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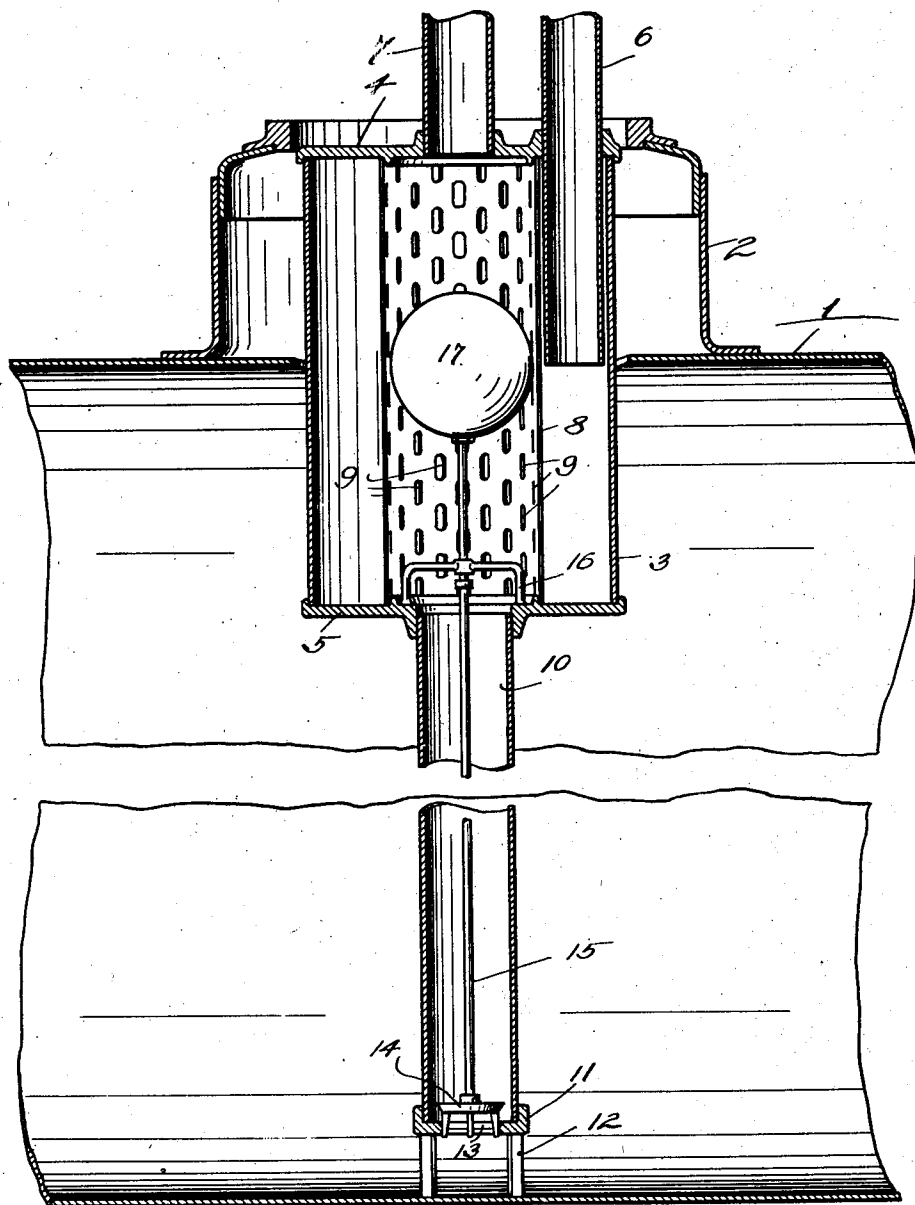
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C. H. M. BURNHAM ET AL
APPARATUS FOR FILLING TANKS

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Filed April 28, 1923

3 Sheets-Sheet 1



Inventor

Charles H. M. Burnham
and
Samuel A. Chadwell.

Charles H. M. Burnham
and
Samuel A. Chadwell.

Samuel A. Chadwell.

Samuel A. Chadwell.

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C. Shepherd.

Attorney

July 6, 1926.

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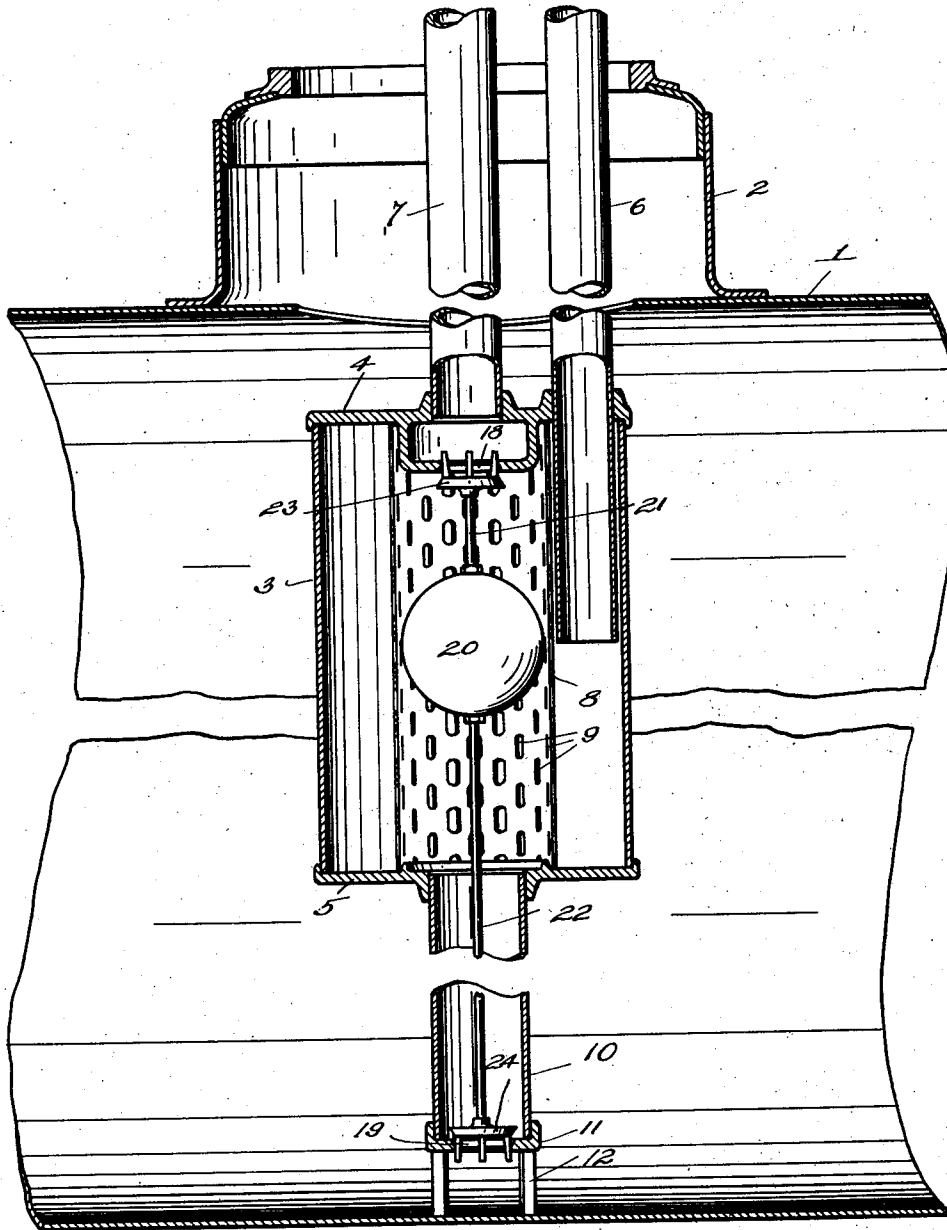


Fig. 2.

Inventor
Charles H. M. Burnham
and
Samuel A. Chadwell.

By

C. C. Shepherd,
Attorney

July 6, 1926.

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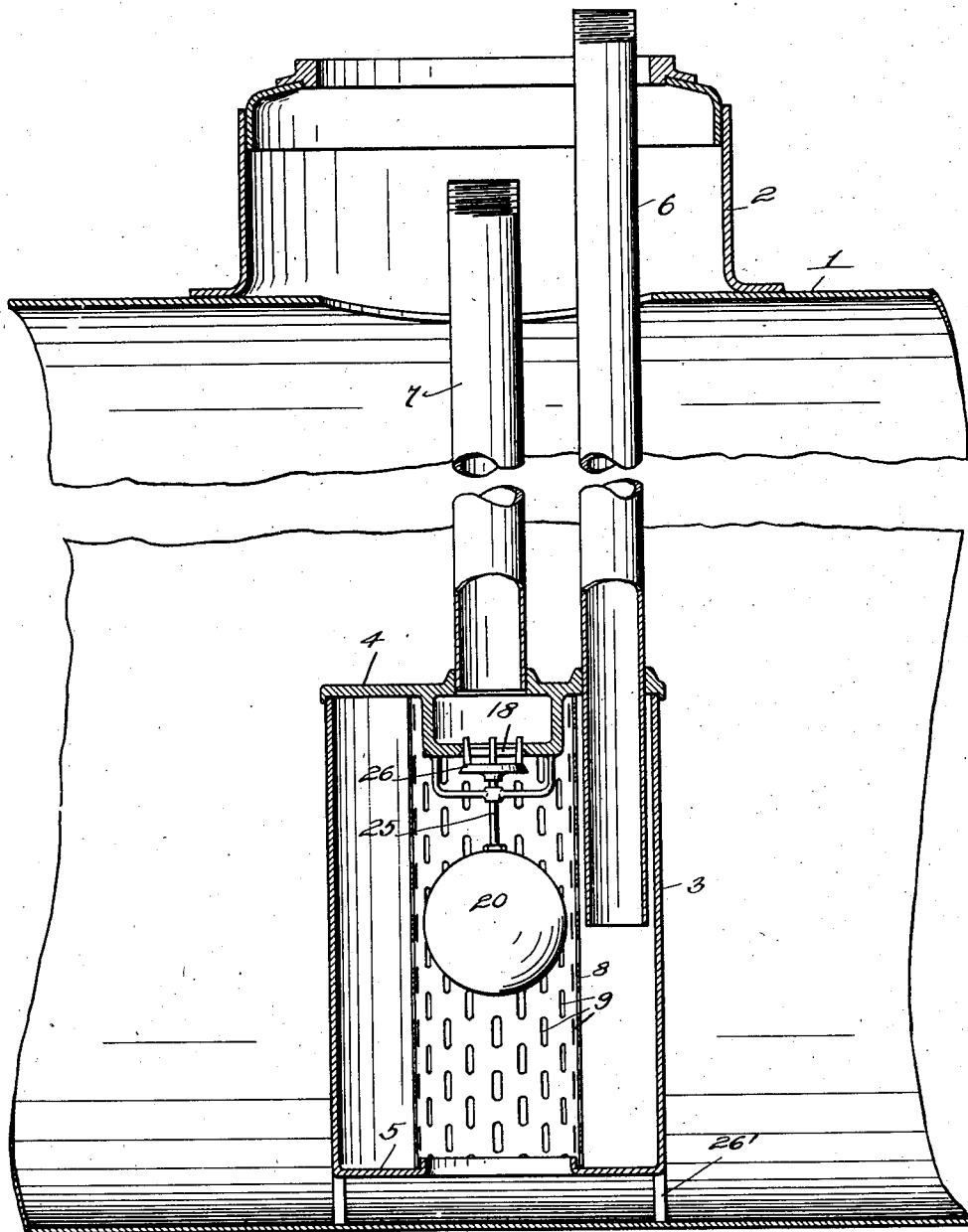


Fig. 3.

INVENTOR.
Charles H. M. Burnham
and
Samuel A. Chedwell.
By C. C. Shepherd ATTORNEY.

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1,591,079

UNITED STATES PATENT OFFICE.

CHARLES H. M. BURNHAM, OF COLUMBUS, AND SAMUEL A. CHADWELL, OF SUGAR GROVE, OHIO.

APPARATUS FOR FILLING TANKS.

Application filed April 28, 1923. Serial No. 635,200.

The present invention is directed to improvements in an apparatus for filling tanks with fluid, such as petroleum, petroleum products and natural gas gasoline.

5 The primary object of the invention is to provide an apparatus of this character so constructed as to eliminate the tendency of the liquid to boil or vaporize when being transferred under existing conditions, either
10 due to the effect of vapor pressure of the liquid itself or the presence of entrained or dissolved gases.

A further object of the invention is to provide an apparatus of this nature so constructed that the dissolved or entrained gas
15 will be separated from the incoming fluid and to make provision for slight boiling of the incoming fluid with its corresponding reduction in temperature, whereby the bulk
20 of the liquid already in the tank is not disturbed by the release of the gases or vapors resulting therefrom.

In the art of producing, transporting, refining, and marketing petroleum, its products
25 and natural gas gasoline the liquid is transferred to many different tanks before reaching its destination, or before being ultimately used.

During the transfer of the liquid into
30 tanks it has been found that if the inlet pipe does not enter the liquid already in the tank an excessive amount of spraying, splashing, atomization follows, resulting in an excessive vaporization loss, commonly referred to
35 as loading, pumping, transfer or evaporation losses. If, in order to overcome this spraying the end of the inlet pipe is submerged the liquid immediately above the inlet is kept in a constant state of boiling
40 or ebullition, the extent of which depends upon the effect of vapor pressure under the conditions of transfer or upon the presence of entrained or dissolved gases which, due to the agitation of the entering stream, or to
45 a change in temperature or pressure, are released and immediately rise to the surface. Although the loss in the second case, that is, when the inlet pipe is submerged, is not as great in many cases as when the fluid spills
50 in from the top of the tank, it is nevertheless a serious loss.

With these and other objects in view, as will appear as the description proceeds, the invention consists in the novel features of
55 construction, combinations of elements and

arrangements of parts, and hereinafter to be fully described and pointed out in the appended claims.

In the accompanying drawing:

Figure 1 is a vertical sectional view
60 through the device showing it in use in connection with a tank 1,

Figure 2 is a similar view of a modified form of the invention showing valves for controlling the vapor or gas outlet and the
65 fluid outlet, and

Figure 3 is a similar view showing a valve used for controlling the outlet of the vapor or gases only.

Referring to the drawing 1 designates a
70 tank car in which the liquid is stored and transported, but it will be of course understood that the apparatus can be used with equal success in connection with stationary storage tanks. The tank car as shown is
75 provided with the usual dome 2. As shown in Figure 1 of the drawings the receiving vessel 3 is partially located in the dome and tank 1, and includes a top and bottom 4 and 5, respectively, and connected with the top
80 4 thereto is an inlet pipe 6 and a vapor or gas outlet pipe 7. The lower end of pipe 6 extends into the vessel for some distance so that incoming liquid can not splash into the pipe 7. Concentrically arranged in the
85 vessel 3 is a cylinder 8, the upper and lower ends of which being engaged with the top and bottom 4 and 5, said cylinder having its side wall provided with a plurality of openings 9 so that said cylinder constitutes
90 a baffle.

Having its upper end connected with the bottom 5 of the vessel is a discharge pipe 10, the lower end of which is provided with a collar 11, said collar having legs 12 carried thereby for engagement with the bottom of the tank and to support the lower end of said pipe spaced from the bottom. The vessel 3 is of such size as to greatly reduce the velocity of the incoming stream
100 of liquid thereby creating a condition favorable to the separation of the entrained or dissolved gases which may pass through the outlet pipe 7 to atmosphere or to a device for conserving this gas or vapor, for instance to compressors. The liquid, in this instance being gasoline, being free of any entrained or dissolved gases or vapor passes from the vessel 3 through the pipe 10 and
105 into the tank 1. Since further liberation of 110

gases or vapors may occur in the pipe 10 said pipe is made comparatively large so as to allow the gas or vapors to pass upwardly therefrom with as little resistance as possible into the vessel 3 and from thence to the pipe 7.

The collar 11 is provided with a valve seat 13 and cooperative therewith is a valve disk 14, the stem 15 of which being arranged axially of the pipe 10 and has its upper end extended into the cylinder 8, there being a guide 16 supported by the bottom 5. The extended upper end of said stem is provided with a float 17. Through the medium of the float a fairly constant liquid level is maintained in the vessel 3, thereby creating a more favorable condition for separation of the gases and vapors without the accompanying agitation incident to gravitation of the liquid in the pipe 10, and at the same time creating a condition which is less susceptible to the difference in pressure and the fluctuations of the same between the volume of liquid in the vessel 3 and the tank 1.

In the form of the invention as shown in Figure 2 of the drawings the top 4 of the vessel 3 is provided with a valve seat 18, there being a valve seat 19 similar to the seat 13 in the form of the invention as shown in Figure 1. A float 20 is mounted for movement in the cylinder 8, said float having upper and lower stems 21 and 22 secured thereto, the former having a valve 23 for cooperation with the seat 18 while the latter carries a valve disk 24 for cooperation with the valve seat 19. This form of the invention differs from the preferred form in that the valve 23 controls the flow of gas and vapors through the outlet pipe 7, whereas in the preferred form of the invention the flow of liquid is controlled only. As a liquid level rises in the vessel 3 the float is correspondingly raised until the valve 23 rests on its seat 18 and at which time the valve 24 is disengaged from its seat 19 to permit the liquid to pass therethrough into the tank 1. It will be of course apparent that as the liquid level is lowered the operation of the valves are reversed. Thus a fairly constant liquid level remains in the vessel 3. Further it will be observed that the advantage of such structure is that the liquid level can not rise to the inlet end of the outlet pipe 7.

In the form of the invention as illustrated in Figure 3, the float 20 has only an upper stem 25 which carries a valve disk 26 for cooperation with the seat 18, said valve serving to control the egress of the gas and vapors through the outlet pipe 7. No valve is employed to control the discharge of the liquid from the vessel 3. Since no liquid controlling valve is used to maintain a liquid level higher than the outlet pipe 7 the vessel is submerged in the liquid in the tank 1. In

order to do this the vessel lacks a pipe equivalent to the pipe 10 of the preferred form, and said vessel has legs 26' carried thereby to hold the same spaced from the bottom of the tank 1 to allow the liquid to flow freely into said tank. When the liquid first starts into an empty tank provided with this invention the valve is open and remains in this position until the liquid level becomes high enough to operate the float. Until the float begins to function the device operates the same as if there was no float and associated valves present. However, after the float operates and assuming that the valve closes tight the liquid level in the separating volume in the vessel is entirely independent from the liquid level in the tank and except on rare occasions never rises above the level required to close the valve. As gas or vapor accumulates in the separating volume of liquid in the vessel the liquid is displaced, the liquid level falls and operates the valve controlling the outlet pipe thus allowing the gas to pass through said pipe.

From the foregoing it will be evident that the pressure within the vessel 3 is equivalent to the head of liquid in the tank as measured from the liquid in the vessel itself, plus any pressure which may be applied to the tank to be filled. This pressure in the vessel is of advantage since it is a great factor in reducing vaporization in the volume of liquid itself.

While we have used the term gasoline we do not restrict ourselves to the use of the device in connection with that liquid, but intend to cover its use with other liquids which may upon transfer tend to vaporize or relieve themselves of entrained or dissolved gases. Neither do we restrict ourselves to portable or removable installations of the invention but intend to cover other installations in which the device is either permanently or detachably connected or installed internally or externally to the tank or container.

What is claimed is:

1. In combination with a tank for containing liquids, of a vessel arranged within said tank, means provided in connection with said vessel for maintaining the liquid level therein normally below the level of the liquid in the tank, means for introducing a liquid into said vessel, an outlet for conducting liquid from the vessel into the tank, and a vent for releasing gases and vapors from said vessel.

2. In combination with a liquid containing tank, of a vessel arranged therein, means provided in connection with said vessel for maintaining the liquid level therein normally below the level of the liquid in the tank, means for introducing a liquid into said vessel, a discharge pipe permitting of the flow of liquid from said vessel into the tank, a

pipe for conducting gases and vapors from the vessel, and means for controlling the flow of liquid from the discharge pipe into the tank.

- 5 3. In combination with a tank for containing liquids, of a vessel associated with the tank; a perforated cylinder mounted concentrically in said vessel, a discharge pipe for the vessel to permit liquid to flow therefrom
10 into the tank, a pipe leading from the vessel

to permit egress of gases and vapors therefrom, a liquid conducting pipe entering the vessel and located exteriorly of the cylinder, whereby vapors released from the liquid will pass through the cylinder before entering the discharge pipe. 15

In testimony whereof we affix our signatures.

CHARLES H. M. BURNHAM.
SAMUEL A. CHADWELL.