SAMPLER PURGE SYSTEM

BACKGROUND OF THE INVENTION

a. Field of the Invention

The invention relates to fluid samplers and more particularly to a purge system for fluid samplers.

b. Prior Art

In the field of water pollution control there is a need to take samples of rivers, sewers, drains and the like. In industrial hygiene applications, there is a similar need to sample industrial plants' liquid effluents. Often this is accomplished by automatic samplers in which a sample chamber is filled with a desired sample volume which is then transferred into sample containers for use in a testing device; a complete apparatus including sample chamber, containers and testing device being described in U.S. Pat. No. 4,098,305, assigned to the assignee of the present invention. After the test procedure is complete the sample is wasted.

In automatic samplers a plurality of sample chambers is frequently used, with a sample being taken periodically, perhaps every hour or more, perhaps every six hours. During this period, the nature of the sample may change slightly. For example, even a few parts per million of certain substances or a change of a few parts per million between samples may be a cause for concern. This means that the sampling apparatus must be sensitive and also that contamination of samples must be avoided and that cross contamination between samples be avoided.

In a prior co-pending application, Ser. No. 918,470, assigned to the assignee of the present invention, the problem of cross-contamination between samples in re-used sample containers was discussed. However, in the present invention our concern was for the intake channel which feeds the sample containers. This channel is frequently made up of hose, tubing, pipes and reservoirs between an intake source and a sample container.

One problem is that a small amount of the previous sample remains in intake channels of the prior art. When a subsequent sample is drawn into the intake chamber, a slight amount of sample cross contamination occurs. Frequently this is due to small kinks in the channel, or gravitationally uneven locales where tiny puddles of sample material may form. In other instances, sample material such as suspended solid material may merely adhere to the walls of the intake channel until a subsequent sample causes this material to move along with the new sample flow, again causing some sample cross-contamination.

Another problem is the introduction of biological material into samples, particularly the growth of algae between sampling intervals. If sampling times are more than a few hours apart, measurable amounts of algae may grow in the intake channel where tiny puddles of prior sample material resides. This algae would be swept along with the next sample to be introduced causing a source of contamination. It may also be possible for other undesired organisms to enter the intake channel between samples, since this channel is usually left in the fluid body to be sampled and is usually open for entry of suspended solid matter during the time a sample is drawn.

An object of the invention was to devise a fluid sampler in which the problem of sample cross-contamination in the intake channel could be eliminated. Another object was to avoid sample contamination by algae, or the like, or even larger organisms invading the intake channel.

SUMMARY OF THE INVENTION

The above objects have been achieved in a fluid sampler in which the intake channel is preconditioned. Prior to introduction of a new sample, the intake channel is filled as though to draw a new sample, but then the drawn material is expelled. This in effect washes the intake channel with fluid similar to that to be drawn. The intake channel is, to a great extent, cleared of old material which formed tiny puddles in the intake channel and adhered to the walls thereof. The new material which forms the tiny puddles and adheres to the walls thereof is of little consequence because it resembles the new sample about to be drawn. Moreover, algae and any other organisms have been expelled.

One end of the fluid channel communicates with a fluid to be sampled, while the opposite end communicates with a sample chamber. A reversible pressure means, such as an air compressor or a fluid pump, communicates with the channel, for drawing fluid to a predetermined point, short of the sample chamber. The arrival of fluid at this point is detected by a sensor which signals a controller which causes a pressure reversal. Fluid is now expelled from the intake channel until the intake channel is clear. After the intake channel has been cleared, a new fluid sample is drawn into a sample chamber until a predetermined volume is collected. The new sample should be substantially free from contamination or cross-contamination from the intake channel.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a plan view of the apparatus of the present invention.

FIG. 2 is a plan view of an alternate embodiment of the apparatus of FIG. 1.

DESCRIPTION OF THE PREFERRED EMBODIMENT

The plan view of FIG. 1 shows an intake apparatus for a fluid sampler of the present invention. This apparatus, while not complete in all details, generally includes an intake channel **11**, a pressure source **13** and a sample chamber **15**. An electro-mechanical controller **17** has a timer for activating the pressure source **13** for drawing a sample by vacuum applied to the channel orifice **19** which is immersed in a fluid body **21** to be sampled.

The intake channel **11** may consist of a combination of hoses, pipes, tubes and passages which serve to conduct fluid from fluid body **21** to sample chamber **15**. In FIG. **1**, the intake channel is shown to consist of hose sections **23**, **25** with a small fluid reservoir **27** interposed therebetween. The first hose section **23** is a relatively long section extending several feet, perhaps 10 or 12, from the sampler to a fluid body and is connected to the bottom of fluid reservoir **27**, while the second hose section **25** is a relatively short section extending a few inches and connected to the top of the reservoir.

A sensor **29** is positioned near the top of reservoir **27** in the interior thereof so that fluid filling the reservoir will contact the sensor. The sensor **29** is a conductivity switch or differential pressure switch which will latch in a closed position when it is contacted by fluid filling reservoir **27**. The switch is not affected by ambient