April 15, 1924. 1,490,782

J. H. MILLIGAN

PETROLEUM TANK ATTACHMENT

Filed Oct. 30, 1922

Fig. 1.

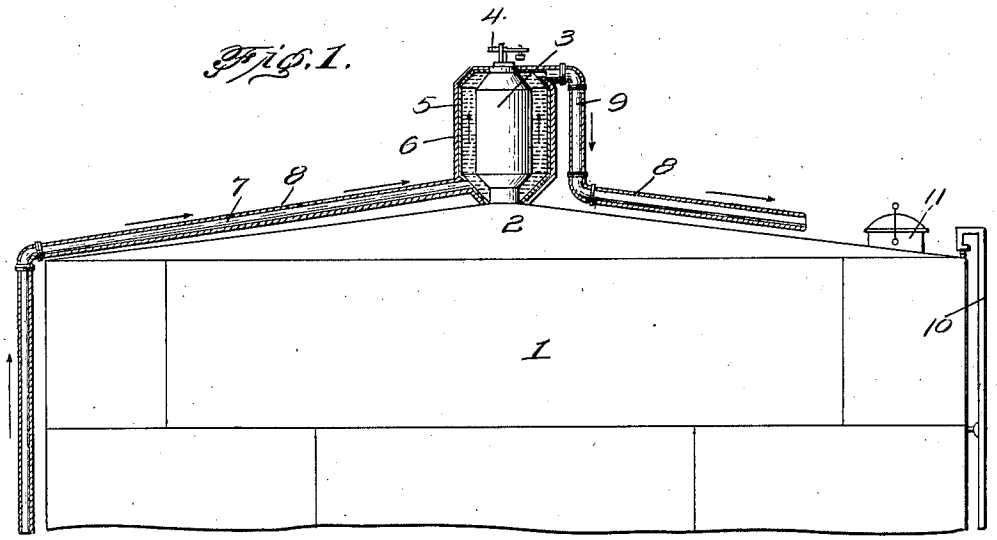
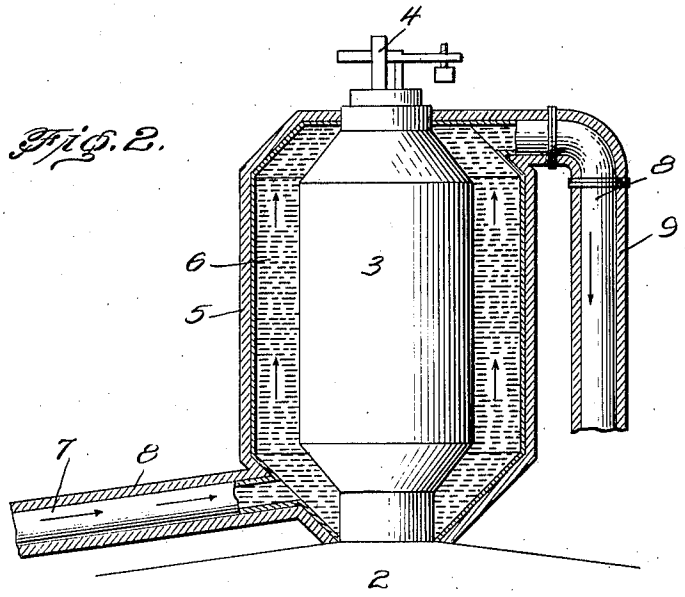


Fig. 2.



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Patented Apr. 15, 1924. 1,490,782

UNITED STATES PATENT OFFICE.

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PETROLEUM-TANK ATTACHMENT.

Application filed October 30, 1922. Serial No. 598,041.

To all whom it may concern:

Be it known that I, JAMES H. MILLIGAN, a citizen of the United States, residing at Los Angeles, in the county of Los Angeles and the State of California, have invented certain new and useful Improvements in Petroleum-Tank Attachments, of which the following is a specification.

This invention has reference to a petroleum tank attachment wherein the tank is employed for the storage of crude petroleum before being refined, or for other purposes.

The stock and storage tanks for petroleum are subject to large and constant losses of oil through evaporation. Just what this loss amounts to in any given lease has never been accurately determined and the only present, easily practical, method of determining this loss is by gaging the tank.

The average stock tank may be usually assumed to be of two hundred and fifty barrels capacity, approximating fifteen feet in diameter by eight feet in height. In such a tank the loss by evaporation makes it, by gaging the tank, usually much more than one inch of oil per day, and, in the case of light crudes, or lighter, and rich in gasolenes, this loss may amount oftentimes to three or four inches per day.

Serious losses measure into dollars and cents and may represent two to two and a half barrels per day from the average storage tank, or, in a percentage of volume, of one per cent to four per cent a day based on a tank full of oil. Inasmuch as the exposed surface is the same whether the tank be full or but partly full, the percentage of volume lost is really much greater. In other words if the loss by evaporation from a tank full of oil be one per cent, then from a tank half filled the loss will be two per cent and the loss from a tank with but two feet of oil in it based on the volume of oil in the tank, will be still greater, nor is this by any means the total loss. To determine accurately what the total loss of oil on the lease may be from the well head to the pipe line would require accurately metering of the oil as it comes from the ground.

In accordance with the invention the storage tank is provided with a salt water or brine cooled vapor-condensing system including a tubular member with a vapor chamber and water jacket. The outer or water jacket is of heavy steel or cast iron covered with cork or other insulating material to keep out the heat. The inner or vapor chamber is of sheet copper, very thin, to insure instant condensation. At the top of the vapor chamber there is located a relief or intake valve. This valve is set to relieve wild gases that come into the tank from the pipe line, to escape at approximately ten pounds pressure. The intake valve is set at one pound vacuum per square inch. The valve is of bronze without springs or adjusting to insure relief at all times under proper pressure without sticking.

The salt water or heavy brine is cooled to about fourteen degrees temperature by a suitable ammonia freezing system and the brine is fed through cork-covered pipes to and through condensers located at that point, thereby assuring perfect condensation for all the condensers.

Salt water is employed because of its non-freezing character, allowing it to be used in all climates successfully.

The action of the condensing system is to condense the vapors that rise from oil stored in airtight tanks exposed to weather conditions and the sun's rays.

As the vapor rises from the oil it ascends to the highest point of the tank to the condenser which is located on the dome of the tank and cooled by salt water at a temperature below freezing thereby condensing the vapor back into liquid form which drips back into the tank assuring the same volume and same gravity of oil as when pumped from the ground.

The vapors when condensing adhere to the inner sides of the cooling chamber and run down the inside and drip back into the oil tank.

As fast as the vapors rise they are condensed back into liquid form and therefore there can be no vapor on the relief valve at any time. All wild gases accumulate in the tank at the relief valve when the pressure reaches approximately ten pounds per square inch, or according to the pressure the relief valve is set for.

The invention will be best understood from a consideration of the following detailed description, taken in connection with the accompanying drawings forming part of this specification, with the understanding that the invention is not confined to any strict conformity to the showing of the drawings but may be changed and modified so long as such changes and modifications

mark no material departure from the salient features of the invention as expressed in the appended claims.

In the drawings:—

Fig. 1 is a side elevation of the upper portion of a storage tank with the condensing system attached.

Fig. 2 is an enlarged view of the condensing system at the apex or dome of the tank.

Referring to the drawings there is shown a tank 1 such as is usually employed for the storage of petroleum. This tank is usually provided with a crown or dome portion 2 in which accumulating gases are naturally gathered.

Erected on the apex of the dome 2 is a condenser 3 communicating at the lower end with the interior of the tank and at the upper end provided with a valve 4 set to discharge at a moderate pressure, say at about ten pounds per square inch.

Surrounding the condenser chamber 3, is a jacket 5 spaced from the condenser 3 to contain a quantity 6 of brine or salt water fed into the jacket 5 by means of a pipe 7, and also provided with an insulating jacket 8 coming from a salt water cooling system, not shown in the drawings, but which may follow the usual practice in freezing machines. The pipe 7 enters the jacket 5 near the lower end thereof above the crown 2 of the tank 1 and leaves the upper end of the salt water container 5 by the way of another pipe 9 returning to the freezing machine also incased in insulating material.

The tank 1 is furnished with a ladder 10 at one side whereby access to the top of the tank is provided, and the tank also is furnished with a removable pressure manhole 11.

Having thus described the invention, what is claimed is:—

1. A storage tank for condensable gases occurring therein, comprising a container for the condensable gases, and a means for retaining a circulating refrigerant in contact with said container, located at a high point with respect to the storage tank, to there chill and condense the gases.

2. A storage tank for condensable gases occurring therein, comprising a container for the condensable gases, and means for retaining a circulating refrigerant in contact with said container, located at a high point with respect to the storage tank, to there chill and condense the gases, said refrigerant having a path of circulation lower than the container to retain the refrigerant to a lower level.

3. A storage tank for condensable gases occurring therein, comprising a container for the condensable gases rising from the top of the tank and provided with a relief valve and a duct for a refrigerant surrounding the container above the storage tank.

4. A storage tank for condensable gases occurring therein, comprising a container for the condensable gases rising from the top of the tank and provided with a relief valve and a duct for a refrigerant surrounding the container above the storage tank, said duct having a heat insulating covering.

5. A storage tank for condensable gases occurring therein, comprising a container for the condensable gases rising from the top of the tank and provided with a relief valve and a duct for a refrigerant surrounding the container above the storage tank, said duct having a heat insulating covering, said container communicating with an incoming duct for the refrigerant at a low point and with an outgoing duct for the refrigerant at a high point.

6. A storage tank for condensable gases occurring therein, comprising a container for the condensable gases rising from the top of the tank and provided with a relief valve and a duct for a refrigerant surrounding the container above the storage tank, said duct having a heat insulating covering, said container communicating with an incoming duct for the refrigerant at a low point and with an outgoing duct for the refrigerant at a high point, the refrigerant container and the duct leading to and from it having an exterior heat insulating envelope and an interior covering of thin heat conducting material.

In testimony whereof, I affix my signature hereto.

JAMES H. MILLIGAN