WASTEWATER SAMPLER

This invention relates to wastewater sampling apparatus, and more particularly to remote control apparatus for automatically and periodically collecting samples from a stream of wastewater for pollution control purposes.

In an effort to combat or prevent further pollution of our rivers, streams and lakes, various states have passed laws requiring that the effluent of certain industrial plants, for example tanneries, be measured and sampled periodically. The samples are then analyzed; and the results are forwarded to a state authority charged with regulation of industrial wastes, or the like.

As a consequence of increased state regulation in these areas, there has been a growing need for more sophisticated and reliable equipment capable of monitoring industrial effluents, for example by automatically and periodically collecting samples of such effluents for test purposes. Heretofore various systems have been proposed for sampling streams of liquids or gases; but most such devices have been rather crude and highly inaccurate. Moreover, most such prior devices have not been completely automatic, and have required nearly constant maintenance or supervision.

It is an object of this invention to provide improved wastewater sampling apparatus capable of automatically and periodically collecting liquid samples from industrial wastewater or the like.

Another object of this invention is to provide automatic sampling apparatus capable of monitoring and recording the rate of flow of a liquid effluent, and automatically operative to collect liquid samples at intervals related to the flow rate of the effluent.

Another object of this invention is to provide remote control wastewater measuring and sampling apparatus capable of collecting wastewater samples in one location, and recording wastewater flow data at a remote location.

Still a further object of this invention is to provide remote controlled apparatus of the type described which is capable of sampling wastewater automatically at predetermined intervals that are proportionate to the rate of flow of the wastewater.

Other objects of this invention will be apparent hereinafter from the specification and from the recital of the appended claims, particularly when read in conjunction with the accompanying drawings.

In the drawings:

FIG. 1 is a diagrammatic view illustrating schematically remote controlled wastewater sampling apparatus made in accordance with one embodiment of this invention;

FIG. 2 is a front elevational view of a sampler, which forms part of this apparatus;

FIG. 3 is a side elevational view of this sampler; and

FIG. 4 is a schematic wiring diagram illustrating one manner in which the apparatus of this invention may be wired for operation.

Referring now to the drawings by numerals of reference, and first to FIG. 1, 10 denotes a conventional weir, or flume, which is intended to be mounted in known manner at the discharge of the effluent from a factory, or the like, so that the wastewater flows through the flume in the direction indicated by the arrow 11. As a practical matter the discharge point of the effluent, and hence the flume 10, are usually located at a point remote from the associated factory to avoid subjecting its personnel to the odors often associated with such effluent.

Mounted adjacent the flume 10 is a transmitter 13, which forms part of a standard capacitance level measuring instrument of the type sold, for example, under the name Robertshaw Leve-Tel. This instrument includes a probe 14, which extends downwardly into the flume to detect the rate of flow of wastewater therethrough. This rate is converted into an electric signal that is transmitted by the transmitter 13 through a probe receiver control board 16, which is mounted on a control panel 18 located back at the factory or plant remote from flume 10. The characteristic of probe 14 is selected to match the flow function of the flume 10, so that for anticipated changes in the flow rate through the flume (i.e. for changes between predetermined high and low rates) the instrument will develop and transmit a linear signal of anywhere from 4 to 20 milliamps, depending upon the sensed flow rate. The transmitter 13 and its probe receiver control 16 can be mounted up to a mile apart from one another; and calibration of the complete instrument, as represented for example by the probe 14, transmitter 13 and receiver control 16, is accomplished in known manner by adjusting the fine and course zero and range adjusting elements (not illustrated) located at the receiver control 16.

Also mounted on the panel 18 remote from flume 10 to be responsive, as hereinafter described, to the signal output of the transmitter 13 is a flow rate recorder 20. This instrument permanently records on a paper chart or the like, the rate of flow of the wastewater through the flume 10 in gallons per minute. As described in greater detail hereinafter, the drive for the paper chart in this recorder is powered from an alternating current power source of, for example, 115 volts. This source also energizes a meter 21 which records the overall operating time of the apparatus in, for example, hours. The output of the transmitter 13 is also applied to an instantaneous flow indicator 22, which may be a milliameter calibrated to indicate at any instant the rate of flow of wastewater through the flume 10 in gallons per minute.

Also connected at the panel 18 to the output of the transmitter 13 is a integrator unit 24, the output of which is connected to a seven digit totalizer 25, which records in gallons the quantity of wastewater that passes through the flume 10 in a given period of time, and to a sampler control unit 26, which under certain conditions, described hereinafter, develops an output or enabling signal for an electrically operated sampler unit 28 that is located adjacent the flume 10 remote from panel 18.

Referring now to FIGS. 2 and 3, the sampler 28 comprises a housing 30 having on its upper end a pair of spaced brackets 31 for hanging or otherwise supporting the housing adjacent the flume 10. Mounted in housing 30 is a pump 32 having an inlet that is connected by a hose or pipe 33 with a tubular fitting 34, which projects from the front of the housing. Fitting 34 is connected by a further hose 35 with the wastewater that flows through the flume 10. The output of the pump 32 is connected by a hose 36 to a conventional, solenoid-operated valve 37, which is mounted in housing 30 adjacent the pump 32. Valve 37 has a first outlet con-