vincial Board of Health exists for their benefit, and if duly and properly consulted can give good and sound advice. It does not exist, however, for the purpose of bolstering up any fad, or providing a pull on behalf of any company or patent vendors. Dr. Sheard (the chairman) is not handling his own funds, and is, therefore, not likely to advise or agree with experimental work carried out with other people's money, and when he, through his Board, gives advice, it is natural that he insists that such advice is based on known and proven data. We cannot expect him to form opinions and to advise his Board to come to any conclusion on this Lindsay plant until these requisite data are before him.

The value of a central health authority to Ontario is great in checking what may be useless expenditure and insisting upon efficiency; but that value depends, in its practical application, upon the confidence and willingness of local authorities to act in unison with that central authority, and not attempt either through ignorance or carelessness to ignore the authority as Lindsay has evidently done in this case.

[Proofs of the above article were submitted to the chairman of the Provincial Board of Health, who stated that this article fairly and accurately represents the facts of the case, and suggested no alterations to the original proof.—Ed. San. Rev.]

MECHANICAL FILTERS.

So many enquiries have of late been sent in relative to mechanical filtration as applied to water supplies that we consider a few remarks embracing such enquiries will best meet the occasion.

Mechanical filtration of water is not a perfect process, neither is slow sand filtration, and up to the present all methods of sterilization in practice also show certain degrees of imperfection. There are many who are content to judge of an apparatus or process entirely from its inefficiency standpoint without giving due consideration to its efficiency, and comparing reasonably the degree of efficiency of any particular process with others. We find such people in everyday life taking this standpoint relative to ordinary things. For instance, the man who could easily afford a motor car, and who would enjoy the use of one, is content to do without, because he thinks that the motor car may yet arrive at a greater degree of perfection. As absolute perfection, in human contrivances, is unobtainable; such a man goes through life without ever enjoying the leading products of his age.

How often we find the statement made: "Filtration of water is all very well if properly attended to, but it requires care and nursing in order to obtain satisfactory results." Is there any machine or mechanical structure which will give its maximum efficiency if not properly attended to? Why judge of the efficiency of a machine when it is the efficiency of attention which is at fault?

Slow sand filtration in the past has not been the success in America which it has in the countries of Europe. This is not the fault of slow sand filtration; it is entirely the fault of those in charge of the works. Mechanical filtration may be said to be more purely American in its use. It was first used in connection with paper mills to remove the larger particles of matter from the great quantities of water used. At first these filters were simply constructed of wood in the form of cylinders filled with sand and gravel, filtering at the rate of from one to two million gallons per acre per day. Great improvements, however, have been made in their construction; and, with additional precipitation, by aid of coagulants, they have been operated for municipal supplies with most satisfactory results. The 1908 annual report for the city of Harrisburg, Pa., shows efficiencies of 99.62 per cent. for bacterial removal, this being the average for the whole year. The above result is not unusual, as the writer is acquainted with a number of plants giving average

efficiencies of 99.5 per cent. and 99.75 per cent. It is the custom, however, and we ourselves must confess to be guilty, of referring more generally to plants which by no means attain such high efficiencies. Criticism, as a rule, is directed at defects, but in dealing with the question generally, it is fair to point our really what can be done, and is done, with proper attention. In all cases of failure the cause can generally be detected, and is invariably found to exist apart from any inherent defect in the filter. Causes of failure are frequently found in inattention to cleaning, improper use of coagulant, the omitting of any coagulant when such is necessary, too great a rate of filtration for the filter capacity, etc.

The Imperial Board of Health of Germany in 1894 drew up articles relative to filtration of surface water for the direction of public supplies. Two of these articles are as follows :---

(a) "The operation of a filter is to be regarded as satisfactory when the filtrate contains the smallest possible number of bacteria, not exceeding the number which practical experience has shown to be attainable with good filtration at the works in question. In those cases where there are no previous records showing the possibilities of the works and the influence of the local conditions, especially the character of the raw water, and until such information



SECTIONAL VIEW OF FILTERS, STYLE "L"

is obtained, it is to be taken as the rule that a satisfactory filtration will never yield an effluent with more than about 100 bacteria per cubic centimeter.

(b) "The filtrate must be clear as possible, and, in regard to color, taste, temperature, and chemical composition, must be no worse than the raw water."

From the above we see that more importance is given to biological purity than to chemical. The German biological standard has been greatly accepted, and makers of mechanical filters undertake to give a guarantee to meet this standard. There is no difficulty whatever, with care and attention in producing an effluent of a higher degree of purity than this standard, as we shall shortly see. It is necessary to reduce bacterial removals to percentage figures in order to compare processes and gage individual efficiencies. It must be noted that percentage removals, no matter how high, are no criterion of the purity of a drinking water, as such percentages may apply to water containing enormous numbers of micro-organisms, and a 99.9 per cent. removal may still leave a number of bacteria far above the standard limit for drinking waters. The percentage removal is an absolute test of the work done by the