

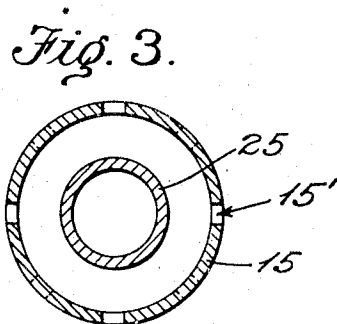
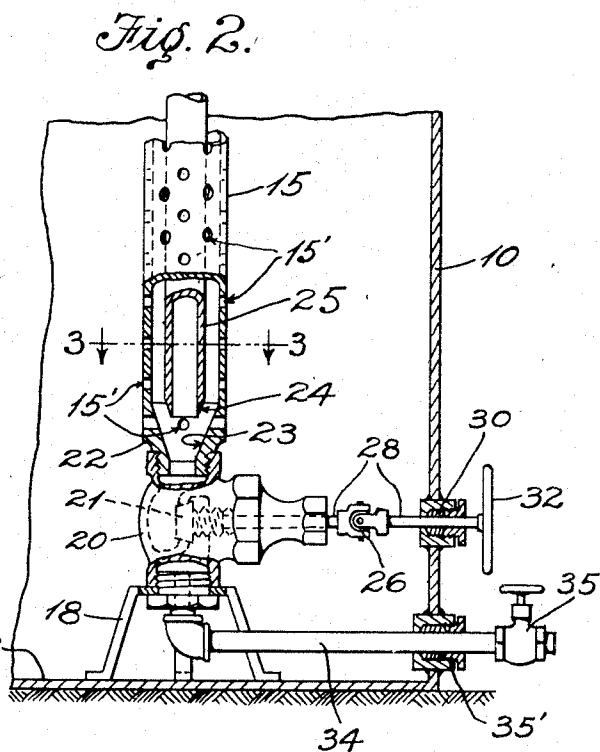
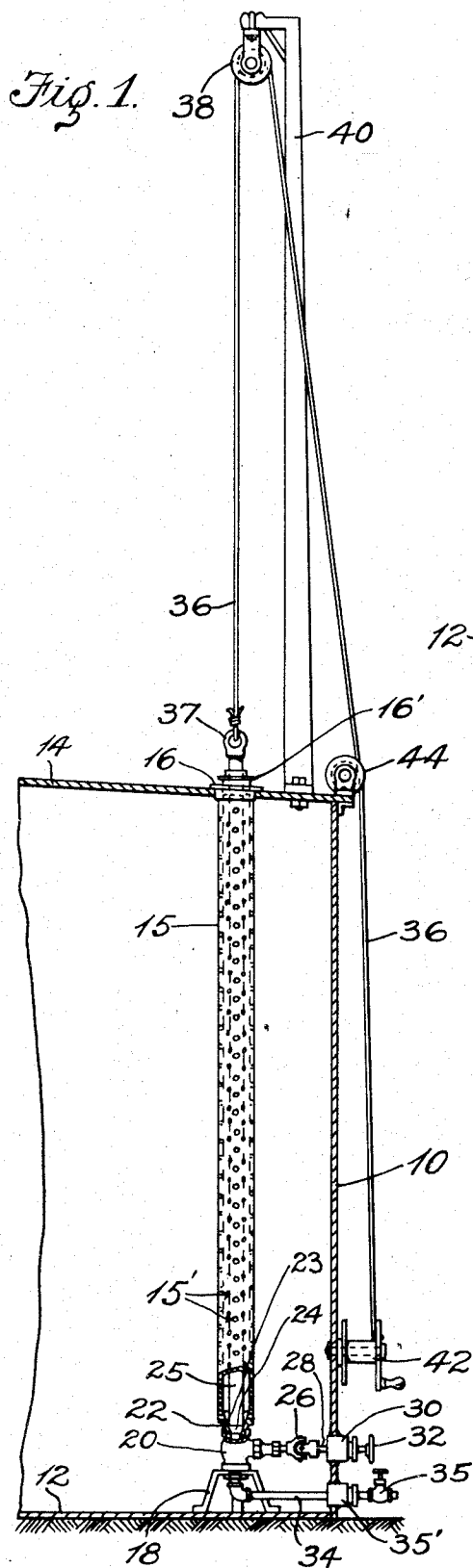
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LIQUID SAMPLER FOR TANKS

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LIQUID-SAMPLER FOR TANKS

Application filed September 25, 1928. Serial No. 308,311.

This invention relates to devices especially adapted for taking liquid samples from tanks of appreciable depth, especially where the contents of such tanks are apt to have a tendency to stratify.

The primary object of the invention is to provide a sampling device which will cut out a sample in the form of a vertical core accurately representing all layers of liquid or other fluid materials in the tank being sampled.

It has been the common practice in taking samples from tanks containing liquid of the character stated, to employ telescoped relatively rotatable tubes provided with perforations or slots adapted to register for admission of the sample and to be moved out of register to trap the sample. I have found in using this common type of structure, that where layers of different viscosities or mobilities are encountered, the rates of flow through the perforations from the various layers of material are not uniform, with the result that a true sample is not obtainable.

However, I have found that this objection may be overcome by lowering into the tank to be sampled a vertically disposed impermeable tube of uniform diameter, open at its lower end and preferably so constructed at its lower end that it will penetrate the fluid layers with a minimum of disturbance to said layers. Said lower end of the tube is made to co-operate with a seat for the purpose of trapping off the core so cut out, and the central portion of the seat is provided with a valved connection leading to the exterior of the tank and through which connection the sample trapped in said tube, may be withdrawn. With this structure a true core is cut out of the various layers of fluid in the liquid body without disturbance of said layer and regardless of relative viscosity thereof.

The invention, therefore, may be considered to reside in a vertically movable tube adapted to be lowered through a body of liquid to be sampled and to engage a sealing seat co-operating with a valve whereby the sample cut out by the tube may be removed independently of the main body of the liquid. In a preferred form the structure also comprises

a vertical guide for the sampling tube, said guide being of any open work construction which will admit liquid and allow said liquid to stratify in exact accordance with stratification outside the guide, this guide insuring direct movement of the sampling tube to its seat without undue disturbance of the various liquid layers. Where the construction is employed on large tanks a mounting is preferably provided for supporting and actuating the sampling tube as it is raised or lowered with respect to said sealing seat.

In the accompanying drawing, wherein a preferred embodiment of the invention is disclosed by way of illustration,

Fig. 1 is chiefly a side elevation of the sampler as it is installed on a storage tank, such as a field storage tank for crude petroleum, the walls of the tank being shown in section;

Fig. 2 is an enlarged detail showing the construction of the lower end of the sampling tube and its relation to the sealing seat and to the control valve and sample removing conduit; and

Fig. 3 is a cross section through the sampling tube and its guide as indicated by lines 3—3 of Fig. 2.

An oil storage tank 10 is shown as having the usual bottom 12 and roof 14. For the proper positioning of the present sampler, the roof 14 is apertured to receive a guide tube 15 positioned in the roof 14 through the medium of a collar 16. Said tube 15 is provided with a considerable number of perforations 15' extending from top to bottom thereof, the lower end of said tube co-operating with a spider or other suitable base 18 resting upon the bottom 12 of the tank to support and position a valve housing 20 and a sealing seat element 22. The housing 20 for the valve 21 is shown as resting upon said spider 18 and as having a threaded connection to the lower end of the seat element 22 which is secured to the lower end of the guide tube 15.

Said seat element 22 is provided with a ground tapered seat indicated at 23, which is adapted to co-operate with a correspondingly ground beveled end 24 of an elongated

sampling tube 25 disposed vertically within said guide tube 15 and having uniform diameter. Said beveled lower end 24 is preferably ground to a knife edge as indicated in Fig. 2, in order that said tube 25 may be lowered through the liquid within the guide tube 15 to cut through said liquid with a minimum of liquid disturbance and insure a proper seal when seated. The tube 25 passes through a packing gland 16'. The valve 21 is located immediately below the seat 22 in order that a minimum of liquid will be trapped below the seat 23 and the sample withdrawn will be substantially only that trapped in the tube 25.

The valve 21 contained in the valve housing 20 is adapted to be actuated through the medium of the universal joint 26 in the valve stem 28 which stem projects through a packing gland 30 in tank 10 and carries the hand wheel 32 for the purpose of manipulation. A conduit 34 communicating with the lower side of valve housing 20 extends through the tank wall 10 and is adapted to discharge the sample passed by valve 21. As a safety measure, the valve 35 is disposed in conduit 34 exterior of the tank. The conduit 34 passes through a packing gland 35'.

In order that the sampling tube 25 may be moved vertically as required, a cable 36 connected with an eye 37 at the upper end of said tube is passed over a grooved pulley 38 mounted at the upper end of a standard 40, carried on the tank roof 14, said cable 36 having its lower end connected with a reel 42 upon which the cable may be wound and from which it may be unwound as the sampling tube 25 is raised and lowered. If required, an additional pulley 44 may be mounted on the edge of the roof over which the cable may be guided.

The operation of the device to take a sample consists simply in closing valve 20, in unwinding the cable on the reel 42 to allow sampling tube 25 to pass moderately slowly downward through the liquid strata accumulated within the guide tube 15. The knife edge of the tapered lower end 24 of the sampling tube cuts the various strata with a minimum of disturbance to the liquid, and when in lowermost position engages with the corresponding ground seat 23, thus sealing the joint between the seat element 22 and said tube at this point. Valve 35 is then opened to drain all the liquid therein. It is then closed. The hand wheel 32 is then rotated to open the valve 21 and allow the sample to pass from the tank through the conduit 34. The sample having been taken, valve 35 is opened. After the sample is taken valve 20 is closed, and the tube 25 is elevated to its uppermost position to await further use.

The guide tube 15 will be so perforated or otherwise constructed that all materials

which are introduced to the tank to be sampled will enter and properly stratify within said guide tube 15. The point above which the stratified materials are to be sampled will be determined by the position of the lowermost perforations in the guide tube 15 or the seat element 22.

From the foregoing, it will be clear that the sampling mechanism here presented will be adapted to cut out an absolutely true sample of stratified fluid material, or in fact any fluid material, regardless of the relative viscosity or mobility of said materials. It is to be understood that the preferred embodiment here disclosed is merely illustrative of the generic invention and that the invention is not to be considered as limited thereby, since many variations may be made by those skilled in the art within the scope of the accompanying claims.

I claim:

1. A sampling device for mobile materials comprising a sampling tube adapted to be lowered into vertical position, a seat adapted to be engaged by said tube when in lowermost position, and a valve controlled conduit for removing materials trapped in said tube from a point adjacent to said seat.

2. A liquid sampler, a seat having an open center, a conduit leading therefrom, a valve controlling said conduit, an imperforate sampling tube open at its lower end adapted to be moved vertically and adapted to engage said seat, and a guide for said tube adapted to admit liquid freely to the path of said tube.

3. In a liquid sampling device, an imperforate tube adapted to be moved vertically to cut out a liquid core, a sealing seat adapted to be engaged by the lower end of said tube, means to guide said tube to said seat and to admit liquid freely to the path of said tube, and means for withdrawing the liquid core trapped by said tube.

4. Means for taking a liquid sample from tank, comprising a sealing seat, a sampling tube adapted to be moved vertically to and from engagement with said seat, the lower end of said tube having an annular knife edge and said seat being ground to receive said lower end, and means for withdrawal of the sample trapped in the tube.

5. A sampling mechanism, comprising an imperforate tube of uniform diameter having its lower end open, means for supporting said tube and permitting vertical movement thereof, a seat adapted to be engaged by said lower end to trap a liquid sample in the tube, means to guide said tube to said seat and to admit liquid to the path of said tube, and means for the withdrawal of the trapped sample.

6. In combination, a tank having a bottom and a roof, a seat supported on said bottom, an imperforate sampling tube having its lower end open and adapted to be moved ver-

5 tically into engagement with said seat, a perforated guide carried in the tank roof and connected with said seat to guide said tube to said seat, said guide admitting liquid to the path of the tube, a support carried by said tank to support said tube and including means for raising and lowering the tube, and valve controlled means connected with said seat for withdrawing a sample trapped in said tube.

10 Signed at Los Angeles, in the county of Los Angeles, and State of California, this 20th day of September A. D. 1928.

PATRICK H. OSBORNE.

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