

- 4794 Corti, J. J., Cornell Univ.
 4795 Eastwood, S. K., Cornell Univ.
 4796 Lockwood, A. E., Cornell Univ.
 4797 Ruckgaber, O. E., Cornell Univ.
 4798 Shepard, E. M., Jr., Cornell Univ.
 4799 Wetzell, C. H., Cornell Univ.
 4800 Semple, J. C., Wash. State Coll.
 4801 McElroy, R. B., Wash. State Coll.
 4803 Du Vall, C. C., Wash. State Coll.
 4804 Barnes, S., Washington Univ.
 4805 Lassaff, B., Ohio Northern Univ.
 4806 Steele, H. S., Bucknell Univ.
 4807 Bressler, J. W., Bucknell Univ.
 4808 Shaffer, H. A., Bucknell Univ.
 4809 Fairchild, E. E., Bucknell Univ.
 4810 Stetler, A. M., Bucknell Univ.
 4811 Hooker, C. B., Bucknell Univ.
 4812 Richards, E. M., Bucknell Univ.
 4813 Brewster, W. E., Univ. of Minn.
 4814 Wilcox, L. W., Univ. of Minn.
 4815 Purves, L. E., Univ. of Minn.
 4816 Hitchcock, H. W., Cornell Univ.
 4817 Phillips, C. E., Bucknell Univ.
 4818 Bliem, H. M., Lafayette College.
 4819 Hamilton, R. F., Colorado College.
 4820 Love, N. R., Colorado College.
 4821 Bruhn, H., Ohio Northern Univ.
 4822 Livingston, J. K., Univ. of Wisc.
 4823 Kempf, F. J., Purdue University.
 4825 Freygang, W. H., Stevens Inst. Tech.
 4826 Coddling, H. W., Mass. Inst. Tech.
 4827 Morgan, F., Univ. of Michigan.
 4828 Rooke, R. L., Bucknell Univ.
 4829 Hoot, D. W., Iowa State College.
 4830 Wahaven, J. W., Iowa State Coll.
 4831 Mott, C. H., Iowa State College.
 4832 Martin, E. E., Iowa State College.
 4833 Summers, W. G., Iowa State Coll.
 4834 Kilby, D. H., Iowa State College.
 4835 Walton, J. N., Iowa State College.
 4836 House, W. M., Iowa State Coll.
 4837 Elder, P. M., Armour Inst. Tech.
 4838 Sells, H. J., Ohio Northern Univ.
 4839 Braunig, H. E., Tex. A. & M. Coll.

Total, 110.

Recommended for Transfer

The following Associates were recommended for transfer to the grade of Member by the Board of Examiners at its regular monthly meeting held on December 5, 1911. Any objection to

the transfer of these Associates should be filed at once with the Secretary:

ALBERT M. ALLEN, Consulting Engineer
Cleveland, Ohio.

CHARLES W. PENDALL, Engineer, Contract Department, North Shore Electric Company, Chicago, Ill.

ARTHUR L. MUDGE, Electrical Engineer in Charge of Construction, Smith, Kerry and Chace, Toronto, Ont.

WILLIAM C. BAUER, Head of Electrical Engineering Department, Northwestern University, Evanston, Ill.

WALTER E. HOLLAND, Chief Electrical Engineer, Edison Storage Battery Company, Orange, N. J.

SAMUEL INSULL, President, Commonwealth Edison Company, Chicago, Ill.

Public Control of Public Utilities*

BY PROFESSOR GEORGE A. DAMON

For the last three years I have been connected more or less with the movement of public control of public utilities; for two years in New York, our firm being consulting engineers for the Public Service Commission of the First District; for eight months in Pittsburgh, studying the transportation problems there, and since last January I have been here, almost constantly connected with the question of the control of public utilities. I am often asked where the movement started; and where it is going to end. There is no question about its having been started. The people here a few years ago found out that they had a right to control—they were a long time in finding it out—and there is no question about their right to control. I have heard it stated that the state has a right to everything; to your property and to my property if it is necessary for the good of the state. But it has not the right to take your property without compensation, and in exercising

*Abstract of an address by Professor George A. Damon, of Throop Polytechnic Institute, Pasadena, at a meeting of the Los Angeles Section of the A. I. E. E., held on October 17, 1911.

this right of public control we are still very young and have a great deal to learn. My idea as to how it will develop is this; first, it is to be public control; then it is to be public partnership; and then it is to be public ownership, but not necessarily public operation. Let me give you some of the reasons for this belief. Public control, of which we know so little at the present time, and which as yet is not exercised at all in a scientific manner, especially in this state, must rest fundamentally upon the following propositions: First, it should secure for the people adequate service. Now note, I do not put the regulation of rates first. To the popular mind right of control means the regulation of rates, and the regulation of rates downward. I believe in the regulation of rates and I believe in the regulation of rates downward. It is the natural tendency and we should work for it. It is the thing the engineers of this country are going to bring about, but it is not the first essential. It is the very last one. Public control, to my mind, means securing to the people adequate service. We need better service; we need better street car service; better light service; better telephone service. There is no public utility that is adequate. So the first essential of public control is a technical problem of how to secure adequate service. The second fundamental is to protect the investment. There has been a great deal of money invested in these public utilities; there has been a great deal of time and energy put in them; we cannot confiscate that investment; that time, ability and energy; it should be rewarded with something more than simple interest rates such as we can get on a farm mortgage. We must find some way, then, to protect the investment. There must be a fair return on a fair investment. Now that is another technical question that the technical man must solve, and we must have the opportunity to solve it; it must be given to us to solve. What is the investment and how are we going

to determine what it is? That involves all of the problems of appraisal and valuation; and question of determining depreciation; the question of return, and what a fair return is upon a fair investment. These are all technical problems. The third essential fundamental to my mind is to provide some adequate form of renewal. If our service is to be adequate; if our investment is to be protected, we must have some automatic form for keeping the plant up to date and up to the highest efficiency, so we must study the question of depreciation and the requirements of the renewal fund; that is the third essential. The fourth is the question of improvements and extensions. Some people have the idea that a public utility becomes finished after the investment is made, and that that is all there is to it. Even the bonding people begin to retire their bonds after a certain date as if they could go about so far and then get out of the business. Take the question of transportation. It is a utility that calls, as all other utilities do, for a constant source of new capital; we must be constantly extending the system. From my study of the transportation systems of the entire country I found this to be true; that the riding habit increases as the square of the population; that means that when the population doubles, the income per capita doubles, and if the income per capita doubles and the population doubles, your total income goes up four times; in other words, when the population doubles, you count upon the total income increasing four times. Now every dollar of increased earnings in transportation means about four dollars additional investment. Take it right in this town. Today the local railways are taking in at about the rate of five million dollars a year. By the time the population of Los Angeles doubles inside of the present city limits the local transportation system may be taking in, if the increase is in the same proportion as the other cities of the United States, twenty million

dollars a year, and our investment that we must follow that up with will increase four times. So that the fourth essential is an unlimited supply of new capital for improvements and extensions. Now we cannot get that unlimited supply of capital at reasonable rates unless we protect the present investment. If you attack the present investment and scare away capital, how are you going to make the extensions and provide for your credit? The answer is to so thoroughly protect the investment that instead of going to the brokers in Wall Street and giving them discounts to secure us money—possibly selling bonds at eighty or ninety and paying five per cent interest, we have such protected investment that we will tap the till at four or five per cent. There is an unlimited supply of money that is available for investment, without security, at four or five per cent if it can be placed in a protected investment. The next essential that I shall touch upon is very seldom spoken of, and that is the requirement to advertise part of the investment. We recognize in making appraisals that there is something more than the physical value or the cost to produce the plant; we recognize what we are pleased to term development expenses; some people call them "intangible values" They consist, for instance, of the discounts on the securities that have been passed out; of the profits of promotion, because these promoters should have some profits; of the cost of consolidation, because it costs money to get together the several systems that go to make us a complete public utility; they consist of, perhaps, a few engineering mistakes in the past that are almost unavoidable in the developing of the property, and of a number of investments that do not show upon the surface but possibly may amount to all the way from twenty to thirty per cent of the cost of producing the plant but because they are "intangible", because you cannot see them, because you have to theorize about them, it would

be better if the capital represented by those developing expenses is wiped out. So I maintain that out of the first real earnings of the plant money should be taken to retire the investment in those development or intangible values, and there should be a fund created for that purpose. This is a point that is very often overlooked.

The next essential is to eliminate competition. We thought that the proper method of regulating public utilities was by means of competition, and if we had a telephone company that was not giving us good service we gave a franchise to another telephone company and sought to regulate the question that way; or in the case of a lighting company that did not give us good service we gave perhaps another franchise to a hostile plant. Well, what is the result? We have a duplicate investment; two dollars doing what only one dollar should do; a duplicate management; we have inefficiency all the way down the line. The competition cuts the rates and neither company can give us good service, and I think we are prepared to say that competition is not the answer. So that one of the essentials of the future development of public utilities is to eliminate competition. Public utility work is a natural monopoly; it should be encouraged as a monopoly, but a regulated monopoly, a protected monopoly, though still a monopoly. If we allowed this monopoly under established rights to regulate, how are we going to control it? Fix the rates so that they are sufficient to take care of these fundamentals that I have mentioned. Make the rates high enough to refuse to reduce them until such time that the income will take care of these fundamental essentials; until we have a depreciation fund to take care of our renewals; until we can be sure that we can take care of our expenses; until we can pay a proper return on the investment; until we have money in the surplus fund to advertise some of the capital, and then let us retire some of it. There should be a

surplus fund created with every public utility, but that surplus fund should not belong to the company. To my mind here is where scientific regulation can do its best work. Let the control of the fund be in the hands of the technical men who understand business and what can he do? Why, he has a fund then that he can do anything with. If he wishes to renew some part of the property or replace some inefficient part with something that is more efficient so as to cut down the cost of operation, this fund will be available for that purpose. If he wishes to extend some of the plant into parts of the city where it will be a non-paying road for a little time and yet build up that section, that fund is there for that purpose. If he wishes to advertise some of the capital so that the fixed charges will be reduced, that fund will be there for that purpose. It will give a stability to the whole proposition that will guarantee a return on the investment, and capital will be glad to come in and furnish the necessary money. Finally, when the fund gets sufficient to do all these things, and more, then is the time to cut your rates. Hence the reduction of the rates is the last thing. While the whole program tends towards the regulation of the rates it does not put the regulation of rates downward as the first essential. Now how are we going to work to bring that about? Why, don't you see, if we get control of this surplus fund of these corporations and we take the corporations in hand and make them stable by insuring a return on their investment and protecting that, that we are thus in partnership with the utility company at once? That is public partnership. This is not a theory, it has been worked out in actual practice. We have practically this same arrangement in Chicago. In working out the transportation problem there, a contract ordinance was entered into between all of the railway companies and the city in which all of the railway companies were combined so as to have

one system or monopoly. The companies were given five per cent return on their actual investment and the investment was protected. The Chicago railroad companies can get all the money they want at five per cent, an unlimited supply, on the primary security of the company. The fund was then divided fifty five per cent to the city and forty-five per cent to the company, and the company was required by ordinance to maintain the property and have a sufficient renewal fund; and in making the arrangement these intangible values were given a certain value, and a great many of them were advertised at that time. Today the City of Chicago and the railway companies are in partnership, and the City of Chicago takes fifty-five per cent of the net and they put that fund in a bank. That fund has not been touched and it is available today to either build subways with, to extend the service into non-paying districts, to reduce the fare if they wish to, or to buy out the company. So public partnership will actually end in public ownership; because after we have learned the business and have treated the man who has taught us the business right because of our having been in partnership with him, we will finally say to Mr. Public Utility Man, and particularly the promoter and the capitalist, "Now don't you think you would like to take your money out of this enterprise and go into some other business where there is a possibility of making more money, and let us run this thing on a five per cent basis?"

But I want to tell you there is a danger. Every operator of every utility recognizes that today. He will say, what is going to become of me? I don't want to work for the public; I don't want to work for the city; I don't want to work for the government; I don't want to play politics to keep my job; what is to become of me? I am going to get out of the business if it is to come to that. And to my mind if it does end in public ownership and

operation of these utilities there will be that danger, and I see only one way of overcoming it, and that is after we get public ownership we eliminate public operation and turn over the operation of these utilities to operating companies organized on very similar lines to the operating companies of our present utilities, which will be without any necessity of raising capital or without any necessity of financing, or getting franchises, or manipulating, or going into politics. I have talked this thing over with some pretty big utility men in this country and I think I can see the day when there will be some such operating companies, known by the name of the man at the head of them, composed of prominent financiers with an organization working on a bonus proposition. We worked out a proposition of this kind on the New York subways, and it worked out all right. It has been looked into by some prominent operating men who quite agree upon its feasibility.

Those are the technical problems that you have to face, and I do not see how you are going to get away from it. If you do not work for some public service company, you at least use the service.

How are we going to deal with the question out here? The first move we have to make is to be found right in politics. Last week we voted to extend the duties of a State Railroad Commission so that it would have the power of regulation of most of the public utilities in this state. The Railway Commission of Wisconsin to my mind is an ideal one. Although, as I say, I was with the Public Service Commission of New York for two years I still regard the Wisconsin Commission as the premier organization. Why? Because they organized at once and turned over all of their technical problems to an engineering organization. They went to the state university and turned over the engineering department of that Wisconsin Commission to the professors of that university,

who at once organized for the purpose. The commission then began to work up a fabric of decisions, every one of which was based upon reports of these engineers. Four volumes are now in print, and it will be instructive to notice how the commission took the little cases first and gradually built up the splendid fabric of decisions which they now have. The result is that in the State of Wisconsin the public utility business is in a state of absolute balance. It is protected, and as I understand it in no single court case has the decision of the commission been questioned.

California has that opportunity. Whether we have a state commission that will be wise enough to organize in that way I don't know, but they have this Wisconsin precedent before them for their guidance. Personally I should be glad to see them take as their technical assistants the professors and technical organization of our state university. I should be glad to see the state commission so efficient in its work, so careful in its judgment and so commanding the confidence of every citizen that Los Angeles itself would feel impelled to turn over its problems of regulation to a commission which would be entirely free from any local political influence.

Annual Tables of Constants and Numerical Data

The first volume of the *Annual Tables of Constants and Numerical Data, Chemical, Physical and Technological*, compiled and published by an International Commission appointed by the Seventh International Congress of Applied Chemistry (see *Science*, August 4, 1911, p. 158) is now open to subscription. Subscription blanks, the terms of subscription and descriptive leaflets may be obtained from any one of the three American commissioners: Dr. G. N. Lewis, The Massachusetts Institute of Technology, Boston, Mass., Professor G. F. Hull, Dartmouth College, Hanover, N. H., and Professor