

valve 39 to allow the pressure to blow the liquid out of the chamber into the receiving jar 36. At the end of a predetermined pressure period, the purge timer shuts off the apparatus and resets itself.

In FIGS. 8 and 9, apparatus 10a is an alternative form of the invention, in which program timer 70 is replaced by a vacuum switch 105 and a blow timer 108. Vacuum switch 105 is in communication with metering chamber 18 so as to be affected by vacuum within the chamber. This switch is set so as to be operated by a predetermined degree of vacuum in the chamber, this being above the vacuum required to draw liquid into the chamber. Blow timer 108 is connected to solenoid valves 49 and 50 and to vacuum switch 105 so that when the latter is actuated, the blow timer is started and the solenoid valves are changed to apply pressure to the metering chamber. After a preset time, timer 108 reverses the valves 49 and 50 so as again to apply suction to the chamber.

The following is a desirable operating sequence for apparatus 10a. A sample-taking operation is started, by a signal, for example, from cycle timer 80. This starts blow timer 108 and pump 56 to apply pressure to chamber 18 for the preset time to purge the system by blowing out the chamber, control tube 25 and hose 31, pinch valve 39 being closed at this time. At the end of the preset time, valves 49 and 50 are reversed to apply suction to the metering chamber and thereby draw liquid thereinto. When the liquid reaches electrodes 42, purge timer 94 comes into operation and changes valves 49 and 50 to apply pressure to the chamber. After a predetermined time, the purge timer opens valve 39 to allow the pressure to blow the liquid out of the chamber into receiving jar 36. At the end of a predetermined pressure period, the blow timer 108 shuts off the apparatus and resets the cycle timer 80.

On the other hand, if a blockage occurs during the suction period, the vacuum in chamber 18 increases sharply and when it reaches the point where vacuum switch 105 is actuated, timer 108 is started to apply pressure to the chamber and blow out the system and any clogging material therein. At the end of the preset time of timer 108, suction is again applied to the chamber. Alternating periods of suction and pressure will be applied to the metering chamber until the liquid therein reaches electrodes 42.

As stated above, the automatic expulsion of the liquid from the metering chamber of the sampler may be omitted. In this case, the measured sample would be taken in the manner described above, and the purge timer would cause pressure to be applied to the metering chamber for a predetermined time, which would be sufficient to cause the level of the liquid to move to the lower end of control tube 25, after which the purge timer would shut off the apparatus. In this case, chamber 18 would have to be removed in order to get the measured sample out of it.

I claim:

1. Apparatus for taking measured samples of liquids with or without solids therein, comprising a closed metering chamber, a volume control tube extending into the chamber and having a lower end above the bottom thereof, the liquid being sampled entering the chamber through the control tube, a source of positive and negative pressure operatively connected to the chamber near the top thereof, control means for causing said source selectively to apply pressure and suction to the

chamber, said pressure blowing out the control tube and said suction drawing liquid into the chamber, and a level controller in the chamber above the lower end of the control tube and connected to said source to operate the latter to shut off the suction and start the pressure when liquid in the chamber reaches a predetermined level, said pressure forcing liquid out through the control tube until the level of the liquid reaches the lower end of said tube.

2. Apparatus as claimed in claim 1 including an outlet at the bottom of the chamber, a shut-off valve controlling said outlet, and means for opening said valve after the liquid level reaches the lower end of the tube.

3. Apparatus as claimed in claim 2 in which said control means includes means causing the pressure and suction to be applied to the metering chamber alternatively for predetermined periods.

4. Apparatus as claimed in claim 2 in which said control means includes means for applying the pressure to the metering chamber for predetermined periods, and means for cutting off the suction when the vacuum created thereby in the chamber reaches a predetermined level.

5. Apparatus as claimed in claim 1 in which said control means includes means causing the pressure and suction to be applied to the metering chamber alternatively for predetermined periods.

6. Apparatus as claimed in claim 1 in which said control means includes means for applying the pressure to the metering chamber for predetermined periods, and means for cutting off the suction when the vacuum created thereby in the chamber reaches a predetermined level.

7. Apparatus as claimed in claim 1 in which said control tube is adjustable vertically relative to the metering chamber.

8. Apparatus as claimed in claim 7 in which said level controller is connected to said control means to stop the latter when the liquid reaches said predetermined level.

9. Apparatus as claimed in claim 7 including an outlet at the bottom of the chamber, a closed shut-off valve controlling said outlet, means for applying pressure to the chamber after the liquid has reached the predetermined level, and means for opening said valve a predetermined time after the liquid has reached the predetermined level.

10. Apparatus as claimed in claim 1, in which said level controller is connected to said control means to stop the latter when the liquid reaches said predetermined level.

11. Apparatus as claimed in claim 1 including an outlet at the bottom of the chamber, a closed shut-off valve controlling said outlet, means for applying pressure to the chamber after the liquid has reached the predetermined level, and means for opening said valve a predetermined time after the liquid has reached the predetermined level.

12. Apparatus for taking measured samples of liquid with or without solids therein, comprising a closed metering chamber, a volume control tube extending into the chamber and having a lower end above the bottom thereof, the liquid being sampled entering the chamber through the control tube, a source of positive and negative pressure operatively connected to the chamber near the top thereof, a program timer to cause said