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TANK CLEANING METHOD

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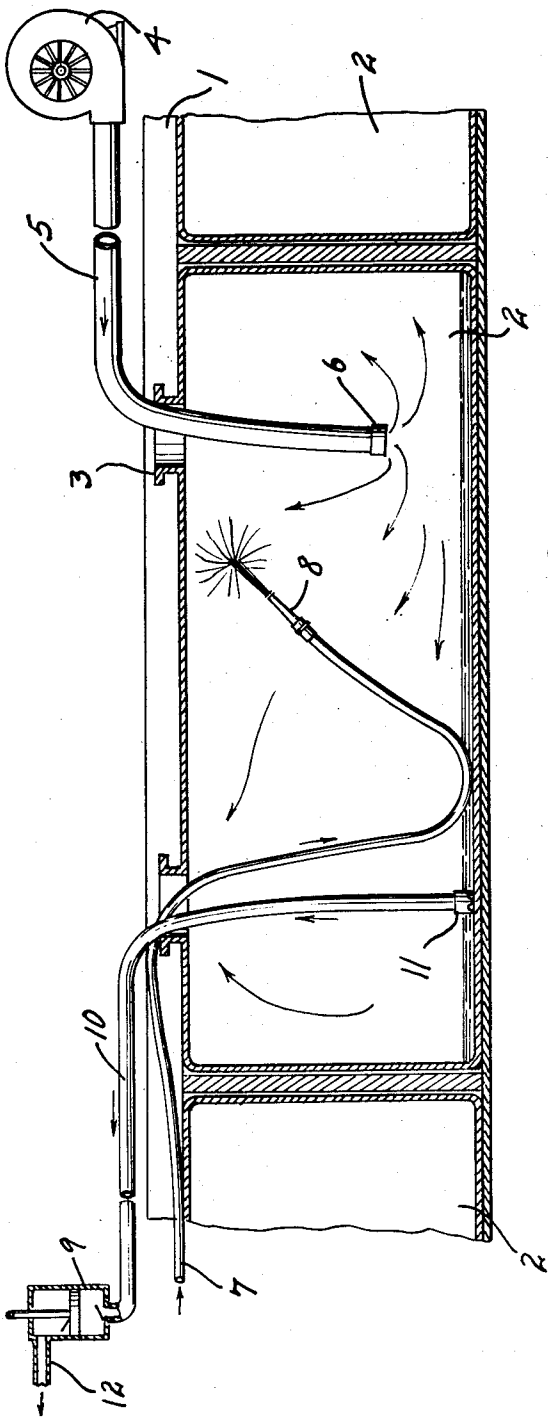


Fig. 1.

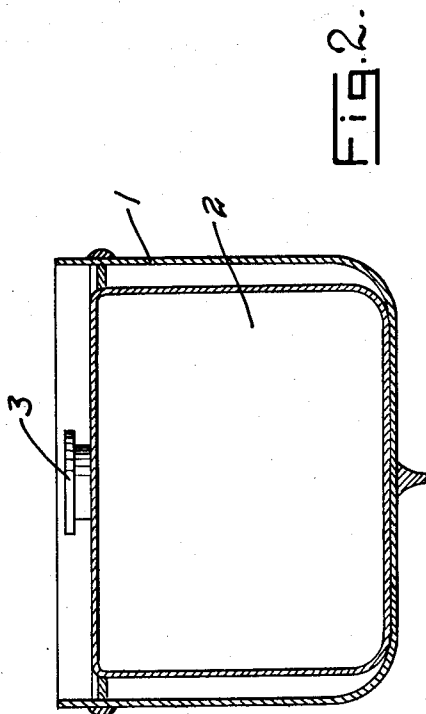


Fig. 2.

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## TANK CLEANING METHOD

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1 Claim. (Cl. 134—24)

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This invention relates to the cleaning of tanks and more particularly has reference to the removal of gases, liquids and solid materials from tanks. In tanks on barges and in other locations it quite often becomes necessary to clean out deposits of liquids and solids adhering to the walls and bottoms thereof. Also, in many instances fumes, vapors and gases accumulate in such tanks and are a source of danger due to the possibility of the vaporous contents therein exploding.

Quite often tanks used for the transportation and storage of crude oil are desired for subsequent use for the transportation and storage of refined products, and before they may be used for the refined products, it is necessary to remove the deposits of heavy oil and solids therefrom. Likewise it is desirable to remove the volatile constituents accumulated in the tank which may form explosive mixtures.

Heretofore tanks of the above character were cleaned by forcing steam into the tank over a period of several days in order to not only clear the atmosphere in the tank of dangerous fumes but also boil off the lighter fractions from the oil sediment in the tank. This has been thought to be necessary up to now. After the steaming operation, the present practice is and the practice in the past has been to send a man in to wash out what remains of the sediment in the tank. This process is dangerous and very disastrous explosions have resulted from its use because even after the steaming has been completed the sediment within the tank continues to give off fumes and these may easily create an explosive mixture in the atmosphere of the tank, whereupon any small spark will cause an explosion. Furthermore, this whole method takes a long period of time, requires the use of a boiler or boilers to generate the steam as well as the fuel necessary for that purpose, and because it boils off the lighter fractions of the sediments before the sediment is washed out, it makes it more difficult to wash out the sediment and in all probability the tank will not be cleaned as desired.

An object of this invention is to provide a method and equipment for the removal of volatile combustible material and liquid and solid deposits from tanks.

Another object of this invention is to provide a method and equipment for purging the atmosphere from a tank before, after and/or during the playing of a stream of water upon the

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surfaces of a tank containing liquid and/or solid deposits.

With these and other objects in views which may appear more fully hereinafter, the present invention resides in the steps, procedures and equipment hereinafter set forth and diagrammatically illustrated in the drawings.

In the drawings:

Figure 1 is a fragmentary sectional view of a barge provided with tanks being treated in accordance with the present invention.

Fig. 2 is a transverse sectional view of a tank barge corresponding to that illustrated in Fig. 1.

Referring to the drawings, there is shown somewhat diagrammatically a barge 1 equipped with a series of tanks 2 provided with manholes 3 in their upper portions. Preferably each tank is equipped with two or more manholes but the present invention may be applied to tanks having a single manhole.

For carrying out the present invention a blower 4 is provided which when in operation forces a fairly large stream of air through a flexible conduit 5 which may be inserted through one of the manholes in the upper portion of the tank. If desired, the end of the conduit 5 may be provided with a nozzle or distributing device 6 of any suitable character.

There is also provided a water hose 7 which is adapted to be connected to a suitable source of water supply, not indicated. This hose is equipped with a nozzle 8 so that the water ejected from the end of the hose may be constricted to provide a jet which will exert a considerable eroding or deterging action on any deposits on the inner surface of the tank.

A discharge pump indicated diagrammatically by reference character 9 is provided for removing the water and entrained material which collects in the bottom of the tank. This pump has a flexible hose or conduit 10 connected to its intake end. A fitting 11 is provided on the intake end of the hose 10 for insertion within the tank. The water and other material removed from the tank by pump 9 may be discharged through pump outlet 12 to any desired point.

One method of carrying out the present invention consists in first sending a man into the cargo tank of the barge to wash the walls and floor with a high pressure jet of water discharged from the nozzle 8. Of course, the man sent into the tank would probably have to wear a gas mask or some other equipment to prevent asphyxiation due to the gas and vapors which may be present in the atmosphere in the tank. The action of

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the high pressure water jet will serve to remove and loosen the deposits of liquid and solid material from the walls of the tank so that they may be sluiced out with the water withdrawn by the pump 9. After the tank has been thoroughly cleansed of liquid and solid deposits the man may be lifted out of the tank and then the flexible air hose introduced therein to scavenge or purge the gaseous atmosphere from the interior of the tank, displacing the same with substantially pure atmospheric air. While the man is in the tank washing the same and prior to the scavenging or purging of the atmosphere from the tank, the gaseous mixture in the tank would be too rich for there to be any danger of an explosion. After the washing operation is over the man could come out and the air could be introduced into the tank so that in a very few minutes the tank would be free of substantially all fumes to such an extent that no explosion could occur.

An alternate method of cleansing the tank in accordance with the present invention comprises first purging or scavenging the tank of its atmosphere by displacing the same with air introduced through the flexible conduit 5. After the air has been forced into the tank for a few minutes a man could enter the tank and wash the same with the high-pressure stream of water in the manner above described but without being required to wear a gas mask. During the time the man is working in the tank, the stream of air could be continuously forced therethrough to insure the removal of any fumes which would be detrimental to the health of the workman. After the tank has been thoroughly cleaned, the current of air could be continued to insure the removal of all fumes therefrom. Thus, from a short time after the air was first introduced into the tank there would be no danger of an explosion due to the removal and/or dilution of the combustible fumes in the tank.

It has been found that by merely using water supplied at a pressure of about fifty pounds per square inch and with a nozzle capable of forming a high pressure jet the oil and solid deposits accumulated on the inner surfaces of the tanks can be very well removed therefrom.

In view of the difficulties encountered in prior art methods of cleaning, the state of cleanliness obtained by the above-outlined procedure is remarkable. There is hardly a trace of oily material adhering to any part of the tank and a tank so cleaned is satisfactory for the carriage of refined products in spite of the fact that the tank had been used for a very long time for the transportation of crude oil. It appears that the ad-

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vantage of this procedure is due largely to the cleaning action of a strong jet of water acting upon the oils present in the tank while still in a fluid state. Preliminary steaming of the tank as is usually practiced results in the driving off of the more volatile substances leaving a heavy residue, highly asphaltic in character, which effectively bonds the sand, dirt and other extraneous matter very strongly to the metal surfaces so that it cannot be removed therefrom except by the use of chemical cleaners or very vigorous wiping and scraping.

In addition to the effectiveness of the cleaning of the tank in accordance with the present invention and the safety features, the cleaning time for the tanks of a barge which heretofore required from three to four days is reduced to about six or seven hours and consequently cuts the cost of cleaning from \$800.00 to \$1,000.00 down to less than \$100.00. The saving in cleaning time means that the barge or tank will be out of service a much shorter period of time than required for prior art cleaning procedures. Furthermore, when it is considered that barges are usually operated in multiple with a single tug towing three or more barges, the saving in time is considerable.

From the foregoing it will be appreciated that the present invention provides the effective cleaning of tanks under safe conditions in a very short time and at a great saving in cost.

Having described my invention, I claim:

A method of cleaning residual crude oil and deposits therefrom from tanks comprising purging the combustible gaseous medium in the tank therefrom by forcing a stream of air into the vented tank at such a rate as to displace the combustible gaseous medium from the tank in a few minutes, playing a stream of water on the residue in the tank at a sufficiently high pressure to mechanically dislodge the residual crude oil deposits from the surface of the tank while continuing to force air into the vented tank and removing the water and residue entrained thereby from the tank.

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