Dec. 11, 1928. 1,694,668

A. R. PETERS

OIL TANK BAFFLE

Filed Feb. 28, 1928

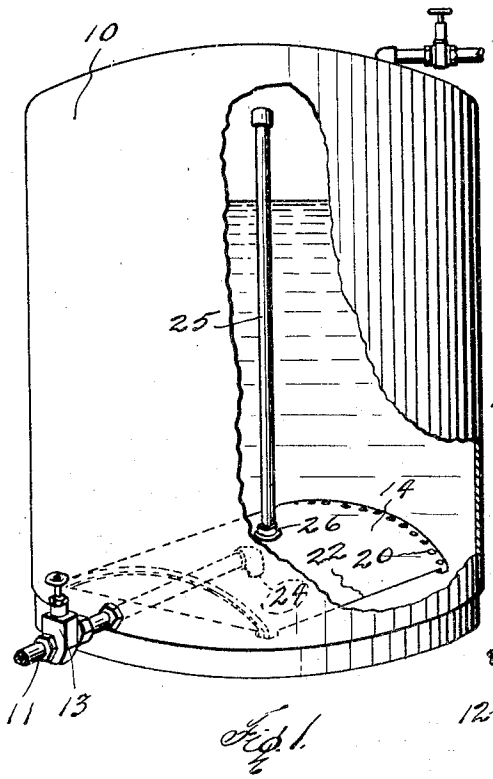

Fig. 1.

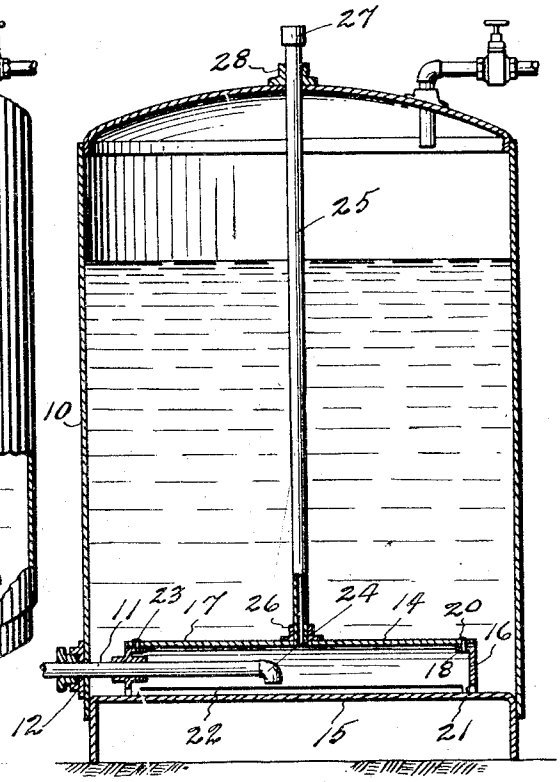

Fig. 2.

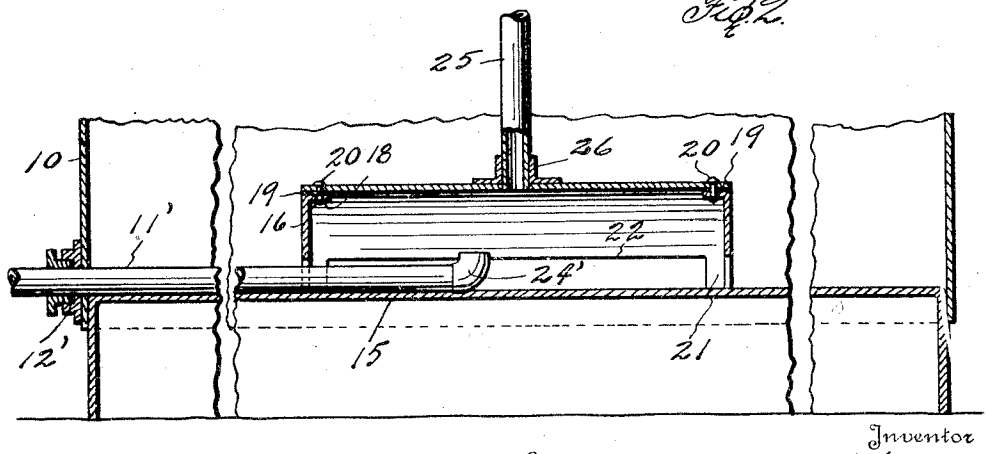

Fig. 3.

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UNITED STATES PATENT OFFICE.

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OIL-TANK BAFFLE.

Application filed February 28, 1928. Serial No. 257,618.

This invention relates to new and useful improvements in oil tank baffles.

Crude oil which is stored in tanks contains, besides the marketable oil, certain quantities of undesirable liquids and semi-solids known as roily oil or basic settlement. In the oil fields the objectionable matter is known as basic settlement and it will be so designated herein.

The basic settlement collects in the bottom of the tank and attains a depth of from two to four feet, if not frequently cleaned out. It is difficult to draw off the basic settlement without losing a quantity of marketable oil.

One object of the invention is to provide a baffle so arranged on the bottom of a tank as to permit the basic settlement to be discharged without carrying off the marketable oil.

A particular object of the invention is to provide a baffle and a discharge pipe leading from the baffle, in combination with a vent pipe extending upwardly from the baffle, whereby upon filling the tank with oil, said oil will rise in said vent pipe from under the baffle thus preventing the formation of an air pocket under said baffle, and also whereby upon opening the discharge pipe to drain the basic settlement, the column of oil standing in said vent pipe will aid in promoting a flow of basic settlement outward through the discharge pipe, owing to the weight and downward pressure of said column.

A construction designed to carry out the invention will be hereinafter described, together with other features of the invention.

The invention will be more readily understood from a reading of the following specification and by reference to the accompanying drawings, in which an example of the invention is shown and wherein:

Fig. 1 is a perspective view of an oil tank, a portion being broken away to disclose the baffle and vent pipe,

Fig. 2 is a vertical sectional view of the same parts and showing the vent pipe extending through the top of the tank, and

Fig. 3 is an enlarged vertical sectional view of a portion of the lower end of a tank and illustrating another form of the invention.

This application is a continuation in part of my former application filed November 12, 1926, Serial No. 148,050.

In the drawings the numeral 10 designates a storage tank, such as is used for storing crude oil, and no attempt is made to go into the details of the tank structure. In Figs. 1 and 2 a discharge pipe 11 is shown extending through a stuffing box 12 in the side of the tank and outside of said tank the discharge pipe includes a gate valve 13.

A baffle 14 is supported on the bottom 15 of the tank. The baffle comprises upright transversely elongated end walls or plates 16 having their upper edges arched to receive a curved or arched top plate 17. As is best shown in Fig. 3, the end plates are provided along their upper edges with inwardly directed flanges for receiving packing strips 19 on which the top plate rests. The flanges and top plate are firmly secured together by rivets 20 so as to make a fluid-tight joint at each end. Of course, it is to be understood that the baffle may be constructed in any suitable manner so long as it functions in accordance with the invention.

The baffle is supported on the bottom of the tank by legs 21 formed by extensions of the top and end plates. When the baffle is in position on the bottom of a tank there will be a layer of basic settlement, not only surrounding the baffle but a portion of said layer will rest upon the top 17 of the baffle. By arching the top the basic settlement resting on top of the baffle is influenced to slide downwardly when the basic settlement surrounding the baffle is drawn off and this is a particular advantage over a baffle having a flat top. By providing the legs 21, the lower edges 22 of said baffle are thus elevated above the bottom 15 of the tank and form elongated entrance slots through which the basic settlement may pass into said baffle. The height of these slots depends somewhat on the nature of the crude oil and the precipitate therefrom, and consequently the legs 21 may be made longer or shorter as the conditions may require.

The discharge pipe 11 is passed through a sleeve 23 in one of the end plates 16 in such a manner as to provide a fluid-tight joint. Experience has found that any openings in the baffle around the discharge pipe or between the top and end plates will interfere with its proper functioning. The pipe 11 is continued inwardly under the baffle toward the center portion and is preferably provided with a downturned elbow or end 24 at its inner end,

which is of course open to permit the basic settlement liquid to enter said pipe. By turning the elbow downward, the tendency is to siphon the fluid by drawing the same upwardly from the bottom 15, rather than by drawing it downwardly or transversely of the baffle. This has a tendency to prevent undue agitation and whirling. When the gate valve 13 is opened the hydrostatic pressure of the oil in the tank tends to force the basic settlement under the edges 22 of the baffle and the siphoning action through the pipe 11 tends to set up a flow or discharge of said basic settlement.

The top 17 of the baffle extending over a considerable area surrounding the elbow 24 acts to prevent the oil above said baffle from whirling and breaking through the basic settlement at the bottom of said tank. The only escape for the liquids is under the edges 22 and out through the pipe 11, consequently if there is no undue agitation the basic settlement will be drained downward to the level of the edges 22 without carrying off an appreciable amount of the marketable oil from the tank.

However, it has been demonstrated that the baffle will not operate under general conditions unless it is provided with a vent pipe 25. This pipe has its lower end extending through the top of the baffle and is secured thereto by a base flange 26. An ordinary collar 27 is screwed onto the upper end of the pipe and this provides means for attaching an elevator or grapple to the pipe for bodily lifting the baffle structure. The vent pipe may extend above the oil level, as is shown in Fig. 1, or it may extend through a box 28 in the top of the tank, its upper end in all instances being open and above the oil level.

When the tank is first filled with oil, said oil will pass under the baffle and rise in the pipe 25 to the same level as in the tank. This prevents the formation of an air pocket in the upper portion of the baffle because any air which would be pocketed in the baffle is driven out by the oil rising in said vent pipe. When the valve 13 is opened and the oil begins to flow through the elbow 24 and pipe 11 there would be a tendency to the formation of an air pocket in the upper portion of the baffle which would retard the discharge through the pipe 11. However, the vent pipe 25 will prevent such a retardation. The pipe 25 being full of oil, it will be seen that when the valve 13 is opened the weight of said column of oil will exert a downward pressure on the liquid immediately surrounding the elbow 24 and tend to initiate a flow into said elbow and outward through said pipe 11. This would be particularly true if the basic settlement was rather heavy and required some exterior force to start the discharging movement.

Experiments have shown that the column of oil in the pipe 25 will fluctuate, but at no time does the oil entirely empty from said vent pipe. There is always a lighter body of oil or liquid under the baffle and this will rise in the vent pipe 25.

It is pointed out that the purpose and function of the pipe 25 is entirely different from a so-called air vent, as after the tank is once filled air does not pass through said pipe. Of course, to secure the best results the elbow 24 should be located near the lower end of the vent pipe. It is customary to seal the top of the oil storage tank and to provide the tank with a valve opening at eight ounces of pressure and where the vent pipe had its upper end opening into this air space within the tank the column of oil would, of course, be subject to this pressure; however, just as satisfactory results are obtained where the vent pipe extends through the top of the tank, as is shown in Fig. 2.

Where it is found desirable to vertically adjust the baffle or to remove the same, the structure used in Fig. 3 may be employed. In this case the discharge pipe 11′ is placed upon the bottom 15 of the tank and rigidly held in place. A suitable packing box 12′ is provided on the side wall of the tank. The legs 21 are made long enough to rest upon the bottom 15 and the edges 22 are high enough to pass the pipe 11′. This does away with the connection 23 and permits the baffle to be adjusted. In this instance the elbow 24′ is turned upwardly and has its entrance at about the same height as the elbow 24.

Various changes in the size and shape of the different parts, as well as modifications and alterations, may be made within the scope of the appended claims.

What I claim, is:

1. In combination with a tank, a baffle in spaced relationship to the bottom of the tank defining an extended area for the accumulation of that portion of the tank contents having greatest specific gravity, a discharge pipe line extending outwardly through the tank and from beneath the baffle for the withdrawal of the precipitate, and a vent pipe communicating with the under side of the baffle and terminating at a point spaced from and above the intake of said discharge pipe line and extending upwardly to a point above the oil level of the tank, said pipe being open at both ends to air and liquid.

2. In combination with a tank, a baffle in spaced relationship to the bottom of the tank, said baffle including an end wall, a discharge pipe line extending outwardly through the tank and through said end wall and from beneath the baffle, an elbow at the inner end of the discharge pipe, means fixing the connection between the pipe line and the end wall of the baffle, and a vent pipe extending from a point beneath the baffle and above the end

of the discharge pipe to a point above the liquid of the tank and being open for air and liquid to pass therethrough.

3. In combination with a tank, a baffle resting upon the bottom of the tank but having portions spaced therefrom for the admission of that portion of the tank contents having greatest specific gravity, a discharge pipe line extending inwardly through the tank and through a wall of the baffle to a point substantially at the center of the baffle, an elbow carried at the inner end of the pipe turned toward the bottom of the tank, means carried by said wall of the baffle to fix the connection of the pipe, means carried by the wall of the tank to make a tight joint around the discharge pipe line, and a vent pipe carried by the baffle communicating with the under side thereof above the discharge pipe and extending to a point above the oil of the tank.

4. A baffle having a convex top and side walls having their base edges provided with supporting feet spacing it from the bottom to provide a fluid inlet beneath the baffle, a discharge pipe extending outward through the side of the baffle and mounted therein in determinate relation to its base, and a vent pipe attached to said convex top with the lower end open and in communication with the interior of the baffle and its upper end open and above the oil level.

5. In combination with a storage tank, a baffle in spaced relation to the bottom of the tank defining an extended area for the accumulation of that portion of the tank contents having the greatest specific gravity, a vent communicating with the under side of the baffle and open to permit air and liquid to pass up therethrough, and a discharge pipe extending through and beyond the tank from a point beneath the baffle, said pipe having its intake end below said vent and formed with a downward extension terminating adjacent to the tank bottom and effective to extract the tank contents upwardly therethrough from the strata at the tank bottom, said vent being open to liquids rising from under the baffle.

6. A baffle comprising a substantially horizontal plate provided with means for supporting it contiguous to but spaced above the bottom of a tank, a liquid discharge pipe having its inlet end located under the plate and adapted to extend through the wall of a tank, and a vent pipe extending upwardly from the plate, said pipe at its lower end being open to the liquid under the plate and open at its upper end at a point above the oil level of the tank.

7. A baffle comprising a substantially horizontal plate provided with means for supporting it contiguous to but spaced above the bottom of a tank, a liquid discharge pipe having its inlet end located under the central portion of the plate and adapted to extend through the wall of a tank, and a vent pipe extending upwardly from the central portion of the plate, said pipe having its lower end open to the liquid under the plate and being adjacent the inlet end of the discharge pipe while the upper end of said pipe is open at a point above the oil level of the tank.

8. A baffle comprising a substantially horizontal baffle plate provided with means for supporting it contiguous to but spaced above the bottom of a tank, a liquid discharge pipe extending from the baffle plate for conducting liquid from under said baffle plate and adapted to extend through the wall of a tank, and a vent pipe extending upwardly from the plate, said pipe at its lower end being open to the liquid under the plate and also open at its upper end.

9. The combination with an oil storage tank, of a laterally extending baffle mounted on the bottom of said tank and having fluid inlets contiguous to the bottom of said tank, a discharge pipe leading from the baffle through the wall of the tank for draining off basic settlement, and a vent extending from the top of the baffle for carrying off air from under the baffle when the tank is first filled with oil and for containing a column of oil after said tank is filled, whereby said column of oil may exert a downward pressure upon the liquid under said baffle, the upper end of the vent extending above the oil level of said tank and being open.

In testimony whereof I affix my signature.

ARCHIE R. PETERS.