reject drizzle or a light rain, as desired. Water collected in the detector funnel flows into a flow rate detector element, e.g., a tee connection below which is a flow resistive element. An adjustable water level detector is located above the tee connector. The flow resistive element causes water to rise in the leg containing the level sensor. If flow is very low, the level may never actuate the flow rate detector element and there will be no collection of sample. A flow above a predetermined rate will cause the detector to signal a control circuit. The control circuit causes mechanical actuators to function which remove the cover above the collector surface and rotate the sample distributor thus placing a storage means, e.g., a sample bottle in line with flow from the collector. The time interval between the previous movement of the sample distributor and the just completed movement is measured and recorded by the time measuring and recording means and a new measure of time interval is initiated.

On cessation of precipitation, the water level in the detector recedes until the level sensor is uncovered. This signals the control to proceed with return of the collector cover and movement of the sample distributor to the next position which contains a by-pass line. The sample is sealed as a result of movement to a position which has no connection to the atmosphere. The interval of time between movements is again recorded in the recording means and a new time interval is initiated. Each position on the sample distributor is consecutively numbered and the recording means is incremented with each movement of the sample distributor such that later recall of time intervals can be related to distributor position.

BRIEF DESCRIPTION OF THE DRAWINGS

FIGS. 1A and 1B are exterior views of the precipitation sampler showing the detector collection cylinder, collection funnel, and collector cover movement.

FIG. 2 is a schematic of the precipitation detection system showning the collection funnel, tubing arrangement, pressure switch, and flow restrictive element.

FIG. 3 is a cross-sectional view of the sample-distribution turret.

FIG. 4 is a view of the sample-distribution turret from below which shows the arrangement of eight sample bottles.

FIG. 5 is a cross-sectional schematic sample turret sump.

FIG. 6 is a partially sectioned view of the cover lift mechanism.

FIG. 7 is an overhead view showing the sample collection cover in a closed position over the turret mechanism.

FIG. 8 is an overhead view of the sample collection cover in an open position to allow for precipitation detection and shows turret rotation relative to FIG. 7.

FIG. 9 is a block diagram showing the interrelation between the sensing switches which provide input information to the electronic control unit and the actuating elements of the system which respond to output signals from the controller.

FIG. 10 is a schematic of a pneumatic operating system for controlling the operation of the sample collection system.

FIG. 11 is a schematic view of an air release mechanism in the water flow passage to prevent air locking in the sample collector.

DESCRIPTION OF THE PREFERRED EMBODIMENT

With reference to FIGS. 1A and 1B the automatic precipitation sampler comprises generally an enclosure 1, preferably from a heat reflecting metal, a support structure 2, a precipitation detector 3, a sample collector cover 4 which is automatically rotated at the initiation of precipitation, upon a signal from the detector 3, to expose a sample collection funnel 5, a sample distribution means immediately below the funnel outlet 6, and all necessary controls, actuating mechanism and power sources in the enclosure as required to collect samples of each precipitation event, record the time of sampling, and to seal the collector funnel and sample storage means between precipitation events.

Specifically, with reference to FIGS. 1 and 2, the automatic precipitation sampler is as pictured in FIG. 1A when there is no precipitation. When precipitation begins, water is collected in open cylinder precipitation detector 3 and flows through an extraneous solids removal means, e.g., a fine screen 7, into funnel 8 which passes through the top surface plate 9 of the metal enclosure 1 through fitting 10 into tube 11. Tube 11 drops through loop 12, which traps suspended matter not retained by screen 7, to flow-restrictive element 13. As water continues to flow into loop 12, the level rises to tee connection 14 and spills over to flow-restrictive element 13. The flow restrictive device may be a valve, capillary tube, or other similar device; however, in the preferred embodiment of this invention, a fine filter of relatively large area is used to prevent a few small particles from altering the flow resistance significantly. When water passes tee connection 14, air is trapped in tube 15 leading to pressure switch 16. As the level of water rises in tube 11 as a result of the flow restriction in element 13, water also rises in tube 15 causing the pressure in this tube to increase to a level which causes pressure switch 16 to close sending a signal to the control circuit that a significant amount of precipitation has been detected to initiate action which will uncover sample collection funnel 5 as demonstrated in FIG. 1B. When the level of water rises in tube 11 to the point of connection of overflow tube 17, the excess runs through tube 17 and connection 18 through the bottom plate 19 of the metal enclosure 1 to the ground. Water passing through the flow restrictive element 13 is then discharged to the ground through tube 20 and tubing connector 21. Vent tube 22 is attached to tube 11 a short distance above the overflow connection to ensure that atmospheric pressure exists at all times at the surface of the water in tube 11.

FIG. 3 shows a cross-sectional view of the sample distribution means, e.g., a sample distribution turret. A sample bottle 40′ is shown in the collection position; sample bottle 40 is shown in a sealed position. Starting at the top of the drawing, the outlet 6 of sample collection funnel 5 is attached to a Teflon sleeve 42 which is held by a aluminum block 43 attached to the under side of the top surface plate 9. The cylindrical flow passage 44 in the Teflon sleeve 42 intersects a cylindrical flow passage 45. Teflon insert 47 fits tightly in a movable aluminum cylinder 48, as do eight Teflon cylinders 49 having female threaded ends to accept sample bottles 40. Aluminum disc 51 contains means such as coil springs 90 which compress against the Teflon annular ring 50 to force the movable aluminum cylinder 48 against the conical Teflon insert 46. Disk 51 is attached