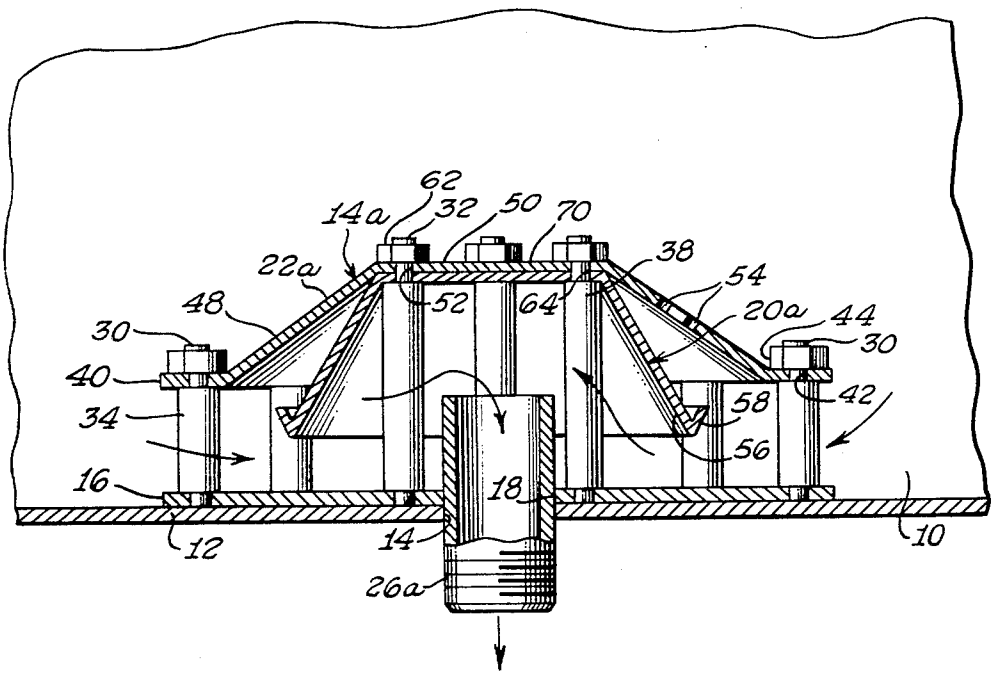
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TANK BLEEDER

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TANK BLEEDER

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3 Claims. (Cl. 137—590)

The present invention relates generally to the storage of liquids within tanks, and more particularly to a novel tank bleeder for use with liquid storage tanks.

This application is a division of my application Serial No. 288,685 entitled "Tank Bleeder," filed in the Patent Office on May 19, 1952, which issued on January 24, 1956, as Patent No. 2, 732,071.

Liquid storage tanks are widely used throughout the world today. In many instances it is necessary to store a plurality of liquids having different specific gravities in a single storage tank whereby such liquids will assume separate horizontal stratums. A common example occurs where oil or other hydro-carbon is stored in a tank together with water, which water may have entered the tank with the oil or perhaps later entered the tank by means of leakage or condensation. Inasmuch as such water will have a greater specific gravity than the oil it will settle to the lower part of the tank in the form of a strata. Thereafter, at such time as it becomes desirable to remove the oil from the tank this strata of water must be bled off, whereafter substantially uncontaminated oil will remain for withdrawal.

The means heretofore proposed for bleeding off such water has generally comprised a selectively-openable outlet of a comparatively small diameter located near the bottom of the tank. Occasionally, a horizontal pipe of the same diameter as such outlet may be inserted therethrough so as to draw water from a position spaced inwardly from the side of the tank wherein the outlet is formed. With either of these arrangements, unsatisfactory results are obtained inasmuch as considerable turbulence is developed by water entering the small diameter outlet or pipe. Such turbulence effects an intermixing of the oil disposed above the water with the water being bled from the tank, whereby a certain amount of this intermixed oil is bled off together with the water. In this manner a considerable amount of oil may be lost. However, it is true that such oil which is bled off with the water may be later recovered by a resettling process or the like, but such process involves an appreciable amount of time and trouble and hence is to be avoided.

It is possible to avoid such turbulence and its consequent intermixing of oil with the water being bled off by permitting the water to bleed off at a very slow rate. The slow withdrawal rate, however, is generally objectionable, primarily because an operator must stand by during the bleeding operation in order that he may close the outlet valve the moment the oil begins to drain from the tank. Accordingly, it is important that the bleeding off be accomplished as quickly as possible whereby the operator may leave the tank and attend to his other duties. A slow withdrawal rate is also objectionable inasmuch as it prevents the immediate re-use of the storage tank with a new body of oil.

It is a major object of the present invention to provide a tank bleeder for storage tanks which permits a tank to be bled in a minimum amount of time and with a minimum amount of turbulence.

It is a further object of the present invention to provide a tank bleeder for storage tanks which is simple of design and rugged of construction, whereby it may have a long and trouble-free service life.

It is another object of the present invention to provide a tank bleeder for storage tanks which may be made from readily obtainable materials and by simple manufacturing processes whereby it may be sold at a low price.

An additional object of the present invention is to provide a tank bleeder for storage tanks which has a novel arrangement for returning any liquid of a lower specific gravity than that being bled off which inadvertently enters the bleeder to return to the main body of such lighter liquid.

Other objects and advantages of the present invention will become apparent from the following detailed description thereof when taken in conjunction with the appended drawings wherein:

The single figure is a side elevational view of the invention.

Referring to the drawing, the lower portion of a storage tank designated generally by the numeral **10** is shown that includes a bottom **12** in which an opening **14** is formed through which a liquid outlet pipe **26***a* extends upwardly. An oil and water mixture when discharged into tank **10** will gradually separate into two strata, the lower strata being water, and the upper strata oil. The present invention permits the water to be discharged from drain line **26***a* without any appreciable quantity of oil being discharged therewith as will be hereinafter explained in detail.

The invention **14***a* includes a circular metal base **16** having a central opening **18** formed therein through which drain line **26***a* extends upwardly, with the drain line being welded or otherwise affixed to the portion of the base adjacent opening **18**. The base rests on the bottom **12**.

A number of circumferentially spaced first stud bolts **30** project upwardly from the upper peripheral edge of base **16**. Also a number of circumferentially spaced stud bolts **32** of greater height than bolts **30** extend upwardly from base **16**. Bolts **32** are relatively close to the upwardly projecting end portion of liquid outlet pipe **26***a*.

Stud bolts **30** have tubular spacers **34** disposed thereon, the lower ends of which rest on the upper surface of base **16**. Spacers **34** terminate substantial distances below the upper ends of bolts **30**. Likewise, bolts **32** have tubular spacers **38** mounted thereon that rest on base **16** and terminate substantial distances below the upper ends of the bolts.

A frusto-conical turbulence shield **22***a* is provided that includes a ring-shaped flange **40** in which a number of circumferentially spaced bores **42** are formed through which the upper end portions of bolts **30** extend, with the flange being supported on the upper ends of spacers **34**. The upper end portions of bolts **30** are threadedly engaged by nuts **44** to removably support the flange in a fixed position relative to base **16**. A frusto-conical side wall **48** extends upwardly and inwardly from the inner peripheral edge of flange **40** and terminates in a first flat circular plate **50**. A number of circumferentially spaced bores **52** are formed in plate **50** through which the upper ends of bolts **32** extend. Side wall **48** has a number of apertures **54** formed therein, the purpose of which will be explained hereinafter.

A frusto-conical sheet metal collector **20***a* includes an upwardly and inwardly tapering side wall **56** that has an upwardly and outwardly tapered lip **58** extending around the lower peripheral edge portion thereof. Side wall **56** terminates in a second circular plate **60** that has a number of circumferentially spaced bores **64** formed therein through which the upper ends of bolts **32** extend. Plate

60 rests on the upper ends of spacers 28. The upper surface of plate 60 is in abutting contact with the lower surface of plate 50. Nuts 62 engage the upper ends of bolts 32 to hold plates 50 and 60 in the above mentioned fixed relationship.

In operation, when it becomes desirable to bleed off the water contained in the lower portion of the tank 10, a valve (not shown) in communication with the pipe 26*a* may be opened whereby the water adjacent the bleeder 14*a* will enter the confines of the collector 20*a*, as indicated by the arrows in the drawing. Thereafter, this water will by gravity flow out of the tank through outlet pipe 26*a*. During the bleeding off of the water there will be little if any turbulence created by the entry of the water into the collector 20. This results from the streamlining effect of lip 58 formed upon the large end of the collector 20. In the event some turbulence should occur however, whereby a small quantity of oil should be drawn towards the large end of the collector, the major portion of such oil will pass upwardly into the annular space separating the inside of the turbulence shield 22*a* and the exterior of the collector 20*a*. From here the oil is free to pass through a plurality of apertures 54 formed about the upper portion of the turbulence shield 22. Inasmuch as the oil will be lighter than the water, such oil as may pass through these apertures is free to return upwardly to the main body of oil (not shown).

Although there have been described what is at present considered to be the preferred forms of tank bleeders embodying the present invention, it will be apparent to those skilled in the art that various modifications and changes may be made thereto without departing from the spirit of the invention or the scope of the appended claims.

I claim:

1. A tank bleeder for use in separating and drawing off two layers of liquids differing in specific gravity from a tank due to the hydraulic head to which the lowermost layer is subjected, including: an outlet pipe having a generally vertical open-ended portion that extends upwardly from the bottom part of said tank; a frusto-conical turbulence shield, the central portion of which is positioned above the upper extremity of said pipe and disposed in a substantially horizontal plane, said shield having a continuous side wall in which a plurality of apertures are formed; a horizontally disposed plate projecting outwardly from said vertical portion of said pipe, said plate extending beneath said turbulence shield and being vertically spaced therefrom; a plurality of circumferentially disposed spacers extending between said plate and turbulence shield that define a plurality of openings and hold said plate and shield in said spaced relationship, with the total area of said openings being such that fluid can flow therethrough without appreciable turbulence at the maximum rate said fluid can be discharged from said outlet pipe when said liquid to be separated is subjected to the maximum hydraulic head possible in said tank; a frusto-conical collector situated within said turbulence shield, with the central portion of said collector being positioned above the upper extremity of said outlet pipe, said collector being formed with a continuous side wall disposed at a lesser angle to the vertical than that of the side wall of said shield to define an annulus-shaped space therebetween with the lower horizontal edge of said collector terminating intermediately between the lower extremity of said shield and the upper surface of said base plate; and means for holding said collector and turbulence shield in fixed relationship to permit separation of said liquid after entering said openings into a first moving stream flowing into said annulus-shaped space, and a second more rapidly moving stream flowing upwardly inside said collector to discharge into said pipe with the relative rate of flow of said streams being determined by the total area of said apertures and the area of said openings, which area ratio is such that portions of said upper liquid layer inadvertently mixed with said lower liquid layer as it enters said bleeder will be directed, due to its natural tendency to rise into said first stream and continue said rise as said first stream flows through said apertures to return to the main body of said upper layer.

2. A tank bleeder as defined in claim 1 wherein said collector and turbulence shield are formed with flat central portions that abut against one another.

3. A tank bleeder as defined in claim 1 wherein said holding means include a plurality of circumferentially spaced rigid members that extend upwardly from said plate and to which both said collector and turbulence shield are affixed.

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