 3 is a horizontal section taken on the line III—III of Fig. 2.

Referring to Fig. 1 of the drawing, a tank 1 is disposed at one side of a fluid pressure line 2, such as a water line, and is provided with an opening at one end connected by a pipe 3 to the pressure line. The opposite end of the tank is provided with an opening also connected by a pipe 4 to the water line, and the two pipes are provided with valves 5 which may be closed to cut the tank off from line 2. Either of the tank openings may serve as the inlet, and the other as the outlet, depending on which way the water is flowing through the pressure line. If the water is flowing upwardly in line 2 in Fig. 1, then the lower tank opening serves as the inlet. The tank is adapted to receive a liquid chemical with which the water in the pressure line is to be treated for the purpose of softening it, preventing scale formation and corrosion, or the like.

It is a feature of this invention that the liquid chemical is fed undiluted from the tank to the water line, so that a uniform quantity of chemical is delivered to the pressure line per minute as long as the supply lasts, and in the desired amount per given number of gallons of water. Accordingly, disposed in the tank is a hollow expansible and collapsible member provided with an opening that is connected to one of the tank openings in order to divide the tank into two chambers sealed from each other. This member is preferably a flexible bag 11 made of rubber or other suitable liquid-tight material and having only a small opening which is connected to the lower opening in the tank by a tubular sealing member 12. When the valve in pipe 3 is opened, water under pressure from line 2 will enter the tank and tend to expand the collapsed bag against the liquid chemical in the tank. As the valve in pipe 4 is opened at the same time, the chemical is free to flow into the pressure line at a rate controlled by the valve 5 in that pipe. The expanding bag forces the chemical from the tank, but prevents the water that enters the tank for this purpose from mixing with the chemical

and diluting it. As a result, the chemical that is fed to the pressure line is of the same concentration throughout the feeding period.

As shown in Figs. 2 and 3, the fully expanded bag fills the tank so that substantially no chemical can remain therein. When expanded, the bag therefore is of the same shape as the interior of the tank.

After the tank has been emptied of its liquid chemical valves 5 are closed, a drain valve 16 connected to pipe 3 is opened, and a venting valve 17 connected to pipe 4 is also opened. This permits air to enter the tank so that the water in the bag will drain therefrom and the bag will collapse, after which the tank can be filled again with liquid chemical through valve 17. As soon as the tank has been refilled and valves 16 and 17 closed, valves 5 are opened and the feeding apparatus starts functioning again in the same manner as before.

If the water is flowing through line 2 in a direction corresponding to downwardly in Fig. 1, the bag is filled with the liquid chemical and water under pressure from the line is admitted to the tank through pipe 4. This pressure slowly collapses the bag and thereby feeds its contents into the water line through pipe 3. In such a case the tank should be positioned with its outlet at the top, such as when viewing Fig. 1 upside down, so that the bag can be filled by merely pouring the chemical into it.

It will thus be seen that my invention makes it possible to feed a liquid from a tank by fluid pressure without diluting the liquid. The feeding means is very efficient, although inexpensive and easy to install. No sealing rings or the like are necessary because once the bag has been clamped in place there is no chance of the water mixing with the chemical in the tank. The bag can therefore be readily installed in existing by-pass tanks.

According to the provisions of the patent statutes, I have explained the principle and construction of my invention and have illustrated and described what I now consider to represent its best embodiment. However, I desire to have it understood that, within the scope of the appended claim, the invention may be practiced otherwise than as specifically illustrated and described.

I claim:

Apparatus for feeding a water-treating liquid undiluted to a water pressure pipe line, comprising a tank for said liquid provided with an inlet and an outlet, means for connecting said inlet and outlet to said pipe line at opposite ends of the tank, a flexible bag disposed in the tank and having a restricted opening communicating with said inlet, a tubular member extending through said opening and inlet and having a flange at its inner end overlying a portion of the bag surrounding said opening, means outside of the tank for drawing said flange tightly against the bag to clamp the portion of the bag surrounding its opening to the tank in sealing engagement therewith, said bag substantially filling the tank when expanded, means for controlling the entrance of water from said pipe line into said bag whereby to force said liquid out of the tank outlet and into the pipe line, closable means for admitting air to the tank, and means for connecting the bag with the atmosphere while said closable means is open to permit the bag to drain and collapse.

HARRY L. BAER.