June 25, 1935. M. A. MEYER 2,006,301

APPARATUS FOR EXAMINING THE CONTENTS OF TANKS

Filed May 22, 1933 3 Sheets-Sheet 1

FIG.I.

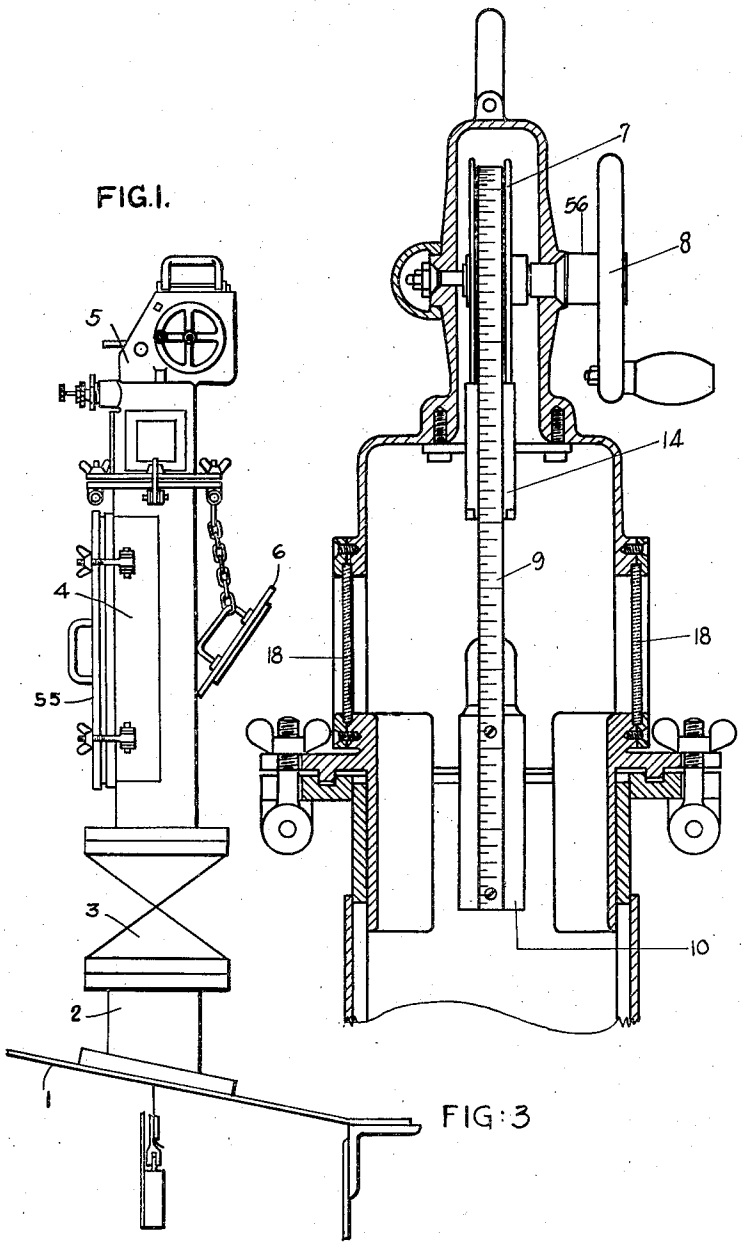


FIG:3

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APPARATUS FOR EXAMINING THE CONTENTS OF TANKS

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FIG: 2.

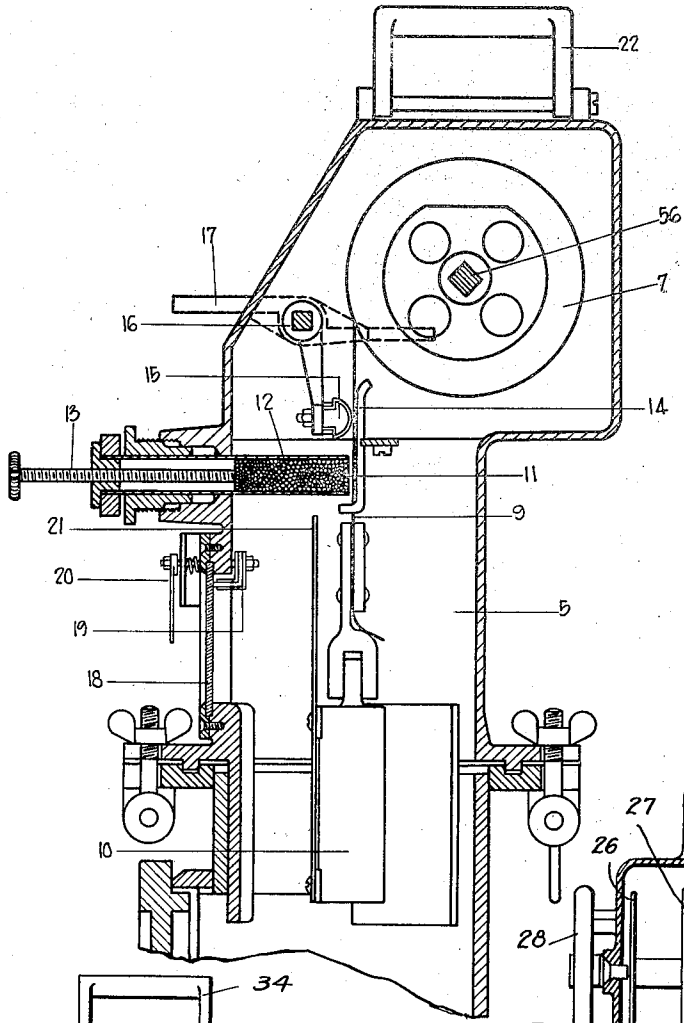
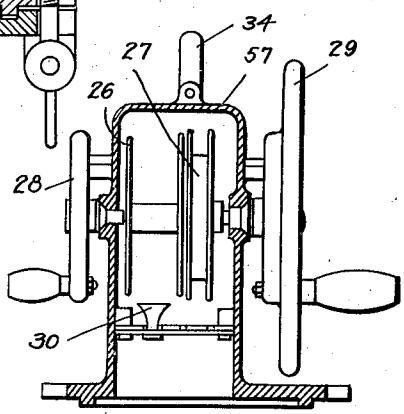


FIG: 4.

FIG: 5.



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APPARATUS FOR EXAMINING THE CONTENTS OF TANKS

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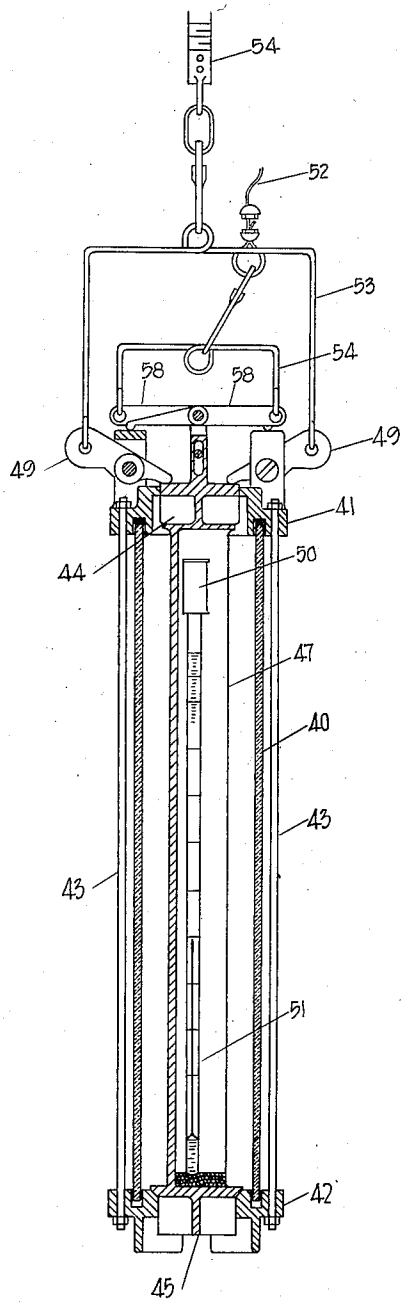


FIG: 6

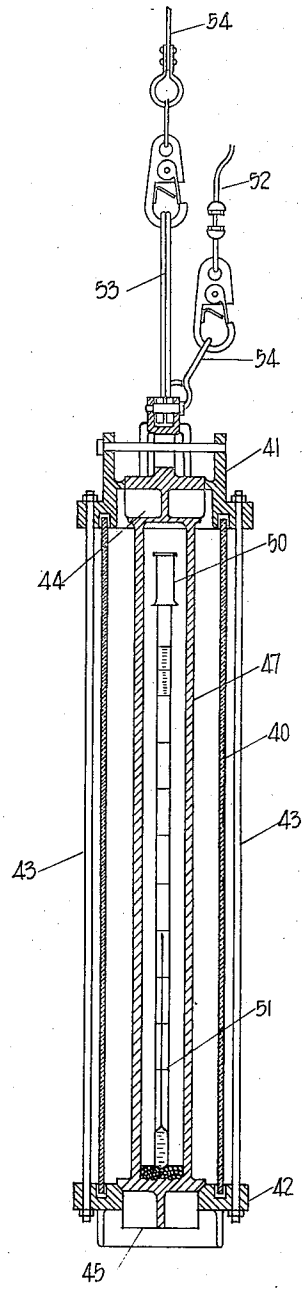


FIG: 7

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Patented June 25, 1935 2,006,301

UNITED STATES PATENT OFFICE

2,006,301

APPARATUS FOR EXAMINING THE CONTENTS OF TANKS

Martinus Adrianus Meyer, The Hague, Netherlands, assignor to Shell Development Company, San Francisco, Calif., a corporation of Delaware

Application May 22, 1933, Serial No. 672,148
In Germany July 22, 1932

2 Claims. (Cl. 137—18)

Many tanks for the storing of volatile substances such as gasoline are now equipped with gas-tight roofs in order to reduce loss of the contents by evaporation and if desired to render is possible to withdraw valuable vapors from the tanks and subsequently recover them in a vapor-recovery system.

To prevent loss by escaping vapors, it is important that such tanks be kept closed from the atmosphere when their contents are examined for gauging the amounts of liquid, for taking samples, for determining the temperature or for any other purpose.

The method usually employed for examining the contents of a tank by lowering instruments into the tank through a "thief hole" in the roof of the tank results in vapor losses if used upon a tank of the gas-tight type.

It is an object of my invention to provide a method and apparatus by which the contents of gas-tight tanks may be examined without loss of vapors.

According to my invention it is possible to lower the different instruments into a tank without the necessity of having an open communication with the atmosphere. This result is accomplished by employing a gas-lock. On the roof of the tank is mounted a cut-off valve having a tube attached to its upper side, at the upper end of the tube means are provided for attaching a removable gas tight head which contains the particular instrument to be introduced into the tank. This head is furnished with controls on its exterior whereby it is possible to operate the instrument from the outside.

When using my device with a measuring tape, sample can or other instrument, the cut-off valve is of course opened and on the other hand when attaching or removing the gas tight head and also when the apparatus is not in use, the cut-off valve is closed. When the head is removed the end of the tube may be covered by means of a flange or other sealing member, in order to prevent rain water or dust from collecting in the tube.

The instruments for carrying out the different determinations must be formed in such a way that they will fit in the gas tight head and in the tube above the cut-off valve. Furthermore, the instruments must be capable of being operated from the outside.

Further details of my invention will be understood from the following description throughout which reference is made to the accompanying drawings of suitable apparatus.

Figure 1 is a section through part of a tank showing the apparatus in position.

Figure 2 is a sectional view of the head for measuring liquid levels in place on the tube.

Figure 3 is a sectional view at right angles to the view shown in Figure 2.

Figure 4 is a sectional view of the head for taking samples.

Figure 5 is a sectional view at right angles to the view shown in Figure 4.

Figure 6 is a sectional view of the sample can for use with the head shown in Figures 4 and 5.

Figure 7 is a sectional view at right angles to the view shown in Figure 6.

Referring to Figure 1 the roof of the tank 1 is provided with a connecting flange 2 having attached to its upper end a cut-off valve 3. To the upper side of the valve 3 is attached a tube 4 provided with a removable side piece 55. The tube 4 is of such length that the head 5 attached to the upper end of tube can be conveniently used from the roof of the tank. This head 5 can be easily installed or removed by means of hinged bolts provided with wing nuts. When the head 5 is not in position upon the tube 4, a cover 6 may be fastened over the upper end of tube 4. The particular head 5 used for measuring the levels of liquid is shown in detail in Figures 2 and 3.

Referring to these figures, a drum 7 upon which is wound a measuring tape 9 is mounted upon a shaft 56. The drum and shaft may be turned from the outside by means of a hand wheel 8 mounted upon the shaft which fits gas-tight in the housing. The measuring tape is graduated and is provided at its lower extremity with a weight 10. In order to more easily determine the liquid level in the tank, a paste which is soluble in the liquid being gauged may be applied to the tape as it is lowered into the tank. This may be done by providing in the head 5 a cylinder 12 which contains the paste in the form of a pencil as shown at 11. The pencil may be pressed against the tape 9 by means of a suitable screw 13. A guide plate 14 is provided on the side of the tape remote from the pencil to ensure, among other things, that the tape passes across the face of the pencil.

Old or excess paste can be removed from the tape by means of a wiper 15 mounted on a shaft 16. The wiper may be operated from the outside by means of a lever 17. The wiper may advantageously be provided with a pressure spring as well as a catch for keeping it out of contact with the tape 9 when its use is not required.

In measuring the contents of a tank the tape

9 is allowed to unwind until the weight 10 reaches the bottom of the tank. The paste 11 may be applied to the tape as the tape passes down into the tank by bringing the paste into contact with the tape by means of screw 13. After the weight 10 reaches the bottom of the tank, the tape is rewound upon the drum 7. The level of liquid in the tank indicated by the paste may be read through a window 18 in the side of the head 5. A wiper 19 operated from the outside by a handle 20 is provided for cleaning this window. Other windows 18 are also provided as shown in Figure 3.

After gauging operations are finished the head 5 may be removed from tube 4 by closing valve 3 and unscrewing the thumb screws. A handle 22 is provided for carrying the head from place to place.

Figures 4 and 5 show in detail a head interchangeable with head 5 but designed for use with a sample can such as shown in Figures 6 and 7. Referring to Figures 4 and 5, 57 represents the head generally. Mounted in the head are two drums 26 and 27 placed side by side. These drums can be rotated independently by means of the hand wheels 28 and 29 on the outside of the casing. On drum 27 is wound a measuring tape by means of which a sample can may be lowered into the tank. On drum 26 is wound a control cable, the purpose of which will be explained later herein. The head is provided with a cable guide 30 and a window 31. The latter has a wiper 32 operated from the outside by a lever 33. A carrying handle 34 may also be provided. The sample can shown in Figures 6 and 7 consists of a glass cylinder 40 with upper and lower end pieces 41 and 42, the whole being held together by rods 43. A bail 53 to which is attached the measuring tape 54 supports the sample can. In the upper plate 41 and in the lower plate 42 are mounted two valves 44 and 45 respectively. These valves 44 and 45 are operated simultaneously as the two valves are connected by a rod 47. The valves are normally kept in a closed position by means of levers 49. The inner ends of these levers are free to press upon the top of valve 44 while the outer ends are attached to the bail 53. The fulcrums of the levers are attached to the end piece 41 as will be seen from Figure 6 of the drawings.

In order to open the valves 44 and 45, the valve assembly is fastened to a cable 52 by means of a bail 54 and levers 58. The levers 58 are connected at their fulcrums to the valve assembly. One end of each lever is attached to the bail 54 and the other end of each lever is free to press upon the end piece 41. The upper end of cable 52, to which reference is above made is attached to drum 26 shown in Figures 3 and 4. When it is desired to open the valves 44 and 45 of the sample bottle, the cable 52 is wound up so that some or all of the weight of the sample bottle is carried by cable 52. By the arrangement of levers the force needed to open the valves is greatly reduced. The control is so arranged that the lower valve 45 opens before the upper valve 44 whereby the inflow of liquid from the bottom and the outflow of air from the top is assured and the reverse direction of flow prevented.

A thermometer 51 and support 50 are conveniently attached to the rod 47 passing through the middle of the sample bottle. In this position the thermometer will be entirely surrounded by liquid and will therefore more accurately indicate the temperature of the liquid.

I claim as my invention:

1. Apparatus for examining the contents of tanks, comprising a cut-off valve attached to the top of the tank, a hollow head adapted to be attached to the upper side of said cut-off valve, two drums mounted in said head independently rotatable, cables attached to said drums, a transparent cylindrical sample can having end plates, connected valves arranged in the end plates of said sample can, two sets of levers on one of said end plates for operating said valves, each set of said levers being attached to one of said cables.

2. Apparatus for examining the contents of tanks, comprising a hollow head adapted to be attached to the top of a tank, means for lowering a cylindrical sample can into said tank, connected valves mounted in upper and lower end plates of said sample can, levers for opening and closing said valves, said valves so arranged that the lower valve opens before the upper valve, and cables to said levers and to said control head for moving said levers.

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