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SAMPLE TAKING APPARATUS

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This invention relates to sample taking apparatus and more particularly to mechanism for taking samples of liquid from a conduit through which the liquid is flowing.

The invention has for an important object the provision of a sample taking device adapted to be applied to a conduit through which liquid flows and which is operated entirely by the flow of liquid through the conduit to remove samples of the liquid from the conduit at short intervals for the purpose of keeping a close check on the quality of the liquid.

Another object of the invention is to provide apparatus for taking samples from a flowing liquid whereby the proportion of the sample to the amount of liquid flowing may be accurately controlled as well as the amount of each sample withdrawn.

A further object of the invention is the provision of sample taking apparatus which is adapted to be mounted on a conduit through which flows a liquid to be sampled and which includes means operable by the flow of the liquid for controlling the withdrawal of samples of the liquid in accordance with the amount of liquid flowing through the conduit.

A still further object of the invention is to provide sample taking apparatus of the kind referred to which is of simple design and rugged construction and which is capable of continuous operation to withdraw portions of liquid at regular intervals from the conduit through which the liquid flows.

The above and other important objects and advantages of the invention will best be understood from the following detailed description, constituting a specification of the same, when considered in conjunction with the annexed drawings, wherein:

Figure 1 is a side elevational view, partly broken away and partly in cross-section illustrating a preferred embodiment of the invention;

Figure 2 is a cross-sectional view taken along the line 2—2 of Figure 1, looking in the direction of the arrows;

Figure 3 is a cross-sectional view, taken along the line 3—3 of Figure 1, looking in the direction indicated by the arrows; and

Figure 4 is a view similar to that of Figure 2 showing the relative positions of the parts at a somewhat different stage of the operation of the device.

Referring now to the drawings in greater detail the invention is shown in its application to a liquid flow line, such as an oil pipe line or conduit 10, of conventional construction, and in which an opening 12 is provided, leading from the interior of the conduit and which is surrounded by an external annular flange 14. The invention includes a closure 16 of suitable design which fits on the flange 14 and may be secured thereto by suitable fastening means, such as the bolts 18 which extend through registering perforations in the flange and closure. Spaced, parallel supports or lugs 20, 20 extend downwardly from the closure within the interior of the conduit, and are provided within the conduit with suitable bearing means such as the adjustable plugs or bushings

22, 22, arranged in longitudinally aligned relation and externally threaded to be received in internally threaded openings in the supports.

Rotatably mounted between the bearings 22, within the conduit, there is a driving element or rotor 24, which may conveniently be formed with a central tubular hub 26 provided with radially extending, suitably curved vanes 28, which hub is rotatably supported on a shaft 30, journalled at its opposite ends in the bearings 22. The hub 26 extends beyond one side of the rotor, and is provided at its outer end portion with a worm 32, which meshes with a gear 34, carried on the lower end of a driving shaft 36. The driving shaft 36 extends upwardly through a housing 38, carried by the closure 16 and extending therethrough, suitable bearing means, such as that indicated at 40, being provided within the lower end of the housing, and the housing also having a conventional stuffing box at its upper end, within which an external flange 42 on the shaft is disposed, there being suitable packing above and below the flange, which is retained in position by a screw plug 44 closing the stuffing box.

It will be apparent that liquid flowing through the conduit 10 will cause the rotor 28 to rotate, thus turning the screw 32 and actuating the drive shaft 36, which will be rotated in accordance with the flow of liquids through the conduit.

A support 46 extends above the closure 16, and is secured thereto in any suitable manner as by means of the bolts 48, and on the upper end of this support a valve casing 50 is positioned, within which a valve 52 is rotatably carried. The valve casing is preferably formed with an internal tapering seat 54, and the valve 52 is tapered to fit the valve seat. An extension 56 is provided on the drive shaft 36, connected thereto by a suitable coupling 58, designed to permit relative longitudinal movement between the shaft and the extension, the extension extending upwardly through the valve casing, and being connected at its upper end to the valve in any suitable manner, as by means of a lost motion connection 60 whereby the valve will be rotated with the drive shaft.

The valve housing is closed at its upper end by a bonnet 62 within which a movable element 64 is carried, which is urged downwardly into contact with the upper surface of the valve 52, by means of a resilient element such as the coil spring 66, whereby the valve will be urged into fluid tight engagement with the valve seat.

The valve casing has an inlet port 68, and an outlet port 70, and also has a port 72, which is connected in communication with mechanism by which the amount of the sample withdrawn may be regulated. A passageway 74 is provided in the valve 52, by cutting away a portion of the valve body, which passageway is adapted to be brought into one position to establish communication between the ports 68 and 72 and to close off the port 70, and to another position, in which the port 70 is in communication with port 72, and the port 68 is closed off.

The mechanism by which the amount of the sample taken is regulated comprises a casing 76, having a chamber 79, whose outer end is connected in communication with the port 72 by a pipe 78, and whose inner end opens into a counterbore 80 within the casing. A piston 82 is movably mounted in the chamber 79 and has an extension 84, which works in the counterbore 80, and an adjusting screw 86 extends through the casing into the counterbore 80 for engagement with the extension 84, whereby the distance which the piston may move in the chamber is regulated. This casing 76 has a port 88, leading into the chamber 79, through which fluid may enter the chamber to cause the piston to move toward the outer end of the chamber 79, and a pipe 90 is connected in com-