flexing of the stop member **272** against the stop **274** (FIG. **7**) at bottle positions one and the last bottle position.

The step **456** of going to a bottle includes the step **472** of calculating the target position which factors in expected coast and mechanical play, the step **474** of moving the distributor arm through the required number of change of states as indicated by the optical interruptor, followed by the step **476** of hunting for the correct position necessary followed by the step **478** of updating the coast amount which includes 70 percent of the old value and 30 percent of the new value. The step of hunting for the correct position relates to the ability to detect overshooting by detecting a greater number of pulses than the desired position indicates. If the distributor has been moved, the position must be updated from the information indicating its current position.

The control module **103** initiates all communications through the computer **12** with the modules **202** (FIG. **2**). The identification of the module is stored in memory. The modules take readings and convert the readings to engineering units. They respond to requests made by the control module **103** (FIG. **2**).

To perform random sampling, the program run time is entered in hours and minutes at the keyboard. The number of samples to be taken during the run time is entered into the keyboard for a one bottle configuration, but the computer program calculates the number of samples from the distribution information for multiple bottle configurations. The program start time is entered as a delay past the run request or clock time and day of the week at the keyboard.

At the time of running, a set of random numbers is generated. These random numbers are scaled so that the sum of the resulting set of time intervals equals the program run time. Specific clock times are then calculated from the random intervals. While the program is running, samples are taken as each of the random clock time occurs at the position indicated by the generated number. The sample bottles for depositing can be obtained by inquiring at memory. Moreover, the software can be drawing and inserting samples into containers in accordance with one program and nontheless simultaneously follow at least one other sampling program. The other program or programs may be triggered during the execution of the first to start program, such as for example, by the detection of a preprogrammed value of pH or flow rate.

During sampling, the controller runs the pump in reverse to purge the intake line. When configured for one bottle, the controller keeps track of how long the liquid presence signal exists while doing its post-sample purge. This time is indicated by pulses measured by the sensor. If this time measured in pump counts is greater than or equal to a full-threshold, a bottle-full condition is declared. If the count is less than the full-threshold an average of the most recent five readings is found.

At the program run time, the full-threshold is initialized to 200 (large enough to eliminate false bottom-full indications). For each consecutive sample, the full-threshold is set to the average as calculated above plus a pad of 20. The pad value of 20 counts (approximately 20 ml) is added to prevent a premature declaration of a bottle-full condition. Because of variations in sampling conditions, a minimum sample volume of approximately 40 ml is required for this indicator to work reliably.

From the above description, it can be understood that the pumping system of this invention has several advantages, such as for example: (1) it permits higher pumping velocities under high head conditions with peristaltic pumps; (2) it provides longer life to peristaltic pump tubes; (3) it increases the life of tubes and reduces lateral movement; (4) it permits more precise positioning of the distributor outlet port; (5) it permits easy attachment of modules for cooperation with the sampler; (6) it permits safe and easy access to the pump tube for replacement thereof; and (7) it provides a security system to avoid tampering with samples.

Although a preferred embodiment has been described with some particularity, many modifications and variations of the preferred embodiment can be made without deviating from the invention. Therefore, it is to be understood that, within the scope of the appended claims, the invention may be practiced other than as specifically described.

What is claimed is:

1. A method of drawing samples into a plurality of containers comprising the steps of:

calibrating a distributor arm as to position;

drawing samples with a peristaltic pump;

selecting a designated container;

moving the distributor arm directly to the designated container without applying samples to containers between the starting position of the calibrated distributor arm and the designated container by counting changes in incremental angular movement of the distributor arm until it is over the designated container wherein an outlet end of the distributor is connected to the distributor arm;

causing at least one of said samples to flow into the designated container by rotating the outlet end of the distributor over the designated container and causing the sample to flow through the distributor into the designated container; and

continually updating the position of the distributor arm in memory.

2. A method in accordance with claim **1** in which the step of moving the distributor arm directly to the designated container includes the steps of entering into a memory of a computer the position of the designated container and correlating that entry with the number of positions of movement of the distributor arm as determined by a position measuring device.

3. A method in accordance with claim **1** further including the step of determining when a container is full.

4. A method in accordance with claim **1** further including the step of inserting a functional module in a modular holding means for said sampler, wherein said module performs one or more functions in cooperation with said sampler.

5. A method in accordance with claim **4** in which some of said one or more functions includes digitizing of pH signals, communication with a pH sensor and storing of pH values together with the time of occurrence of the pH values.

6. A method in accordance with claim **5** in which one of said one or more functions include cooperating with a depth measuring device, transmitting a signal indicating the depth of water in a body of water being sampled to a computer, determining the flow rate of water in said body of water and storing it in memory.

7. A method in accordance with claim **5** in which the step of moving a distributor arm includes the step of adjusting the position of a distributor nozzle radially inwardly with a plurality of adjustment means prior to begining the depositing of samples.

8. A method of drawing samples into a plurality of containers comprising the steps of:

calibrating a distributor arm as to position;