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PITOMETER SURVEY OF WATER MAINS.

The means of rapidly determining water losses by mechanical means will be greatly appreciated by waterworks engineers and others having occasion to give serious thought to the subject.

There has of late been brought to a very satisfactory state of perfection an instrument known as the pitotmeter, which is designed to indicate water waste and main losses. A great advance over other methods of water waste investigation has been brought about in this instrument, inasmuch as the main does not have to be cut. This instrument is primarily a rate meter, depending on the velocity of the water in the main. Two brass tubes bent at their lower ends with carefully formed orifices of $\frac{1}{8}$ -inch internal diameter are held in a suitable cap which screws upon a standard 1-inch corporation cock through which the tube may be readily introduced into any main and as easily withdrawn. Heavy cloth-insertion rubber tubing connects the orifice tubes with a long glass manometer or U-tube, and blow-off cocks are provided to remove the air from the instrument.

The Pitometer Company, 220 Broadway, New York, recently made a pitotmeter survey of certain sections of Toronto, and their report was made to the city a few weeks ago. Mr. E. A. Howland was in charge of the survey for the Pitometer Company.

A district about six blocks square (larger on matters according to the consumption) was taken and all the boundary valves closed except one. A photo recording pitometer was placed on this main and the flow gauged for forty-eight hours. If the district was residential and showed a high night rate between the hours of twelve and five, it was subdivided between those hours to find the cause.

The U-tube was filled with a mixture of carbon-tetrachloride and benzine having a specific gravity of 1.25 and when in use the water from the pipes filled the remaining space in the U-tube.

This was done by closing the inside valves supplying the various streets, and noting the drop in flow as the valves were closed.

If a street was found to have an abnormal flow, the curb cocks were closed, and if a house had any waste the amount would at once be shown by the fall of liquid in the manometer. The curb cocks were sounded with an aquaphone, before being closed, and if leakage was detected, again after. If the flow stopped on closing the curb cock, the leakage was evidently on the house side of the curb cocks. After all the curb cocks had been shut off the valve on the main supplying this street would be closed, if a drop in flow was then noted, it would be caused by leakage on the main or services up to the curb cocks. This could then be located by means of the aqua-phone and connections.

The orifices are set to receive the maximum velocity within the main, which is usually near the centre, and is indicated by the deflection in the manometer.

This deflection, by virtue of the differential action of the water and the slightly heavier and insoluble liquid, is just four times that due to the actual difference of water head on the orifices produced by the flowing stream.

The current impinges directly on one orifice, but the other is turned directly down stream and gives something less than the static head within the main, thus increasing the difference of pressure produced. This difference is then multiplied in the U-tube, the result being that a low velocity within the pipe produces a readable deflection.

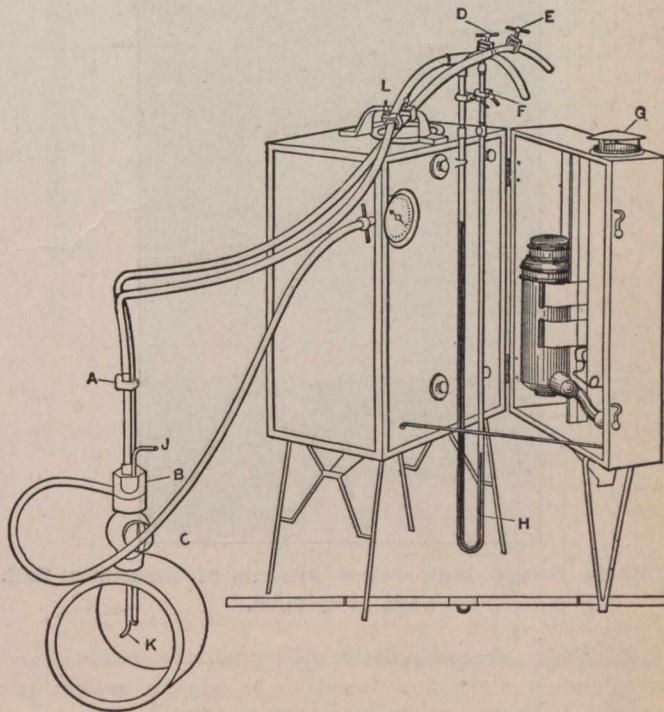


Photo Recording Pitometer.

The photo recorder consists of a portable box in which a drum carrying sensitized paper revolves before a fine vertical slit just in front of which is locked one leg of the U-tube, in such a position that the rays of light from a lamp will be partly interrupted on their way through the colored liquid in the lower half of the U-tube. As the liquid rises and falls with the velocity in the pipes it will record a line or band of shade on the velox paper whose ordinates vary according to the well known formulae $\sqrt{v} = c \sqrt{2gh}$ in which h is $\frac{1}{4}$ of the U-tube deflection in feet or half of the recorded ordinates on the paper, $C=0.84$ the calibration coefficient of orifices. A prism attachment records the full deflection at low velocities.

Autographic horizontal lines are formed by notches in the drum split, spaced so as to correct for the angularity of the light and enable the true deflection to be readily taken from the diagram at any point.