April 9, 1963 A. VAN DOP 3,084,555

SAMPLING DEVICE

Filed July 26, 1960 2 Sheets-Sheet 1

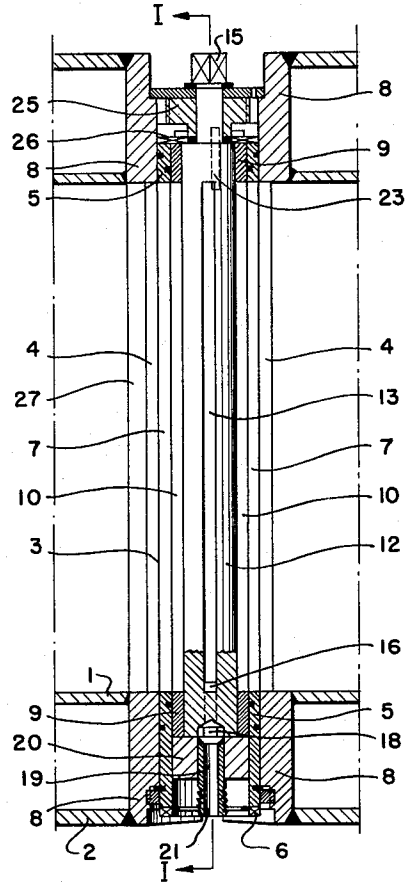

FIG. 1

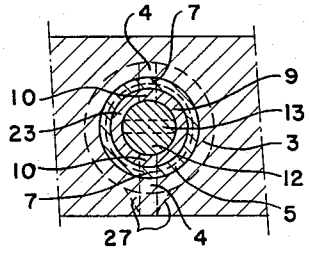

FIG. 3

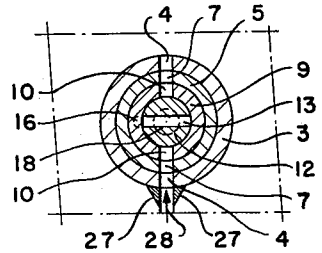

FIG. 4

INVENTOR:
ADRIANUS VAN DOP
BY: J. H. McCarthy
HIS AGENT

April 9, 1963 A. VAN DOP 3,084,555

SAMPLING DEVICE

Filed July 26, 1960 2 Sheets-Sheet 2

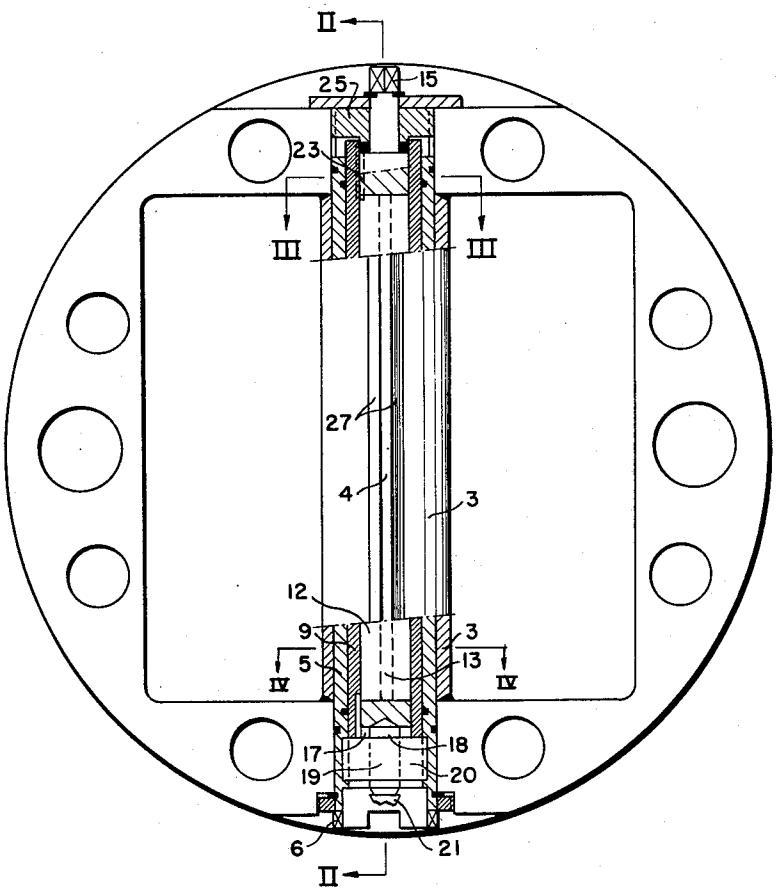

FIG. 2

INVENTOR:
ADRIANUS VAN DOP
BY: J. H. Mc Carthy
HIS AGENT

United States Patent Office 3,084,555 Patented Apr. 9, 1963

3,084,555

SAMPLING DEVICE

Adrianus van Dop, Vlaardingen, Netherlands, assignor to Shell Oil Company, New York, N.Y., a corporation of Delaware

Filed July 26, 1960, Ser. No. 45,346
Claims priority, application Netherlands Sept. 4, 1959
1 Claim. (Cl. 73—422)

This invention relates to a sampling device and pertains more particularly to apparatus for drawing a sample of liquid from a pipeline.

The invention is directed to an apparatus for drawing samples of liquid from a line consisting of a horizontal, rectangular line section, at least one bushing which is positioned transversely and vertically in the line section the bushing wall being provided with a slot-shaped opening extending in an axial direction, of a plug arranged rotatably in the bushing and provided with a liquid discharge channel and a slot-shaped opening extending in an axial direction, and of means for discharging liquid from the plug to a liquid collecting device.

An apparatus of this type is known from the U.S. Patent 2,736,201, issued February 28, 1956, to R. M. Ohlsen et al. In an apparatus of this type it is essential for the flow pattern in the line to be disturbed as little as possible when drawing the sample so that a representative sample is obtained.

The object of the invention is to provide sampling apparatus which has the advantage that it enables a sample to be drawn, the analysis of which gives the maximum amount of information about the composition of the liquid in the line.

The construction according to the invention is characterized in that the wall of the bushing has two diametrical axial slots, and the plug is provided with a central channel and two diametrical axial slots or with one axial slot extending between points situated diametrically on the circumference of the plug, channels being present in the plug and in the bushing which are so arranged that in the position of the plug in which the slots of the bushing and plug coincide the liquid from the line section can continue its course practically without obstruction, whereas in a position of the plug in which the slots do not coincide, viz, when the supply of liquid from the line section to the interior of the plug is cut off, a liquid discharge from the interior of the plug to the liquid collecting device is released, communication between the upper part of the plug interior and the atmosphere being also established.

To permit inspection, cleaning or repairing of the plug and the channels in the plug and the bushing while the line is in operation, use is preferably made of a number of bushings which fit tightly into each other in such a way that they can only be rotated relatively to each other round a common longitudinal axis with some difficulty, at least one of the bushings being provided with means permitting such a relative rotation of the bushings that the slots are closed.

The apparatus according to the invention will now be discussed with reference to the drawing showing an embodiment.

FIGURE 1 shows a longitudinal cross-section II—II taken in the line section and FIGURE 2 shows a cross-sectional view I—I taken on the line section.

The FIGURES 3 and 4 show cross-sections III—III and IV—IV, respectively, of FIGURE 2.

A rectangular line section 1 is housed in a cylindrical section of pipeline 2 to which it is secured by means of plates 8 and is internally provided with a bushing 3 which is rigidly connected to the line section 1. The bushing 3 is provided with two axial slots 4 which are diametrically

arranged in the wall of the bushing 3. A second bushing 5 is positioned in the bushing 3 and is provided at one end with a notched edge 6. The bushing 5 is so positioned in bushing 3 as to be rotatable round the common longitudinal axis relative to the fixed bushings 3. This may be done with the aid of a suitable spanner or wrench fitting the notched edge 6 (FIGURE 2) of the bushing 5 Likewise the bushing 5 is provided with two axial slots 7. During normal use the bushing 5 is in the position shown in the figures, viz, in the position in which the slots 4 and 7 are in register. A bushing 9 is inside the bushing 5. The bushing 9 is so secured as to be incapable of rotation round its longitudinal axis. The wall of the bushing 9 is provided with slots 10 which extend in an axial direction and are in register with the slots 7 in the bushing 5.

The bushing 9 is provided with a plug 12 which is rotatable relative to the bushing 9. The plug 12 has a continuous axial slot 13. The top of the plug 12 has a square wrench head 15 by means of which the plug 12 can be rotated. The plug 12 can be rotated by hand, for instance by means of spanner fitting the square head 15, or by a motor, the shaft of which is connected to the plug 12. The lower part of the bushing 9 has an axial channel 16. The lower part of the plug 12 is provided with a radial channel 17 which is in communication with a central axial channel 18 which is also provided in the plug 12. The channel 18 in turn communicates with a channel 19 in a cylindrical element 20, which is screwed in the bushing 5. A hose or a line through which the liquid sample can be discharged may be connected to the nozzle 21 which is secured in the channel 19. The upper part of bushing 9 is provided with an axial channel 23, which is in communication with the atmosphere. The upper part of the bushing 9 is secured at the top and locked against rotation by means of the nut 25 and the plate 26.

If desired, the bushing 3 may be provided on both sides of the slots 4 with metal strips 27 (FIGURE 4) to ensure that the disturbance of the flow of liquid in line section 1 is reduced to a minimum.

The apparatus operates as follows.

When the plug 12 is in the position in which the slot 13 is in register with the slots 10, 7 and 4, part of the liquid flowing through the line section 1 will be able to pass freely through the slots 4, 7, 10, 13, 10, 7 and 4. The liquid then flows in the direction as indicated by the arrow 28 (see FIGURE 4).

If it is desired to take a sample, the plug 12 is rotated either manually or mechanically to the position shown in the figures. A quantity of liquid remains in the slot 13 and since the channel 16 in the relative position of the plug 12 is in register with the slot 13, the liquid can flow away from the slot 13 to a collecting vessel (not shown) through the channels 16, 17, 18, 19, the nozzle 21 and the line connected thereto (not shown). Since in the said position of the plug 12 the channel 23 establishes communication between the slot 13 and the atmosphere the liquid will readily flow to the collecting vessel.

The channel 23 and the channel 16 are so positioned relative to each other that rotation of the plug 12 will establish communication between the slot 13 and the channel 16 before the slot 13 communicates with the channel 23. This is essential to ensure that the pressure in the slot 13 is released before the slot 13 is brought into communication with the atmosphere through the channel 23.

The composition of the liquid in the collecting vessel may be analyzed so as to gain information on the composition of the liquid flowing through the line. The plug 12 may be continuously or intermittently driven, preferably by means of an electric motor. In this way a sample of the liquid can be automatically drawn from the line at predetermined intervals. Analysis of the samples drawn

enables the composition of the liquid in the line to be determined at any time. The apparatus described has the advantage that the sample can be isolated and drawn without the flow pattern of the liquid in the line being greatly disturbed. A great advantage is that the composition of the liquid of the sample is closely representative of the composition of the liquid in the line.

The apparatus according to the invention is particularly intended for use in large diameter pipelines (60 cm.) for the transport of crude oil over long distances, for instance from a port of entry to a number of refineries situated inland. Since the amounts due for crude oil pumped into the line near the port of entry have to be settled with the consumers at the other end of the line it is important that the percentage of water in the crude oil flowing through the line should be determined as accurately as possible. The apparatus according to the invention confirms to this requirement and renders the use of settling tanks unnecessary.

The bushing **5** may be rotated in such a way around its longitudinal axis by means of a spanner fitting the notched edge **6** provided at the end of the bushing **5** that the slots **4** and **7** are no longer in register wtih each other. This has the advantage that the bushing **9** and the plug **12** may be dismounted, for instance for inspection, cleaning and repairs, while the line remains in operation.

I claim as my invention:

An apparatus for withdrawing a sample from liquid flowing through a pipeline comprising

a first bushing fixed to and extending transversely through the pipeline, said bushing having diametrically-disposed slots through the walls thereof;

a second bushing rotatably disposed within said first bushing, said second bushing having slots through the walls thereof adapted to align with the diametrically-disposed slots of the first bushing;

means connected to the second bushing whereby said bushing may be rotated within the first bushing;

a third bushing disposed within the second bushing and fixed relative to the first bushing, said third bushing having slots through the walls thereof in alignment with the diametrically-disposed slots in the first bushing;

a plug rotatably disposed in the third bushing and having a slot therethrough adapted to be aligned with the slots in the third bushing, the ends of the slot in the bushing being adapted to communicate with the outside of the pipeline when said slot is out of alignment with the slots in the third bushing;

and means connected to the plug whereby said plug may be rotated within the third bushing.

References Cited in the file of this patent

UNITED STATES PATENTS

1,562,121	Newton	Nov. 17, 1925
2,736,201	Ohlsen et al.	Feb. 28, 1956

OTHER REFERENCES

Weaver: A Device for Sampling Material Carried by Silt Bearing Material, Information Circular of the U.S. Dept of Interior, I.C. 7249, August 1943. (Copy in 73–425.)