May 14, 1940. J. H. McCABE 2,200,630

PRESSURE TANK GAUGE AND SAMPLING DEVICE

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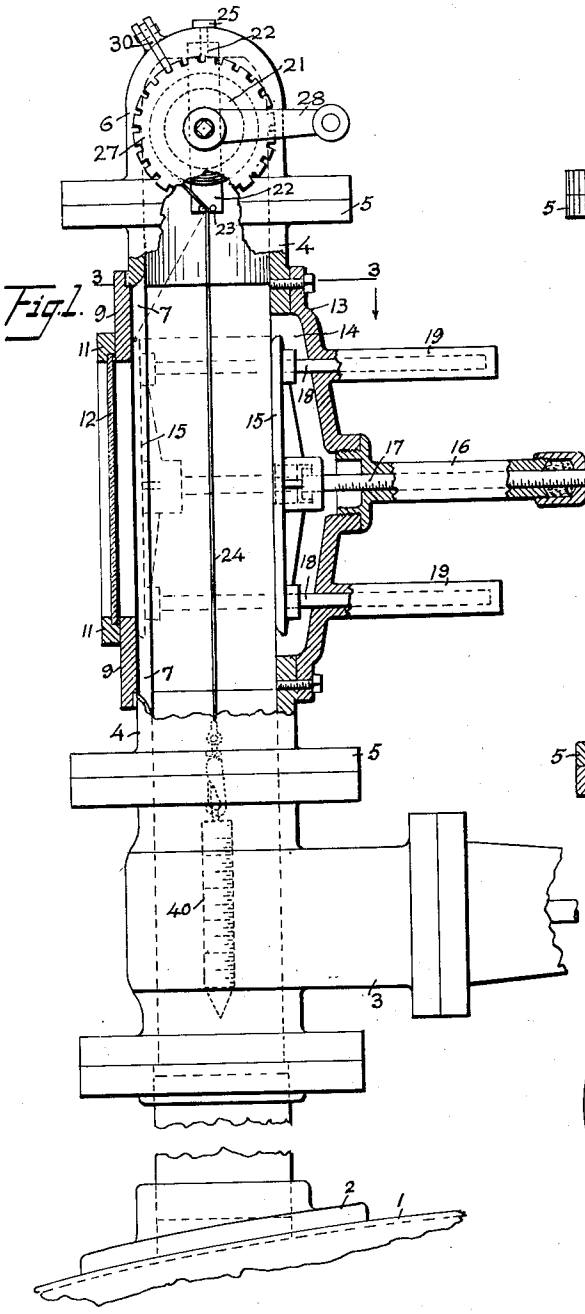


Fig. 1.

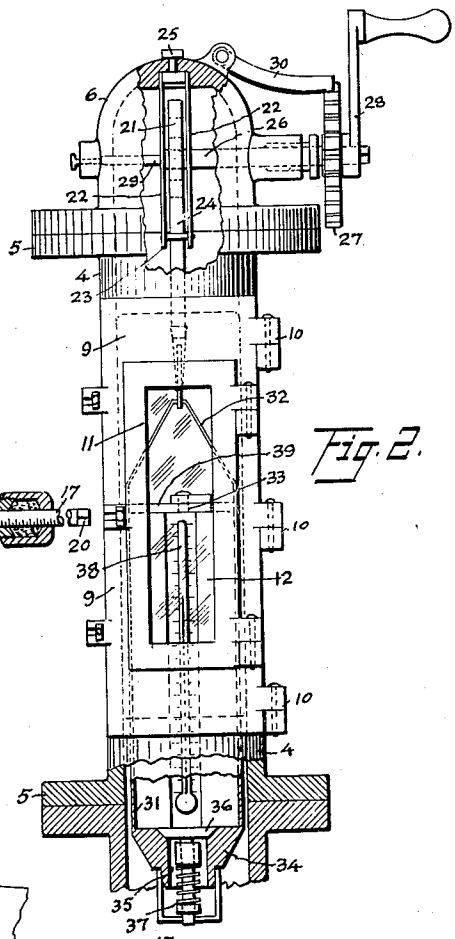


Fig. 2.

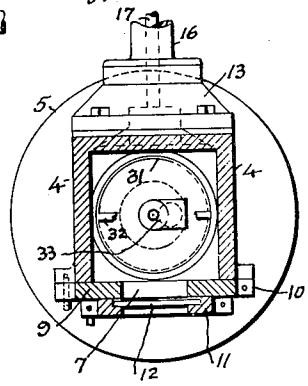


Fig. 3.

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PRESSURE TANK GAUGE AND SAMPLING DEVICE

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2 Claims. (Cl. 33—126.7)

My invention relates to improvements in pressure tank gauges and sampling devices and it more especially includes the features that are pointed out in the annexed claims.

The purpose of my device is to simplify the gauging of oil tanks; that insures a degree of accuracy in gauging that has been unattainable hereto; that enables a gauger to take the measurements very rapidly; that enables the gauger to secure samples of the specific gravity at different levels or only at the top or the extreme bottom of the tank; and that at the same time the temperature of the sample can be taken.

With these and other ends in view I illustrate in the accompanying drawing such instances of adaptation as will disclose the broad features of the invention without limiting myself to the specific details shown thereon and described herein.

Fig. 1 is a side elevation partly in section showing a plumb bob in dotted lines associated with a reeled tape.

Fig. 2 is an elevation partly in section at right angles to the vertical plane of Fig. 1.

Fig. 3 is a top plan view in section approximately on the line 3—3 of Fig. 1.

In installing my device on oil tanks or any tanks holding liquids, I may use such changes of the structure herein described or modifications thereof as the exigencies of varying conditions may demand without departing from the broad spirit of the invention.

My device is secured to an extension from the top of a tank 1 in any desired manner by way of a flange 2, a flange section of pipe and a quick opening gate valve 3 on top of which my device is placed. It comprises the central portion 4 carrying flanges 5 at the top and bottom. A flanged dome 6 is secured to the top flange 5. Between the two end flanges 5 of the central portion 4, side openings 7 and 8 are formed. On the left hand side of Fig. 1, the opening 7 is closed by a large door 9 that is suitably hinged at 10 shown in Figs. 2 and 3. To this large door a smaller glass door 11 is hinged. This carries a panel of heavy plate glass 12. The doors may have suitable gaskets to insure that they will close tightly and any desired form of clamps may be used to hold them securely closed without having recourse to hinges.

Opposite the door opening 7 another opening 8 is formed. This is covered by a special casting 13 in such a way as to form an open space 14 into which a face plate 15 may be retracted. At the center of the cover 8 a tubular detachable extension 16 is secured. In it a threaded rod 17 has movement. A suitable packing is provided to make the outer end of this rod gas tight, and the inner end of the rod is secured to the back side of the face plate 15.

The face plate itself is rectangular in shape. It is held in this rectangular vertical position as against tilting by means of two guide rods 18, which enter projections 19 formed on the outside of the cover 13. The threaded stem 17 extends out far enough so that when the stem and the face plate have moved laterally so that the face plate is substantially against the inside of the large door, the squared or other end 20 of the stem will be outside of the central projection 16 of the cover.

The dome top 6 has supported beneath its dome a tape line reel 21. The support 22 passes on each side of the reel 21 and at its lower end a pair of rollers 23 are provided. The purpose of these is to always hold the tape line 24 approximately central of the pipe connections. A supporting screw 25 holds the reel attachment assembled in the dome top.

The reel has a spindle 26 of large diameter extending to the right of Fig. 2. It passes through a stuffing box and outside of this a toothed wheel 27 is supported on it and beyond this a hand lever 28 is positioned. The other end 29 of the spindle 26 is of reduced diameter. It passes into a bearing of the dome top and may have a conical end against which a take-up screw may be moved.

On top of the dome 6 a pivoted arm 30 may be placed, the purpose of which is to drop into any desired tooth of the wheel 27 to lock the reel spindle 26 so as to hold the tape 24 in any desired position. In Fig. 2 an all brass sampler cage 31 is shown. It has a top bail 32 by means of which it is suspended on a snap hook at the free end of the tape 24. In the top cover of the sampler an opening 33 is formed. It is closed by any suitable cover. The sampler cage has a closed bottom 34 somewhat conical in shape in a downward direction. This has a hollow recess 35 leading up from the bottom and terminating in a conical valve seat.

There is a conical valve 36 having a central stem provided at its bottom end with an adjustable collar. The stem passes through a cast-in guide and between this guide and the collar, a coil spring 37 is positioned to normally hold the valve closed.

Within the sampler cage 31 a thermometer tube 38 is placed. This may be held in grooves formed

in the outer wall so that it may be easily withdrawn through the cover 39 for examination.

In order to definitely gauge the depth of liquids in the tank, for instance, gasoline, the tape 24 is covered with a paste that is quickly and accurately dissolved by the gasoline without any crawling past the exact level of the gasoline, which on the reeling of the tape 24 and the bringing of it close to the glass panel 12 by the face plate 15 will make visible the depth of the liquid within the tank due to the paste having been dissolved off from the tape by the action of the gasoline.

In gauging operation the operator has a rough idea, within a few inches, of the height that the oil in the tank should be, and he lowers the gauge bob 40 down till the tape shows the reading opposite the center of the glass panel 12 of the height he believes the oil to be. He then locks the tape in this position by the use of the locking finger 30 which engages the gear 27 shown at the top of Fig. 2. The quick opening gate valve 3 is open all this time.

He then operates the lever handle 28 which may be placed on the stem 17 of the face plate 15 which moves the face plate over into the position shown by the dotted lines. This carries the tape sidewise against the door frame, which is provided with a face gasket to make a gas tight joint at this point.

The glass door panel 12 is then opened and the operator covers the tape by hand with paste and closes the door, pulls the face plate back and lowers the tape until the gauge bob 40 touches the bottom of the tank. He holds it in this position for 15 or 30 seconds, then pulls the gauge bob up until the line of height, as shown by the paste which has been washed off from the tape, appears at the window, and he then again operates a handle 28 throwing the face plate over against the outer door, opens the glass door, takes his reading and wipes the tape clean, closes the door and winds the tape up until the plumb bob is opposite the glass door, and then closes the gate valve 3 immediately below.

When both a sample and its temperature are desired he opens the larger of the two doors, unhooks the gauge bob 40, and hooks the special sampling can 31 on to the snap, and then closes the large door, opens the gate valve and lowers the sampling can 31 to any particular point in the tank at which he wishes to take the sample or the temperature. Then the can 31 is raised, the gate valve closed, the larger door opened and the sampling can removed. The gauge bob is replaced and the door closed which completes the operation.

For most occasions the sampling and taking of temperature is an entirely separate operation. Also sampling cans are of different types, those which fill from the top through small holes so that an average sample can be taken of the oil as the can descends according to the size of this opening. The sampling can shown is made to take samples at the bottom, or in other words is lowered to the bottom of the tank, and is allowed to fill at that point. Other cans are made which are heavily weighted so they can be lowered to any desired depth, the cans then open with an automatic valve 36 and a sample taken at any desired level.

I have designed and shown a sampling can in which the thermometer has been placed in specially provided grooves inside the can. By doing this, both a sample and temperature are taken in the same operation.

My can is further designed and constructed so that it can be used in any one of three ways; first, to take a sample at any given level; second, to take an average sample throughout the depth of the oil in the tank; or third, to take a sample of the water in a hydraulic pressure tank or other mixture of different specific gravity at the bottom.

What I claim is:

1. Tank gauging and sampling devices associated with openings in tank tops, comprising a casing positioned above an opening, reel supported at the upper end of the casing and enclosed thereby, means for manipulating the reel from the outside, the casing having openings on opposite faces, a composite door over one opening, a suitable cover over the other opening, a tape line on the reel suspended in spaced apart relation to both openings, means within the second opening adapted to be moved transversely of the casing adapted to shift the tape line for observation into close proximity to the composite door opening.

2. A gas tight extension projecting upward from an opening into a tank, a quick acting gate valve in such extension, means for supporting a tape line and its reel within and near the top of the extension, there being openings in opposite walls of the extension between the reel and the gate valve, a door having an opening therethrough, a second door hinged thereon and closing said opening, said second door having a glass panel and both doors closing one of the openings in the extension, a face plate in the other opening directly opposite the doors adapted to be moved toward the doors to carry the tape line suspended in spaced apart relation to both openings with it, means external of the extension for operating the reel, and other means external of the extension for moving the face plate across the extension to shift the tape line toward the door opening.

JOSEPH HUNTER McCABE.