the tube **20** (FIGS. **1**, **3** and **6**). The sample is then continually pumped and the program waits for a pump count change at **133**. The maximum pump count was predetermined based on the head of the previous sample or measured by the user and entered into the program before the user began the pump (not shown) in the configure sequence **150** (FIG. **18**).

The program **110** then goes through a series of steps at **139** starting with determining if the maximum pump count has been exceeded in the step **161**. If the maximum pump count has been exceeded, the program will save the information indicating that no liquid was detected at **151** and proceed to the series of steps **153** of stopping the pump. During shutdown of the pump, the program shuts the pump off at **155** and returns to the calling routine at **157**.

If the maximum pump count has not been exceeded at **161**, it is then determined whether a good water count was found at **143**. The program determines if a water count is received so near to the beginning of a sample drawing run as to indicate an error. This can occur in the first few cycles such as for example four cycles of the pump. After a predetermined number of cycles of the pump, this type of error tends not to occur. In the preferred embodiment, the pump must have counted at least 50 counts before the count is considered good. If it was not a good water count, the program: (1) returns to waiting for the pump count at **133**; and (2) maintains in memory the amount of water counts already received and adds a new water count to the previously received water counts.

If it was a good water count, it is then determined if a new maximum amount of water counts should be calculated at **145**. If a new maximum should be made, the program calculates a new maximum water count at **149**, using the head from the previous sample or the head defined by the user in the head subsequence **196** (FIG. **24**), and then decides at **147** if the sample water count is the correct amount. If not enough sample was pumped, the program returns to the wait for the pump count at **133** and pumps more liquid until it has pumped a predetermined amount of pump counts and continues with the series of steps **139** starting at **161** to determine if the maximum count was exceeded. If the pump did receive a correct water count, it is recorded in memory at **159** that the sample volume was delivered correctly and proceeds with the series of steps **153** of shutting down the pump at **155** and returning to the calling routine at **157**.

If it is not necessary to calculate the maximum water count, then the program skips the step **149** and determines at this point if it is a correct water count at **147**, records that the sample volume was delivered correctly at **159** and proceeds with the series of steps **153** of shutting off the pump at **155** and returning to the calling routines at **157**.

When the program returns to the calling routine at **157**, the memory is accessed to find out if the liquid was detected at **112** (FIG. **25**) and if it was not, the program would advance to the program at **128** to access **170** of the options for the liquid detector control **162** (FIG. **19**) of the configure sequence **150** to find out if it should retry pumping sample before shutting down. If the user entered any retries, and the total amount of retries has not been met, then the program returns to purging the pre-sample at **98** and continuing with the rinse routine **100** (FIG. **25**).

In FIG. **27**, there is shown a flow diagram of the program and run review sequence **221** (FIG. **18**). The program and run review sequence **221** is used to check program setting or sampling routine results. The subsequences included are the pump tubing warning subsequence **225** and the sample information for the last sample routine subsequence **223**.

Each time the pump count maximum for replacing the tubing is exceeded, the pump tubing warning message at **225** is displayed. The threshold for the pump count maximum has been user-defined in the tubing life indicator control **154** at **156** (FIG. **20**) before beginning the pump. If the user does not enter a new threshold, the threshold from the previous sampling process will be used.

After each sample gathering process, certain information is stored in memory for future use at **223**. Included are: (1) if the sample process was performed and no liquid was detected at **227**; (2) the time and date at **229**; and (3) the number of pump counts before liquid was detected at **231** and the amount of time for the entire pump cycle. The number of counts before liquid was detected at **231** is used to calculate the head at **149** (FIG. **26**).

In FIG. **28**, there is shown a block diagram of another embodiment of tubing life indicator circuit **154**A for providing a signal after a predetermined number of strokes of roller against the tube **20** (FIGS. **1**, **3** and **6**) in the peristaltic pump assembly **16** (FIG. **1**), having the cycle signal generator **11**, a counter **241**, a switch **247**, a manually resettable switch **243** and a warning light **253**. The counter **241** is directly connected to the conductor **13** to receive all counts regardless of direction and having an output set at a predetermined number of counts connected to the resettable switch **243** to actuate the switch at the predetermined number of counts and thus energize the warning light to which it is connected.

With this arrangement, the operator may set the counter **241** at a count that indicates the tube **20** (FIGS. **1**, **3** and **6**) should be replaced. When the number of pulses from the cycle signal generator **11** reaches the preset number, the counter **241** supplies a signal to the resettable switch **243** which applies a signal from the source of voltage **255** to the warning light **253**. The resettable switch **243** can be manually reset when the tube is changed and it resets the counter **241** and disconnects the power **255** from the warning light **253**.

To permit a hardware determination of the direction of rotation, the switch **247** receives pulses from the conductor **13** and a direction signal from the cycle signal generator **11** to switch from one of the two output conductors **249** or **251** to the other so that pulses representing the number cycles in each direction can be determined. This function can also be performed in software.

In FIG. **29**, there is shown a functional flow diagram of the program for positioning the distributor arm including the step **452** of getting a request to deposit a sample at a particular location, calibrating the system, or updating the position indication of the distributor arm. With this arrangement, the position of the distributor arm is continually updated to ensure that any movement of the arm between intentional moves is tracked. A full rotation of the distributor arm results in 1200 state changes of the optical interruptors described in FIG. **18**.

To calibrate the distributor arm, the step **454** of calibrating includes the steps **460** of moving to stop past the last bottle, the step **462** of moving to stop past the first bottle and calculating the total arm flexure, the step **464** of obtaining the time to go from bottle five to bottle one of the **24** bottle base as shown in step **464**, the step **466** of getting the time to go from bottle **20** to bottle **24** of the **24** bottle base as shown in step **466**, the step **468** of assigning a portion of the total arm flexure to the bottle one side, and the step **470** of moving to bottle one in the order stated. In this manner, a measure is taken of the air at the stop positions caused by