

The reason for this attitude is this: Every student of human nature knows that if a water department is reputed to be lenient, the average person takes a chance and depends upon his ability as a bluffer to get out of paying the bill. Talk is cheaper than plumbing bills. If he is victorious because "he has been unfortunate and won't let it happen again," he surely will. In the old days of leniency it was found that the average consumer did do it again.

Complaint Department

But it is impossible to handle this matter properly without an efficient complaint department, for it is then impossible for the department to prove its case. Every waterworks man who has had to deal with consumers under the meter system is aware of the number of excuses and prevarications that are evolved in order to make the management believe that there was a mistake made in the reading, that there are no leaks, that the fixtures have been repaired recently, that the meter works when no water passes through it, that the meter reader is in collusion with the "bunch of grafters in the office" and reads the meter from the next block, and so on.

Oak Park, however, is prepared to prove to all these amateur lawyers that they have no case in court. There is a record of all complaints of whatever nature that have been made to the water department and about the water department for the past five years. These are arranged by years in 3- by 5-inch card files, and are the original records. All calls are recorded on the same size cards, three colors being used to distinguish between complaints relating to meters and bills, complaints and job orders relating to the mechanical division, and those relating to delinquent bills. This record is very valuable in refuting unjust accusations, in tracing past records, and for the purpose of settling especially difficult problems.

All complaints concerning high bills are investigated and a comprehensive written report is made to the consumer. The nature of the complaint is written on the card provided for that purpose and is given to an inspector who makes a specialty of investigating high bills. It has been found impracticable for the meter reader to waste time making investigations. He notes all unusual sounds or evident leakage on the reading slip and a special call is made. Sometimes a consumer is dissatisfied even after a second investigation, and he is allowed to hold the payment of the bill until the next quarterly statement, when he will see for himself the result of stopping small leaks. If, however, a rebate is yet expected or sought, a final notice of "shut off for non-payment" is issued and the water is shut off in spite of threats of litigation.

For the purpose of determining the cause of persistent high bills, where "there are only two in the family, no leaks, and there is no sprinkling done; while the family next door has three or four children, does its own washing, sprinkles the lawn all day, and has only minimum bills," the department has evolved a recording detector which is substituted for the meter and which gives a graphic record of the consumption for 24 hours or a week. It is thus possible to spot the number of times the faucets are opened, the number of baths with the quantity used each time, and the number of times the toilets are used. It has thus been possible on many occasions to show that the toilet would not work about every fifth time it was operated, and that the lady of the house was apparently too clean, having the habit of letting the water run in the kitchen sink too long each day or that somebody took a cold bath every morning and consumed about 50 gallons each day in the operation, or that a thermostat used by a central heating plant leaked at some time dur-

ing the day, or that the toilet was used too often to wash down foreign substances that did not belong there, or finally that the servant was very wasteful.

The complaints on account of high bills dropped in number from 2,000 in 1913, to 600 in 1917, due to the education of the consumers who, realizing that the department means business, is strictly impartial and is able to help them reduce their water bills, have begun to cooperate with the department.

Recording Pressure Gauges and Master Meter

The third item in the efficient elimination of waste is the installation of recording pressure gauges and a master meter directly on the distribution system. The combination of the two devices is a great aid in estimating the rate of consumption during the night, which is due to leakage alone, in noting the progress each day in the stoppage of leaks, and in determining the necessity for making a special waste survey. The efficiency of the pumping station attendants as well as that of the pumps can be determined at a glance. Many plants are equipped with Venturi meters or pitometer recorders placed on the main leading to filter beds, or to reservoirs or standpipes. The character of the consumption cannot be accurately determined by meters so placed that the fluctuations cannot be seen.

Periodical Waste Surveys

The waste survey is one of the most important elements in the prevention of continued needless waste on a metered water system.

In order to shorten the work of making waste surveys and avoid unnecessary work, it is advisable to make first a rough survey of the entire city with a pitometer, which is done by isolating certain districts and measuring all the water consumed through one of the mains as a feeder. Here is where the master meter on the distribution system comes into use. The Oak Park department often shuts down large districts for a few minutes and notes the drop on the Venturi chart. It is impossible to do this at night because the quantity is only 400 gallons per minute between the hours of 1 and 4 a.m. In fact, the smallest pump is so throttled in order to maintain the assumed pressure of 40 lb. that the opening left is equal in area to that of a 2-inch pipe. The Venturi meter is not sensitive enough at that low velocity; but it is possible to accomplish nearly the same result in the day time during periods of steady consumption when there is a draft of 2,000 or 3,000 gallons per minute. In this case the drop has been found sufficient to allow the making of an analysis of the leakage conditions. The pitometer is the surest way, however, for it is possible with it to obtain accurate information and so eliminate the "good districts."

After the pitometer survey, especially when the leakage is so small that there is little velocity in the mains, the "hydrant and hose method" follows logically. It is practically useless to expect any headway if a displacement meter is used, as the rate of consumption and the minimum flow cannot be accurately determined. The Oak Park department uses a 2-inch Venturi meter, but a pitometer inserted into a short piece of pipe 2 inches or smaller in size is as good. A manometer and as much condemned fire hose as can be obtained from the fire department, completes the outfit.

During the summer of 1917 the department tested 18 miles of mains, and stopped leakage amounting to 220,000 gallons per day. This represents a saving in the cost of water purchased from the City of Chicago, of \$5,000 and the outfit used cost only \$150, exclusive of the hose. It also accomplished the reduction of the night

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