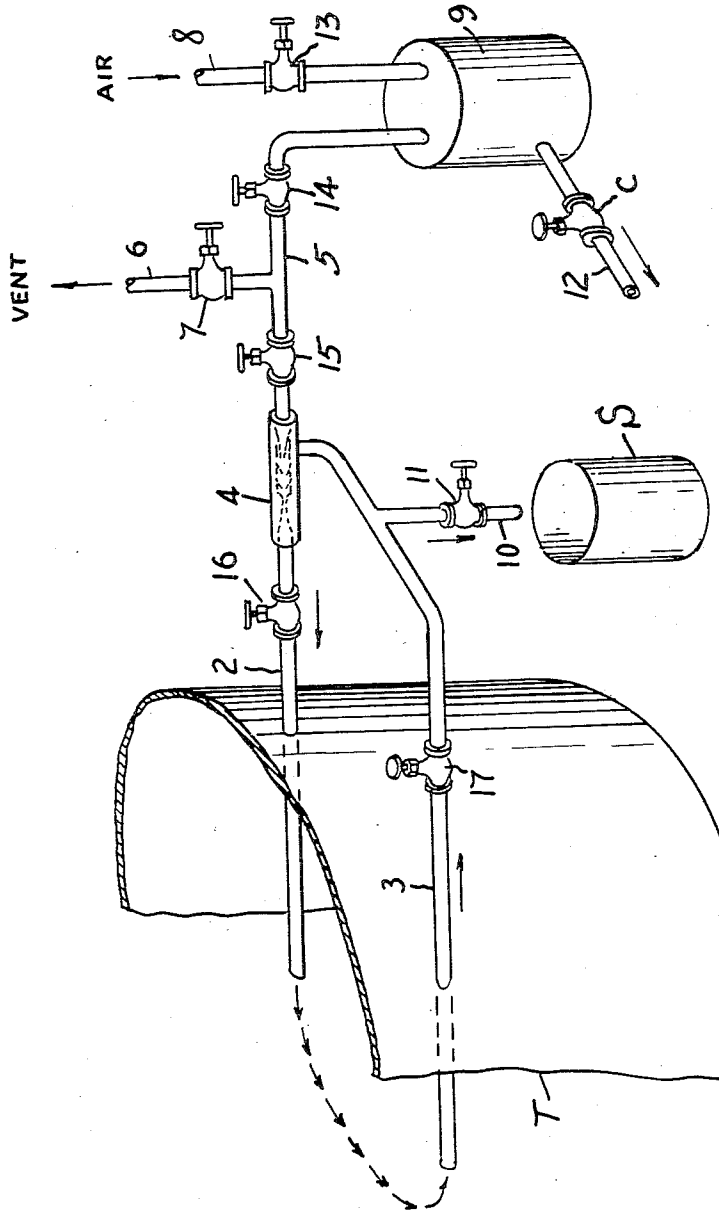
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TANK SAMPLING APPARATUS

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TANK SAMPLING APPARATUS

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With bulk containers, such as tanks, as in petroleum refineries, or in field installations, etc., it is commonly necessary to obtain samples of the liquid contents from time to time, and it is desirable that this be accomplished without undue inconvenience. It is also desirable that the attaining of samples be under such conditions that accurately representative samples of the liquid be obtained. It is further desirable that it be possible to perform sampling operations without waste or spilling on the ground or necessity of draining into the sewer. In accordance with the present invention, such desired standards may be obtained, and in addition it becomes possible to sample liquids which are in very wide range, both as to composition and specific gravity, and also importantly as to temperature. In this latter respect it thus becomes possible to take samples of molten materials which if casually handled would solidify such as to interfere with handling which is not conducted promptly. And withal, the equipment is versatile in its applicability to bulk containers of wide range, and involves relatively simple equipment. Other objects and advantages of the invention will appear from the following description.

To the accomplishment of the foregoing and related ends, said invention, then, comprises the features hereinafter fully described and particularly pointed out in the claims, the following description and the annexed drawing setting forth in detail certain illustrative embodiments of the invention, these being indicative, however, of but a few of the various ways in which the principle of the invention may be employed.

In said annexed drawing:

The sole figure is a perspective view of tank equipment embodying the invention, a portion being in section to better show detail.

In general, the invention involves a circulatory circuit which in part is within the bulk container or tank, and in part outside, the latter including liquid-propelling means and a tap-out for drawing a sample from the circuit.

An illustrative embodiment involves a bulk container, an oil tank T, such as in refinery equipment, or in the field, and an inlet pipe 2 and an outlet pipe 3 are in spaced-apart relation and may have their inner ends in preferred cases even projecting within the tank for an averaging or representative location back from the tank wall, and also in a location such as is desired in any particular case above the floor level. The outlet pipe 3 connects in closed circuit with the inlet pipe, and interposed is a liquid-propelling means 4 which operates to provide a circulation from the end of the inlet pipe to the end of the outlet pipe, thus in the tank liquid and thence in the outside portion of the circuit back to the inlet. This outside piping may be covered with insulation if desired. While mechanical liquid-propelling

means may be used in some cases, it is preferable to apply a Venturi-type means such as an injector, also sometimes called an eductor, and an illustrative instance of which is a Schutte-Koerting Syphon No. 217. This type of device has an advantage in that a gaseous propellant, usually air, or in some rare instances steam, breaks up a dense mass of particularly viscous liquid material and facilitates its movement. Using air pressure as a propellant force, thus an air pressure supply inlet pipe 8 may have a connection through pipe 5 into the injector or eductor 4, while the return circuit from pipe 3 connects into the injector also. In the outlet pipe 3 a branch 10 with its control valve 11 allows the drawing off of a desired sample into a sampling vessel S, as desired.

In cases where the air supply contains condensing-out moisture, it is desirable to include in the line a water collector, such as a receptacle 9 to which the air inlet pipe leads and from which the further pipe 5 goes to the injector 4.

A set of control valves is required, and valve 13 controls the air inlet supply, while valve 14 is interposed between the water collector and the vent 6, and valve 15 is interposed between the vent and the injector, while valves 16 and 17 are interposed in the inlet and outlet pipe connections of the tank.

The process of sampling is as follows: Vent valve 7 is closed, and valves 13 and 14 are opened, then valve 15, then valve 16, and valve 17. This starts a circulation through the injector and pipe 2 and the tank content between the end of the inlet and the end of the outlet pipe 3, and through the latter to the injector. The operator can allow this circulation to continue as long as he wishes. When he is ready to obtain a sample, he opens valve 11 and receives the liquid sample in the receptacle S. To shut the system down, valve 17 is closed first, then valve 16, then valve 15, then valves 14 and 13. finally the vent valve 7 is opened.

It is noticed that by reason of the circulation accurately representative samples are obtained, and there is no waste, and no spilling or surplus which has to be drained to a sewer. And, in practice liquids of light gravity and normal temperature are easily sampled, as are also liquids of heavy gravity, and high viscosity such as up to 380 Furol at 140° F.; and even materials such as molten asphalt are readily handled. It is noticed also that a sample can be drawn without requiring access to the surface of the liquid in the tank.

Other modes of applying the principle of the invention may be employed, change being made as regards the details described, provided the features stated in any of the following claims or the equivalent of such be employed.

I therefore particularly point out and distinctly claim as my invention:

1. Apparatus for sampling liquid in a bulk container comprising an inlet pipe connected to the side wall of the container at a point spaced beneath the surface of the liquid therein, an outlet pipe similarly connected to the container wall in spaced relation to said inlet pipe and at approximately the same elevation, such pipes extending horizontally and being interconnected substantially directly externally of the container, the pipes and connection thereof forming a normally closed system for the withdrawal and substantially immediate return in continuous flow of a portion of the liquid in the container, flow inducing means in such system operative to create a considerable pressure differential therein and uninter-

rupted flow of the liquid therethrough, a branch line connected to an external portion of such system at the inlet side of said flow inducing means, and valve means in said branch line operative to draw off a sample of the liquid without interrupting the continuous flow thereof in such system.

2. Apparatus as set forth in claim 1 characterized further in that said flow inducing means is operative to inject high velocity air into the system.

References Cited in the file of this patent

UNITED STATES PATENTS

1,860,107	Lien	May 24, 1932
1,967,428	Quereau	July 24, 1934
2,693,705	Casler	Nov. 9, 1954

FOREIGN PATENTS

673,751	Germany	Mar. 27, 1939