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GAUGING CONSTRUCTION FOR TANKS

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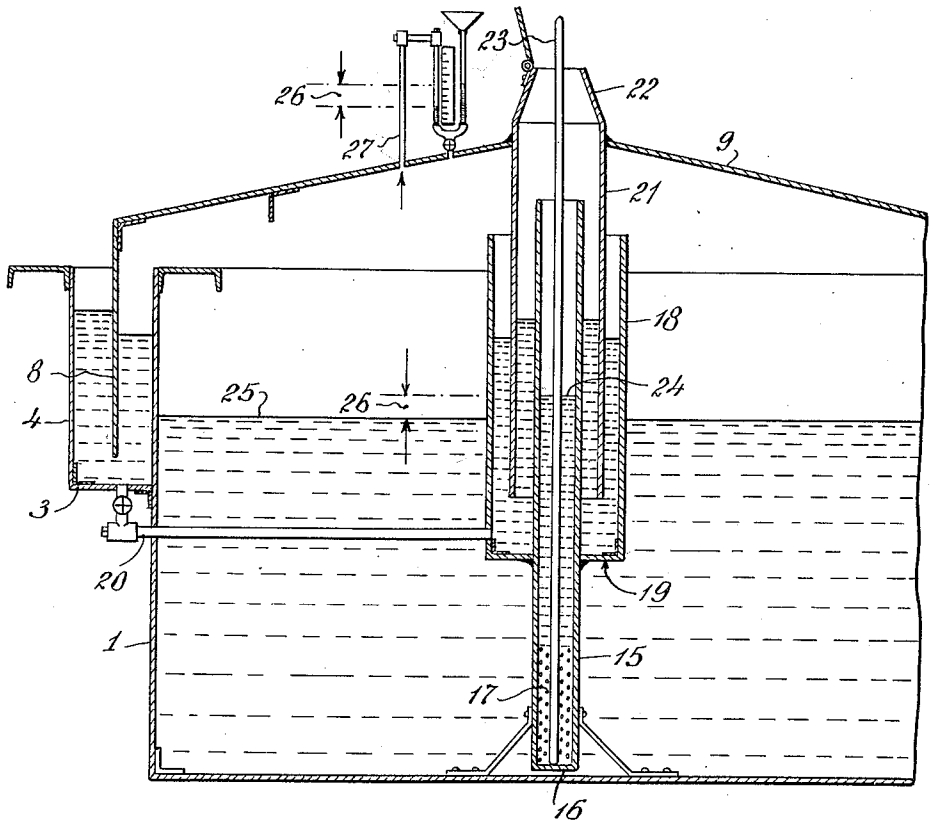

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GAUGING CONSTRUCTION FOR TANKS

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2 Claims. (Cl. 73—120)

This invention is directed to improvements in storage tanks for volatile liquids, and more particularly is directed to improvements in tanks having a gasometer type roof.

The gasometer roof tank is a tank in which the roof has a depending skirt which dips into a trough extending around the circumference of the tank wall proper, either inside or outside, at the top. This trough or well is filled with liquid, and the tank roof is free to rise and sink in accordance with the vapor pressure below. The application of excess pressure and vacuum is avoided by the use of proper relief valves.

Great difficulties had with these roofs have been the provision of proper gauging means whereby the measurement of the contents of the tank might be effected, without allowing the escape of vapors or without attempting to find a time when the tank was not under pressure or vacuum and gauging at that time.

An object of this invention is the provision of reliable and easily operated gauging means for use with such tanks.

The various objects and advantages are obtained by means of the designs set forth in this specification and shown in the drawing attached to and made a part hereof.

The single figure of the drawing shows a gauge well, in section, adapted for use with gasometer roof tanks.

The gauging of the contents of a tank of this type calls for certain precautions, because not only must the escape of gas while gauging be prevented, but the pressure or vacuum obtaining within the tank at the time of gauging will make certain alterations in the level of the contents which must be properly measured and taken into account. I have accomplished this gauging by means of the device set forth diagrammatically in the figure, wherein **1** is the shell of the tank, **3** and **4** form the liquid seal around the upper edge of the shell, **8** is the dip ring at the edge of the roof, and **9** is the roof. At some point within the tank I have erected a vertical pipe **15**, terminating at or near the bottom of the tank and closed on the bottom by a plate **16**. In small tanks, or in tanks arranged so that the roof rotates as it rises, this pipe should be at the center. In other tanks, a location near the side wall is preferred. In the lower portion of pipe **15**, for a distance of say 18 inches or two feet, I have perforated the pipe with a plurality of small holes **17**, the arrangement and total area of these holes being such that the liquid within the pipe is always in free communication with the liquid outside of the pipe and the total area being sufficiently small so that momentary surges in the exterior liquid, due to pumping, sudden pressure changes, and the like, are not communicated to the interior of the pipe in the form of surges. Around the top end of this pipe **15** at a level near that of the seal on the outside periphery of the tank wall, I have provided an interior seal composed of a pipe **18**, considerably larger in diameter than pipe **15**, which is placed around pipe **15** and secured thereto by plate **19**, which forms the bottom of an annular liquid retaining space concentric with and exterior to pipe **15**. I connect this liquid space to the liquid in the exterior seal by pipe **20**, through which liquid may flow freely. Inside of the seal formed by pipe **18**, and exterior to the pipe **15**, is a pipe **21** depending from and supported by the roof **9**. I have thus set up at this point a trap for vapor of the same nature as that on the tank wall, with the following exception. The vertical length of pipe **18** is greater than the vertical depth of the exterior trap, and the pipe **21** extends into the liquid in seal **18** to a greater depth than does the dip ring **8** in the exterior seal; consequently, any venting of vapors will occur at the exterior trap rather than in the gauge well. The exterior portion of the pipe **21** is closed by a hatch **22** of any convenient form, preferably with a protecting lid. This lid should not be vapor tight, but should be vented to the atmosphere to protect against vacuum and pressure. In gauging the tank, a pole or tape **23** is inserted through this gauge hatch **22** and into the interior pipe **15** until it is stopped by touching bottom, after which it is withdrawn and the depth to which it is wetted is noted, this giving the height of the level **24**. This level **24** is not the same as the actual level **25** of the liquid within the tank, the difference being that amount **26** due to the variation between internal and external pressure, an amount which may be either plus or minus. To observe the amount of this difference **26**, a quantity of the liquid from within the tank is withdrawn through the gauge hatch and placed in the manometer **27** which is arranged upon the roof at a point convenient to the gauge hatch. In this manometer the difference **26** is reproduced, and as the liquid in the manometer is of exactly the same nature as that in the tank, no corrections for specific gravity and the like need be made. The difference **26** observed in the manometer is applied to the level **24** observed by means of the gauge pole and the correct level **25** thus determined, and by reference to a computed table of tank capacity the gallonage at this level is determined.

This case is a division of my copending application, Serial No. 708,351, filed January 26, 1934 now Patent No. 2,061,175 dated November 17, 1936.

I claim

1. In a gasometer roof tank, a gauging device comprising a vertical tube located within the body of the tank, means allowing communication between the interior of such tube and the

liquid storage space of the tank, means surrounding such tube and forming a storage space for a sealing liquid, a sealing liquid in such storage space, a second tube depending from the roof, surrounding such first tube, and dipping within said sealing liquid to form a seal preventing the escape of tank vapor therethrough, and access means on the tank roof, opening into the depending tube, whereby the level of the column of liquid within the first tube may be ascertained.

2. In a gasometer roof tank, a gauging device comprising a vertical tube located within the body of the tank, means allowing communication between the interior of such tube and the liquid storage space of the tank, means surrounding such tube and forming a storage space for sealing liquid, a sealing liquid in such storage space, a second tube depending from the roof, surrounding such first tube and dipping within said sealing liquid to form a seal preventing the escape of tank vapor therethrough, access means on the tank roof opening into the depending tube whereby the level of the liquid in the first tube may be ascertained, and a manometer, communicating with the tank vapor space, from which the pressure correction to be applied to the ascertained liquid level may be determined.

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