

less organic matter. For the present base the estimate on 15 pounds per million gallons, or 50 tons per annum, at \$25 per ton, costing \$1,250. The cost of applying would be represented by the salaries of four men and something extra for supervision, say \$3,500 per annum. The total cost would probably be something like \$5,000 per annum. In order to carry out this treatment all the water should be brought to the pumping station through one pipe. There is now one 40-inch pipe supplying water and a new 42-inch pipe is being built. It was the intention to give these two pipes separate connections with the pumping station. This arrangement would not lend itself conveniently to the hypochlorite treatment. In order to carry out that treatment advantageously both of these pipes should be connected to a new 60-inch pipe at a little distance from the pumping station, say at a distance of two or three hundred feet, where the two pipes could be brought together and the single large pipe carried to the pumping station. I would put a Venturi meter on this pipe, so that the amount of water being pumped could at all times be known with certainty. The hypochlorite of lime could be dissolved and controlled in a space in the attic over the present pumping station which is adapted to this use. The solution would be carried to the beginning of the 60-inch pipe and would become mixed with the water by the flow through it, and by the flow through the throat of the Venturi meter, so that the water taken to each pump would have its fair share of the substance. Passing through the pumps of course, would effect a very thorough mixing. The hypochlorite treatment on present evidence is equal in its effect to the ozone treatment in every respect, and is both surer and cheaper. It would not reduce the color of the Ottawa river water appreciably, nor would it remove any turbidity and sediment in it. Its object would be to remove as many as possible of the bacteria resulting from the sewage pollution of the river. A considerable bacterial purification could be secured in this way. The process is worth installing at once and continuing in use until permanent purification works or a new supply is installed, and I recommend that this be done."

### IS A RATIONAL BASIS POSSIBLE FOR TELEPHONE RATES?

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The question of fair telephone rates is a very complex one. It is much more complex than the question of fair rates for gas or for tramway service. A gas company has a particular commodity to sell—associated with the disposal of some by-products, to be sure—but the main object is to sell one particular commodity. A telephone company, on the other hand, must sell service, which is more difficult to accomplish satisfactorily than the sale of commodities, perhaps for psychological reasons. On account of the wide range of service that telephone companies must supply, it seems necessary to group their customers and organize the groupings on the grounds of the use likely to be made of the service. This grouping of telephone subscribers as residence subscribers, business subscribers, private branch exchange subscribers, special line subscribers, party line subscribers, etc., etc., has become substantially universal. I will here give my own answer to the query that is found in the title of this paper. A rational basis of rates is pos-

sible, and it primarily consists in arranging the groups of subscribers so that no group fails to bring the revenue necessary to operate its service, and so that the subscribers are so fairly associated in the groups that in none are a considerable proportion of the subscribers not self-sustaining. Both of these requisites are commonly neglected in the rates maintained by telephone companies.

The rates charged for telephone service in all the important American cities have grown up in accordance with expediency, and as the result of the judgment and experience of the telephone officials, and it is, therefore, not astonishing that the telephone companies have become accustomed to assert that rational methods of analysis cannot be applied to test the reasonableness of such rates. Ready means of inter-communication are now so essential a part of business and social life that it is equally natural for subscribers to view askance the efforts at telephone rate-making, which depend only on expediency or on the judgment of certain officials. Skepticism of the fairness of telephone rates fixed in that manner has led to investigations in a number of the more important American cities and states, and has produced reports like those made by the Merchants' Association of New York, in 1905, the Special Telephone Commission of Chicago, in 1907, the Board of Trade of New Orleans, in 1908, the Travellers' and Merchants' Association of Baltimore, in 1910, and the recent studies of the Commissions of the city of Los Angeles, and of the States of Massachusetts and Wisconsin.

The activity thus stirred up seems to give promise of the general adoption of a more rational basis of charges for service. It is undeniable that the judgment displayed by telephone officials has built up their business marvelously, and has made the telephone a necessary tool of commercial and social intercourse; but the very importance thereby given to the telephone service makes indefensible any opposition to legitimate efforts to get rates on a more rational basis. Guiding principles in so complex a subject can be evolved only as the result of thorough-going statistical study of the problem.

The startling complexity of the telephone rate problem is illustrated by the introductory statement of the Commission of Engineers, who in 1907, made a comprehensive report of the telephone situation in Chicago. I will quote three paragraphs from that report:

"A telephone company in a large city must face a problem in many respects more complex than that of any other public utility corporation. The water department is called upon to sell a single commodity, namely; water, and at prices which are fixed with comparative readiness. The gas company, also is called upon to sell a single commodity, metered for nearly every customer, and its conditions in dealing with customers are relatively simple. It may sell some additional by-products, as coke, tar and ammonia, but the quantities and market values of these are readily arrived at. The traction company has a more complex problem than some of the other purveyors of public utilities, but even here the price paid by the several patrons is uniform, and the substantial difference between patrons lies only in the lengths of the rides which they may choose to take.

"The telephone problem, on the contrary, involves many complexities, partially caused by the relatively large number of classes of service which the telephone company must offer to its patrons for the purpose of fully developing the telephone service of the city, and partially by the intangible character of the electric medium with which the telephone

\*Paper presented before the National Municipal League at Buffalo, N.Y., Nov. 15, 1910.