4. The method as recited in claim 1, including the end of said pumping time (T_t) reversing the operation of said pump to purge the pump and said conduits of liquid.

5. The method as recited in claim 1, including reversing the operation of said pump if said first time interval (T_s-T_o) is detected, thereby repeatedly to rinse the portion of said first conduit between its inlet end and said point before operating said pump in its forward direction for said total time (T_t).

6. The method as recited in claim 1, including reversing the operation of said pump if said first time interval (T_s-T_o) exceeds a predetermined value.

7. The method as recited in claim 1, including generating an alarm signal if said first time interval (T_s-T_o) exceeds a predetermined value.

8. The method as recited in claim 1, wherein detecting said first interval of time (T_s-T_o) includes sensing each time liquid appears in said first conduit at said point, said sensing of said liquid being performed without contacting said liquid and without obstructing its flow in said first conduit.

9. The method as recited in claim 8, wherein said sensing of said liquid includes positioning an electrostatic capacitance type of proximity switch adjacent the exterior of said first conduit to generate an output signal each time liquid appears in said first conduit adjacent said switch.

10. The method as recited in claim 8, wherein said sensing of said liquid includes applying ultrasonic energy to said point in said first conduit, and from the exterior of said first conduit.

11. A method of improving the quantitative accuracy of liquid sampling apparatus, comprising

passing a flexible tube of uniform internal diameter, and therefore of uniform internal volume per unit length, through the operating chamber of a peristaltic pump, with the inlet of the tube communicating with a supply of liquid that is to be sampled, and with its outlet connected to a sample collector,

operating the pump in a reverse direction to purge all liquid from the tube,

operating the pump in a forward direction to commence pumping liquid from the supply thereof to said collector,

sensing when the pumped liquid reaches a point in said tube spaced a predetermined axial distance along said tube from the inlet thereof,

determining the interval of time (T_s-T_o) taken for the liquid to fill the first portion of the tube from its inlet to said point, and

based upon said time interval, calculating the rate of flow of the liquid being pumped, and the total time (T_t) the pump must operate to convey a sample of predetermined volume from said supply to said collector,

reversing the operation of the pump to purge said first portion of the tube of said liquid, and

thereafter operating said pump in its forward direction for said total time (T_t).

12. The method as defined in claim 8, wherein said sensing includes using a sensing device positioned exteriorly of said tube adjacent said point to detect each time liquid from said supply appears at said point, whereby

said sensing step occurs without physically contacting or interfering with the flow of the liquid in said tube.

13. The method as recited in claim 11, including before operating said pump in a forward direction, and for a predetermined number of times, operating said pump in a reverse direction each time said time interval (T_s-T_o) is determined.

14. In combination with a reversible, positive displacement pump having an inlet connected by a first conduit to a supply of liquid, and an outlet connected by a second conduit to a sample collector, and said pump being operable selectively in a forward direction to pump liquid from said supply to said collector, and in a reverse direction to purge liquid from said pump and said conduits, improved pump control means for cyclically and intermittently delivering liquid samples from said supply to said collector, comprising

cycle initiating means operative in response to a start signal momentarily to operate said pump in a reverse direction to purge liquid from said pump and said conduits, and then to operate said pump in a forward direction to commence pumping liquid from said supply toward said collector,

sensing means positioned externally of said first conduit and operative without touching said liquid to generate a sensing signal each time the liquid appears in said first conduit at a point spaced a predetermined axial distance along said first conduit from the inlet end thereof,

timing means responsive to said sensing signal for determining the interval of time (T_s-T_o) it took liquid to pass from the inlet end of said first conduit to said point, and

means responsive to said timing means for determining the rate of flow of the liquid passing said point and the time (T_t) necessary at said rate to pump a volume of liquid equal to the internal volume of said pump and said conduits from said point to said collector, plus the desired volume of one sample,

said cycling means including means for continuing to operate said motor in a forward direction for said remaining time (T_t).

15. The combination as defined in claim 14, wherein the last-named means includes means for generating a purge signal momentarily to effect operation of said pump in its reverse direction after said pump has been operated in its forward direction for said interval of time (T_s-T_o).

16. The combination as defined in claim 15, wherein said timing means includes means operative for a predetermined number of times, before operating said pump in its forward direction for said time (T_t), to generate said purge signal each time said time interval (T_s-T_o)is determined, thereby repeatedly to rinse said first conduit between its inlet end and said point before pumping a sample to said collector.

17. The combination as defined in claim 14, including means for generating a warning signal if said time interval (T_s-T_o) exceeds a predetermined value.

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