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U. S. DEPARTMENT OF AGRICULTURE.
PUBLIC ROAD INQUIRIES—BULLETIN NO. 21.
MARTIN DODGE, Director.

PROCEEDINGS

OF THE

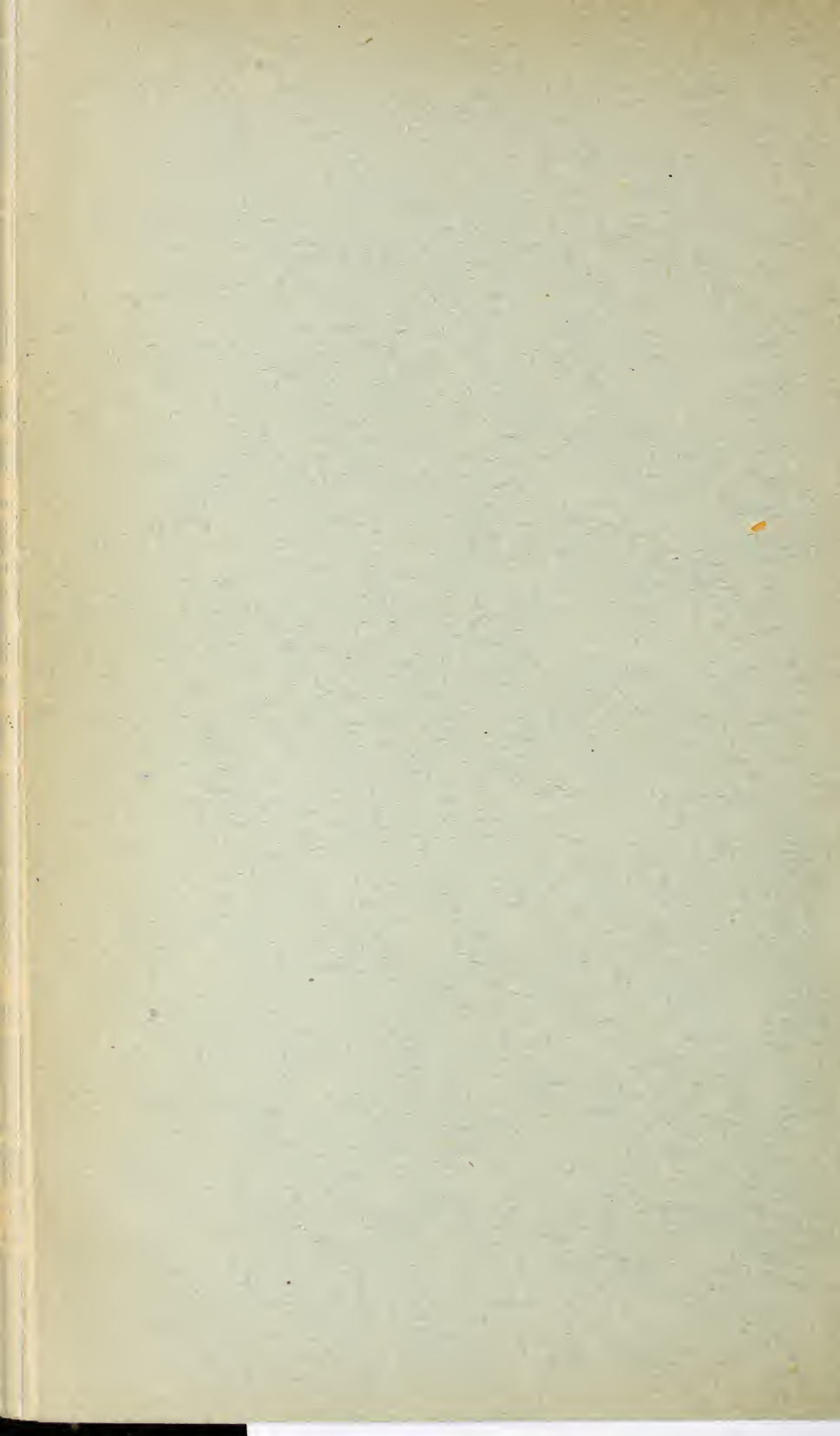
INTERNATIONAL GOOD ROADS CONGRESS,

HELD AT

BUFFALO, N. Y., SEPTEMBER 16 TO 21, 1901.



WASHINGTON:
GOVERNMENT PRINTING OFFICE.
1901.



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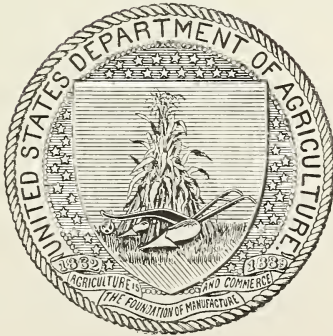
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LETTER OF TRANSMITTAL.

U. S. DEPARTMENT OF AGRICULTURE,
OFFICE OF PUBLIC ROAD INQUIRIES,
Washington, D. C., November 1, 1901.

SIR: I have the honor to transmit herewith a report, condensed from our stenographer's notes, of a portion of the proceedings of the International Good Roads Congress, held in Buffalo, N. Y., September 16 to 21, 1901. This report contains much valuable information relating to the actual progress of road construction in this and other countries, and I would respectfully recommend that the same be published as a bulletin of this office.

Very respectfully,

MARTIN DODGE,
Director.

Hon. JAMES WILSON,
Secretary of Agriculture.

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PROCEEDINGS OF THE INTERNATIONAL GOOD ROADS CONGRESS,
HELD AT BUFFALO, N. Y., SEPTEMBER 16 TO 21, 1901.

MONDAY, SEPTEMBER 16, 1901.

The congress was called to order by W. H. Moore, president of the National Good Roads Association. Prayer was offered by Rev. Charles Edward Locke, D. D., of Buffalo, N. Y.

The call for the International Good Roads Congress, issued from the headquarters of the National Good Roads Association, Chicago, Ill., under date of July 22, 1901, and signed by W. H. Moore, president, and R. W. Richardson, secretary, of that organization, was then read; also the notice of the same issued and distributed by Martin Dodge, Director of the Office of Public Road Inquiries, United States Department of Agriculture, Washington, D. C.

This was followed by the reading of the invitation to the foreign governments from the Department of State, as follows:

DEPARTMENT OF STATE,
Washington, August 8, 1901.

To the diplomatic officers of the United States:

GENTLEMEN: I append herewith copy of a call issued by the National Good Roads Association of the United States for an International Good Roads Congress, to be held at the city of Buffalo, N. Y., from September 16 to 21 next, which invites participation by delegates from foreign countries.

The congress has the indorsement of the director-general of the Pan-American Exposition at Buffalo, and while it will not be under the auspices or patronage of the Government of the United States, the Department would be glad if the Government of the country to which you are accredited could find it of advantage to send delegates to the congress.

You may communicate the invitation to the minister for foreign affairs and request that it be given publicity for the information of organizations and individuals who may be interested.

I am, gentlemen, your obedient servant,

ALVEY A. ADEE, *Acting Secretary.*

OPENING ADDRESS.

By COL. W. H. MOORE, *President of the National Good Roads Association.*

LADIES AND GENTLEMEN: It being the general opinion among advocates of good roads that the occasion of the Pan-American Exposition would be an opportune time for directing wide attention to the subject of road improvement, the National Good Roads Association, of

which I have the honor to be president, was urged to take the initiative and call this International Good Roads Congress.

It is not necessary for me to state that we meet under adverse conditions, for the hearts of the nation to-day are following the funeral train that is now on its way to the Capitol bearing the remains of our beloved President.

As president of the National Good Roads Association I have the honor to call this congress to order, and to bid the delegates from many States and countries welcome. I see far-away States—Florida, Mississippi, and others—represented by delegates, and I am sure that, had it not been for the great calamity that has so recently and unexpectedly befallen the nation, this would have proved to be the greatest industrial meeting that has been held in this nation. Nearly 100,000 copies of the letters of notification have gone out to governors of States, mayors of cities, commercial organizations, and various associations throughout the nation, inviting them to send delegates, in order that there might be assembled men representative of this great cause to consult, advise, and consider plans not only to improve the roads of this State and this community, but of all States and all communities. In doing this we thought it proper that we should invite other nations, for you who are familiar with the subject know that the nations of Europe are far in advance of us in the matter of road improvement. Therefore we sought the cooperation of the Secretary of State at Washington, who invited foreign delegates, and we have received assurances from Canada, Mexico, and other governments that a large number of delegates will be here, representing various countries. This, then, is an international congress, and one which will mean far more to us than any congress which has been held for many years.

The movement looking toward the calling of this congress really began some ten years ago, and the intervening time has seen ten years of hard work—ten years of agitation. To say that any one association or any one organization represented here has done more than another would perhaps be unjust, because all have cooperated to promote and bring forward plans for road improvement and kindred objects. We welcome all these associations; we are glad to meet you here; we are glad of the part that you have played in the past, but, important as that has been, it is not so important as the labor which is now before you. You are meeting to-day to consider a subject more important to the interests of all the people than any other subject which has ever been agitated in the nation. Thousands of people are giving attention to it, thousands of columns of newspaper articles are going forth over the land advocating the improvement of our roads, of our rivers and harbors, and of all the various means of travel and transportation; also the construction of the Nicaraguan Canal. No doubt this will continue to be a very prominent factor in public affairs. In thinking over the life of our martyred President we recall how kind he was two

years ago when we requested him to lay this matter before Congress. He did, and he urged upon the attention of Congress the great importance of the road question. So, too, in the Philadelphia platform, "good roads" were included as a leading plank. We know that this cause has gained ground since then, and therefore must receive the attention of all political parties in the future.

In my judgment, the road question will receive attention from the Fifty-seventh Congress. I believe that you will see a new department created, the department of commerce, and that a new Cabinet officer will probably take charge of that department. It is designed that questions of transportation and kindred subjects shall receive special attention at the hands of the new department. I believe that the Office of Road Inquiries, of which we have a good representative here, the Hon. Martin Dodge, will be made a bureau by the next Congress. It was created in 1893 for the purpose of agitation and education. But the work has grown so much and is so much greater than was expected then that it seems fitting and just that there should be a road bureau, by which and through which the Government may cooperate with the people more effectively than in the past.

In going through the various States, and I have recently had rather a large experience along that line, inquiry has been made again and again by those high in authority as to why Congress should do so much for the rivers and harbors, appropriating sometimes \$20,000,000 for their betterment, and at the same time give to this question of primary importance—the question of common roads—little or no attention. It has been a mystery to a vast number of people that so little should be done by Congress for good roads. I do not believe that the Government will for a long time be in a position to build roads for the States. I do not believe such a thing should be advocated; but I do believe that, as the Government owns our post-offices and carries the mails, it is proper for Congress to further the improvement of roads. The Government is pushing forward along the line of free mail delivery to all the people. Congress has set aside millions of dollars for that purpose, yet the office of public road inquiries received from Congress at its last session an appropriation of but \$20,000. I can not understand why more liberality was not shown. It is the duty of Congress to promote organization. Possibly what we do here may not have much effect on the legislation of Canada and Mexico, but I do believe that you can arrange plans which will affect your own localities, and that you can present measures to your law-makers looking toward proper action by them; you can also urge Congress not only to appropriate a suitable sum of money to carry on this work, but also to create a bureau for good roads.

Concerning local legislation I can only say that we shall see during the progress of this congress what is being done in some of the States and the different conditions existing in various localities. I presume we can not do anything more than recommend what seems to be nec-

essary and practical. I do not think you ought to take up in this congress new-fangled ideas; I do not believe that is the object or purpose of this international congress. You may consider all subjects, but I hope the resolutions and recommendations of this congress may be in accordance with wisdom, so that they will commend themselves to both State and national legislators, and the best results may be obtained.

I believe that this movement will be one of the greatest of this century. The common roads must carry 90 per cent of all the commerce that comes from the farm before it can reach a railroad train or boat. That being so, great benefit to commerce must come from the improvement of those roads. Millions of dollars are now being spent for that purpose. The last legislature of New York appropriated \$420,000 for use in the State aid movement. I believe that this question of State aid is going to be more forcibly placed before the people, and that the cities, seeing the evil fruits of muddy and bad roads, will be willing to aid in their improvement. Our splendid "good roads train" is being carried free by the railroad companies, and that is strong evidence of the fact that railroad corporations are willing to assist in any way they can in bringing about the betterment of our roads. The roads belong to everybody, and everybody should be interested in them. I believe that in a very short time, perhaps in two or three or five years, many States will adopt legislation similar to that already in force in New York, Massachusetts, New Jersey, and some other States relative to this subject.

Let all your resolutions be conservative and wise. Let it go forth that this International Good Roads Congress is doing something for the people that is practical. We are laboring under difficulties, but let us do the best we can; that is all we can do. We have done that in the past; we have done that in trying to promote this congress.

We are to have a practical exhibition of road building. The good-roads train arrived this morning; with it there are 12 cars of modern road machinery and experienced road engineers. The great road-machine companies have cooperated by furnishing a force of men who will show you what modern machinery can do in this direction; and I tell you that you can not get along without these modern means.

Now let us try to bring about good results from this congress. Attend the sessions, serve on the committees, recommend what you think is wisest and best, not alone for the State of New York, but for all the States. Next Saturday has been set aside at the Pan-American Exposition as "good-roads day," and a meeting will be held in the Temple of Music, and I am sure that when this congress adjourns at the close of that meeting you will say that you are glad you came here.

I welcome you, and take great pleasure in introducing to you Gen. John C. Graves, of Buffalo, N. Y., who will welcome the delegates on behalf of the mayor of this city.

ADDRESS OF WELCOME.

By Gen. JOHN C. GRAVES, *Representing the City of Buffalo.*

In the absence of our mayor I have been called upon to say a few words of welcome to the members of the International Good Roads Congress. I do so with particular pleasure, for I myself am very much interested in the subject. The city of Buffalo extends to you a hearty welcome, and trusts that it will be of some benefit to you as an object lesson, and believes that it will receive benefits from your deliberations.

The city of Buffalo can present an object lesson as the best-paved city in the world. Buffalo has always been noted for being a well-paved city; it was well paved with stone before the modern pavement of asphalt was introduced, and now it has a greater number of miles of good asphalt streets than any other city in the world. We shall also present you an object lesson of fine park roads. We have two, if not more, roads built under the State-aid law, one at the extreme northern portion of the city and one in the southern portion. These roads are extremely well built, perhaps with greater expense than would characterize an ordinary country road, but they are well worth seeing. One of them is in front of South Park and the other on the river road, north of Riverside Park. These roads happen to be in connection with parks, but the parks are in no way responsible for them, as they were built entirely by the State.

The city of Buffalo has paid very much attention to this subject, and I see before me many substantial, vigorous business men of the city, who are here as delegates and who will no doubt take an active interest in the affairs of the congress. They are our skilled men, our engineers, our practical business men, and their presence here shows very strongly the interest that the city of Buffalo takes in this movement.

In the name of the city of Buffalo, of the mayor of the city, and of our city government, I take great pleasure in extending to this congress a very hearty welcome to our town. I trust you will enjoy your stay, and that it may be a very beneficial one to all concerned. I know nothing will give more pleasure to Buffalo and its citizens than to have you go away with a kindly feeling toward the town and its inhabitants.

Hon. Edward A. Bond, State engineer, then delivered the following address of welcome on behalf of the State of New York:

ADDRESS OF WELCOME.

By Hon. EDWARD A. BOND, *Representing the State of New York.*

MR. PRESIDENT, LADIES, AND GENTLEMEN, DELEGATES TO THE INTERNATIONAL GOOD ROADS CONGRESS: In the absence of our governor it is my pleasure to greet you to-day. I hope that this congress

will prove a great benefit to our whole country, indeed to the whole Western Hemisphere. This is a serious work; it is a work that ought to be met promptly; it is a work that should have been met years ago. Represented here to-day are not only the several States of the Union, but the whole western world; and, Mr. President, the results of this congress may be more far-reaching than most of us conceive. I recall how, years ago, there were grave doubts in the minds of many people whether or not the union of our States would be permanent, and it is my individual belief that the network of railroads reaching north, south, east, and west, has done quite as much as any other cause to cement the bonds of this union.

A century and a quarter of this nation's existence has passed, and we are meeting conditions very different from those which existed in the first century of our country's history. To-day, by reason of condensed population at different centers of our manufacturing and commercial districts, we are confronted, among other things, with the tenement-house problem. That is a problem closely allied with the question of good roads, and who knows but what this new era, this one hundredth and twenty-sixth year of our national existence, may usher in an era of good roads that will prove the salvation of our country, and not only solve the labor problem, but relieve all of the discontent of the discontented masses that we meet at different points of our country. We all realize the benefit of railroads; also the benefits of quick and cheap transportation by means of electric cars. But we must go a step further and improve our highways, so that the masses congregated at centers of manufacture and industry can get out into the country with their families and find homes miles away from their work where they can have quick transportation over good roads. Let us have these families living on small farms of, say, from 3 to 10 acres, where they can bring up their families in comfort, bring them up so that they can become good citizens, thus cementing this country of ours into one solid mass ready to meet any conditions that may confront us.

It is not my purpose at this time to go into the subject of practical road construction, but to show how matters are leading in the right direction permit me to mention the conditions existing in our own State, in a brief way. The first State aid given in this State was in 1898, when the legislature appropriated \$50,000; in 1899 the legislature appropriated another \$50,000; in 1900 it appropriated \$150,000; and during the last session of our legislature, through the kind aid of our admirable governor, Governor Odell, we succeeded in getting an appropriation of \$420,000, more than we had received in the three previous years. I know something of the sentiment for good roads in the State of New York. I only speak now of that State, but I hope to learn from other States that are here represented. I realize that New Jersey and Massachusetts lead New York in this matter, but I hope

the time is coming, and I believe it is almost here, when all the different States of our Union, and all the countries of the Western Hemisphere, will vie with each other and see which can build the greatest number of good roads each year.

I again extend a hearty welcome from the State of New York to every delegate to this congress, and to all of the friends of road improvement.

Colonel Moore then announced as temporary chairman the Hon. Martin Dodge, Director of the Office of Public Road Inquiries, Department of Agriculture, Washington, D. C.

ADDRESS OF THE TEMPORARY CHAIRMAN.

By Hon. MARTIN DODGE, *Director, Office of Public Road Inquiries, Washington, D. C.*

MR. PRESIDENT, LADIES AND GENTLEMEN OF THE INTERNATIONAL GOOD ROADS CONGRESS: I appreciate very highly, I assure you, the honor of being called upon to preside temporarily over your deliberations. I do so, however, with feelings of the most intense regret, that we and the entire nation have been overtaken by this great calamity—the assassination of our beloved Chief Magistrate. Undoubtedly the attendance of delegates is diminished by reason of that unfortunate fact. However, we may take some encouragement from the further fact that those who are here come from many distant parts of the country. I see before me not only delegates from the Empire State and from the adjacent States in New England, but from the entire Atlantic seaboard from Maine to Florida. Furthermore, I am advised that there will be many delegates here from the corn belt, from the cotton belt, from the great wheat districts of the Northwest, and from the sugar-cane lands of the Gulf.

It was my good fortune to participate in the good-roads crusade which took place in the lower Mississippi Valley during the early part of this year, especially in the States of Louisiana and Mississippi. And I understand that the governor of Mississippi will be here and a large number of delegates from that State will accompany him. I understand also that, while the governor of Louisiana can not be here, he has appointed many delegates who will be with us, and I have been very much pleased to meet this morning Mr. Newland, representing the New Orleans Picayune, who attended and reported the numerous meetings, sixteen I think in all, that we held in that part of the country.

The president of the National Good Roads Association has already stated that the Government is taking a great deal of interest in this matter, and I am glad to assure you that is true. It is, however, a matter of regret that the Government has been somewhat slow to appreciate the necessities of the people in this great movement. It

was not until 1893 that any provision whatever was made in this direction. At that time a small sum of money, a very small sum considering the magnitude of the question—only \$8,000—was appropriated by Congress. That appropriation has been continued from year to year until last year, when it was increased to \$14,000, and it has now been increased to \$20,000 for the present year. It is still, however, ridiculously small to meet the necessities and requirements of the case.

I further desire to impress upon you the fact, which has appeared to me and which you may have noticed, that our people generally throughout all the States have been somewhat delinquent in reference to these matters. I live in the State of Ohio, in the city of Cleveland, the metropolis of that State; and it was not until within the last ten years that that great county of Cuyahoga, with a population of 400,000 people—greater than that of several States—did anything in the way of improving its highways in the modern sense of making hard and durable roads. I am informed by one of the engineers here that it is only within the last two or three years that the State of New York has done anything in the way of improving its highways; and so we might refer to the actions of various States all along the line, and we will find that it is within the last ten years, and mostly within the last five years, that anything has been done either by the States or by the United States to promote this cause. I believe that it is a lack of appreciation of the necessity of these improvements that has led to the present condition, and I believe what has been accomplished within the last few years is the result of the agitation that has been kept up by associations and societies, and by different conventions similar to this one. I therefore take great comfort in the thought that this convention will not only stimulate to greater activity the various States that have entered upon these new methods, but that the Government at Washington may also be led to see the wisdom of increasing the appropriation for this purpose; that your Representatives in Congress may be requested and instructed to give their earnest aid to enlarging the work.

I had the honor to recommend in my last report to the Secretary of Agriculture that a sum of money should be appropriated by Congress sufficient to enable us to go into every State and there build an object-lesson road of a mile or so in length, so that the people might have actual examples before them, stimulating them to greater activity along these lines. I still hope and expect that Congress will make such an appropriation at its next session. Whether or not it does must depend largely upon the feelings of the people; it will depend largely upon the proceedings of this Congress; it will depend largely upon the actions of your Representatives in Congress. All of us who have been engaged in this work understand that it is one of greater magnitude than the people ordinarily apprehend. As soon as we invest-

tigate we find that hundreds of thousands of miles of roads require our attention, and we also find that, in order to improve this very great extent of mileage, there is involved the expenditure of many millions of dollars. The appalling extent of the mileage and the magnitude of the sum of money necessary for the work has discouraged many workers in this movement, they thinking it was too great a task ever to be accomplished and the cost so great as to constitute a burden that would not be willingly borne by our people. I might entertain the same opinion myself, if I did not also appreciate that the benefits and advantages that will come through these improvements will be much greater than the burdens necessary to be borne in order to make them. But I have no hesitation in saying that the benefits would be manifold. The conditions at present existing have put an immense burden upon our industries by reason of the difficulties which exist in the transportation of our products for any considerable distance by the ordinary and primitive methods of conveyance which now exist. That burden is found in bad roads, in mud roads, in steep grades. In all those difficulties that we are so familiar with is found a burden resting upon our people far greater than they ought to bear, far greater than they can successfully bear.

State Engineer Bond has referred to the concentration of population, and I agree with him when he says that the evil may be partly remedied by the improvement of the local highways, so as to disperse somewhat the population of these crowded cities; and I desire to emphasize in this connection the fact that the very concentration of population which we see, and which we regard as a danger to our civilization, has been brought about mainly by cheap transportation for long distances. There are no great and growing cities to-day excepting those which enjoy the benefits of cheap transportation, both by land and water, for long distances; at the same time it is a remarkable fact that these very cities are destitute of even tolerably good means of transportation by the ordinary highway system for short distances. I was informed by the engineer of the park system of Buffalo that the objectless road which General Graves referred to as being built by the State, was absolutely the first improved road ever built in this county, outside of the city. That emphasizes the fact that, while this city and many others of our great cities have been built up by cheap transportation upon the long haul, concentrating the population and the food products to maintain them and the materials for manufacturing, those cities, for the most part, have neglected, and are still neglecting, up to this very time, to provide any suitable means of meeting and overcoming the difficulties that confront us everywhere on the subject of the short haul. However cheap or efficient our transportation facilities are for the long-distance haul, they are yet unsuitable for short distances, such as 5, 10, 15, 20, or perhaps 30 miles; there are no very cheap means of transportation for those distances by steam cars or

steamships, therefore we are forced to improve the highways, and we are encouraged to believe that when we have made those improvements we shall see a diminution in the cost of transportation corresponding in part to the remarkable diminution which has been made in the cost of long hauls. Not only are we encouraged to think this will be true in reference to the ordinary method of moving vehicles by animal power, but we are assured, with the invention of the automobile and the successful introduction of the bicycle and the suburban street cars, which run for long distances from all the centers of population now, that many means will be found to contribute toward diminishing the cost of transportation for these short hauls.

In order to meet the burden of expense connected with the improvement of the highways we are bound to consider all the resources available for that purpose. It is very seriously doubted whether this burden, which is so great, as I have already stated to you, can be borne by adjacent properties in the rural districts. The concentration of population has been attended by concentration of wealth. The rural districts in many portions are impoverished, and in all portions of the country they stand for a far smaller percentage of aggregate wealth than they did in any former period of our history. Therefore it seems to be not only desirable but absolutely necessary that we should change the method of legislation and taxation, so that we may relieve in part the burdens that have wholly rested heretofore upon agricultural areas, thereby bringing to their rescue some of the wealth massed and concentrated in the great cities and represented by the great corporations. The road in this neighborhood, which we have been invited to see, and which has been built by the aid of the State of New York, would probably not have been built at all had it not been for the change I have referred to.

It is a remarkable fact that we should have gone on for a century and a quarter and yet have none, or almost none, of these improved roads in any part of our country, even adjacent to such great centers of population as this, and I doubt if we shall succeed very well along these lines except with the greater aid that is coming through the new methods to which I have referred.

It is not my intention to discuss, at any length, these methods, but simply to emphasize the fact that a new method, or at least a departure from the old, is necessary to make an onward movement and to relieve the rural districts. We must have a greater fund at our disposal. We must call to our aid not only the various resources we have had before, but the State and nation must bear their proportion of this burden and give their proper supervision in the way of executive management as well as favorable legislation.

The cost of transportation has been diminished on the long haul so that our products can be carried 50 miles upon the steam railroads at about the same cost that is required to carry them 1 mile

upon the wagon road with animal power. We want to overcome that difficulty, and in doing so we want the aid of this State, of all the States, and of the United States Government.

In conclusion, let me call your attention to the fact that the cheap rates which prevail upon the steam roads and the steamships have been largely brought about by the aid which has been given to them by the Government of the United States. You all know how many millions of dollars are and have been appropriated annually for many years past in the "rivers and harbors bill" to deepen the rivers and harbors and the water communication between the Great Lakes; and you also know that as a result of this Government aid work has been done which otherwise could not have been done; that the rivers and harbors have been deepened and the water communication between the lakes has been improved, so that cargoes are greatly enlarged and thereby the cost of transportation per ton has been greatly diminished. The Government has also given its aid to the long-distance railroads going through the prairies of the West and over the mountains to the Pacific coast, and in that way great results in the cheapening of transportation have come through Government aid.

You know that grants of lands and subsidies were liberally and, I think, wisely given in that direction. But what I now think is that having accomplished so much in those directions and the needs being so great in reference to a matter which has been so long neglected, we ought all to agree that the Government itself should give suitable aid, and that the various States would follow the example set by this State, Massachusetts, New Jersey, and other States, and push this work forward until we have accomplished for the short haul as much as has been accomplished for the long haul.

At the close of Mr. Dodge's address Mr. R. W. Richardson, of Nebraska, was made temporary secretary of the congress.

Governor Jennings of Florida was then called upon to address the congress, and responded as follows:

Governor JENNINGS. Mr. President, and ladies and gentlemen, it strikes me this is a little early after one's arrival to bring one on the floor. I came here to listen; I am not here to give out information but to receive it. I am not even a delegate; I am only a proxy, by consent.

This organization is in a temporary state, and I do not think we can do much for good roads before we have a permanent organization, but I am very glad to be here and to associate with those who know more about good roads than I do.

I am really in earnest about being here as a student, and I had hoped to take my place at a desk and take notes in order that I might be benefited, as I know I shall be, by being here.

I do not believe there is any question before the people so near the hearts of the masses as the question of good roads.

The streets of Buffalo prove the desirability of the expenditure of money. The streets are magnificent, and you never heard any person ask what they cost, because any good road or any good street economically constructed under the skilled supervision of an engineer is worth all that it costs. It is not so much a question of cost as it is of systematic effort to construct roads suitable to the conditions of the place where the road is situated.

I am sorry I have not a speech to make, because I never saw a time when I should like to make a speech more than now.

RESOLUTIONS ON THE DEATH OF PRESIDENT MCKINLEY.

William Pierson Judson, deputy State engineer of New York, then presented the following resolutions, which were unanimously adopted:

Resolved, That this International Good Roads Congress condemns in strongest terms the vicious doctrines which have led to the dastardly crime which has plunged our whole country into grief by striking down, with the foul hand of murder, William McKinley, the beloved and revered President of the United States.

Resolved, That we deplore the loss to the nation and to the whole world of our wise and honored head, whose remains have been to-day started on the journey to our national capital.

Resolved, That this congress records its sense of loss, its grief, and its dependence upon Divine aid to carry this country through this crisis in its history.

Resolved, That we express our confidence in the wisdom of our new President, who has assumed the duties of his great office, and our assurance that he will lead us on to continued and increased prosperity in the affairs of our nation.

Resolved, That we extend our heartfelt sympathy to the widow and relatives of our honored President. And be it further

Resolved, That this congress adjourn on Thursday, September 19, the day of the President's funeral, as a mark of respect.

The following committee on permanent organization was then appointed: James W. Abbott, Colorado; J. A. Holmes, North Carolina; James A. Menzies, New York; Gov. W. S. Jennings, Florida; J. M. Mann, Missouri; C. J. McCoy, Illinois; William H. De Nyes, New Jersey; Benjamin B. Bell, Kentucky; C. J. Monroe, Michigan; A. L. Seelig, Kansas; L. W. Matthewson, Ohio; M. O. Eldridge, Tennessee; Arthur Kirk, Pennsylvania; G. J. Leeb, Louisiana; J. E. Staples, Maine; William R. Hoag, Minnesota; Charles W. Ross, Massachusetts; J. C. McDuffy, Idaho.

TUESDAY, SEPTEMBER 17, 1901.

Chairman Dodge called the congress to order.

The committee on permanent organization reported the following-named gentlemen as permanent officers of this congress:

Gov. W. S. Jennings, of Florida, permanent chairman.

Edward A. Bond, of New York, and Hon. Martin Dodge, of Ohio, vice-presidents.

R. W. Richardson, of Illinois, permanent secretary.

M. O. Eldridge, of Tennessee, assistant secretary.

On motion the report was adopted and the officers were declared elected.

SPEECH OF PERMANENT CHAIRMAN.

By Hon. W. S. JENNINGS, *Governor of Florida.*

I am profoundly grateful for this compliment, and appreciate it very much indeed. I am a little embarrassed under the circumstances, and I would be especially embarrassed if it were not a merited reward. [Laughter.] I am reminded of an experience I had some years ago, when I appeared in an assembly, about as I did here yesterday, and I made so much noise on the floor that they elevated me to the chair to get rid of me. [Laughter.] I did not know when I came here yesterday that my reputation had preceded me; so I tried it again and this is my reward. [Renewed laughter.]

I will now ask the indulgence of this body; I will be as quiet as I can; and will ask you to do the same so that we may proceed in an orderly way with the deliberations of this congress. We are assembled here under adverse circumstances; the nation to-day mourns the loss of its Chief Magistrate. The great problems of the day are upon us, not those which have gone before, or those which are to come, but those which are here now. The chair that has been made vacant by this national calamity has been filled, and he who now takes the reins of this great Government in hand needs the sympathy and aid of us all, and may he not look to the American people in vain. May his hands be upheld, and may his power and influence be for good, as was the life of the one who has gone before him. [Applause.] When we realize that in this nation that has a right to boast of its freedom and the privileges of its citizens, three out of seven men regularly elected to the Presidency have fallen at the hands of assassins, we can see that a problem of great importance has been forced upon the American people.

But to return to our immediate duty. One of the great problems concerning the American people to-day is covered by the object of this congress. I will not take up your time by discussing it now; there are others here who are prepared to do so, and I now take great pleasure in announcing that the chair is ready for the regular order of business.

The chairman then appointed the following committee on programme: James P. Wood, New York (chairman); J. A. Holmes, North Carolina; Henry J. Warren; A. H. Battey, New York; C. D. Zimmerman.

The chairman next appointed the following committee on resolutions: John C. Graves, New York; A. W. Campbell, Toronto; D. P. Hutchison, North Carolina; Charles A. Forbes, Minnesota; Robert Stone, Kansas; A. L. Mann, Florida; J. C. Van Pelt, Kentucky.

The chairman then introduced the Hon. A. H. Longino, governor of Mississippi, who spoke as follows:

IMPORTANCE OF THE ROAD QUESTION.

By Hon. A. H. LONGINO, *Governor of Mississippi.*

While of course I am pleased to be introduced to you, I can not say that it is altogether a pleasure, for while I came from far-away Mississippi to be present at this congress, I hoped to be with you as a silent looker-on, to receive the benefits that might be derived from the association without being prominent in the meeting myself.

It occurs to me, important as is the subject under consideration here, that owing to the unfortunate and untoward circumstances to which reference has been made several times, the occasion itself is unfortunate, for so great is the subject and so much are the minds of the people diverted from it that the greatest good can not come to the subject of our meeting which is of so much importance to the whole country. I find that the people—not only of this splendid city, but those from other sections of the country—are cast down in gloom owing to the death of President McKinley, that great and good man whom all sections loved to honor. [Applause.]

In this country of ours, though we may have our local interests or our sectional differences, there are times of great emergency or great sorrows, when patriotism and love of country rise above all questions. There is an imperialism that knows no State, no section, no North, no South, no East or West, but which turns to a common country produced by common blood, defended and upheld by common sacrifices. [Applause.] I want to say to this convention, as a message from far-away Mississippi in the South, that the gloom of sorrow overhangs the people there quite as much as it does here.

My friends, the importance of good roads seems to me to be so apparent, so self-evident, that the discussion thereof is but a discussion of truisms. Much as we appreciate railroads, rivers, and canals as means for the transportation of the commerce of the country, they are, in my judgment, of less importance to mankind, to the masses of the people, and to all classes of people than are good country roads.

I live in a section of the country where that important subject has found at the hands of the people apparently less appreciation and less effort toward improvement than in many others. In behalf of the good roads association, headed by Colonel Moore and Mr. Richardson, which recently met in the State of Mississippi, I want to say that more interest has been aroused by their efforts concerning this important subject, among the people there, than perhaps ever existed before in the history of the State. By their work, demonstrating what could be done by the methods which they employed, and by their agitation of the question, the people have become aroused as they never were before; and since their departure from the State a large number of counties which were not already working under the contract system

have provided for public highways, worked by contract, requiring the contractor to give a good and sufficient bond, a bond broad enough in its provisions and large enough in amount to compel faithful service; and Mississippi is to-day starting out on a higher plane than ever before. [Applause.]

We are watching with much interest the proceedings of this congress. Unfortunately I have but few suggestions to make, for the reason that, having lived all my life in a State where, as I have just said, we have not had much of the good-roads spirit, and few good roads, I know little that would be of interest here. My associates and myself have come here to be benefited and instructed and to carry back to our State such practical suggestions looking to the betterment of the public highways as we may be able to gather; and I sincerely hope that, when our legislature meets in January next, some very important and practical legislation will be adopted along this line. I can assure you that we shall read and study with interest the proceedings of this congress. [Applause.]

The chairman then introduced Dr. Rachel J. Davison, of Michigan, whose address follows:

RURAL ROAD NAMING AND HOUSE NUMBERING.

By Dr. RACHEL J. DAVISON, of *Michigan*.

With true American modesty I will only claim to represent about 99 per cent of the world—all the men who believe in the advance of the world, and all the women and children.

This is not the commercial aspect, and so long as the commercial, the material, stands in the ratio of 100 to 1, when compared with the ethical, so long will there be great crimes. Not matter but mind should be the aim of great nations. Children are the first consideration. What will make them stronger physically, mentally, morally, and spiritually? There must be college and university lectures in every township in our country. These are impossible without good roads, properly marked and lighted, for it always storms when the moon is at its full. For more than twenty years I have been trying to have this done in some way and somewhere. Some of my hindrances and how they were overcome may be of interest. First, I tried our supervisors; then I offered to furnish the markers to my native township, the best in the world, if it would put them up. The offer was declined without thanks, though I did not ask to have the road named for myself or anybody else. Then I tried State legislators, Congress, the Postmaster-General, who, six or eight years ago, replied that my very valuable suggestion had been "placed on file"—that was so helpful, you know. Then I tried the superintendent of the rural free delivery, who did not reply at all. I tried everybody who should be interested. No knowledge of anatomy is necessary to know that the pocket nerve is extremely sensitive, but it is callous in comparison to the political nerve. Political death from the farmer vote is what I heard everywhere. Fortunately I am of the patient and persistent sex. Last winter our farmers institute indorsed road markers unanimously. With this I went before the Genesee County supervisors, and on July 2, 1901, they passed this resolution:

Whereas the plot-naming and house-numbering committee will assist in the work and in furnishing the markers; therefore be it

Resolved, That we appoint a committee of five from each township to act with this committee till October 10, 1901.

My first victory! We expect to have our county marked within a year. The work will be begun this fall and finished next spring, we trust. Will we not be the first in the world?

That was July 2. On July 6, flushed with triumph, I sent a communication to one of our papers. They headed it "A rural project," and gave it what I believe newspapers call a triple-header; they put it next to the editorials and at the top of the page, and they gave it editorial indorsement. In this communication I said:

The naming and marking of country and village roads, schoolhouses, and churches, and the numbering of farm and village houses will increase farm values and make a country directory accurate and valuable. It will help farmers, produce buyers, officers (police), travelers, wheelmen, automobilists, lecturers at clubs and institutes, and all other professional and business women and men. When roads are improved, marked, and lighted, college and university extension lectures on practical, profitable, and pleasing subjects will be possible and farm isolation will be a thing of the past. Time and temper will be saved for farmers and for travelers. Neither will be bothered or hindered. Such roads, rural free delivery, electric roads and telephones, will be followed by improved schools, child study clubs, clean high-toned local papers, increased circulation of other papers, and by a federation of all reforming and uplifting forces. Rapid and easy communication will make better acquaintance and reciprocity possible. These will solve most of the world's vexed problems. Country life will be ideal. Our country should lead in all these; should stand as an object lesson and challenge the world.

Fields and farms should be named and front gates marked. House owners should use numbers that are large enough to be read from the street. Country cemeteries, churches, and schoolhouses should be named and marked by their officers.

For the sake of uniformity—the county being the unit—the naming and numbering should be done by the county and city committees jointly. Roads from the county seat to the county line, and roads extending across the county should have but one name. Retain all old familiar and historic names. These could be called streets, avenues, or boulevards.

Number south from the north township line and west from the east line, giving 10 numbers to the mile. Put odd numbers on the north and east sides of the streets. The address would be the number and street, the township, the post-office and State, and in the lower left-hand corner the county.

STATE AID IN NEW YORK.

By Hon. EDWARD A. BOND, *State Engineer, Albany, N. Y.*

It has been my hope that at this stage of the proceedings we might have a five or possibly ten minutes' talk by a delegate from each of the several States and countries represented, and thus have a short history of what is being done in each State or country with reference to the improvement of roads and what is being done by the legislatures in the various sections. However, I will try to give a short history of the law in the State of New York.

We are acting in New York under what is known as the Higbie-Armstrong law. By that law any person or township in any county of the State can petition the board of supervisors for State aid in the improvement of any particular road in the county. If a majority vote of the board of supervisors is obtained a petition is sent to the State engineer, designating the road, giving its length and a description of it, and asking for State aid. This petition is filed in the State engineer's office; the road is afterwards examined by him, and, if he considers it of sufficient public importance to warrant State aid, he at once orders a survey, together with plans and estimates of the cost of the road, to be prepared. The next step is for the State engineer to submit the estimate of cost, survey, and plans to the board of supervisors for their action, so that they may vote one-half of the total cost of the construction of the road. If that is favorably received the matter is given a number. They have been numbered from 1 up, until now the numbers have reached about 150. The State appropriates money to a greater or less extent as

the different legislatures from year to year see fit, and the roads are built in their consecutive order. In other words, we could not build road No. 69 until road No. 68 was provided for. These roads are not limited to any particular section. The first movement for the road originates with the people in the particular section, and comes either from the people living on the road or from the people in that particular township and goes from them to the board of supervisors. From their action it goes to the State. After the surveys and estimates have been made it is returned again to the people, so that the people have the final action. We have found that plan to work with remarkable success. There are delegates here from New Jersey, Massachusetts, and other States that have been in the good-roads movement longer than our State, and I feel like taking my hat off to them, but I hope we will hear from them later.

To illustrate the working of our law I will briefly point to our map. The first road built under the Higbie-Armstrong law was in Erie County. To show the improvement is diversified and not centralized in any one district I want to say that in Warren County they have presented a petition, but it has been so recent that we have not made a survey. In Oswego County they have presented a petition, a survey has been made, but they have not yet voted the money. In Tompkins County there has been a petition and survey, and the board of supervisors has voted its half of the money, but the road has so high a number, and the State at the present time has not appropriated money enough to enable us to advertise the road and let it. In Cortland County we have a petition, a survey, the board of supervisors have voted the money, and the road is now under contract and being constructed. In Chemung County we have all of the other conditions I speak of and, in addition to that, a finished road.

My motive in exhibiting this map is to call attention to the fact that, while the Higbie-Armstrong law does not call for a long, continuous stretch of road through the State, it is finally, and quickly too, going to result in that by reason of the action of the people in their several localities. For instance, the county next adjoining New York County is Westchester. Starting at Westchester you will notice that the counties of Putnam, Dutchess, Ulster, Columbia, Greene, etc., reach continuously up to Albany. Thus we follow the line of traffic through our State, first running north from New York to Albany, and then west to Buffalo. Going west we take in Montgomery, Fullerton, Herkimer, etc., each county adjoining the other from New York to Buffalo, with only one break. When we consider that the first money was appropriated in New York in 1898, and that we have only been working on these lines about two and a half years, I regard this as a most remarkable showing, and to me it is quite convincing that the Higbie-Armstrong law is wisely arranged.

This is one of the things which I had hoped to hear discussed here, so that, if the State of New York was not working on the right lines, and if Massachusetts, New Jersey, or some other State has laws that are going to help along, and bring quicker results, we might know it, and profit by it.

I am very anxious that we should hear from each State and country represented in this meeting.

GUS. A. GREENBAUM (Illinois). How is the other half provided for?

Mr. BOND. The law provides that the county shall pay 35 per cent of the cost, and the township or the individuals owning property on the road improved shall pay 15 per cent; the State pays the other 50 per cent.

Prof. J. A. HOLMES (North Carolina). Either private individuals or the township can do that?

Mr. BOND. A majority of the private individuals facing the road to be improved can apply to the board of supervisors, in which case it is mandatory for the board to make the application to the State engineer; but if the application is from the

township to the board of supervisors it is not mandatory, but a majority, of course, would rule in the board.

Hon. MARTIN DODGE. I would like to take this opportunity of saying that, believing it would be useful to other States to have a knowledge of what has been done in this State, as well as in any other progressive State, acting for the Government, I had this law published some six or seven months ago in pamphlet form, and anyone so desiring can be provided with a copy of it. We believe, as Mr. Bond has said, that it is very useful to other States to know what is being done in this State, and we think it would be useful to this State to know what is being done in any other State, provided it is better than what is done here. One of the very objects and purposes of this congress is to secure the latest and best information of what is being done in every State, and then have it published for the information of other States. It is my intention, as Director of the Office of Public Road Inquiry, at Washington, to publish all the material parts of the proceedings here in pamphlet form, which I shall be glad to furnish to any citizen of the United States who may apply for them without any cost to him.

A DELEGATE. I would like to ask Mr. Bond whether he finds any opposition in any other parts of the State. I notice there are only three counties north of Albany and there are four counties in the southwest part of the State which have not taken advantage of this law. I would like to know if that indicates an opposition by those sections of the State to the law, and whether an objection is not based on the fact that those sections are being taxed for roads which do not benefit them.

Mr. BOND. There has been no question in regard to that. The counties which are not represented on the map which I have shown you as having taken advantage of the law are simply places which are waiting for some active person to take the initiative in the movement.

There is another thing I want to mention: In some counties a short road has been built, perhaps only half a mile long; that has become an object lesson in the county so that petitions come in and they ask for more than we can possibly give them, and we are constantly having to restrain them in order to have an opportunity of placing a sample road in counties which now have none.

I have never heard a word of opposition from the counties the gentleman has just spoken of. On the other hand you will notice that we have built roads in Chemung County, on the southern tier, and we are now building a road in Clinton County, the most northeasterly county of the State. The truth of the business is the only doubt about the road is as to the county raising its half; we never hear any complaints about the State's half of the money. If the State of New York should put a half a million dollars a year into good-roads construction (and they are going to do a great deal better than that) at our present rate of taxation, it would be less than 9 cents per thousand dollars of a sessed valuation.

But I will answer the gentleman's question in another way by making a prophecy: I believe that anyone who lives to be ten years older will find that we will have no direct State taxation in New York, so that this money will be a free gift to any of the people who get it.

STATE AID IN NEW JERSEY.

By JAMES E. OWENS, *Newark, N. J.*

It might not be out of order now to suggest that road construction in New Jersey is somewhat of an old story. I say that simply because we have gone through the fight of the criticism and the shrinking, I might call it, of the citizens from road construction. On the other hand, to-day the difficulty is to provide means for the construction of all the roads that the citizens of the State require.

Work in this direction began in New Jersey about 1870, in the county of Essex. Like other sections of this country, roads in New Jersey were proverbial for their

badness, and the attempt to improve them began by what was known as a county law. That law was passed in 1868 and provided for the appointment of commissioners of roads for the county of Essex. It gave them power to borrow money and to build roads. The work was begun in 1872 in the construction of hard roads, and they built about 30 miles of such roads. That was the initiative of State road work in New Jersey. The good example of these roads caused the different communities in that section to improve their local roads. Then the idea was extended, and a general law was passed enabling all the counties in the State to improve their roads, and that was known as the county act. It gave the county authority to issue bonds and build roads. Under the terms of that act Union County built its roads, Passaic County built its roads, and, I think, Morris County. Some 300 miles of hard road were constructed. The rural districts, as a rule, were slow to take up the hard-road movement. Then the State aid act was passed by the legislature about ten or eleven years ago. That act provided that when the citizens on a stretch of existing road not less than 1 mile in length should petition to the board of freeholders (those are our county supervisors), agreeing to pay one-tenth of the cost of the road, and their petition should be indorsed by the county board, it should be transmitted to the commissioner of roads, and upon his approval an appropriation of one-third of the money should be made by the State. The cost was divided into three portions: One-tenth from the adjoining property, one-third from the State, and the balance from the county. There was also a provision in the law that the county should not exceed a certain rate. After the passage of that act the legislature appropriated \$75,000 for State aid. The idea had not been taken hold of by the people, and matters went on slowly, the result being that only a portion of that first appropriation of \$75,000 was applied for, and that was all spent in one county in the central part of the State. The balance of that appropriation unfortunately lapsed into the treasury. However, the leaven was working, and the demand grew and has been growing satisfactorily ever since. The legislature increased the annual appropriation from \$75,000 to \$100,000, and then to \$150,000. We have tried to get it up to \$200,000, but without success. The result has been that the demands for road construction in New Jersey have been so far ahead of the ability to build, under the appropriations made, that there are now in the hands of the road commissioner applications for hundreds of miles of road beyond the amount appropriated.

The total number of miles built under the State aid act is about 700. The cost to the State was \$1,071,000, and the total cost of those roads \$3,244,000.

The continuity of these roads has been a matter of earnest consideration. You can well understand that the question of their continuity would not be regarded primarily by the petitioners. The judgment of the State commissioner comes into play there, and he has given his assent more particularly to the construction of roads that would benefit through travel, and the result now is that you can go from Trenton to Newark, and so on to Newfoundland, a distance of probably 80 miles, on one continuous through road. In south Jersey you can go from Atlantic City to Camden and also to Cape May. As there are about 20,000 miles of country road in New Jersey, you can readily see that with the appropriation at present made by the legislature the road problem in that State is not yet solved. There are still four or five counties which have not yet come in under the law; petitions have gone in to the board of freeholders, who have rejected them, so that they have not reached the State commissioner; but doubtless it will be but a short time before, learning wisdom from the experience of the other counties, they will follow the same course.

A great deal of money has been spent by the different municipal corporations in the State out of their own funds in improving their own particular roads, and an equal amount of money has been spent by individual localities for road construction as that expended for roads built by State aid.

I will also state that a law was passed some two years ago giving powers to townships enabling them to vote on the construction of roads. A petition can be sent to the governing body of the township, and if approved it is sent to the State commissioner, who grants one-third of the cost from the State money for that particular road, and the township then pays the difference between the assessment and the State appropriation. As yet, however, I have heard of no attempts to build roads under that act. It is a feasible project, but the idea seems to be that if the cost of the roads could be saddled on the county it would be a much better financial procedure than to limit it to a single township.

The only opposition we find to-day is directed at an increase of the State appropriation from \$150,000 to \$200,000. The legislature last year unanimously passed in both houses an appropriation of \$250,000, but on account of the demands from other departments of the State for money that appropriation was cut down.

We have no State tax in New Jersey, but we have a large surplus. We get our revenue from the corporations.

The money is distributed over the State as equitably as possible. Of course, if the people of some parts of the State don't want the money the State commissioner recognizes that fact.

I think what I have said gives a general idea of the State-aid act in New Jersey. The work is done under the supervision of the county officials, and the contracts are made in the name of the county. All contracts have to be approved by the State commissioner, and he exercises the function of an overseer of the work and has his own agents to look after it. If in his opinion the work is not properly done, he notifies the county board that he will not appropriate one-third of the cost to be paid by the State. But the details are handled by the different counties. So far, I think, there are only four out of the twenty-one counties that have not come in under the act.

Mr. ABBOTT. Do you know what the annual revenue of the State is?

Mr. ROBERT A. MEEKER (Plainfield, N. J.). The revenue is not fixed; it depends largely on the number of corporations that are incorporated under the State law during the year. Our revenue is derived from foreign corporations—

Mr. OWENS. No; not foreign. [Laughter.]

Mr. MEEKER. Well, no; not foreign; but it is derived from other States. The corporations are formed in other States and incorporate under our laws.

Mr. ABBOTT. The purpose of that question was to draw out what proportion of your State revenue is spent on the roads.

Mr. OWENS. About 10 per cent.

Mr. MEEKER. Yes; but the sentiment now throughout the State is so great that a great many people do not consider the portion the State has to pay at all, and a number of the counties, when they can not get assistance from the State, build the roads themselves, and the townships do the same. Our township law has been taken advantage of in four townships and two counties, and in many other cases where they have not secured State aid they have gone ahead and built roads.

Gen. JOHN C. GRAVES (Buffalo, N. Y.). May I ask what the average cost per mile is?

Mr. OWENS. Well, there were 700 miles built for \$3,244,000.

Mr. ABBOTT. Mr. Eldridge, the assistant director of road inquiry, has written an article in which he epitomizes the results in that particular in a very satisfactory way, and I believe that has been published by the Department in pamphlet form.

Mr. OWENS. The cost of construction is so much a matter of locality that a general statement might be misleading. I am building some roads to-day at a cost of \$2,300 a mile, and I have built a great many for \$3,000 a mile. In those cases the stone and everything else has been conveniently located for the construction of

the road: but the cost of building a road in south Jersey, which is quite remote from stone crushers, might be 100 per cent more.

General GRAVES. I would like to ask the gentleman what it costs to maintain an ordinary macadam road per mile.

Mr. OWENS. The general experience of the cost of maintenance, taking country and city travel together, shows that it is about 3 cents per square yard per annum. Of course you can understand that the wear of the road is in the ratio of the travel; that you may have a country road with very little travel on it, where, if it is constructed properly, with proper drainage, the repairs would be very small. I have known of a piece of road that was down for nineteen years and never had a dollar's worth of repairs on it, and that was not in the country, but in a suburban district. Where, however, there is a heavy, concentrated travel the road will wear out more quickly. There is another thing to be said on that subject, and that is that the first new road in a district always wears out quicker than those that follow, because the travel from every direction concentrates on that road.

PENNSYLVANIA'S ROAD SYSTEM.

By Hon. JOHN HAMILTON, *State Secretary of Agriculture, Harrisburg, Pa.*

In Pennsylvania we have been endeavoring to get State aid, and we have reached the point where the people of the State, as a rule, believe that State aid is the only solution of the road question.

I think that in the discussion of this subject we ought to take into account the difference that exists in the several States as to the methods of taxation. I understand that in the State of New York real estate is taxed for State purposes, so that when the State makes an appropriation for a road it simply returns to those who own real estate some of the money that they have already contributed. In Pennsylvania it is different. We have no tax on real estate for State purposes, and the appropriation that is made by the State legislature comes from corporations and other sources of income that are general and do not fall upon real-estate owners at all, but on personal property, money at interest, etc. Thus in Pennsylvania State aid to the townships, the agricultural districts, means receiving money from the State by country people which they did not contribute, but which came from other sources. Now, I believe that these other interests which are taxed are just as much concerned and just as much benefited by the improvement of the roads through the country districts as the country people themselves, and that it is not a bonus or a gift to the country people to provide this State aid from this fund, but it is simply an investment on the part of the State for the improvement of all of the interests of the Commonwealth. State aid has now come to be regarded in Pennsylvania as an essential feature of any system of road improvement. There is no difference of opinion on that point, and we should have had it before this. In the legislature of 1897 there would have been no difficulty in obtaining an appropriation of \$1,000,000 for the construction of public roads had it not been that our capitol had just been destroyed and immediate provision had to be made for that: therefore it was impossible to secure the money at that time for good roads. I speak of that time because at that particular session of the legislature the good-roads law of Pennsylvania was enacted, and there was attached to the bill a proviso which has rendered it inoperative—that \$1,000,000 should first be appropriated before the act could go into effect. So we have on our statute book a law which we believe is in good form and will give us good roads in Pennsylvania as soon as it can go into effect. It could not go into effect at the time of its passage for the reason I have stated; at the session of the legislature two years ago (we have biennial sessions) the finances of the State were in such a condition that it was impossible to get the money, and at the last legislature there were other interests involved which prevented our getting the money.

But Pennsylvania is going to have State aid, and I believe it will come at the next session of the legislature. We had to appropriate \$4,500,000 for a State capitol, and we have been paying some debts that were on the Commonwealth, and that has kept back the appropriation of money for State aid. We are putting money by hundreds of thousands of dollars into forests and the purchase by the State of waste lands. That is on our hands, so that the funds of the State seem to be demanded for other purposes. We had also to add to the \$11,000,000 appropriated for public schools another million dollars, which was taken out of the last appropriations, so that altogether the State is loaded down with appropriations that must be met, and the matter of roads has been left in abeyance. As I say, I believe it will come on at the next session of the legislature, two years hence. When it comes there will come with it, in the bill to which I have referred, this feature that we believe is the foundation of any and every system of good roads wherever good roads are to be secured. Before State aid and before anything else can be done, and paramount to all, there must be competent supervision. [Applause.] It is the greatest folly to appropriate money which is to go to men who are incapable of expending it judiciously. Much as I am interested—and I have said it repeatedly to members of the legislature and to our citizens—much as I am interested in good roads in Pennsylvania, if I were in the legislature and \$1,000,000 or \$5,000,000 were to be given for public roads and its appropriation depended on my vote, under our present system of supervision, I would vote "No." [Applause.]

What is the system of supervision? It is simply of such a character as exists in many of the States, in which the selection, not of the fittest, but of the most unfit, is made. [Laughter.] By it men are selected who are willing to stand out on the public roads for a dollar and a half a day and watch two or three other men do nothing. So the first thing is to select men of intelligence, and we have in our Commonwealth, as in other States, plenty of men who have the information, or who have the capacity for the acquirement of information, in regard to this matter. If we should select our best and most capable citizens for road officials, we would have a corps of supervisors in Pennsylvania equal, if not superior, to that of any other State in the Union.

This law of 1897, of which I speak, provides just that thing. It is not a good-roads law; it is simply a supervisor's law. It provides that there shall be three supervisors elected in each county in the State, and they shall form a board and serve three years, one man going out each year and leaving two of the old members in. It is a continuous board; it never closes its account; is always in existence, and always on duty. [Applause.] Thus the majority of these men will be men having at least one year's experience.

I tried to educate supervisors. That is what they said I should do, and that is right. But you must have some person that you can educate to begin with, then you must have a little time in which to educate him, and then you must have the services of the man after he is educated. We have over 3,000 supervisors in our State and I secured the names of every one of them and sent literature to them. At the close of the year, in most of the districts, the supervisors go out of office and a new set of men come in, so that the work you have done with the previous board is practically lost and you have a new set to deal with, more ignorant perhaps than the others [laughter], at least less informed on road matters, and you begin over again. The board provided for under the act has this advantage, that its information is hereditary; it is transmitted from year to year, and it is cumulative in its character. You educate a board of supervisors, and, although a man goes out, the information is retained and in the course of a few years the board is fairly well educated; instead of having a system of retrogression you have one of progression and accumulation. That is what we need in road matters. We have not yet reached the perfection of road improvement and road instruction. Until

within the last twenty years our engineers really did not know how to build a road; now they are beginning to learn how a road can be built. But we must teach the supervisors in all the districts how to construct a good road, and after it is constructed how to maintain it, which is of equal importance.

I believe that we must have in every locality a board of intelligent men educated in road matters which will have charge of the roads in that community and look after them, a board that is continued and can be instructed and which will acquire the best information that is to be had on the subject. Then State aid should follow. Give State aid to such a board, and the money of the State will be spent intelligently. Instead of wasting millions of dollars, as is done to-day, without improving the roads at all, every dollar expended in the future will bring a dollar's worth of service, and, after it is expended, we shall have a guaranty that there is somebody to look after it and see that the work which has been done is not obliterated in a single year. That means constant supervision. But our new law provides that this board of supervisors shall do no work on the road at all; nor shall it oversee men who work on the road. These boards may be made up of lawyers, physicians, ministers, professional men, business men, farmers; anybody can be on this board. We are after brains; that's what we want. [Applause.] The members of this board get no pay excepting \$1.50 for each time they meet, and that can not amount to more than \$54 a year, because the board is only required to meet once a month.

Then as to looking after the road. Under this law the roads in the townships are put into districts of so many miles to a district and over that district a road master is put, who is a hired man, hired by this board of supervisors. That man understands road building, understands road-making appliances, and he obeys instructions. He is under no obligation whatever to the men who work under him, but is responsible simply to a board of supervisors, and his position depends upon whether he obeys their orders or not. Under our present supervision the supervisor is the man who is elected and who wants to be elected the next time; therefore, men and boys at work on the public roads are allowed to waste their time and the township money, and this supervisor can not protest because he wants a reelection. Instead of having a man who is under obligations to the men who work under him, and owes his position to them, we put a man there who is independent of them, and who can insist that a day's work be done or else the workman get off the road and pay his road tax in money. This bill provides also that at least one-half the road tax shall be paid in money, and we hope, when it goes into effect, that if a day's work is required of every man for a day's wages the man will prefer to pay that in money rather than do the day's work. Then we can hire men to work upon our public roads.

One of the duties of the road master, under the act, is to be on the road every day of the year excepting Sundays. He is also responsible for his section, and the supervisors of the district supervise with a horse and buggy.

I have not time to go into this fully, but State aid will come just as soon as you have in each township men who are instructed, and capable of expending the money. We hope to have it soon in Pennsylvania.

We have made some improvements in our system already. Since the beginning of road agitation we have had what is known as county roads. The citizens of a county may petition the grand jury for a county road, designating its limits. That petition must be acted upon favorably by two grand juries before any further action can be taken. Then the county commissioners are authorized to build the road and use for that purpose county taxes. In our State personal property, not real estate, is taxed for county taxes. Many communities are taking advantage of that law. They are building some fine roads in the county of Allegheny. But that law seems applicable only in counties in which there are large cities and where the amount the city contributes will be of assistance to the country people.

It is said that the country people can not be taxed any more for roads than they are at present.

We are spending in the country districts of our State about \$4,000,000 per annum for roads. We have altogether about 100,000 miles of country roads. We have a law which is now two years old which forms townships of the first and second class. Townships of the first class have a government very similar to cities or boroughs, and there the road question is settled. But they can only be formed in districts where the population is dense, and road improvement is a simple matter in those localities. But the great difficulty is found in townships of the second class, where the population is sparse. There the country people are utterly unable to build roads as they should be built, so they must look to the State. At the last legislature we did a thing which looks like a very simple thing, and perhaps you gentlemen from the prairie States may not know how much it means. We passed a law which requires the supervisor to pick the stones off the roads once a month during the summer months. If he does not, he can be arrested and fined. The legislature passed another law last winter which is a great law for every State in the Union, and that is the wide-tire law. [Applause.] When you have got your good roads you must stop the use of narrow tires, and you people in New York should make it a penal offense for a man to go on your roads with a load of over 2,000 pounds with a narrow tire, or you will have no roads. [Applause.]

WEDNESDAY, SEPTEMBER 18, 1901—MORNING SESSION.

M. Victor Valliant, a delegate from Belgium, was then introduced and addressed the congress in French, Mr. E. L. Tessier, of South Carolina, acting as interpreter. The following is a brief summary of his remarks:

The gentleman represents Belgium and has come all the way from there to attend this convention. On the 28th of last month an invitation was received by his Government inviting Belgium to be represented at this congress. He immediately took the steamer and came over, and is therefore not prepared with any exact figures to lay before the congress. In his remarks he deals, in a general way, with the methods of constructing roads, etc., in Belgium.

In Belgium, he says, the construction and maintenance of the roads is divided into three sections, part of which is handled by the State, part by the province, and part by the subdivisions in the province, according to the preponderating interest in each of the respective kinds of roads held by each community.

The State takes care of the large highways, the commune or subdivision of the province takes care of the smaller roads, and the smallest roads of all are taken care of by the parishes in the commune.

The expense of keeping up the roads is entirely in the hands of the State. Whenever a new road is to be built the State takes it in hand and puts it through. The necessary capital is contributed respectively by the State, the commune, and the province in proportion to the proprietary interest of the grounds abutting on said roads. There are no highways in Belgium on which tolls are paid. Everything is in the hands of the State practically, and the State seems to lay down the law as to what roads shall or shall not be built, and the methods to be

used in the building, as well as the charges that shall be made upon the respective properties abutting on said roads.

On Friday next, M. Valliant says, when the meeting is to be held on Grand Island for an object lesson in road building, he will then be prepared to give a few facts as to cost and the materials employed in Belgium.

HISTORY OF HIGHWAY LEGISLATION IN NEW YORK.

By Hon. JOHN A. C. WRIGHT, *Rochester, N. Y.*

MR. PRESIDENT, LADIES AND GENTLEMEN: I didn't feel like coming down here, but I believed there were a great many of you who had come from different States and who had heard, as I had, a voice crying in the wilderness, who were making great efforts to carry on this movement for good roads, and as we have done some work in this State under principles which I believe are applicable to any State in the Union, I thought I might aid you in your work by giving you informally and without any preparation a slight résumé of what we have done.

The State of New York believes in making general legislation, as far as possible, and not special legislation. We believe in making legislation comprehensive yet elastic, practical yet thorough, and in that way we seek in all lines of legislation to make our State a leader and a light to the Union, and thereby bring about that uniformity of legislation which is desirable—legislation without any mandatory features, which is undesirable. It is from that point of view particularly that I want to address this international congress.

How are we doing it, and what is necessary to be done?

First of all, let me cite the situation as it was, and that is general I believe in all the States. We had had State government with nothing to do with roads; we had 61 counties in the State, and the county legislators, who were supervisors, had nothing to do with roads except once in a while they would vote a bridge—by special favor. Then we had towns, and each town elected highway commissioners, and these highway commissioners appointed path masters. In my own county there were over a thousand path masters, so that, if you wanted to say anything in the little county of Monroe, you had to address one thousand people at 2 cents postage each, which means \$20—as I have done out of my own pocket many times. In September, 1891, I prepared a manifesto to the inhabitants of the county of Monroe for county-road building. It was like one of those bombs that we saw at the Exposition the other night, coming out of a clear sky to people who had never seen fireworks. I was called all kinds of names, but I went ahead and began to hear from people in other parts of the State, and the result was I saw we must organize. Then Gen. Roy Stone was starting the National League, and I was back of that, although my name does not appear in it at all, and I worked in it, too. But I found that if we waited for the action of our sister States, the State of New York would bring up the rear of the column, and I meant that it should lead. Consequently I formed the New York State League for Good Roads, auxiliary to the National League but independent, so that whatever we did would be done by the State of New York. We progressed, and it didn't hurt any of the work of our sister States or of the National League. I got from a press-clipping bureau every item published in the State on roads. Thereby I could correct and inform others. I got a representative in every county of the State. There are 61 counties, and through these 61 men I was able to keep my hands on the State at large, and to lead the good-roads sentiment in certain directions and along certain lines, and as we heard more from the counties we finally got a result that every one could go in for. It was a composite photograph of

the good-roads sentiment of the State—all that was possible in legislation, and all that could be carried out.

We began, as I say, in 1891, and we went to all State and county fairs; we tried to get all farmers and farmers' organizations interested. Then I formed a State farmers' congress, auxiliary to the national congress, and got at the farmers in that way. I went to farmers' meetings and got hold of the farmers. It is the farmers you want to get at. We have our county organizations, and we hope to form town and school-district organizations. In 1893, when Governor Flower was in office, we got a bill through allowing towns, by vote, to change to the "money system" in road matters. We got a rebate of one-quarter of the road taxes to men using 7-inch tires. We got the publication of a highway manual, which every highway commissioner was obliged to have, formulating the law as it was and giving what you might call good-roads data. One other thing we did: We got a law through allowing road building by convicts around the three State prisons within a radius of 20 miles. That was the result of two years' work. All towns didn't change to the money system, and there were no counties which built roads. Then an effort was made in the direction of having competent engineers to supervise the road work. Mr. Bowers, of Syracuse, took his supervisors around and mapped out an arterial system of 200 miles for his county; but no action was taken. Then we had a special train and made a great effort. I took the supervisors out to New Jersey and showed them the roads there, and took committees of the legislature there and showed them the roads. That converted those men; it was only a little leaven in the whole lump, still it told. I made up my mind that we could not go fast enough by county road building. Assuming that I built roads in the county of Monroe, there were sixty other counties that must be helped and sixty other men must be found as energetic, as active, and as ready to spend their time and money as I was, and I knew that was impossible. I asked Governor Flower to do something for State cooperation, but he was against it. I think he was right, in the main, then. He said that State road building leads to extravagance. I mention this because I want to show how things spell out by American methods and old town-meeting methods and old legislative-deliberation methods. The first bill we had in this State, as you probably all know, was what was called the Richardson bill, which Governor Hill recommended in two messages. That is for two roads across the county. In January, 1894, when Governor Flower sent in his message without recommending any action for State aid, I wrote an open letter, and I myself drew up the bill which is now known as the Higbie-Armstrong act. It is so called because I gave it in the first place to Mr. Armstrong, who was a new member from my county, and it was introduced by him, and afterwards we had Mr. Higbie appointed the chief of a special good-roads committee, to which I will refer later. I made that bill similar to the Richardson bill, but with this difference: The Richardson bill said the State should go ahead and build, and the State should be bonded for \$10,000,000; but there was not a man in the State who could persuade the farmer to bond the State for \$10,000,000. So I said that if the county wanted a road built and the people should ask for it the State should go ahead and build it and pay one-half the cost, the county to pay 35 per cent and the town or the property owners where the road was situated, should pay the other 15 per cent. That bill was before the legislature for two years in that form, and after we had taken the legislative committee to New Jersey by special train it passed the senate, but didn't go through the house. We then prepared the bill called the Kerr bill, which was modeled on the New Jersey law and a little improvement on it, and that passed the assembly. We were told that we could not get these bills passed, but they let us get them through one house or the other, so that we might keep the matter in the public eye. That is the truth of the matter, if you want the inside history of it.

The year when Governor Morton was governor I persuaded the legislature and the people who are the powers that be to appoint a special committee, with the idea that they could consult with us. As a matter of fact, if they had consulted with me they could have had just the report of the legislature that they did have the year later, for I drew most of the reports and most of the bills. But it was considered better, after discussion, that the legislative committee should make, as they did, a pilgrimage to the neighboring States, and then through our State, and come back and make a report; and they came to Rochester and we drew up the report there. That report was in the line of the efforts we had made and the aims we had, and it had six accompanying bills. Times were hard still, and we could not get any of these bills through; but we had that report, and it gave the matter dignity. Just as soon as we had the bill or propaganda adopted by a special legislative committee the matter was deemed of far greater importance than if it had been merely prepared by John Wright, or John Smith, or some one else. As a matter of fact, however, it was the same thing. Then Mr. Black was elected governor, and we had another man to deal with and persuade. And the governor was persuaded, and so were most of the legislators; we found them very good fellows, but we could not always get their votes. Governor Black had one or two ideas. In the first place, he didn't want any State commission appointed; we were to make somebody responsible for the road building. Mr. Bond told me yesterday that we had thrown a terrible job upon him, and I said I knew when we drew the bill that there was no job ever given to any human being that equaled the detail and responsibility entailed in that bill. You must not tell him, but I tell you that bill is so safeguarded that you can not go wrong—you can not go too fast or go wrong in any way. There never was a bill drawn that is as thoroughly safeguarded, as thoroughly far-sighted, and takes care to do exactly what they said would not have to be taken care of, and that is the point for State appropriations. You can not get State appropriations too fast, because the localities have to pay their share, and that is where it acts as a brake. We appointed the State engineer as the authority, and allowed any road that he might select to be considered a main road within the province of this State highway bill, and then provided for the manner of payment that I have referred to. We didn't have any appropriation. It was a mere naked enactment of the idea for which I had been striving for years and had persuaded other people in the State to strive for. The day before that bill was passed we had another bill introduced by Mr. Fuller, of Broome County, my native county, which contained a provision which I had in the first draft of the previous bill, and that was of State cooperation for towns.

I have been put down on the programme to address you on the subject of State aid. I have sometimes used that phrase, but I am rather against it. There has been so much of what you might call paternalism that I prefer the phrase "cooperation," because I believe that contributions provided for under these bills in New York represent the general commonwealth interest in the common roads. The system is very similar to that which our friend from Belgium has in his own country and the system that they have throughout the continent of Europe, and that is a system where there is State, county, and town cooperation.

Two or three years before the State highway bill, as I call it—bill No. 115—which has become known as the Higbie-Armstrong bill, was passed, the Fuller bill was defeated by lack of a constitutional majority. That provided that where towns adopted the money system the State would give 25 per cent of the amount raised by them as a contribution for the road work, to be used in work of a permanent character. Mr. Bowers, who represents Onondaga County in good-roads matters, tells me that in that county of 19 towns 14 have adopted the money system. We put our highway-improvement bill on a basis of 50 per cent for the State, 35 per cent for the county, and 15 per cent for the town or the property owners. We said if the rural legislators, who were opposed to this extravagant measure (as they

called it), to this radical measure, to this revolution in the system of the State (I didn't admit it then, but I admit it now; it was all those things—every one of them), would pass this measure (which I called moderate, which I called comprehensive, and which I said then, as I say now, is preservative of home rule and local option) that we would pass the Fuller bill for them. We passed the State highway-improvement bill, and I sat by the speaker in the assembly when it was passed. Three days after that we called up the Fuller bill and passed it. That is the result of ten years' effort practically almost alone. It is true I have had some help. Major Wadsworth and Colonel Sanger, who is now in the war office, contributed toward the expenses some \$200 or \$300, and I got a few dollars from some other people, but the rest I provided myself. I spent seven or eight years of time and a good deal of money to bring it about. In some counties there were men who were cooperating with me and doing in these several counties, under my suggestions, things that produced results.

I want all of you from every State in the country to start in your own States. You can start from a similar situation to that which we had here—the old feudal idea, the system of labor on highway work that we inherited from George III of England at the time when our forefathers thought it was a good thing to pull away. Since then we have reformed, while our highway system has stood still. You can each of you be a center of force. Each of you who has the time and the energy and a little money can be a center of energy and force to bring about just such changes as we have seen here.

In New York you can build most roads under the State highway bill, and the cost will be paid in the proportions I have named. But, besides that, each county can build roads for itself, if it prefers, and have the State engineer to care for them. Each town can adopt the money system and care for its roads, and the State will contribute a certain percentage to be expended in work of a permanent character on the roads of the town, under the direction or with the advice of the State engineer.

I don't know whether Mr. Bond has told you what is going on in the State, but I can tell you that in thirty or forty counties we are having main roads built at the expense of the State, the county, and the property holders. Wherever good roads are built the people want more. They add to their comfort; they add to the property value and the power of the farmer to market his produce. Long ago in this State we stopped talking of the benefits of good roads, and I am not going to talk on that subject. There are over one hundred towns in this State that have changed to the money system, and you and I know that as soon as you eradicate the rotten, false, fraudulent labor system—as it is now, it is a premium upon dishonesty, a premium upon negligence—you have done a great deal to improve the character of your roads.

Under the bill which I drew towns and counties may build these roads by contract—contract themselves to build them, have the requisite force and machinery, and take a contract from the State and do it, for we provided that the State was to oversee the work.

Just one other thing. I come from the city of Rochester, which was one of the first cities in the State to adopt the wide-tire ordinance. [Applause.] We said: "A year from now everybody must have tires so wide," but at the end of a year everybody had not changed. The chamber of commerce was going to do something. But I said to them: "Suspend it; we do not want to work any hardship; let us lead the people and not drive them." It soon began to be heard in the town that the wagons with wide tires drew easier; it was seen that instead of three horses, two drew them, and everybody knew they were of great benefit to the streets. In dealing with this matter we had to enable the farmers to come to town, because we didn't want to drive them to another town to market. That was some seven or eight years ago. I have been to Albany trying to get the wide-tire bill through, and could not do it. Mr. Bond, the State engineer, is here, and he will assure you

we are not able to finish the State Capitol at Albany. It has only cost us about \$26,000,000 so far, and we are perfectly willing to put in a million or two more, because it is unfinished; it is without a tower. Why can we not finish it? Because, gentlemen, we have had investigations made by engineers and found out the fact that if you put a tower on that building there will be too much weight on the ground, and the whole Capitol might slide into the Hudson River, and we would lose our twenty six million and the State Capitol, too. [Laughter and applause.] Every ordinary road wagon on narrow tires bears upon every square inch of surface ten times the weight of the proposed tower. Do you wonder that your roads don't last?

Why do narrow tires exist? I can tell you one or two reasons. One man in Albany told me that he could not afford wide tires, because when there was snow and ice on the ground he would slide into the gutter. I said to him: "Don't you have tires on your bobs?" He said: "Well, that is different." There was another gentleman, representing Green County—an honest, intelligent man. He said: "I am with you on this, but you don't know the circumstances in our county up in the Catskills; we cut through bowlders in the road, and there are spaces there about that wide [indicating], and narrow tires will go through all right, but you put wide tires on and they will stick between the rocks." [Laughter.] I said to him: "I believe that, besides the making of legislation, there is the administration of legislation, and if I was an official of your district or town or county, and there was such a law in the statute book and its enforcement was ridiculous, I would not enforce it, and I would say so frankly and state the reason." There is no criminality in driving with narrow tires, but wherever wide tires are possible let us have them.

We worked at the State legislature, and the best we could do was to get an optional wide-tire law, which provided that any county board of supervisors, any town board, or any city, might pass local ordinances within its jurisdiction covering the subject. I was not able to get up any local agitation in the county of Monroe or the city of Rochester, but it must have percolated through. I had to use the local newspapers to do the work. I was doing the work for the county and nation. The county of Monroe was the first to pass a wide-tire ordinance, and it is in effect to-day; it took effect as a city ordinance about a year or two later. We passed it scientifically. I was rather afraid to make it scientific, but we did it. I thought simple provisions would meet farmers' ideas better. The tire is proportioned to the diameter of the axle. I can not give you those figures; it is no use giving them; but there are certain rules by which the tire is to be a specific width according to the diameter of the axle. If you want to find out about these things you can ask Mr. Dodge—that is what Mr. Dodge is for! [Laughter and applause.]

Now, gentlemen, this is a somewhat rambling talk, and I do not want to take up much more time. The pamphlets which are here will give you some idea of the subject, but no one can have an idea of the work I have done to bring about this legislation. I do not want to be conceited, but I will state right here in this international congress on good roads that since the days of DeWitt Clinton there has been no legislation passed in the history of the Empire State affecting the political economy and transportation of the State that is as productive of good results as the legislation which you will find referred to in that pamphlet. [Applause.]

Just one word about taxes, because you may want an explanation. I said that the State pays 50 per cent. The first year we only got an appropriation of \$50,000. This was a tax of exactly 1 cent per \$1,000 of assessed valuation. The taxes of the farmers of the State of New York for the purpose of that \$50,000 appropriation were \$3,500. As I told the Albany County farmers who came down against us, they

were spending more to defeat the measure than its passage would ever cost them. Take my own county of Monroe, a very prosperous county. Any county that is the home of good roads, farmers' alliances, woman's suffrage movements, etc., must be a very prosperous county. We are assessed for \$150,000,000, of which the city of Rochester is assessed \$100,000,000. Suppose we built—as we have built in Monroe County—a road under State Engineer Bond, and suppose we spent \$10,000 on a piece of road in the town of Brighton, in the county of Monroe. First of all, the State pays 50 per cent—that is, \$5,000; that comes out of the State appropriation. The sum of \$3,500 is paid by the county of Monroe, and if you spread \$3,500 on \$150,000,000 you get a tax of about 2 cents per thousand.

The town of Brighton is assessed \$1,500,000. There was \$1,500 for the town of Brighton to pay on account of this \$10,000 road. You spread the \$1,500 on the \$1,500,000 and you have got a dollar—one clean dollar—on each thousand as the contribution of the town of Brighton to have a good main road through the town. That is not onerous, and it has not proved so, because they want more. The next town is having roads built, and Mr. Bond is building roads so that Rochester is connected with Brighton and through Brighton with other towns. I had a small section built first, because I did not want to be a hog in this matter. Speaking of hogs, the only joke I know of connected with bad roads is one related of Horace Greeley. He had to take a drove of hogs to market over very bad roads, and it took him so long, and the cost of keeping the hogs was so great, that when he came back and they asked him what he got out of it, he said: "Well, I had the company of the hogs." [Laughter.] There are very few jokes in the road question. I thought we might get the aid of the comic papers, and one time I wrote to both Puck and Judge, trying to get them to make some jokes on this question. I watched their papers faithfully, and one or two attempts were made in that direction, but I must confess the jokes were very poor and very feeble; however, as I could not do any better myself, I didn't feel like criticising them.

This is good common-sense work, that will tell to your advantage and reputation in every locality where you undertake it. There is no lack of literature and knowledge now existing on the subject; if you will write me and will send a postage stamp (I am tired of paying out postage in this matter), I will answer any questions you want to ask. As I say, it is philanthropic work. Some three hundred years B. C., Katha Kari gave this definition of charity: "Charity is found where a man seeking to benefit all men, those he loves and those he loves not, builds canals, makes roads and bridges, and plants trees for shade." It used to be said that a man who made two blades of grass grow where one grew before was a benefactor to mankind. Production will take care of itself, but the man to-day who can make two tons go where one went before is a benefactor to his race. [Applause.] When you make better means of communication, you make better value for the land which you have, and better living for the people who dwell upon it. So it is a philanthropic work.

When I addressed the first national good roads convention I stated my position in this wise, and I state it to you again, in the words of Rudyard Kipling:

Still we let our business slide,
As we dropped the half-dressed hide,
Just to show a fellow-savage how to work.

That is the only purpose I had in coming here and addressing this meeting.

ROAD LAWS AND ROAD BUILDING IN MASSACHUSETTS.

By CHARLES M. ROSS, *Street Commissioner, West Newton, Mass.*

MR. PRESIDENT, LADIES, AND GENTLEMEN: I did not come here to make a speech, but because I am always interested in good roads work, my efforts in that direction having been of a practical nature.

I have been street commissioner of the city of Newton for eleven years. We have something over 200 miles of streets in our city, including about 65 miles of macadam. I have also been on the Massachusetts highway commission, where I served two years, resigning last July.

I will endeavor to tell you briefly of the operation of the State law in Massachusetts; then if you desire to ask me any questions I shall be pleased to answer them to the best of my ability.

The State highway commission consists of three members, one going out and a new member being appointed each year. Mr. MacClintock, who is chairman of this commission at present, expected to be here. He has served for seven years, and I do not think there is a man in the country better posted on road building than he is. This commission was organized some seven years ago, its duty being to take charge of the State roads. In 1894, which was the first year of the existence of the commission, the State appropriated \$300,000 for road purposes. In 1895 the appropriation was \$400,000; in 1896, \$600,000; in 1897, \$800,000. In 1898, on account of the war, the appropriation was cut down to \$400,000. In 1899 it was \$500,000, and in 1900 the same, making in all \$3,500,000 that has been spent on the State roads of Massachusetts under the direction of the State highway commission. The standard road built by the commission is 15 feet wide, with 6 inches of broken stone, and up to the present time they have built about 300 miles. Massachusetts is a very difficult State to deal with in road building, as so many different conditions exist in the different localities. In some parts there is nothing but sand, in some nothing but rock, and in others nothing but clay. A specification prepared for building a road on the Cape is worth absolutely nothing in the Berkshire Hills or down near the Rhode Island line. So we have to change conditions as we meet the situation. The grade is the worst thing we have to contend with. There are places where we were called upon to furnish plans for a road with a 12 or 14 per cent grade. Of course it is impossible to recommend the building of such a road, and in a great many cases the commission has been obliged to go around through other land and build practically a new road in order to reduce the grade, and in that way the cost per mile has been made very high in some places. The practice of the commission has been to pick out the poorest pieces of road in the State for improvement, believing that in doing so the public would receive the greatest benefit from the work. If you can take out a bad place in a road, then a team can go right through. Still, roads have been built practically all across the State, from New Hampshire to Rhode Island and from east to west. The number of miles expected to be built is about 1,800, and after that it will be possible for anyone in the State to reach a good road by riding not over 5 miles at the most, and in most cases a much less distance. Those 1,800 miles represent the main arteries leading through the State. The commission builds no city streets at all, but merely country highways.

In addition to that the commission is authorized to give advice to all towns and cities that require it, and in every county once a year it holds meetings at which the people can come and be heard.

The method of procuring the building of a road is this: In the first place a petition for the road is presented to the municipal authorities, who refer it to the State engineer, who examines the road and reports to the commission whether it is a practicable road to make or not, and its action is based on his report.

The State pays the whole expense. It is not easy to state the average cost per mile. Some roads have cost as high as \$10,000 a mile. Those were in the Berkshire Hills, where we had to spend a large amount in preparing grades, making bridges, etc. The cost of the stone varies a great deal. For instance, on the Cape they have no stone at all, and it has to be railroaded for a long distance, while in the western part of the State there is plenty of trap rock. About \$1.70 a ton is the average cost. As to the cost for a macadem road per mile, that depends so

much on circumstances that I can not tell it. The roads that we build take about 2,500 tons of stone per mile, making the road 15 feet wide, which is wide enough for country roads. The roads themselves are 25 or 30 feet wide, but the stone part is only 15 feet wide. There are instances where a road has been made 18 or 20 feet wide, but the standard width is 15 feet.

The main road through the State from east to west varies a little in width; as you get within 10 miles of Boston it is a little wider than in the western part of the State.

Mr. JAMES W. ABBOTT (Lake City, Colo.). What is the disposition of the railroads with reference to the freight on the stone? Are they willing to give light rates?

Mr. ROSS. I think not. I think they charge about the same on stone as on coal. Perhaps in some cases they have been able to make a little better price than they charged on some other materials.

Our roads are built on the Macadam, not on the Telford plan. The depth of the metaling is 6 inches on our standard roads, and on some others 4 inches. We find that in some cases 4 inches makes a very good road. The stone is put on in three layers. The first stones go through a 2-inch hole in the screen, those in the next layer through 1-inch holes, and on top are placed half-inch stones.

We use a thorough system of underdrainage. We take the report of the State engineer, and in every case where it is necessary to put in side drains it is done by digging trenches on the side of the road—sometimes on the up-hill side and sometimes on both sides. In cuts we put them on both sides. A 10-inch pipe is laid in the drain and the drain is then filled up with fresh stone.

In regard to repairs we consider it better and cheaper to keep a road in good order all the time. On the Cape there is one man employed who takes care of 8 miles of road. In the Berkshire country we have a man who takes care of 11 miles with his team and himself; he goes over the road constantly with his team and makes whatever repairs are necessary to be made.

Mr. RAOUL. How long will that road last?

Mr. ROSS. If it is kept in proper condition it will last until it is gone. [Laughter.] The conditions vary so much that yours is a very hard question to answer. It is not possible for anyone to say how long a road will last. If the construction is proper and good, it will last until the stone is all worn out, because as soon as you wear down onto the 2-inch stones you still have a good foundation to travel on, because the grinding of the wheels over the stone furnishes fine material enough for a good road. We do not calculate to let it wear down as far as that. As soon as the road begins to wear down it is resurfaced. In the resurfacing of the road we find places where the water comes in and forms a channel. These roads are spiked up by putting spikes in the steam-roller wheel, and then we put on about 1 inch of stone with a light binding coat to hold it down. That costs about 10 cents a square yard. My experience both on the highway commission and in our cities is that it costs about 10 cents a square yard for every inch of material you put on. If you put on 6 inches of stone, it costs about 60 cents; if you put on 3 inches, 30 cents.

We have never used any earth or clay as binding material on our stone roads, excepting on the Cape, where we have used a very sharp clean sand which we get there. A very little of that is spread on in the spring when the frost is coming out, less than a quarter of an inch in thickness. The State owns 17 rollers and one of those steam rollers is put on the sand when the ground is soft and rolls it in; but we never put on clay or any other material, except fine crushed stone or sand.

As to the cost of maintaining these roads after they are built, a law was passed last year allowing an assessment of \$50 a mile on any town or city through which these roads go—a contribution toward the making of repairs; but until this last year the State has taken the entire charge of the roads and borne the expense.

Repairs may cost \$1,000 a mile in a particular place. The State is obliged to repair that road, whatever it costs, but can not collect more than \$50 a mile per year from the local community.

As to the cost of maintenance, that varies greatly; it depends upon conditions. For instance, on one road we might have a very severe freshet, washing the surface entirely off and requiring a complete resurfacing. I do not think, however, the average cost on a good road would be more than \$50 or \$75 a year per mile. On the 8 miles of road in the Cape that I spoke of, there has been an average expenditure of \$50 a year per mile: and in the Berkshire Hills the cost is a little more than that.

The stone we use is almost entirely trap rock. In some places we have a very good and hard cobblestone. We do not use any limestone at all.

The use of wide tires is not compulsory in Massachusetts. There is no law on the subject. But the State commission has some fifty-odd teams, and when I was a commissioner, whenever a new tire was wanted, I put on a wide one. I think every city or community should set the example, without having a law passed. I don't believe in compelling a man to use a wide tire; I think a man can see for himself that a team can haul a larger load with a wide tire than with a narrow one.

In building our roads we have tried to get down to 5 per cent grade, but we have had to exceed that in some cases. Some are as high as 8 or 9 per cent, but we do not like them.

We use mostly 12-ton rollers, although the commission has one or two of 15 tons. We have had no trouble in using the heavier rollers. In our city we have as high as 9 or 10 per cent grades, and these 15-ton rollers can roll any street in the city.

In some cases our roads have "raveled." But that is something that people imagine is worse than it is. It almost always happens in the dry time in the summer that the road will loosen up, but if a man went over it with a rake he would find that he would not get a cart load of loose stones in over a mile of road. We take pains to have the roads raked and kept clean.

Mr. RAOUL (North Carolina). You say you have a man for every 8 miles to repair the roads; how often does the roller get to them?

Mr. ROSS. The roller goes over them every spring. As soon as the frost comes out in the spring we calculate to put the roller over as fast as we can.

A DELEGATE. Don't you have a good deal of trouble with your roads in a clay country?

Mr. ROSS. Yes. There is no use putting in macadam on a clay surface unless it is thoroughly underdrained and there is a sufficient foundation to take care of it.

Mr. ABBOTT. A few years ago it was reported that a great many farms in Massachusetts had been abandoned because the roads were so bad that it was almost impossible to market the products. I would like to know whether the construction of these good roads has brought those farms back into the market and caused them to be reoccupied?

Mr. ROSS. I would state in a general way that the effect has been very perceptible in our State; that the conditions were such ten years ago that a farm 5 miles from market was almost unsalable. Now, I was talking the other day with a man who lives 14 miles from Boston, and he has sent teams into Boston for over twenty years and he now hauls with two horses what he formerly had to use three to draw.

Mr. ABBOTT. Then it is a fact that the agricultural conditions in Massachusetts have been very much bettered by the improvement of the roads?

Mr. ROSS. There is no doubt about it. Testimony from all over the State shows it.

Mr. ABBOTT. It is a strange thing that the railroads are not willing to contribute by hauling stone at a low price.

Mr. ROSS. They should do so. It has been a great drawback to the farmer that it costs him as much to get his potatoes from the farm to the railroad station as to get them from the depot to the city.

About \$5,000 a mile will build a 6-inch macadam road without any side drains. If you put in side drains that adds to the expense. If you have to change the grade, that is, cut down or grade up, that affects the cost. Ten thousand dollars a mile has been spent on some roads, but on very few. The average cost is about \$5,000 a mile.

A DELEGATE. A number of farmers in Saginaw County, Mich., took it upon themselves to build 1 mile of firm road through quite a low piece of land, where there was a particularly bad piece of road to be passed over in getting to the city of Saginaw. They did this out of funds they raised themselves. I think the roadbed was about 9 or 10 feet wide, and the stone was put on between 11 and 12 inches deep. This road was built for \$1,800. Some of this material was hauled from the cars by the farmers for a nominal sum, but the stone itself, known as Bayport hard limestone, was hauled on the cars about 40 miles and delivered on a side track quite close to the place of improvement. That road was built about three years ago, and, with some top dressing it has had since that time, has proven to be a very good piece of highway.

I make this statement because I think it is wrong to leave the impression that it is necessary to expend anywhere from \$5,000 to \$10,000 on an average road. Of course some roads are exceptional, both as to drainage and cutting through rock.

Mr. RAOUL (North Carolina). You said, Mr. Ross, that there was no use in building a macadam road on a clay foundation unless it was thoroughly underdrained. That particularly referred to the freezing up of the road, did it not?

Mr. ROSS. Yes, sir.

Mr. RAOUL. If you are where you will not get a frost over 6 inches deep that is different, is it not?

Mr. ROSS. The greatest trouble with a clay foundation is on account of the frost. Of course, with a severe storm it will puddle up with the rain and make it unsatisfactory.

As to rollers, I think it is better to have them all alike, because you have to send the engineers around from one city to another and, perhaps, the engineer who understands one kind might not understand another.

In building a clay road we usually provide for drainage only on the side; if there is a hill, on the upper side; in a cut, on both sides. We don't like to put a drain under the center of the road, because it is pretty hard to get at to repair it. As a general rule we can take care of all the water as I have suggested.

The CHAIRMAN. Saturday, the 21st instant, has been set aside as "Good roads day" at the Pan-American Exposition. From 10.30 to 12.30 Music Hall will be at the service of the Good Roads Congress, and men of national reputation in this and other countries will speak.

The special good roads train, fully equipped with modern road machinery, which has been brought from Chicago over the Lake Shore Railway, will be on exhibition at the Exposition grounds.

R. W. RICHARDSON. A great many gentlemen come from the prairie States, where there is practically no stone or other material for the construction of macadam roads. If the subject of practical earth-road making could be brought up, it seems to me it would be of great value to a large section of this country, principally the great valley States of the Mississippi. [Applause.]

FUNCTIONS OF THE GOVERNMENT, THE STATE, AND THE COUNTY IN AMERICAN HIGHWAY IMPROVEMENT.

By Prof. J. A. HOLMES, *State Geologist, Chapel Hill, N. C.*

MR. CHAIRMAN, LADIES, AND GENTLEMEN: I hope you will not consider the magnitude of the title of this address as representing the length of the address itself. I shall take warning from the motion just passed and give you in a most abstract form the few suggestions I have to make with regard to what, it seems to me, in the majority of the States of the Union, the State and the county or township cooperating, can do, and what the Federal Government should do, cooperating with these, in the way of promoting this great movement.

We congratulate the gentlemen from New Jersey, New York, and Massachusetts, where the good roads problem has already reached such a stage that the State and the county are now cooperating in building highways. In these States the sentimental and educational phases have been passed. It is now actual work that is demanded, and good work at that—more of it every year.

If I am correctly informed, the State highway commission of Massachusetts, at least once, was actually offered by the legislature a much larger appropriation for road building than the commission was willing to expend during that year. But the condition is very different in the larger part of the country, and we have still before us the great problem of bringing the people up to the point where they are willing to support a liberal system of modern road building by taxation on property. And in our South Atlantic States we do not have, as in New Jersey, numerous great corporations to furnish the money for highways and other purposes.

While I believe that all the people in this country are willing to have good roads built, the question is whether they want them bad enough to be willing to pay for them. In the majority of cases they have not yet come forward and said in unmistakable language that they desire them to that extent. Yet from the illustration given us here in New York this morning by Mr. Wright, we can see how much one man can do by continued, persistent, and earnest effort in bringing about the very satisfactory result that has been achieved in this State. If he has imposed extra burdens on State Engineer Bond and his assistants, there are many States in which it is highly desirable that similar burdens be imposed on other engineers.

I may say with regard to county road work that there are scattered about in our several States many cases in which, unfortunately, individual counties have had to act alone, each following a road system of its own, or else be held back indefinitely by the lethargy and indifference of surrounding counties and of the State as a whole; and such counties by forging ahead have not only benefited themselves, but have also stimulated other less progressive counties to follow their example. But in spite of the progress made by these few wealthier and more enterprising counties, we see that there exists to-day in our average county an enormous amount of prejudice, an enormous amount of ignorance, in the matter of road building itself, and a consequent great loss of time and waste of public funds, which latter has done more than almost anything else to keep back this movement for better roads; for I have found that where there is great opposition to taxation it is an opposition which is based on ignorance, indifference, and bad management, and comes from the fact that citizens see the taxes which they pay year after year used to poor advantage, and even wasted on improper work, such as draining a place which can not be drained or grading a place which can not well be graded, both of which places would be avoided by first having an intelligent, experienced engineer relocate the road. And even these counties that have forged ahead in road building have done so in most cases without employing trained engineers or adopting improved economic plans, and hence have done imperfect

work at excessive cost. Cases have been mentioned here where three or four million dollars have been practically thrown away owing to bad management; and I might mention many other cases where there has been enormous waste of money, labor, and materials. And then, too, another disadvantage of such a county system of road building is that while these more wealthy and enterprising counties may forge ahead they do nothing directly to help along the weaker counties, and the latter become discouraged by being left entirely to their own limited resources.

The great object which we have in mind, and in my judgment the greatest object which this congress and similar bodies should endeavor to accomplish, is to secure the introduction and the organization in different States of a proper system of road building based on taxation, and on such plans as will guarantee that every dollar of money, every day of labor, and every ton of material will be used to the best advantage for accomplishing permanent results. This is difficult to accomplish, and the difficulty arises from the lack of trained road builders and from the further fact that nearly every farmer considers himself a competent road builder; and I suppose in most cases the county authorities would prefer to expend several hundred dollars in carrying out their own crude ideas or plans rather than pay \$10 to a competent road engineer for his services. This condition of things must be changed. Brains and experience must guide and control in this important work. The counties must cooperate and profit by each other's experience, so that every additional dollar will be for additional work—not for poor work repeated. This can be best accomplished through some system by which the State and Federal Government will cooperate with the county.

But whatever may be said as to the disadvantages of such a county system, we must, as a rule, expect the county or township to raise the bulk of the funds for the building and the maintenance of the highways within its borders. And the serious phase of the problem, then, becomes one of (1) providing intelligent supervision, and (2) securing the full acceptance of this supervision by the county authorities. It seems to me to be of the utmost importance that we secure the adoption in the different States of a road system which, while it may not be the same as that in force in Massachusetts, New York, or New Jersey, is yet a system which embraces some plan of State aid or State cooperation such as will secure united effort, the best plans and specifications for roads, bridges, and culverts, and the best supervision of this work obtainable. Except in the few cases mentioned the States have never appreciated or discharged their duty along these lines. The most intelligent thinking classes recognize the importance of such a plan; but the people hold back and are slow to take advantage of it. The general situation resembles frequently the experience of a boy going in swimming. He dreads the cool water and waits hesitating and shivering on the bank until someone comes along and pushes him into the water, and then he is glad he is in it. So in Massachusetts, New Jersey, and New York the majority of the people for some years have been willing to do something toward a better system of highways; but there was no one to push them into it, or in some way hoodwink them into it, as I believe my friend, Mr. Wright, and his associates must have done in New York. But now these States have entered upon this great work with energy and wisdom and their people are proud of it.

The State should direct, aid, and encourage the several counties as a wise parent guides and helps his children. Let us see how this may be done. In the first place, the State should guarantee to every county that is willing to build good roads intelligent supervision of the work. You may ask how the State can do this unless it is willing to appropriate money for the actual work of road building. The State can do this in part by providing, free of charge to the county, competent engineering supervision of this work. In the majority of cases the county officers are willing to allow an engineer to superintend the location and building of their roads, provided that someone else pays for his services. That

should be provided for even if the State engineer act only in an advisory capacity. In many cases, as in the case of the roads of your State (Florida), Mr. Chairman, and my own, if we can not get the State to actually appropriate money for building roads, yet the State may be willing to authorize every county to build roads by a liberal system of taxation; and then out of its own larger treasury pay competent engineers who will see that every dollar of that money raised for road building is spent judiciously, and not wasted, as is now so often the case.

Then the State should adopt certain general regulations under which every county may employ on its public roads all its criminals whose terms of sentence do not exceed ten years. In the Southern States this is done already to a considerable extent. In North Carolina we are thus employing practically all the convicts whose sentence is for a period of less than ten years; and, by the use of this convict labor we are building public roads at a cost of \$2,000 or \$3,000 a mile that are practically as good as those which are being built in New Jersey or Massachusetts by hired labor at a cost of from \$5,000 to \$7,000 per mile.

Again, in regard to the education of road builders: We have had in this country, for the past quarter of a century, the agricultural and mechanical colleges, supported in part by the Federal Government and in part by the State, whose duties have been to look after the development of the resources of this country; and yet if, in the Southern States, they have turned out a single intelligent trained road engineer, I have not been able to find him. The State certainly has not done its full duty in administering the expenditure of these funds turned over to it by the Federal Government, and we must see that the proper remedy is applied. Of course it may be said in excuse for these colleges in not turning out trained road builders that the demand for them has been very limited. The county authorities who have selected the men to supervise this work have failed to realize the fact that training and skill are just as much needed in building a first-class wagon road as they are in the building of a railroad, in the construction of a house, or the making of a watch. Failing to realize this, they have placed in charge of this work any man who had sufficient ambition and political pull, or family influence, to make himself felt as an applicant for the place, or who was willing to undertake this work for the smallest pay. Two results of such a system stand out prominently: First, young men of training and ability are not encouraged to undertake road building as a profession; second, money which on any businesslike basis would have been expended for brains to manage this work has been wasted in useless experience, trying to train men who can never be trained, who never did build, and never will be able to build, a piece of good road, who never even saw a sample of it, and would not recognize one if they did see it. Young men trained in colleges for engineering work are turned aside because they have no public or political influence, no one to exercise "a pull" for them, and the positions are given to men who know nothing about the business and who care little about it except to draw their pay.

In connection with supplying road materials there is an enormous amount of money wasted in our Southern States through the use of material that is too soft or otherwise unsuitable. The result of this is that these roads must be repaired or rebuilt every few years, this requiring a very considerable outlay of money; and while the general work of testing road materials is now being carried on by the Federal Government, where it properly belongs, yet the State should help the county by investigating the local deposits of road materials within its borders, and indicating how they can be used to best advantage. There are many local problems of this kind which the State should endeavor to solve, as they are mostly problems which the counties would be likely to neglect, and being of importance to many counties alike, they thus become appropriately State problems.

In still another way the State can reduce the cost of these road-building materials. I am told that the California highway commission, by the use of State

funds and convict labor, has been able to crush the best road material found in that State and load it on the cars at the crusher at a cost of 25 cents per ton; and that even such a "close" railroad as the Southern Pacific Railway Company is said to be has agreed to haul this material anywhere within 100 miles of the quarry for another 25 cents per ton. This material was then sold to each county within reach at just what it cost the State. In this way the best possible road metal was obtained by these counties at a price less than the cost of inferior material obtained in many of our Eastern States. The State of California greatly cheapens and improves permanent road building in its counties practically without cost to itself. Eastern States can do the same. Looking at this matter of transportation as a road builder, I can not see where the "stinginess" of the Southern Pacific comes in as compared with the Massachusetts railroads, which seem to charge all they can get. The cheap transportation of the best road metal is one of the great problems that must be solved. Unless this material can be transported long distances at reasonable rates we must continue to use local material which is often of the most inferior quality and consequently very expensive, the road having to be rebuilt every few years.

The State can and should collect and supply for use in all its counties accurate information about all local matters pertaining to road building, and it should join in all the educational work which is necessary to bring its citizens to realize the need of better highways. There has been an enormous amount of educational work done by the good roads leagues and societies, which work has been largely personal and patriotic. This we should appreciate and encourage, but the whole people of the country are interested in this work and the most reasonable way for them to take part in it is through their government—Federal, State, and county, and therefore each of these governments should take the lead in this educational work.

I know of no better illustration of the results that have been accomplished by such means than what our friend, the Hon. A. W. Campbell, has recently accomplished in the Province of Ontario, where he has gone through the country with trained engineers, agitated the question, and talked with the people about the need of better highways until the provincial parliament at its recent session voted an appropriation of \$1,000,000 to be used along with funds raised by local taxation in cooperative road building, under Government supervision. I believe similar results can be brought about in many of our own States if this educational work can be pushed more vigorously, and the best men obtainable should be employed by the State for carrying on this campaign of agitation and education. The work should not have to be done by private enterprise. The State itself, which represents all the common interests and the common wealth in a concrete form, should take the lead and educate its citizens to realize the importance of this great movement.

If the State will cooperate heartily with its several counties in this work in the ways just indicated, the movement for the betterment of our highways will make great advances. But in view of the importance of this movement, the State should do even more than this. It should give financial aid in the actual work of road building sufficiently (1) to aid and encourage permanent road building in the weaker counties, and (2) to serve as a basis for securing the acceptance by the authorities in all the counties of the engineering supervision provided by the State.

There are several ways in which the State can give the counties financial aid in road building. The first and simplest is by making an annual appropriation out of the State treasury for public road building, the amount of this appropriation being a fifth, a third, a half, or some other definite part of the cost, the same to be used in connection with that raised by the counties. But there are some of our States and counties in which the amount of the annual tax for road building is necessarily small, and yet it is important that a considerable amount of money

for this purpose be raised at a particular time, in order that the work be pushed more rapidly. Generally this can only be done by borrowing money, and yet the average county in the Southern States to-day has great difficulty in borrowing money at a rate of interest less than 5 per cent. I have known some to pay 6 per cent, selling these road bonds at par, while the very State in which such county is located could borrow money at from 3 to 3½ per cent. This difference in the rate of interest on money that may be borrowed by the State and by the county is a matter of considerable magnitude, the difference in the amount to be paid on a loan of \$100,000 ranging from \$2,000 to \$3,000 a year. This saving to the county may be effected if the State will guarantee the county bonds, or borrow the money for the county; and I understand, Mr. Chairman, that this can be done without any risk or loss on the part of the State.

Then, if the State can borrow money for road building at 3 per cent, it can loan this money to the county at about the same rate, and this arrangement will help the county build roads with such rapidity as will in a few years lift from its people the terrible financial burden which bad roads imposes upon them in the form of a hill tax, a mud tax, and a sand tax. There is such a thing as a county getting rich by going in debt—when it goes in debt for good roads. It was suggested some few years ago that the National Government might guarantee such bonds and secure a rate of interest of 2 per cent. That, perhaps, would be too large a problem to grapple with at the present time and it may never prove necessary or feasible; but for the county to borrow money through the State and for the State to guarantee the payment does seem to me both feasible and wise under the conditions just named.

With regard to the work which the Federal Government can do to help along this movement for good roads, it must be remembered that the interest of this Government in good country roads has grown greatly during the past few years in connection with the development of rural free mail delivery and the increased commerce of the country. In view of these great interests it goes without saying that whatever the General Government can do legitimately to promote public-road building in the United States should be done. Still, I can not advocate promiscuous road building by the Federal Government, nor do I believe it would be wise for this Good Roads Congress even to agitate the question of building national roads in the different States at the expense of the General Government. If, hereafter, the people of the United States want that work done they will demand it, but at present the mere agitation of such a measure would, in my judgment, prejudice the whole matter to such an extent that it would increase the difficulty of securing adequate appropriations for such work as we generally agree should be done by the Government to help this movement along during the next few years. So, laying aside that phase of the question, let us discuss briefly what may reasonably be considered as the function of the National Government in connection with this movement for the betterment of American highways; and in doing this let us not forget that while road building is in many respects a local problem, yet many phases of the problem are the same in all the counties and in all the States, and hence are national in character.

In the first place, we can all agree that the Government should supply information. Its agents should collect this information from every part of the civilized world, and, if necessary, it should send men abroad and have them in person examine in every detail the policies and plans followed in each country. This information as adapted to the local conditions in different portions of the United States should be published and widely distributed. In this way our local road builders can make use of the best results obtained under similar conditions in every part of the civilized world; and this will help us to expend every dollar of road money to the best advantage.

Another way in which the Government must obtain valuable information is by

investigation: and one of the great problems to be solved in connection with this good roads movement is where to secure and how to use to the best advantage in road construction the best materials that can be found in different parts of this country. The Secretary of Agriculture has already inaugurated a work of this kind, but it needs to be greatly enlarged. This problem as to materials for road building has no such limits as county or State boundaries; and while there is much that the several States can and should do in its investigation, yet if left to the States there will be much costly and useless duplication of work, and still greater losses owing to the failure on the part of the States to do such work at all.

The colors on the map [pointing to a map on the wall] will show you the general trend of geological formations in this country. They follow no political boundaries, and many of them extend across a number of States, and occur in widely separated portions of the country. Along the Atlantic and Gulf coasts there is a belt embracing one-eighth of the territory of the United States, where there are almost no rocks at all; and there the problem is somewhat like that which exists in much of the prairie region—a problem of drainage and the importation of material for the proper local mixture of sand and clay.

I know of roads built in South Carolina, at the cost of not over \$100 a mile, by the simple admixture of sand and clay, this producing a hard, smooth surface which has borne the wear of three winters and summers in a highly satisfactory manner. These remarkably cheap roads have of course been built under exceptionally favorable conditions. How nearly they can be duplicated elsewhere can only be determined by investigation. But this is a problem which concerns more than a dozen States, and thus becomes an interstate or national problem. Such investigation should be made and information concerning the results should be disseminated by the General Government. Furthermore, the laboratory tests should occasionally be supplemented by road tests. It is sometimes impossible to test road materials satisfactorily in a laboratory alone; and it is important in such cases that there should be constructed out of such material one or more short sections of public road so as to more thoroughly test its suitability for road-building purposes. Such sections of experimental road can usually be built largely at local expense, but the construction should always be under official supervision. When such sections of roads are constructed they have always great educational value and thus serve a double purpose in helping along this movement. Both the experimental and educational work are national in their importance and influence.

This brings me to the suggestion that the Government ought further to cooperate, as it is now doing on a small scale, in this great educational work. If the Government is the best agency for gathering from all parts of this country, and from all other countries, the results of the best experience in road building, then the Government is the best agency for distributing this information, both in the form of publications and by sending its expert agents into different parts of this country to study and explain the adaptation of this information to our more or less local conditions. In this adaptation the Federal, State, and county governments should cooperate.

This educational work of bringing the American people, who have almost come to regard the mud and hills and ruts as necessary evils, to a realization of the importance of having better highways, and to a knowledge as to how to build them to the best advantage, is one of large proportions, and it deserves the best and strongest efforts that can be aroused in its behalf. The friends of the bicycle and of the automobile, the railway companies, the national, State, and county good roads leagues, and many other organizations have each contributed largely to this work. But what has been accomplished is small in comparison with what is yet to be done. The greatest present need in this educational work is for some organization which, from the position it holds and the confidence it commands,

can encourage and wisely direct the work of these many organizations in united, continuous effort and lead them to ultimate success. Such an organization should be a well-equipped good roads bureau properly supported by the Government at Washington.

So, in my judgment, whatever is for the best interest of the good roads movement in this country as a whole, or any considerable part of it, in the way of collecting and disseminating information, in testing materials for road building, and in helping along this educational movement, the Government should be prepared to do in the most complete, practical, and prompt manner possible. And now is the time of all times that we need the work of this enlarged Government good roads bureau. If this Government work is ever to grow to proportions and efficiency commensurate with the magnitude and importance of the results to be accomplished, this should be done now while the good roads movement is in a somewhat chaotic condition and in the direst need of organization and leadership. When the movement in other States reaches the status it now has in New Jersey, New York, and Massachusetts we will not so sorely need a great Government bureau to help it along; and the proportions of such a bureau may then be reduced as its work diminishes. But if now the Government is to do anything at all, it should do something respectable. Its tiny Office of Road Inquiry now found in the Department of Agriculture has done much good work in the past in helping this movement to its present position. But it now is falling far short of the fullness of its mission. It should promptly be enlarged to a reputable bureau, organized on such a basis as will enable it to meet the reasonable and urgent demands of the people in all parts of this great nation.

Mr. Chairman, I must close this address with the feeling that I have already occupied too much of the time of this convention. I have endeavored to outline briefly what I believe to be the more important functions of the Government, the State, and the county in the betterment of our highways. I can not say, as was said in the case of the Three Graces, that the work of one of these is greater than that of the others; nor, in their work, is there any occasion for a conflict of opportunity or responsibility. The task to be accomplished is so large and the progress made so slow that what we need is the active, earnest cooperation of all these great forces; and we need it now.

ROAD MAKING FROM THE ENGINEER'S STANDPOINT.

By Hon. A. W. CAMPBELL, *Deputy Minister of Public Works, Ontario, Canada.*

MR. CHAIRMAN AND GENTLEMEN: I am sure that I am very glad to have another opportunity of addressing the good roads people of the United States. This is the third time, and I can assure you it has always been a very great pleasure and delight to me to avail myself of these opportunities and to listen to the vast amount of most valuable information afforded by many of your experts at these meetings.

We very often, in meetings of this kind, see fit to aim at solving the larger parts of the problem first, rather than taking up the smaller parts, and the parts which, after all, are of the greatest importance. The roads of our country are bad; the roads of the United States, from what I have seen of them, appear to be equally bad, and there is a good reason for this agitation. Roads are the one class of public works which I think on this continent has been most severely neglected, and very largely because we have always looked upon it as being a question of such commonplace importance that the business man, the man of knowledge and executive ability, always fought shy of it. The result is that we have to-day no organization. As Professor Holmes has said, we have no plans, we have no simple specifications. The work of road building in our country previous to the agitation, as no doubt is the case in a great many of your States, was being done without plans or specifications, without reason or design. But, as he has said, the people allow

the cold machinery of taxation to take from their pockets each year many millions of dollars, which is turned over to be expended by men who have never given the question of road making the slightest thought from a scientific standpoint. The better classes have always been too busily engaged with other and more important questions, and the result is we have never really taken the subject of road making into serious business consideration.

The first thing to do is to try and solve the problem of how best to build a road. How should a road be built? If I were to ask you now that simple question I possibly would get fifty different replies from the people in this audience. If a man undertakes the building of an ordinary pigpen, he will take a piece of paper and sketch out a plan; he will consider the question of materials, and roughly estimate the cost: but in the matter of road making, involving the expenditure of millions of days of labor and millions of dollars of cash, the work is done without the slightest plans or specifications. Each municipality, under its system of labor, selects so many path masters at the beginning of each year, and those men simply receive instructions to go on and use their best judgment as to how the work shall be done, to get as much work as possible done, and have it done in the best possible way. The result is that in average townships there are some 75 path masters, and just 75 different plans of road building, and each year these men are again exchanged for others, so that each year, under the labor-tax system, plans are changed. One man who professes to know all about it will say: "I believe in making a narrow road, and grading it 12 feet wide." The next supervisor will say: "You don't know anything about the business, it should be 16 feet wide." The next one makes it 20, the next 25, 30, or 40 feet. One man says it should be built flat on the surface, and another says it should be crowned just enough to shed the water. The third man says "I believe in sloping her up," and he slopes it so that it is almost impossible for teams to turn out. The following year other men are appointed with other ideas, who tear down the work that has been built before them, and this we call, in these enlightened days, a modern system of road building.

We talk about convict labor in the making of roads; but it occurs to me in passing over some of these roads that convict labor has been employed in the supervision of the work rather than doing it. [Laughter and applause.]

To build good roads we must reduce this matter to a simple proposition. I am an engineer by profession, but as a civil engineer I do not profess to be a road maker. My knowledge of road building comes most largely from the actual experience which I have had in building roads. When I started out to get my first experience and to build a road I thought I knew vastly more of the subject than I do to-day, after nearly fifteen years of actual experience. The trouble is that we all employ too much engineering knowledge and profess too much scientific knowledge of this problem. It is the simplest possible problem, but how we do complicate it! The average road supervisor makes the people believe that whatever he says must be done, even if the road be destroyed. The testing of stone and similar questions are important, but they will be solved by the trained and experienced road maker when he comes in contact with the work. We talk of bringing foreign material into our State and of dealing with the railroads in this matter. These are all local problems, which must be considered from the local standpoint pure and simple. We talk of cost and we ask what it will cost to build a mile of macadamized road. That depends entirely on the character of the material you have to deal with, and the length of haul of material, and largely on the requirements of that particular road. It may be necessary for you to macadamize the road from ditch to ditch in order to accommodate the traffic in that particular locality, in which case possibly 30 feet of roadway would have to be macadamized, while on another road only a single track would be necessary, and 15 or 16 feet of well-placed macadam would be as serviceable as the 30 feet on the other road.

We can, however, reduce this to a question of cost per square yard, using a certain limit of haul as a basis for our calculations. But these are questions, I say, which are of a local nature. In the first place we should ask ourselves: "How should a road be built; what are the fundamental principles of construction underlying it?" Then let us answer that. Let us reduce the matter to as simple a basis as possible, lay down our plans for building roads so as to preserve uniformity in their construction and to bring about some decent results for the expenditure that is being made. We are talking about State aid and larger appropriations for road building, but my idea is, and it has been my experience, that we have already had control of too much money, and too much money and too much labor have been expended. The first problem to be solved is to lay down simple plans for handling and expending in a proper manner the money which is being expended on the roads, and when we have completed our organizations and plans, to ask the State's indulgence for a greater amount to be expended in order to bring about results in the least possible time. I agree with Professor Holmes that system, plans, united effort, concentrated expenditure, and systematic and skilled supervision are what are really required, rather than a greater amount of money, in order to bring about good roads.

Let us lay down the simplest possible plans; let each township, each county, take up the question in the first place and say what leading arteries in their territory should be made and maintained as county roads, and let those roads be planned by the county council, made by the county council, and maintained by them for the use of the whole county. Then let the municipal council or the township council plan the remainder of the roads in their municipality, and say how they shall be laid and maintained; and the material to be used in these roads, and the cost of these roads, and so forth, should be in proportion to the amount of traffic which they are likely to bear.

In the first place, a plan should be prepared showing what roads are in each township; then these should be classified according to their importance. About one-third of the roads in a township are leading roads, used by the whole community. They should be made of a better grade and macadamized to a greater width than others; they should be made 24 feet wide between the ditches, graded to that extent, and macadamized or graveled to a width of 16 feet. Then there is another class of roads, constituting about one-third of the whole, which are used by neighborhoods and lead into the main roads; these should be made 26 feet wide and macadamized to a width of 12 feet. The remainder of the roads are simply lateral roads, used by a few people in reaching the other roads, and they should be put in good shape by draining and grading, as ordinary earth roads, and will for some years to come meet the requirements of traffic very well. When the roads have been classified in that way plans and specifications should be prepared for their construction.

There are just three principles underlying this whole question of road making. The first is drainage, the second is drainage, and the third is drainage. [Applause.] Drain the foundations. It is just as useless to attempt to build a road on a weak foundation as to erect a building or any other structure upon a weak or wet foundation. Drain the foundations. Do this by using tiles—a row of tiles beneath the frost line on the upper side of a road where it is being built on the side of a hill. If it is being built through flat land, then place them beneath the frost line on each side of the grade. One gentleman asked to-day whether it would not be preferable to place the drain in the center. We have tried that plan, but my experience has proven that it is vastly better to place single tiles of smaller dimensions on each side of the road than to place one large drain in the center. Where the road passes over a flat piece of land the soakage during the wet season is from the adjoining fields into the roadway; the water runs in and fluctuates, rises and falls with the wetness or dryness of the season. If the tile drain is placed in the center

of the road the water must pass under the road in order to reach the tiling, and the result is that the roadway will attract moisture rather than be free from it. If the tile is placed on each side of the grading outside of the road metaling, then these tile drains cut off this soakage water and always protect and keep the road dry.

The next thing is to grade the road and prepare it for receiving the gravel and stone. The grading, of course, should be done as uniformly as possible and according to a fixed plan. Our plan is to grade the road by giving it a fall of an inch to a foot from the center of the road to the edge of the ditch, and making that as uniform as possible. The center of a road 24 feet wide would consequently be 12 inches higher than the edge of the road by the side ditch. This should be done as perfectly as possible. The ditches then should be placed on each side, thus making the drainage as effectual as possible. Side gutters should be made sufficient to carry the water away at all times, and every water course should be taken advantage of as an outlet, so as to dispose of that water in as small quantities as possible and in the quickest possible time.

The next matter is to place culverts. This is a most important matter, and was referred to by Professor Holmes as being one of the important questions that should be considered. If you were to solve that problem alone to-day, you would have done for the people a very great service, because in some of our municipalities we have roads the cost of maintaining which has been most materially reduced by simply changing the old system of building and maintaining timber culverts and using something of a more substantial nature. There are hundreds of thousands of these small sluices in every municipality that must be maintained in order to carry the water in the natural water courses, and every experienced municipal official knows very well that this is one of the greatest items of expenditure, and when we hear that so many thousand dollars each year are devoted to the keeping up of roads, it might be learned that nearly 75 per cent of the expenditure consists of the cost of maintaining these perishable culverts. In the early history of the country, when timber was plentiful, all we had to do was to cut down a tree and make a cheap culvert, but now that material is much more scarce in most districts. We buy lumber at \$12, \$16, or \$18 a thousand to use for repairs on culverts. It is then subjected to the most severe test that timber can be given; it is placed underground, exposed to frequent changes of wet and dry, and its life is only about five years. This item runs into a very large amount of money each year. Seventeen years ago we abandoned that system and undertook the building of concrete pipes for renewing these culverts. Our people at first regarded that as a copying of the plans of the ancient Romans in road building, and as altogether too expensive for this new country. But it seems that a simple construction of molds can be produced for about \$5, and the material can be made with a simple mixture of cement and gravel by the use of unskilled labor, and the whole matter can be most economically carried out. When those culverts are once made and properly laid, they are practically indestructible. As I say, we began this seventeen years ago, and since then have renewed every sluice in the municipality, and to-day we are not expending one solitary cent on the maintenance of culverts. These pipes may be used up to 3 feet in diameter, and if you require greater capacity you can lay two pipes side by side, leaving a space of about a foot of earth between them: and where a greater capacity of water way is required we simply put in a concrete arch.

This is a simple construction. Templets are made just as a mason makes a templet in a window, and about four are placed in a culvert; rough boards are used for the false arch, and gravel and cement are mixed together and simply put in. The width for a 5-inch culvert would be about 12 inches at the bottom, sloping up to about 5 inches at the top, then the false work can be taken away; it is left until it sets and there is a culvert which will not require any future repairs.

We use the best material for covering or surfacing the road that is available in

the municipality. Very often this material is not of the very hardest nature, but it is cheaper to use that material and to spend a little more in annual maintenance than it would be to freight material for a long distance, especially where the freight rates are very high. A road should be constructed of the very best material and after that it should be maintained and never allowed to get out of repair. It is one thing to build a road and another thing to provide for its proper maintenance, but that should be part of your plan. Where field stones and quarry rock are to be found we use crushing machines similar to those on the construction trains. These crushers prepare the material in four different sizes, ranging from $2\frac{1}{2}$ inches down to stone dust. Usually on the principal roads we put down a layer of the coarsest stone in the bottom, the next size on top of that, the finer on top of that, and surface or finish it with the fine material. On much-traveled roads we make the depth 10 inches in the center and 7 on the side. That is made up of 7 inches of the coarsest stone in the bottom, 2 inches in the next course, and 1 in the next, and the stone dust is placed over that. This is thoroughly and completely rolled in order to get a proper surface. Each layer is rolled and the final layer is rolled until the whole is thoroughly packed. It should be sprinkled with a watering cart in connection with the rolling.

This is a simple plan of construction. The width of our roads varies according to the requirements, our narrowest roads usually having 10 feet of macadam. Where material can be obtained within a mile and a half of the work, these roads cost us 35 cents per square yard. Then a regular system is adopted to maintain them. That matter should be placed in the hands of regular and competent men. In order to bring about all this work, prepare this material, and make this road, it is highly necessary that you should provide machinery and the latest and most modern instruments for doing the work. It is just as useless and foolish to attempt to build a good road by using the old plow, scraper, etc., the implements of twenty-five years ago, as it would be to attempt to erect a structure like this magnificent building by using a hammer and a bucksaw. It matters not what a man's knowledge of road building may be, without good tools he can not do good work. You may place me in charge of some of the roads where the old system prevails, and tell me to follow the practice that has been followed in the past, and I could produce no better results than they.

We must change our method and system. The system of labor taxes was suitable for pioneer days. It has performed its work. Many people to-day fear this agitation, because they have the greatest sympathy for the old pioneer methods and do not wish anything should be said that would in any way cast reflection on that system. That system did a work which I do not suppose could have been performed by any other method, but its day of usefulness has passed away. Those who are most strongly defending its methods are its greatest enemies, because they are asking it to perform a work that it never was designed to do, and in that way they are doing it a great injustice. We must do away completely with that old method. Let us lay down the system by which the council will have control of the road, appoint trained superintendents to look after the work, and equip ourselves with the best modern instruments. Have these placed in the hands of regular officials, with a skilled and experienced superintendent at the head; then lay down the plans and commence to work in a small way. Use to the best advantage the money you are now spending and the labor you are now expending, and when that is done, and you show the people good samples of first-class work, they will readily appropriate money from their own funds; and the State legislatures will come to your assistance and grant all the aid that is required in bringing about an improvement in the condition of these roads.

System, plan, and united effort are what are required, and until these are accomplished little can be done.

My business as an engineer and as a road expert is (I am in the employ of the Government for the Province of Ontario) to go about among the people in the townships, villages, and towns, to meet with them in the schoolhouses and town halls, and talk over the question of making the roads in their particular municipality; to take a plan of their township and discuss the question with them, and try to arrive at a system for them to work upon; discuss with the road builders there the system of statute labor and what should take its place, and help them modify its plans and go along in the right manner: to get them then to set aside \$100 or \$200 or \$300 for the purpose of collecting stones and providing themselves with the proper kind of machinery. Then it is my business to go there and take charge of the work of building a piece of road, as far as that material will go; have the people come there and see and watch the work from beginning to end; and have this done in each of the municipalities. I found that this work was absolutely necessary; you had to go among the people, show them what could be done right in their own neighborhoods, convince them that a good road is better than a bad road, that they ought to build good roads rather than bad ones. When this was done we found that a lively agitation was created among the different municipalities; the legislature was quick then to respond to the voice of the people, and last year a bill championed by Mr. Patullo was put through the legislature granting \$1,000,000 to aid municipalities in the bettering of the roads along the lines they themselves had created.

In carrying on my work I went to New Orleans to attend the convention of the good roads association, and there I saw the good roads train and the work which was being done by it. I immediately returned and suggested to the executive of our association that we should adopt some such plan. The manufacturers immediately offered to supply the machinery, the railroads said they would carry the implements free from one part of the country to the other, and the municipalities said they would furnish stone at places convenient for the work to be done, and the result is that from the 1st of June we have been carrying on a work of practical construction. We go to the place where the material is prepared, crush the stone, grade the road, build these concrete culverts where they can be seen by the people, take one man from a township and train him in the work so he can do it after we have gone; we utilize the material that is there. We do not try to show the people a piece of superficial road and then get out, but the practice is to commence the work and carry it on until the material is exhausted, and as a general thing a mile of road is constructed in each municipality. At the next session of the legislature I expect a special appropriation will be made for operating six outfits of machinery in this way, and the municipalities will not be asked even to contribute the material, but sample roads will be built at Government expense, as free samples or object lessons to show the people how roads should be made.

We can talk roads here, and I can tell you how a road should be built. I frequently told the people how a road should be built before I knew how to build it myself. [Laughter.] But what is the use of doing that, and what is the use of our going on railing at the people and trying to make them believe we know vastly more than they do about this subject? Let us try to undo, to unteach them something that they have been taught, and we will have accomplished a great deal and taken a step in the right direction.

I believe that if a premium were offered for it to-day and all the genius of man brought to bear and concentrated on the formation of one plan for the building of bad roads no more successful method could be framed than some of those ingenious inventions called road systems which have been employed in some of our municipalities. [Applause.] There were to be found the most unjust, the most unfair, the most incompetent, the most inefficient, and the most extravagant systems that could ever be employed by the people for making and keeping up any public

work, and particularly the important public work of building and maintaining our common roads.

Here is the greatest problem the people of this country have to solve in connection with the whole system of transportation. You are appropriating millions of money for building canals and railroads. On the wall is a placard which says that 95 per cent of every material that passes over your canals and railroads must in the first instance pass over the primary roads. In connection with your canals you are doing an immense work; you are still appropriating money and making them more efficient. Your railroad corporations are expending huge fortunes in reducing grades and making their roads straight and smooth; steamboat companies are expending great sums in enlarging the capacity of their ships and increasing their speed. What does all that avail if you who are to be most benefited do not in the first place undertake some sensible system on a business basis for the improvement of the most important part of the whole system of transportation, namely, the building and maintaining in a wise manner of the common roads of the country?

At this point the Hon. Arthur Kirk, of Pittsburg, Pa., asked for ten minutes in which to present an important and novel plan of road legislation. His request being complied with, Mr. Kirk proceeded to read and comment on the provisions of an act bearing the following title:

An act providing for the laying out and permanent improvement of certain highways within the Commonwealth, connecting the various county seats with those of the adjoining counties, making such roads or highways State roads; authorizing the relocation, opening, straightening, widening, extension, and alteration of existing roads when necessary; to include parts thereof in said highways; authorizing the taking of property for such roads or highways, and providing for the compensation therefor; providing for benefits and damages resulting from such taking; for the payment of the costs and expenses incurred in making such improvements, and in thereafter repairing and maintaining the same; authorizing the issue of bonds and the levying of a tax to provide a fund for said purpose; providing for State supervision and control of all the public roads within the Commonwealth, and the appointment of a chief engineer and various subordinates for that purpose.

Space will not allow a reproduction of the entire act. Copies of same may be had by addressing Hon. Arthur Kirk, Pittsburg, Pa.

The secretary then read a telegram stating that President Fish, of the Illinois Central Railroad, would arrive at Buffalo in his private car on the New York Central train at 6 o'clock Saturday morning, but that he would not make a speech; also the following communication:

NEW YORK, *September 17, 1901.*

MY DEAR COLONEL MOORE: I regret to say that the sudden death of my dear friend Calderon Carlisle, of Washington, will prevent my being with you tomorrow. I send you, however, an address which I prepared a year ago, on the subject of the national highway and the good roads work for the new century, which contains practically what I would have said had I been able to be present at Buffalo. I trust that you will be able to develop some interest in the project, and that the congress will deem it wise to have a committee appointed to present the matter to the national authorities at Washington. I need not say that I should be proud to head such a committee if my services for good roads would seem to warrant the congress in conferring that honor upon me.

With warm greetings to all the good friends assembled and highest wishes for your success in the good work you have taken up, I am,

Faithfully, yours,

ROY STONE.

Col. W. H. MOORE,

President Good Roads Association.

On motion of Secretary Richardson it was decided that the address referred to by General Stone should be read at the afternoon session.

The secretary also read the following communication:

FORT KEOGH, MONT., *September 5, 1901.*

W. H. MOORE, Esq.,

President Good Roads Association.

MY DEAR SIR: I deeply regret that it is impossible for me to be present at the convention of your association to be held in Buffalo this month, as I regard it of great public interest. You and your associates are doing much good in directing the attention of the people to a matter of such vital importance, while at the same time you are demonstrating the practicability of constructing serviceable roads in various parts of the country by economic methods.

For the last forty years the ingenuity and efforts of our engineers, railroad builders, and capitalists have been devoted to constructing great lines of communication, in which we have excelled the world, and which have contributed so much to the great development, enormous wealth, and prosperity of the nation. Now, I hope the attention of all citizens may be turned to the construction of suitable wagon roads, which are so much needed and which will benefit the people of the several States, as well as the whole nation. In fact, I do not know of any one enterprise that would contribute more to the comfort and welfare of the whole people. What the agriculturists, the mechanics, and the manufacturers produce must be transported over the wagon roads to the great railroad avenues of commerce, and these roads also constitute the mail routes and lines of communication for our people in every section of the country. The possession of substantial lines of communication is one of the strongest evidences of enlightened civilization and of the public spirit of the people in every community, and I congratulate your association on the splendid work it has accomplished. I trust that it may arouse public sentiment, so much so as to enlist the active cooperation of the municipal, county, State, and national authorities.

The commission of which I have the honor to be a member has endeavored to enlist the interest of the different State officials, and would be glad to cooperate with you in any measure that will promote the public good, and will render any support possible to you and your associates in the commendable enterprise in which you are engaged.

Very sincerely, yours,

NELSON A. MILES.

WEDNESDAY, SEPTEMBER 18, 1901—AFTERNOON SESSION.

Governor Jennings called the meeting to order, and the secretary read the following paper:

GOOD ROADS WORK FOR THE NEW CENTURY.

By Gen. ROY STONE.

During the final decade of the last century the best effort of a great body of earnest men has been devoted to awakening the American public to the fact, already patent to the rest of the world, that the condition of our public highways

is a reproach to our civilization, a bar to our progress, and a stain upon our system of government.

What has been accomplished? Ten years of active campaigning has exhausted the argument for good roads, and, while it has silenced the opposition, we must confess that it has not brought that millennium where the country is ready to go down deep into its pocket to build its highways once and for all. "Convinced against its will 'tis of the same opinion still," and bad roads with their accompaniments of poverty, ignorance, discontent, lawlessness, irreligion, and all the Pandora's box of evils that arise from the isolation of social beings, must continue in the greater portion of the land for generations to come unless we can find some easier means to abolish them than the brute force of direct taxation. We must in fact admit that people who govern themselves will not tax themselves to build the roads they absolutely need; nor will they generally consent to tax their children's children by borrowing the needed money, though they might transmit to them not only the roads themselves, but all the vast savings accumulated by themselves through their use.

In admitting these facts we acknowledge the truth of the strongest impeachment that has been made against self-government, namely, that it lacks the power to compel temporary sacrifices for the permanent welfare; and we can not deny, what our enemies affirm, that this disability will become more marked and more fatal when we have finished skimming the cream of a new continent and are thrown back to live upon our permanent resources like the nations of the Old World.

It becomes our double duty, therefore, in the interest of our own and our children's welfare and the interest of popular government, as the champions and guardians of which we pose before the world, to search with all our wits for some way out of this situation.

What can be done? Two plans have occurred to me as hopeful, in the course of many years' study of the subject. Either of them means a broader scheme of national action than we have been wont to consider appropriate to our system, but in these days we are expanding in more ways than one; we are even building roads nationally, and building them without let or hindrance or criticism, in all our new possessions, and may some day do something of the kind for our own America.

The first plan, which I will only indicate, is to use the postal savings. Every civilized nation but ours, and some of the half-civilized ones, give their people the benefit of government savings banks. We refuse it to ours, ostensibly because we can not find a proper investment for the money, but really because the private banking interests of the country stand in watchful opposition to the measure. When this opposition can be overcome, postal savings banks can be established, to the great advantage of the rural districts and the general welfare; and the deposited money can be invested in county road bonds, guaranteed by the State, bearing a rate of interest so low that it can generally be paid out of existing road taxation, and running so far into the future that their final payment will not be a matter of serious concern. Whoever will take the trouble to work this plan out in figures will find that good roads can be built almost everywhere, and without delay, with no increase of taxation and no cost to the General Government.

Estimating the deposits of the United States postal savings on the basis of those in Great Britain, we should have enough to build a million miles of stone or gravel road in ten years.

With proper limitations and supervision by State and Federal inspectors good work could be secured and the investment would be a peculiarly safe one, since every dollar invested by a county in good roads adds at least \$5 to the value of property in the county and thus multiplies its own security.

The second plan is based on the experience of our own country in building railroads. We have built half of the railway mileage of the world without taxation, except in rare instances, and have raised for this purpose three times as much money as is needed now to make good wagon roads for the whole country. How have we raised this vast amount? Mainly by anticipating the benefits of the railroads, borrowing the money to build them, and letting them pay for themselves out of their earnings or else pay such a rate of interest on the money borrowed as contents its owners to let it remain on long loans or in perpetuity.

The benefits of improved highways do not show in earnings, since their use is free, but they appear quite as plainly in the enhanced value of adjacent and neighboring lands.

If this class of benefits can be anticipated and made available to procure the means of road building, we shall be able to build roads as easily as we have built railroads. But this requires the intervention of the State or National Government and the use of the public credit in some form to carry the work through until its local benefits are realized and the beneficiaries are enabled to assume its cost. Meanwhile, however, the Government could secure itself by a lien on the property benefited and ultimately be doubly repaid once in cash and again in the increase of taxable values and the development of general prosperity.

What can the National Government do as a worthy object lesson in this behalf? It is often easier to do great things than small ones of the same kind, and what the Government undertakes in this regard should be something big enough to excite the imagination and stir the pride and patriotism of the country; something that will put us, in respect of roads, as far ahead of the other nations as we have been behind them heretofore. Let it be a national highway, a continental boulevard, the greatest and best road in the world.

The time is ripe for it. The old century went out with the triumphs of war and expansion. Let the new one bring in a triumph of peace and home development. The country has wealth and credit abundant for the work. Moreover, a revolution is taking place in locomotion through the automobile which demands such accommodation in America that we may take our proper lead in its progress, the lead due to American enterprise, ingenuity, and mechanical skill.

Where should such a road be built, and how? When I had the honor to address the Tennessee road convention on this subject in 1895, I sketched an outline of a possible route, and later I was able to trace it more in detail on the admirable topographical maps of the United States Geological Survey.

Briefly stated, its eastern division should join all the States on the Atlantic by a coastwise line, and its western division should do the same on the Pacific, while its continental division should connect the eastern and western divisions by a line from Washington through the central cities to San Francisco. Following this line between Washington and Cincinnati low passes are found through all the mountain ranges within 7 miles of a straight line from city to city, except over the main plateau of the Alleghenies, which can be surmounted by a long incline with a grade of only 4 per cent; and that limit of grade need not be exceeded anywhere between the oceans. These lines would traverse or touch two-thirds of all the States in the Union: they would run through the most picturesque regions of the country and the scenes of its greatest historical interest. Along the east coast the road would be the storied route of march of the Continental armies. Crossing the Memorial Bridge at Arlington, it would traverse the civil war battlefields of Virginia, Kentucky, and Missouri; farther on it would follow one of the trails of the great explorers, and on the Pacific would strike the oldest road on the continent, the "Camino Real," or royal road, which joined the ancient Spanish missions on that coast.

This road should be worthy of its builder and of the age. Broad steel tracks for carriages and automobiles; bicycle, bridle, and footpaths; plenty of shade and

fountains; plenty of room on the borders for ornamental trees and plants, not set in stiff rows, but artistically grouped or scattered, the whole forming for all passers-by a continuous and practical lesson in forestry, floriculture, and landscape art, as well as in road building.

Before many years such a road would be lined with handsome villas through the mountain sections, model farms on the prairies, and villages and wayside inns everywhere. It would become the main artery of American country life.

The cost is difficult to estimate, but there are some data for comparison. The Government is now making, at an expense of \$11,000 per mile, a stone road in Porto Rico which follows the difficult canyons of the Arecibo and Portuguese Rivers and crosses the precipitous mountains of the Cayey range. Labor is cheap there, but, on the other hand, labor-saving machinery is barred out, in order that the work may furnish the greatest relief to the starving people. This whole line is more difficult to construct than the worst portion of our national road would be, but ours would be wider and better in many ways. All things considered, therefore, it would not be wise to estimate the cost at less than \$20,000 per mile.

The equitable distribution of this cost would not be so difficult as it might seem. The General Government would naturally build the road through public lands and reservations and the District of Columbia, and would especially aid the Territories in building their portion. Through the States a fair distribution according to benefits would perhaps be one-fourth to the Federal Government and the same to the State, and one-half to the lands lying in the zone of local benefit. This zone would not be less than 5 miles in width on each side of the road, making 6,400 acres to the mile of road; \$10,000 for this area would be about \$1.50 per acre, on the average; but the assessment should be adjusted by local boards according to proximity and value, ranging say from \$5 on the best abutting lands down to 50 cents on the poorest or most distant. To lighten even this burden to impecunious landowners the Government could safely advance the money at a low rate of interest, taking liens on the property, and let the owners pay it off at their convenience by paying the interest and a little more for a sinking fund. On the highest assessment the charge, say at $2\frac{1}{2}$ per cent for interest and sinking fund, would be $12\frac{1}{2}$ cents per acre annually; on the lowest, $1\frac{1}{4}$ cents per acre.

The general advance in value of the property along the line would enhance the national wealth by hundreds of millions taxable by the States, while so grand a lesson in the benefits of good roads would stimulate road building everywhere. State governments would learn to follow the same plan of anticipating benefits and easing the burden to their landowners. States on the line of the national road would build branches to it, and those not on the line would combine to reach it.

The first steps in so great an enterprise should be cautious and slow. A national highway commission, composed of one member from each of the States concerned, and a half dozen officials and others representing the nation, could be assembled to discuss the legislation, State and national, which would be required to inaugurate the project, while a detail from the engineers of the Army, the Geological Survey, and the State highway commissions could be making a preliminary study of routes.

All this would involve little cost, while it would speedily develop the facts upon which Congress and the public could base a judgment as to whether it was worth while to follow the project further.

Such a preliminary inquiry is not much to ask of Congress, and if all the forces which have heretofore worked in unison for good roads, together with the new and powerful automobile allies who are now joining our ranks, should combine to press this measure, it can easily be passed at the next session; and if this is done, the early days of the century will mark the inception of the greatest peaceful work the great Republic has ever undertaken or the world has ever witnessed.

The chairman then introduced Lewis C. M. Haupt, C. E., Isthmian Canal Commission, who delivered the following address:

THE HIGHWAYS OF COMMERCE.

By LEWIS C. M. HAUPT, C. E., of the *Isthmian Canal Commission*.

Every forward turn of a wheel is a revolution and typifies progress. It is immaterial whether it be a wagon wheel or a car wheel, a fly wheel or a water wheel, a turbine or a propeller, a pinion or a pulley, a bicycle or an automobile, it is always fascinating to see the wheels go 'round.

But behind the wheel, to make it revolve, there may be a crank; behind the crank there must be a motor; behind the motor, an artisan; behind the artisan, a capitalist; behind the capitalist, an inventor; behind the inventor there is the great Creator of mind and matter, the incomprehensible God, the mainspring of all activities and possibilities.

Intuitively the mind is carried back in the spirit to the days of old, when the prophet Ezekiel stood on the banks of the river Chebar, in the land of the Chaldeans, and, looking into the opened heavens, beheld the four living creatures, which had the likeness of a man, going upon wheels.

"The appearance of the wheels and their work was like unto the color of a beryl, and they four had one likeness, and their appearance and their work was as it were a wheel in the middle of a wheel. * * * The spirit of the living creature was in the wheels, and whithersoever the spirit was to go they went; thither was their spirit to go." From that day to this the earth has trundled around her course in yearly laps, bearing to the children of the present century the fruition of this prophecy of the spirit and the wheels. Well may it be said to-day that everything goes upon wheels, but there are wheels and wheels. Some turn more easily than others and do more work at less cost, and thus we are brought directly into contact with the surface or roadway which the wheel traverses as a practical question in economics, mechanics, and physics.

In addition to the wheel and its way there are obstacles of various kinds which impede its progress. There may be a mountain in the path, a cataract in the stream, a chasm in the plain, or it may be that rain has converted an earthen road into a slough, a cyclone has drifted sand across a railway, or a blizzard has filled a cut with snow. A misplaced switch may have stopped the wheels by ditching the train, or a washout may have destroyed the continuity of the way by removing a bridge or a culvert. Again, the channels of seaports may be obstructed by sand bars, shoals, or reefs which limit the capacity of the carriers and add to the cost of the movement.

Another form of obstacle, and often a serious one, is found in the financial world, where a Wall street bear may strangle a most promising enterprise by his cupidity, or a too sanguine and well-watered bull may toss the aspirations of a lifetime to the dogs by stock-jobbing methods of promotion.

Such are but a few of the contingencies which obstruct the highways of commerce and which it is the work of the engineer and roadmaker to remove where practicable.

What better and more condensed instructions can be found for this purpose than those which come to us from the prophet Isaiah as the voice of Him that crieth from the wilderness of Asia, "Prepare ye the way of the Lord, make straight in the desert a highway for our God. Every valley shall be exalted and every mountain and hill shall be made low, and the crooked shall be made straight and the rough places plain." To-day Russia is literally carrying out these specifications in extending her arm of steel from the Baltic to the Japan Sea, that civilization may advance by the peaceful revolutions of the wheel and not by the arbitrament of the sword.

The missionaries in China adopted a different policy. They established outposts remote from their bases and relied upon politics and diplomacy to maintain them in their efforts to convert the Confucians, but with disastrous results. Truly the wheel is mightier than the sword as a civilizing agent. Roman roads subjugated and controlled the Empire. The sea, as an open highway, is to-day the dominant factor in the world's progress because it furnishes the cheapest known avenue of communication for both mind and matter.

Fluid resistances are less than solid and are more easily overcome; hence the rivers, lakes, and seas have always been the main avenues of commerce and should be utilized wherever practicable.

As a nation we have not realized this, and have been too long content to pay tribute to foreign carriers for the privilege of having our products delivered across the sea. We are beginning to correct this evil by having our responsibilities forced upon us by the demands of our insular possessions.

But as the great feeders to the world's markets railroads and common roads are indispensable adjuncts, and it is this overland transportation which has given rise to this convention, one purpose of which is to consider the methods of still further reducing the cost of delivery.

It is evident that to compete in distant markets, whether at home or abroad, it is necessary to meet current prices by an article of equal quality or of superior utility. The consumers' price being fixed by local conditions and the cost of production being likewise controlled by environments, the difference is the margin left for transportation, storage, commissions, losses, insurance, profits, and other items.

This margin is the essential factor in determining how far the commodity may be carried, or, in other words, the market range beyond which it will not bear transportation without loss. For the purposes of this discussion it will be assumed that all of this margin is available for transportation, thus making it an extreme case. On this assumption, the market range of any commodity will be found by dividing its margin by the tariff charges per unit of distance. From this equation it will be seen at once that for a given margin the range will be increased by lowering the rate.

Thus the area of distribution will be increased as the square of the distance, which will be beneficial to both producer and consumer. If the price be maintained, the producer will secure a larger profit, but if it be reduced in the same ratio as the rate, the consumer will have the benefit.

The market price and the cost of production being generally fixed by physical or local conditions, their difference, or the margin, is also fixed for a given commodity. As this is chiefly consumed by the charge for transportation, it is evident that the tariff becomes the vital factor in determining the market range. The application of the general rule of carriers "to charge what the traffic will bear" has resulted in the adoption of an arbitrary schedule of rates and classification based upon the market value of the commodity and the presence or absence of competitive routes. Hence it follows that the higher priced articles will bear a higher rate and a longer average haul than a less valuable product. To illustrate this law in a general way, the appraised values of various groups of commodities carried on the New York State canals during the past sixty years have been averaged, and it is found that the average value per ton of articles moved on the New York State canals between 1837 and 1897 is as follows: Forest products, \$10.95; agricultural products, \$37.82; manufactures, \$37.03; merchandise, \$307.50; other articles, \$15.29; average of all, \$38.45. During the year 1897 the total tonnage carried was 3,617,814 tons, which was distributed under this grouping into the following percentages: Forest, 25 per cent; agricultural products, 22 per cent; manufactures, 0.04 per cent; merchandise, 0.07 per cent; other articles, 42 per cent. These figures serve to illustrate two important facts, to wit, the great divergence in value of the various groups of commodities, the lowest being forest

products, valued at about \$11 per ton, and the highest merchandise at \$306 per ton: also the insignificant amount of tonnage of merchandise and manufactures carried by water, and conversely the large volume of the lower class freights which seek this avenue of transportation. In other words, 67 per cent or two-thirds of the movement by canals is confined to articles valued at less than \$16 per ton. Of the remaining 33 per cent, two-thirds consists of agricultural products of relatively low value.

Thus it is seen that it is the low-priced commodities which seek the water routes because of the lower tariff charges. The obliteration of these avenues of commerce as supposed competitors will not give the railways more business, as is sometimes assumed, since the margin is not large enough to enable the low-grade freights to be carried by rail for any considerable distance. The effect of closing up the waterway must be to reduce the movement of raw materials, restrict the wheels of industry, and reduce the revenues of the railways derived from the higher classes of manufactured products. These conclusions may be substantiated in a general way by an analysis of the through-freight traffic of any of our large transcontinental systems of railways.

From an official statement in detail issued by the management of one of these roads, it is found that 34 per cent of the freight was composed of agricultural or animal products; 26 per cent mineral and miscellaneous; 37.3 per cent manufactures and merchandise, and only 2.7 per cent forest products. In other words, the volume of the freight carried bore a direct relation to its value, the greatest tonnage consisting of the higher priced commodities. There is not sufficient margin in the ordinary forest product to bear the charges for a long haul by rail, and hence only the more valuable wood is shipped.

To illustrate more fully the importance of a large margin or a low tariff rate in extending the market range, let it be assumed that the margin available for transportation is equal to the cost of production or is one-half of the market price at point of consumption. Applying this ratio equally to the several groups of commodities, it will give as the margin available for carriage the following amounts: Forest products, \$5.50; agricultural products, \$10; manufactures, \$18.50; merchandise, \$153.

The average unit cost of movement on a common road, as determined from statistics furnished by the office of Public Road Inquiries, Department of Agriculture, is 25 cents per ton per mile. The average for rail service, as stated in the reports of the Interstate Commerce Commission, is 0.72 cent per ton-mile, while the average charge on an artificial waterway may be taken at one-third of this figure, or 0.24 cent per ton-mile. On the open sea it is often only a small fraction of a mill.

With these average units of cost on the three systems of ways and with the entire margin available for transportation, the extreme limit to which these commodities could be carried would be as follows:

Limits of market range by wagon road, railroad, or waterway.

Commodity.	Margin.	Common road.	Railroad.	Canal.
		<i>Miles.</i>	<i>Miles.</i>	<i>Miles.</i>
Forest products.....	\$5.50	22	764	2,203
Agricultural products.....	19.00	76	2,640	7,920
Manufactures.....	18.50	74	2,570	7,710
Merchandise.....	153.00	612	21,250	63,750

This exhibit reveals at once the enormous advantages of the low water rate and the large margin, and shows, on the other hand, the narrow limits placed upon distribution by the almost prohibitive cost of the common road rate, which is about thirty-three times more expensive than that by rail and about one hundred times more than that by water.

It may be remembered that prior to the opening of the Erie Canal, in 1826, it

cost over \$3 to carry a bushel of wheat by common road from Buffalo to New York. This charge had to be paid by the consumer. The nutritive properties of the wheat were not enhanced by the journey, but the additional cost was required to compensate for the power and wear and tear expended in the transportation, for which there was no equivalent.

To-day that entire distance of about 500 miles is covered at a charge of 3.4 cents per bushel by rail, and of 2.8 cents by canal. But the low rate by rail only prevails during the season of navigation and is about half of the usual minimum. The reduction in cost is therefore reduced to about one one-hundredth of that of 1820; hence the range is increased one hundred fold, and the area of distribution ten thousand fold by the lower rate.

To illustrate this point more fully it may suffice to recall the fact that during the period of low prices existing only a few years ago corn was burned as fuel in the Mississippi Valley, because it would not bear the cost of transportation since the margin was insufficient. The railroads lost the freight and the market the product. It was reported that the average cost of raising a bushel of wheat in Wisconsin was 54 cents, while corn cost 37 cents. Should the market price of wheat at the seaboard fall to 60 cents, the margin would be only 6 cents a bushel or \$2 a ton. This would permit of a wagon haul of only 8 miles, or of a rail haul of 400 miles, at a half cent per ton-mile. It could not therefore reach the seaboard except at a loss of \$3 per ton. By all water the cost of movement would be about \$1.60, leaving a margin of 40 cents to the farmer if he could ship on the lake front with no haul. At 70 cents per bushel, or a margin of 16 cents per bushel, or \$5.50 per ton, this food product could be carried by rail to the seaboard with a small profit to the producer. If advantage be taken of the water rate, the product could be sold at a lower price and both consumer and producer be benefited.

We are making the same egregious blunders to-day in paying for the circumnavigation of South America instead of cutting across the isthmus, and are wasting millions of dollars to no purpose, as did our forefathers prior to the opening of the Erie Canal. At the average charge for rail freight, the cost of moving a ton 3,000 miles across the continent would be \$21.60, so that an average commodity, which is not worth this sum plus the cost of production, can not bear this charge, and hence can not be moved through this distance. It will be seen at once that there are comparatively few articles which come within the present scope of rail transportation for so long a haul, but many that could be carried around by water and be delivered to them at their tidewater termini for internal distribution by a short haul at a profit. The canal, instead of withdrawing from, would add largely to the tonnage and revenue of the railroad systems of the country by largely increased passenger traffic, by supplying, at water rates, cheaper raw materials, and by building up manufacturing centers located on water courses, thus in turn stimulating the higher grade tonnage for distribution by rail at a more profitable charge to them. This increase in manufactures would attract a larger population dependent upon agriculture for subsistence. This would react to increase the demand for farm products in the home markets, with shorter haul, higher margins, and larger profits, enriching the farmer and transporter, who in turn would patronize the merchant and manufacturer, and thus elevate the status of humanity generally. Hence we have the wheel in the middle of the wheel to operate, regulate, and synchronize the social machinery of a contented people. Such in brief would be some of the results of a shorter waterway for our foreign trade via an Isthmian canal.

It is therefore manifest that the opening and enlargement of our canals, rivers, seaports, and maritime channels is a great public benefaction. It is likewise true that the improvement of our common roads, which at times are impassable, would also be of enormous economic value as feeders to the railroad systems of the country and would aid in promoting the general welfare.

Very little of the 800,000,000 tons of freight carried annually on the railroads

of the United States has its origin directly on the lines of the roads. It is first moved from the farm, mine, or forest over earth roads at an average cost of 25 cents per ton-mile. If the average distance for each ton carried be but 4 miles, the expense of transportation before it is delivered to the railroad would be \$800,000,000, while the charge for distribution at destination may swell this sum to over a billion dollars annually, most of which goes to cover wear and tear. It is largely wasted, and yet if saved it would more than pay the entire expenses of the Government.

The cost of transportation on our common roads may be greatly diminished by reducing the resistances and improving the grades, alignment, surface, and drainage. If reduced to even one-half, the effect would be to double the area of the territory tributary to the railroads and so increase their tonnage, as well as the margin available for transportation. But improvements are only justifiable when the traffic is sufficient to warrant the expense. Nevertheless, it must not be assumed that because there is no visible tonnage to-day on a byway, there would be none on it tomorrow, if converted into an improved highway; for facilities create traffic. It is frequently reported that our seaports are unworthy of improvement, because there is no commerce; whereas, the reason for there being no commerce is because the channels are unimproved, being obstructed by sand bars.

As it costs much less to improve roads than to open branch railroads as feeders, it would be good policy on the part of the railroads to unite with counties, townships, and boroughs in developing systems of improved trunk roads with laterals, as feeders to their own systems. So important, indeed, is the subject that it has been seriously proposed to create a national bureau of roads, to build and maintain them from the public treasury, as is now done with our waterways. Numerous precedents for such a policy exist in foreign countries where the results have proven its wisdom and economy.

This convention could do no better work than to indorse and urge the enactment of the measure¹ now pending in Congress to create a department of commerce and industries, which is designed to have "general jurisdiction over all matters pertaining to transportation facilities by land or water, except in cases under the jurisdiction of the Interstate Commerce Commission." This matter has been before the public for some time: it has been earnestly indorsed by our leading commercial bodies, and will no doubt be called up at the coming session of Congress.

It is not the purpose of this paper to present any details of road construction or management, which are available in the many excellent manuals now published, but rather to impress the importance of low rates and large margins as factors in promoting and extending our commerce. Certainly the improvement of our highways and the deepening of our waterways are most important means to this end, but the initial step in this direction must be the establishment of an efficient working organization such as may be secured under the proposed legislation, with slight modifications. Works of this class, well administered, can not fail to enhance the power, influence, and civilization of this great Republic, whose star is in the ascendant. If this paper shall contribute in some small degree to this end it will have accomplished its purpose.

The congress next listened to an address from its presiding officer.

PROGRESS OF ROAD IMPROVEMENT IN FLORIDA.

By Hon. W. S. JENNINGS, *Governor of Florida.*

In a country as new to development as Florida, so many subjects demand attention that some, and perhaps among the most important, must of necessity go unattended to. These important but neglected subjects are neglected because

¹ Senate bill No. 738, Fifty-sixth Congress, first session, reported February 8, 1900.

other and more important matters push them into the background, and the makeshift that takes the place is not so bad as to make an imperative demand for improvement; and man, being a creature of habit, becomes accustomed to a method or an evil, and in his look into the future bears the ills he suffers in the hope that he will find relief in winning that for which he is striving.

Bad roads constitute one of those evils to which the rural population has grown so accustomed all over this country that it has become a habit to endure with little or no complaint; and yet the same farmer who stoically bumps along over his villainous country road, full of ruts, roots, stones, logs, sand, and gullies, gets as mad as a hornet if he stumbles over a piece of poor paving in town. Our people acquired the bad-road habit by long years of martyrdom to long distances, poor markets, and sparse population; but as the years went by and the country became settled the character of the products of the land and the need for quicker, easier transportation impressed itself, and the subject of good roads has become an absorbing question. Fortunately there is scattered all over the State available materials for making good roads and the people are using these materials as fast as the time and the means at their command will allow. A number of counties are already interested. Orange County has about 60 miles of good roads of clay, which is abundant and convenient to all the country roads. It is of such character that it requires only proper grading and construction to insure as good and permanent a road as can be made of a material that wears away, as clay must under constant use. As the method of construction is not similar in all parts of the State it is proper to mention it here. The roadbed is first cleared of all obstructions and graded, the average width of the grade being 14 feet; on this graded surface the clay is laid and either rolled or beaten down into a compact body. When the road is completed there are 8 inches of hard, packed clay in the center, sloping to 4 inches at the edges.

Osceola has as yet only 8 or 9 miles of good roads, 6 miles of which is constructed of what is popularly known as "Bartow clay" or phosphate clay, really phosphate of aluminum. It makes a smooth, compact, easily kept road, which is as elastic as asphaltum, the only objection to it being its color (white), which is very trying to the eyes. But this difficulty can be readily overcome by staining the clay with colored ochers, large deposits of which exist in many parts of the State. This road material is abundant in many of the Gulf counties. Roads constructed of Bartow clay cost from \$300 to \$600 per mile. Hillsborough County has begun a system of road building throughout the county: has a number of miles already built almost exclusively of rock and more in process of construction. These roads are being built from the proceeds of bonds issued for the purpose. They are constructed of a limestone rock with a 2-inch macadam of crushed flint, at a cost of \$3,000 per mile. They are 24 feet wide, 8 inches thick in the center, sloping to 5 inches on the outside.

Lake County has constructed between 30 and 40 miles of clay roads. Here the roadbeds are graded and the clay placed and treated as before described; but after the clay is in place a coating of sand 2 inches thick is placed over the whole, because the clay in this county is absorbent and becomes soft and sticky after rains. These roads have cost on an average \$300 per mile, one-half paid by the county commissioners and the other half by the people living on or tributary to the road.

Marion County has about 80 miles of good roads, mostly constructed on rock. The roads radiate from Ocala, the county seat, and county convict labor has been largely utilized in their construction. Polk County has 40 to 50 miles of good roads, constructed largely of Bartow clay gotten from the pebble phosphate mines near Bartow, the county seat of Polk County.

Good roads, not hard, are made of "pine straw." A "straw" road is the quickest and cheapest of all to construct, and is serviceable for a considerable time. The process of construction is simplicity itself. The ruts are cut out, the worst

holes in the track are filled up with earth, and then the pine straw or pine needles are deposited over the ruts or wagon tracks. The wheels of the passing wagons grind and crush the needles into the sand until it forms a soft, springy cushion, over which the wheels travel. As the straw is broken and incorporated with the sand it becomes less and less combustible and the road is practically safe from that bane of all new countries, forest fires. When these roads need repairing the material to mend them is raked up from the roadside and put in place.

On the east side of the peninsula Volusia and Dade counties are leading in the good roads movement, and, as is the case all over the State, population and improvement are following or keeping just in advance of the good roads. In Volusia County pine needles are being used in the interior of the county, but along or near the coast decomposed shell marl and coquina rock, taken from the water by dredges and from quarries, have been found the cheapest and most satisfactory materials for road making. In Dade, one of our newest and most southern counties, and our longest county, stone and shell are both used, according to location and accessibility. At the last session of the legislature Dade County secured the passage of an act permitting the issuance of bonds for road building, and work on that line is progressing so rapidly that Dade County will soon have more miles of good road than any other county in the State.

Material for the construction of good roads is abundant all over the State and is so distributed that a good road can be built more cheaply and quickly in Florida than in any other State. From the straw or needles that fall from the trees all over the State roads can be built for \$70 per mile. Clay of many kinds abounds in nearly every county, and from this material good roads can be built at a cost of from \$300 to \$500 per mile, and where the Bartow clay is accessible this splendid material can be turned into roads at from \$300 to \$600 per mile. When none of this clay can be had conveniently or in abundance, there is a full supply of rock to take the place of clay. Rock is the most expensive, costing about \$1,000 per mile, but once built it is, if properly constructed, a permanent road, growing more stable each year, the crushed rock, dust, sand, and water combining and forming concrete that is practically one solid stone from one end of the road to the other. If asked why these advantages have been neglected so long, I must answer by again calling your attention to the fact that Florida is really but twenty-five years old. In 1858 the rifle of the Seminole Indian held civilization at bay on over two-thirds of the peninsula. Following the Indian came the civil war, and that was in turn followed by the still more disastrous and paralyzing years of reconstruction that throttled Florida until the close of the year 1876. Since that time it would seem, from looking at results and the time in which they have been accomplished, that much has been done—not perhaps all that could have been accomplished, but more than enough to absolve the State and its people from any charge of negligence or lack of progressiveness. The movement is on, the people realize the need, and a few years will show Florida in possession of one of the most complete and best constructed systems of highways in the Union.

In conclusion I beg to say that it is my opinion that good roads are a necessity. The people are entitled to good roads. Such a system reaches the masses of the people. It is not so much a question of cost, for it is universally conceded that a good road, economically constructed upon a business basis, under the skilled eye of an experienced engineer, is worth to any community, great or small, what it costs. View the streets of Buffalo and you never hear it asked what these streets cost, though they are magnificent, and these good people are no more entitled to good roads than people living a thousand miles from Buffalo. They have to pay for their roads, and others can afford to assume the same burden proportionately, and construct good roads wherever needed. The cost is easily calculated. The value of a complete system of good roads is incalculable.

At the close of his address Governor Jennings said: "I again desire to thank the congress for the honor conferred upon me as selecting me as its chairman. The time, however, has come when I must soon leave, having been unable to change appointments which have been made for me. I have enjoyed being here and feel that it has been of great benefit to me. I feel that my State has been honored by my being selected as chairman, and I thank you very much for the indulgence you have shown me."

On motion of J. G. Heaps (Des Moines, Iowa,) a vote of thanks was extended to Governor Jennings for the able and impartial manner in which he had presided over the congress.

Governor JENNINGS. Gentlemen, I sincerely appreciate this token of esteem and thank you for the compliment. In bidding you farewell I will ask Hon. Martin Dodge to take the chair.

Mr. DODGE. I am sure we are all very much gratified in having the governor of Florida preside over our deliberations. I feel sure also it will be a great benefit to the cause and I hope it will be a benefit to the Governor's own State, as he seems to think it will be. It is certainly a matter of very great satisfaction to me to realize that we are getting good reports from most distant places and that all of the various sections of the country are apparently willing to cooperate in a more feasible manner than ever before. I now have great pleasure in introducing to you Mr. S. S. Bailey, of Michigan, who will address you.

SHALL THE FARMER HAVE AID FOR HIGHWAY IMPROVEMENT FROM THE WEALTH OF THE NATION?

By S. S. BAILEY, *Grand Rapids, Mich.*

I belong to that class of the American people called farmers, a class considered by many quite essential to the welfare of the nation; a class from which the cities get their recruits to save them from going into decay; a class in whose soil no seeds of anarchy have ever been or ever will be planted.

We hold these truths to be self-evident: That the condition of the highways of this country is bad; that they are not being improved so as to meet the wants of the nation; that the system by which these highways are improved is bad; that under the present system there is no hope for any permanent improvement during the century just begun. Good roads are necessary for business, necessary for pleasure, necessary for health, necessary for reputation and a good name. Good roads will not come to us to benefit and bless us, like sunshine and wind and rain, without expense, but will require system, money, and labor to build them. In no country have good, permanent roads ever been built without aid (and supervision in part) from the States or General Government.

We admit that during the last twenty-five years much money and labor have been expended on the highways for their improvement, but the improvement has not kept pace with the increased amount of travel and the increased amount of freight carried over them, and now they are but little better in spring and fall for heavy traffic than they were twenty-five years ago. The highways of the nation in fact, though not in name, belong to the nation, and are for the use and benefit of all the people, and not for the farmer alone. The millionaire and the pauper have equal rights in the use of the highways of the nation, whether good or bad. A very

large portion of the wealth of the nation has never contributed to the improvement of the highways, though sharing in all the benefits of them. The improvements up to the present time, with few exceptions, have all been made by the farmers and at the expense of the farmers alone. The farmers have expended in money and labor during the century just passed, to make the roads we now have, poor though they may be, over ten thousand million dollars. They have laid the foundation, in the main, for most of the highways of the nation, and now call for aid for the superstructure, to make them such as the wants of the nation require. Without aid there is no hope for much progress. Educated brains and educated experience are wanted as well as money. We want intelligent supervisors to see that the money appropriated is not wasted, but brings a dollar's worth of good road for every dollar spent. Shall the farmers have the aid that rightfully belongs to them? We most earnestly ask the men who legislate for us to broaden their views of the needs of the country if we are to have continued prosperity, and direct money and labor into channels that will permanently improve our highways and bring benefits and blessing to all our people, and add much to the nation's wealth and greatness. All the wealth of the nation has passed once, and much of it many times, over the highways. Great loss has been sustained by reason of bad roads. In the future, unless we have better highways, we can not as successfully compete with producers in countries which have highways over which they can transport their products to market at one-fourth the cost of carrying the same on our highways. Thus three-fourths of the cost of transportation saved would, in a very short time, amount to enough to make first-class roads of every important highway in the nation.

At this particular time we wish to remind our lawmakers that this nation has been made wealthy and great by the sons of honest toil, and not by those who profit by the labor of the farmer and manufacturer by making exchanges and finding markets. Enormous wealth has been secured by those who stand between the so-called toilers of the nation and the consumers of their products. Under our present laws they share equally with the farmer in all the benefits which the highways give to all. Shall this enormous wealth, which has in the past been exempt from aiding highway improvement while receiving its benefits, be made to contribute its proper share in the future, or shall the farmer continue to bear the burden alone? Has ingratitude taken such a strong hold on the people that the word justice has no longer any meaning—ingratitude to the Creator, ingratitude to the toilers of the nation? Let us banish that word from our thoughts and look upward and around us and give thanks for the good already received. Let the word paternalism have no longer any terror to frighten men who legislate for us. Let us substitute for the word paternalism the words gratitude and justice. When these words by those who make our laws are well considered and have their full meaning, the farmer will have aid in improving and making permanent highways.

Chairman DODGE. I now take great pleasure in introducing to you Capt. I. G. Heaps, editor of the *Farmers' Tribune*, of Des Moines, Iowa, who will speak to you.

THE ROAD SITUATION IN IOWA.

By Capt. I. G. HEAPS, *Des Moines, Iowa.*

MR. PRESIDENT AND MEMBERS OF THE INTERNATIONAL CONGRESS FOR GOOD ROADS: A few days ago Governor Shaw of our State sent me word that he wanted to see me. He informed me that there was to be a meeting of the International Congress on Good Roads at Buffalo and that he wanted me to go there and learn all about road making. "There will be a great deal of talent there, and they will turn the X-ray upon this question and bring out much information along that line."

You know we have the grandest State in this Union, that our resources are unlimited, the industry, intelligence, and push of our people are surpassed by none, and yet, notwithstanding our imperial position and great wealth, we have no system of road making, and we are not improving our highways as we should. Our people are not getting such a return for the vast sums of money expended as they are entitled to. That explains why I am here and that I want to learn how to build roads in Iowa, where the greater part of our roads must always be built out of our black soil. I have learned much that will be valuable to me.

As a distinguished statesman once said about the tariff, this is purely a local question. All this talk about stone roads, brick roads, asphalt roads, etc., will not apply to us. Your system here in the East will not fit when applied to us. When the Almighty, on creation morn, said, "Let the waters be gathered together and let the dry land appear," then your rock-ribbed country appeared, and he furnished you the material out of which you could build good roads. And as you have not such extensive plains to cultivate as we have, you have plenty of time to break rock and mend your ways. After your great Appalachian system of mountains had reared high its crest; after our first parents had been driven out of the Garden of Eden, then the Almighty again spoke, and said: "I will make another Garden of Eden, a land that shall bring forth the food upon which my people shall live." And then the great alluvial Mississippi Valley appeared, the best, the richest, and the most extensive agricultural and horticultural region in the world. And the most favored spot in that beautiful empire of the West is Iowa, and the people who have taken possession of this favored region have in their veins the best blood from all the kingdoms and peoples of the earth, who have always been conquerors and subduers; and as a result of their industry and intelligence they have made the State of Iowa as productive as are the fertile plains of Lombardy, the beautiful valleys of France, or the fields of Belgium. But while this is all true, the fact remains that, except along some of our rivers, there is no material out of which we could build hard roads, and our people will have to construct them out of the soil which lies along our highways. The question with us is: How can this best be done? What system that is practicable can we accept that will bring the best results? Like many other States, we have no system. Every overseer of the highways is chief engineer and is monarch of all he surveys on the highways, and as a result of our vicious system, or rather lack of system, one set is constantly pulling down and changing what the others have done. Some think that we should have wide roads graded from fence to fence; others, narrow grades; some that they should be high and narrow; others, low and flat; some that one side of the road should be drained; others that there should be a drain on both sides, and some insist that the drain, if there be any, should be in the center. As a result of this kaleidoscopic system, out of the millions of dollars that are spent annually on our roads and bridges, what have the people to show for it? And what more can we expect in the future if present conditions are to continue?

Our great railroad systems, steel plants, and manufacturing interests select men to manage them who have thoroughly mastered their profession. Not so with our roads. We select men who will expend millions of dollars annually, who have had no training, and who do not know the first principles of road making. If these great corporations managed their business as we do ours their stockholders would be bankrupt in three years. It is an easy thing to find fault with our present system, but we can not adopt the system that some have recommended for hard roads. Why, sir, if we should construct such narrow roads as some have suggested our heavy Percheron, Clydesdale, and Shire horses could not pass on them, and when our farmers drove their fat steers to market they would have to walk in single file, as two could not walk abreast on such a road. But our peo-

ple are willing and anxious to do the best that they can with such material as they have. They pay millions of dollars yearly to the archfiend, mud, and would willingly pay as much for road improvement if they were assured that the money would be well expended and that they would get a just return for it. A gentleman says we have no good roads in Iowa. Well, that may be partially true; but on such roads as we have our people marketed off the farms of our State last year produce worth the princely sum of \$374,096,028, and our population has increased to 2,231,853 and our taxable wealth to \$2,106,615,620. These facts show that we have a wide-awake people, and you need not be surprised that we love our State above all others.

The distinguished gentleman from Canada has done much toward showing us how to build roads, and his three propositions fit our case exactly. His first proposition was drainage along our highways. I believe that is the starting point in making dirt roads and is of more importance than all the rest. His system of road drainage is, I believe, the correct one, viz, no center drainage, for that will prove a failure, but side drainage; on sloping ground, have the drain on the upper side of the road; on level ground, on each side, with proper fall and outlet to carry off all the water, with frequent culverts, and those not to be made of lumber, but of lasting material, so that when once put in they will be there for all coming time. By this plan there will be no water soaking into our roadbeds, but they will soon be dry after the hardest rain. If there was never another furrow plowed, nor another scraperful of dirt dumped upon our roads until a thorough system of drainage was accepted, it would be the inauguration of an era of good roadmaking that would be a perpetual blessing to our people and to all our varied interests. Our people will readily adopt this system if it be presented to them under a proper law placing this vast interest in the hands of a competent board. The pathmasters of to-day should be relegated to the rear; our system of assessing labor on the roads should give way to taxation, not the taxation of the present, but a just and equitable revenue law that will make all property pay its share, for all are alike benefited by having good roads. And when that good time comes (for it is as sure to come as to-morrow's sun is to rise), then will our boys be willing to stay on the farm and our daughters willing to become farmers' wives. The isolation of farm life will then have passed away, and instead of our boys and girls leaving the farm to go into the crowded cities more will be going from the cities to the farm, as it is now in Europe, where they have such magnificent highways. Then every house will have free mail delivery, also the telephone, and we will be the happy and contented people that the Almighty intended we should be when He gave us this rich and beautiful heritage.

A QUESTION OF EDUCATION.

By Col. EDWARD DANIELS, *Fairfax, Virginia.*

This whole road business, it seems to me, rests upon a question of education.

When I was a boy, out in those big woods, fifty years ago, boys were trained to build roads; I can remember as if it were yesterday the work that we did plowing and harrowing and rolling and picking up the stones. If you could get as much as that into the heads of the people of this country to-day it would be well, and that is the elementary lesson that should be taught to every boy in school. That is the beginning.

It has been said that the greatest need of America is homes, especially farm homes. Part of the home are the road and the school. Let the girl be with her mother, trained to home duties, and the boy with the father, trained for business.

Let there be a central school in each township and the roads made so that the children can get there from any direction in thirty minutes; and then a rational, common-sense education, and the question of road building will be solved far better than it will be by fine-spun theories that you can't get the people to understand.

Get your legislature to start an industrial school in every county. We should have a system with industrial schools that will teach road building; then the roads will come and you will find the country transformed inside of ten years—a country with smooth, hard roads and beautiful homes all along the roads, and your mail carried free from house to house.

You may think this a little bit out of line, but I think it is strictly pertinent to the subject of road building.

A FARMER'S VIEWS ON THE ROAD QUESTION.

By J. F. BEAN, *Vice-president Ontario Good Roads Association.*

MR. PRESIDENT AND GENTLEMEN OF THE INTERNATIONAL GOOD ROADS CONGRESS: Having been appointed a delegate to this congress by the department of agriculture of the Province of Ontario, it is with some degree of timidity that I attempt to address so large and distinguished an assemblage of public-spirited representatives gathered from so many distant States and European countries, on so important a subject and of such wide national interest as that of good roads.

Having followed with deep interest the progress of the good roads movement of recent years in both the United States and Canada, I desire briefly to touch upon a few points of the good roads question from the farmer's point of view.

If it is sound public policy and the true function of government to do in the interest of the community as a whole all those things which the individual can not well do by himself, does it not appear clear that the State should pay the whole cost for improving its main thoroughfares? These are to be the leading arteries connecting all business centers, and continuing from county to county across the entire State and separate from the many other local roads to be cared for by the local authorities.

The principle of State-built highways appears to be as old as civilization itself, being adopted by the first extensive builders of good roads—the Carthaginians and Romans. Not since the building by the latter of the Appian Way and the 53,000 miles of solid roads across that ancient empire, and which remain as monuments of their wisdom to this day, has any country obtained the priceless boon of good roads without some measure of State aid. Let the State first build its main highways and they will be ever present object lessons to the local authorities for constructing the other roads.

The length and number of streets in the city are short and small compared with the compact concentration of wealth, thus making the burden of cost comparatively light for street improvement. In the country districts the length and number of only the leading highways to be improved are so far out of proportion to the sparsely settled and scattered wealth of the farming communities that it is entirely out of the question for the farmers alone to think of paying the much larger comparative cost for such first-class stone roads as are required. The farmers have always borne their share, sometimes more than their fair share, of needless taxation, and will not object to paying their just part for State-built good roads.

Partial measures of State aid are steps in the right direction, so far as they go. I would not say anything in disparagement of the good work and the very commendable degree of progress that has been made under the partial systems of State aid for good roads in those leading States of New Jersey, Connecticut, and New York. But in the foremost State, Massachusetts, which has adopted more nearly the European and Roman systems, we find the nearest to the ideal plan, a continuous system of good roads built across the entire State, under competent State authority. The work is projected and the roads properly located where they will ever be of the greatest good to the greatest number. The State builds the roads and pays the whole cost and afterwards charges one-fourth of it to the

county through which the road is built. This far less complicated system overcomes an immense amount of difficulties, drawbacks, and delays with the less enterprising local authorities of county or township.

Let the general governments of the United States and Canada build ideal continental highways from ocean to ocean. Let the States and provinces build similar highways from border to border. Let the European nations expend some of their war millions in building ideal highways from Europe across Asia, thereby placing Western civilization in closer touch with the Chinese and other Orientals. Let the United States and England build good roads in the Philippines and South Africa, and they will more effectually pacify the Filipinos and Boers at far less cost than by use of the cannon.

STEEL-TRACK ROADS.

By Mr. S. C. DICKINSON, *of Pennsylvania.*

Steel is the best possible thing for a wheel to roll upon. The same horsepower will pull twenty times more on a steel track than on a common dirt road, and five times more than on a macadam road. This steel track will last, without damage or repair, at least five times as long as either. The macadam road can not be perfect without this steel track laid in it, while underdrainage, by the process of laying the track, makes a common road dry all the year around, and with a cinder tread it is dustless, and also noiseless, with no ruts or mud.

The automobile and bicycle have come to stay, and must be provided with a suitable track. This steel track is the best possible track for both. The same track that carries the wagon or carriage so perfectly is also perfectly adapted to the bicycle and the automobile.

The cost of this steel track is less by one-half than a macadamized road, full width, and less by two-thirds than an ordinary street of brick or stone pavement. The principle of structure in this steel track is such that the least possible amount of steel in any given case is employed, giving complete mastery of the problem of cheapest and best track for all countries and for all time.

Under the steel rail is cut a drain, as if for drain tile, say 3 feet deep, 1 foot of which depth is filled with stones; on top of these stones, where the slotted pillars are to be, is placed the concrete in which the pillars are set. The ditch is then filled with dirt. This gives perfect underdrainage under each rail throughout the entire street; hence a dry street or road at all times.

THE BRICK WHEEL-TRACK ROAD

By D. N. LONG, *Buffalo, N. Y.*

In nearly every other branch of civilization wonderful progress has been made, and especially during the last fifty years, while advancement in the art of road building has remained nearly at a standstill.

That the art of road making is susceptible of nearly as great improvement as most other lines of industry has finally been demonstrated by the introduction of the wheel-track system, whereby very superior roads can be constructed at a fraction of the cost under the old-time method in such general use to-day.

The agitation and investigation of the road question by the United States Department of Agriculture during the past ten years has brought out the fact that the people of this country are needlessly losing over \$600,000,000 each year because of our bad roads, making this the most important economical question before this country at the present time. The advent of the bicycle, followed by the automobile and the free rural delivery of mails, has greatly stimulated the agitation of this question.

The fact that our post-office officials claim that mail could be delivered to nearly every home in this country without cost to the National Treasury if we had good roads has also been a powerful stimulant toward the energetic and earnest study of the road problem and is an instance of its far-reaching scope and importance.

Nearly two years ago an investigation of this wheel-track system was made by the Office of Road Inquiry of the United States Department of Agriculture, resulting in a test piece of this road being built in the Department grounds at Washington, D. C., in the early part of 1900, which has been in constant use ever since, with the most encouraging results.

The fact that all loads are hauled over very narrow parts of the road—railroad cars, for instance—indicates that if that narrow portion can be properly adapted to carry the load on our common roads very new and important results may be secured.

It is also well known that wagon wheels tend to form and follow ruts in the roadbeds. Now, by simply constructing a shallow, even, and nonwearing rut or slight depression for the wagon wheels, the ideal and natural conditions for road construction are largely met.

The brick wheel-track road accomplishes these results in a remarkably efficient manner and at so low a cost as to almost seem incredible. At the same time an even surface for the wagon wheels is provided, and excellent drainage is afforded to the whole roadbed.

A wheel-track road can be built for about \$1,500 per mile in all sections where paving blocks can be had for \$15 per 1,000, and should last for many years without material expense for repairs. This cost of construction could be reduced to a few hundred dollars per mile if the plan for using convicts is adopted. Even at this low cost a permanent road is secured of such smoothness that several times the load can be hauled on it with the same motive power required on the average stone or earth road, while all mud, dust, and objectionable ruts are avoided.

This wheel-track system gives a wheel-carrying surface nearly equal to the steel rail in its evenness, with nearly the same wearing qualities, but without its liability to rust. In fact, many of our best shale paving bricks are composed of 15 to 20 per cent of iron; so the wearing qualities of these roads when built of shale brick are largely due to the presence of iron in the wearing surface.

The development of this system has made practical another great advance in road construction. As a result there is no reason why, after this method, our convicted criminals and vagrants should not be employed to construct the finest roads in the world throughout our entire country, with scarcely any assistance from our taxpayers.

The suggestion by the United States Department of Agriculture that the long-term convicts be employed in the penitentiaries and workhouses to make the brick and other road materials and the short-term convicts to construct the roads is an eminently practical one, by which the taxpayers of this country could probably make a clear saving of \$7 for each individual in the country on the average. Instead of this they are now paying large sums to support these people in addition to large sums for roads.

Convict labor, thus employed, would not, properly speaking, come in competition with free labor, as if this work is not done by them it probably would not be done at all to any great extent, and, besides, every workingman, no matter where located, will be directly benefited by the improvement in our public roads.

A sample of this wheel-track road system has been laid in the street adjacent to this building, to which your critical attention is particularly invited. By this system this country can likely secure by far the best roads in the world at so low a cost as to be insignificant.

Mr. A. H. Battey, of New York, presented the following resolution, which was adopted:

Whereas Thursday, September 19, has been selected as the day for the burial of President William McKinley:

Resolved, That as a token of respect to his memory the International Good Roads Congress adjourn until Friday, September 20, at 9.30 a. m.

The motion was carried and the congress adjourned.

FRIDAY, SEPTEMBER 20, 1901.

Vice-President Edward A. Bond, of New York, called the meeting to order.

General Graves, of the committee on resolutions, presented the following report, which was unanimously adopted:

RESOLUTIONS ADOPTED BY THE CONGRESS.

To the International Good Roads Congress:

Your committee on resolutions respectfully reports the following resolutions and recommends their adoption:

Resolved, That it is the sense of this International Good Roads Congress—

(1) That now, while the public road systems of this country are in a somewhat chaotic condition and in a state of transition, the need for investigation and educational work by the Government is greater than at any time in the past.

(2) That the Office of Public Road Inquiries in the Department of Agriculture should, therefore, at once be enlarged into a bureau and supported by such larger appropriations as will be more in keeping with the great work to be done by it.

(3) That in the opinion of this congress an appropriation of at least \$150,000 should be made by the United States Congress for this purpose, and all members of Congress are respectfully urged to secure such an appropriation.

Resolved, That we, the members of the International Good Roads Congress, do hereby heartily approve of the organization of the National Good Roads Association and commend its work to the careful consideration of the people of the several States.

Resolved, That we recognize and commend the action of the League of American Wheelmen and all kindred associations in their efforts to obtain good roads.

Resolved, That it is necessary for the purpose of carrying on the work of good road construction to complete and perfect a chain of organizations in each State, Territory, and county for thorough concerted action under a definite, systematized plan of work and cooperation with the National Good Roads Association of the United States.

Resolved, That it is the sense of this congress now assembled that a vice-president of the National Good Roads Association for each State be authorized and requested to organize a State good roads association in his State or Territory, and that this congress heartily favors and indorses such action and pledges its support thereto.

Resolved, That the Illinois Central, which was the first railroad to equip and run a good-roads train to illustrate to the different portions of the country the use of modern machinery in road making; that the Lake Shore and Michigan Southern Railroad, for furnishing and transporting the good-roads train now operating in this city, be especially commended; also the New York Central and Erie railroads for special terminal favors extended; that the manufacturers of road machinery who furnished machines and tools, and the various corporations and

individuals who assisted in the work, are entitled to the commendation of all interested in the work of obtaining good roads.

Resolved, That we commend the action of the national and State granges in their efforts in behalf of good roads as a necessary prerequisite to the establishment of a system of rural free mail delivery; and we heartily indorse the policy of the Post-Office Department in requiring the maintenance of good roads as a condition necessary to free delivery of the mails in rural districts.

Resolved, That experience has demonstrated that the greatest progress for good roads has been made in the States where the system of State cooperation has prevailed under the direction and control of a State highway commission or engineering department; and that we recommend this plan to the several States as far as the same may be applicable to their conditions.

Resolved, That it is the sense of this Good Roads Congress that every agricultural college in the United States should have a short course of study on road building adapted to the State in which said college is located.

Resolved, That, in the opinion of this congress, the Government should make necessary appropriation to carry to an early and successful completion its system of roads in Yellowstone National Park, to the end that the comfort and convenience of the traveling public in this national pleasure ground may be properly cared for, and that these roads may become an example of correct highway construction to the rest of the country.

Resolved, That this congress indorses the use of convict labor where practicable in the work on public roads or in the preparation of materials therefor, thereby taking the convicts out of the competition with honest labor.

Resolved, That this congress heartily approves of the use of the wide tire on all public roads, and of the payment of the usual road taxes in cash instead of in labor.

Resolved, That the thanks of this congress be extended to those who have made addresses and read papers at its various sessions, and to the press, which has so heartily indorsed and aided the movement.

Respectfully submitted.

JOHN C. GRAVES, *New York.*

A. W. CAMPBELL, *Toronto.*

D. P. HUTCHISON, *North Carolina.*

CHARLES A. FORBES, *Minnesota.*

ROBERT STONE, *Kansas.*

A. L. MANN, *Florida.*

J. C. VAN PELT, *Kentucky.*

STEREOPTICON VIEWS OF GOOD ROADS.

Lewis M. Haupt, civil engineer of the Isthmian Canal Commission, presented a number of stereopticon views of the post roads and highways of Norway and Sweden, Switzerland, Germany, and Austria, showing the excellent surface and easy gradients in vogue in those countries. Among the views shown were the following: The "Axenstrasse," the "Via Mala," the "Versam Road," the "Fursten Allee," the "Gorge of the Schottenen," the "St. Gothard Pass of the Alps," the "Skarsfos," the "Blaafjeld," and the "Verlome Loch."

As an object lesson, showing what defects might be expected, a series of street pavements were projected on the screen and the gauge rut and longitudinal joint caused by the use of blocks of uniform size, even when placed so as to break joint, was emphasized.

A few internal waterway slides were also exhibited as showing an ideal surface of least resistance to traction; and the intimate relation of the three systems of water, road, and rail transportation, together with relative economies, was brought out.

William Pierson Judson, deputy State engineer of New York, then presented, by means of the stereopticon, views of small portions of five of the fifty different roads that Mr. Bond, the State engineer, has under construction. The pictures had been made within the last few weeks and showed condition of the work.

The chairman then introduced H. M. Chittenden, captain, Corps Engineers, U. S. Army, who presented the following address, illustrated with stereopticon views:

THE GOVERNMENT ROAD SYSTEM OF THE YELLOWSTONE NATIONAL PARK.

By Capt. H. M. CHITTENDEN, *Mammoth Hot Springs, Wyoming.*

The territory to which the Yellowstone National Park road system is intended to give access embraces a total area of nearly 6,000 square miles. The original reservation contained about 3,400 square miles, the Yellowstone Park Forest Reserve, on the east and south of the park, 1,500 square miles, and the Teton Forest Reserve, still farther south, about 1,100 square miles. The whole territory lies in the heart of the Rocky Mountains and comprises some of the most rugged country on the continent. It is the source of nearly all of the great river systems of the West. The Madison and Gallatin forks of the Missouri rise within the original reservation, while only a short distance to the west is the source of Jefferson Fork of the same stream, more distant from the ocean by water channel than any other point upon the globe. The Yellowstone River, largest tributary of the Missouri, and its own tributary, the Bighorn River, known in its upper course as the Wind River, likewise flow down from the mountains of this elevated region. The Continental Divide runs directly athwart these reservations from northwest to southeast, dividing them into two portions, of which the smaller, about one-third of the whole, is on the Pacific slope. This area is drained by the Snake River, the great southern tributary of the Columbia. A little to the southward of the Teton Reserve another important river of the Pacific slope finds its source, the Colorado, which rises among the perpetual snowdrifts of the Wind River Mountains and pours its waters into a tropical sea at the southern boundary of the United States.

The topography of these reservations is what would be expected in a country filled, as this is, with lofty mountain ranges. It is exceedingly rough and broken, except in the central park plateau, where there are large tracts of comparatively even surface. The great mountain ranges occupy the larger portion of the area. Among these are the Gallatin Range in the northwest portion of the park; the Absaroka Range in the east, one of the most compact and rugged mountain masses on the continent; the Wind River Range, which is the southern prolongation of the Absarokas, and the wonderful Teton Range, which lies in the western portion of the Teton Reserve. There are also detached spurs and ranges in various sections, the more important being the Washburn and the Red Mountain ranges. Among these mountains the terrain is excessively rough, and routes of travel are necessarily confined to the stream valleys and the passes between them. Even these are in many cases impracticable, except at enormous cost.

The streams are typical mountain torrents of rapid fall and perennial supply. The precipitation of this region is much greater than that in the country around

about. It has never been systematically measured in the upper park, but in the northern portion at an altitude of 6,000 feet it averages nearly 19 inches, with a maximum of nearly 25. In the upper park it is much greater, and the snowfall there reaches a depth of from 4 to 6 feet in the dense forest. The park streams, therefore, never become dry, except in a few places where the water escapes through a porous soil. Their flow, even in autumn, is strong and abundant and the water perfectly clear and pure. The torrential character of the streams and their liability to heavy floods in the springtime make them an element in road construction that has to be most carefully reckoned with.

In certain sections of the park springs abound in great numbers and are troublesome to deal with. In others they are entirely absent over large areas.

Over 80 per cent of the park is covered with pine forests, often of great density, and in many places so filled with down timber that they are almost impassable. They are a matter of the greatest importance in the development of the park road system, chiefly as an undesirable quantity, though sometimes quite the reverse. Contrary to the generally accepted view, these forests are largely responsible for the spring floods. Instead of permitting the snow to accumulate in drifts they cause it to lie in an even sheet of uniform depth over the face of the country. When spring comes the dense shade keeps it from melting under the rays of the sun and holds it until late in the season, when it suddenly disappears under the first warm winds and rains. Out in the open, on the other hand, such snow as does not accumulate in drifts disappears gradually, thawing under the sun during the day and freezing at night without any swelling of the streams beyond their safe capacity. The snow in these areas entirely disappears, except in the drifts, while yet the forest areas are covered to an average depth of from 2 to 4 feet. The snow in the open country has no marked effect upon the June rise, which is essentially a forest flood; but the drifts last until late in August, supplying water for the streams long after the snow has entirely disappeared from the forest.

The climate of the park is one of extremes and of a kind which tells heavily against the maintenance of the roads. In the spring storms are frequent, rainfall is as heavy as in the Eastern States, and all the conditions of a wet climate are present. In the later summer the rain almost wholly disappears, the surface of the ground thoroughly dries out, and the roads suffer more from the lack of moisture than they did from its excess.

In the composition of the rock and soil of which the roads have to be constructed the park presents a greater variety, in all probability, than any other region of like extent upon the face of the globe. Everything is met with from granite to the softest geyser formation, but as a whole the material is of very inferior character for road work. The rock is nearly all volcanic, and most of it too soft to wear well under wheels. Gravel beds abound, but not with sufficient frequency to meet the requirements for surfacing material. In certain portions of the park whole mountain sides are formed of masses of crushed rock, varying in size from pieces of a cubic foot volume down to the smallest pebbles. This broken rock will be utilized wherever it is within reach of the roads. Over extensive portions of the park the hot-springs formation prevails. With few exceptions it is worthless as a road-surfacing material. A very marked characteristic of the soil throughout the park is the presence of crystals of black rock from the size of an eighth-inch cube down, resembling obsidian in color and texture. It has no adhesive power, and wheels cut through it to the depth of several inches with a creaking noise like that of sleigh runners in frosty weather. In the valley of Jackson Hole, in the Teton Reserve, are extensive masses of fine rock or gravel, perfectly smooth and free from dirt and absolutely devoid of any binding power. They constitute a most annoying kind of road material in their natural state and can scarcely be driven over with heavy loads. In still other portions of the park the ground is a vast

mass of boulders of all sizes up to 5 or 6 tons weight. They increase enormously the difficulty of road building in these sections.

Such is a brief outline of the physical conditions which are encountered in the construction of the mountain roads of the Yellowstone National Park. The necessity for these roads arises from the desire of the public to see the peculiar natural phenomena with which this region abounds, and which first became generally known about thirty years ago. The Government set apart the entire region as a public reservation for the benefit and enjoyment of the people, and thereby assumed the obligation of making its points of interest accessible to the traveling public. About seventeen years ago it began the development of a road system which, though still far from completion, will yet become one of the finest and most extensive mountain-road systems in the world.

The controlling points of interest which it was considered necessary to make accessible to all travelers are six in number—the Mammoth Hot Springs, the Norris Geyser Basin, the Firehole Geyser Basins, the Yellowstone Lake, the Grand Canyon of the Yellowstone, and the beautiful mountain park country near Tower Falls, where the fossil forests and other objects of interest abound. The first three of these points are on a north-and-south line in the western portion of the park and are about 20 miles apart. The other three are similarly situated, about 20 miles east of the first. It naturally resulted that the main circuit of the roads should pass along the first line, across to and along the second, and then back to the beginning. This is what is known in the official project for the road system as the Belt Line. The general travel will always pass around this circuit to the left.

To reach the Belt Line from the borders of the park there are four approaches—one from each side. The shortest of these, but the most important, is that from the north, where the Northern Pacific comes in. The eastern approach, which is the Burlington connection, is about 60 miles long. It will be the most beautiful road, as a whole, in the park. The southern approach, with its course through both forest reserves, will embrace about 110 miles. It has no railroad connection, but leads from the famous valley of Jackson Hole, at the base of the Teton Mountains, one of the most picturesque and wonderful mountain valleys on the continent. The western approach connects with the Oregon Short Line Railroad.

Besides the Belt Line and approaches, there are numerous side roads to isolated objects of interest, and many horseback trails for the use of travelers who wish to get away from the main traveled roads, and also for troops and scouts patrolling the park.

The total mileage of the Park road system, when complete, including the roads in the forest reserves, will be nearly 450 miles. The trails probably have an aggregate length of 150 miles.

The roads of the park are primarily designed for tourist traffic; secondarily, only for the hauling of freight. This purpose controls absolutely in the matter of location. Not only do the roads lead to the important centers of attraction, but the intermediate portions are carried where the best view of the surrounding country may be had, and where their own construction will be a matter of interest.

The limiting gradient on the main circuit is 8 per cent, and this is reached in only a few instances. It has been found that, for the purpose of tourist traffic, an 8 per cent gradient is not much more objectionable than one of 5 per cent. Beyond 4 per cent a loaded coach can not be hauled at a trot for any considerable distance. Whenever the speed is reduced to a walk it is found that a team will ascend an 8 per cent gradient nearly as rapidly as a 5 per cent. The elevation is thus gained more quickly, a lighter gradient is reached, and a faster gait is resumed. In downhill travel an 8 per cent gradient can be safely descended at a rapid trot, but

for anything higher a slower speed is necessary. For these reasons gradients of 8 per cent are admitted on the Belt Line where the situation requires them.

On the eastern approach a gradient as high as 10 per cent has been adopted for about a mile, from sheer necessity in overcoming natural obstacles. The same gradient is admitted where necessary on the side roads, for travel on these roads is generally in light vehicles.

Experience has shown that occasional breaks in the gradient in ascending long hills is an advantage. Instead, therefore, of making a continuous ascent from top to bottom, level stretches are introduced every half mile or so. This is particularly important with descending traffic, for where a driver has to hold his foot on a brake continuously for half an hour or more the strain becomes too great for his endurance.

The curves are carefully adjusted to the accidents of the ground and are generally of more than 100 feet radius. In a few places a radius as small as 50 feet has been found necessary.

The right of way is taken at 30 feet, and the clearing through timber has hitherto been only of this width. It will be necessary in certain localities to widen this clearing on the south side of east-and-west roads, to let in the sun in the spring for the more rapid melting of the snow. The roadway is given a width of 18 feet, with 6 feet on each side for slopes and ditches.

Drainage is accomplished by the usual side ditches. Extra precautions are taken in swampy and springy country, but in general a ditch of small capacity answers every purpose. No effort is made to secure subdrainage by blind drains or other means, but rather to offset the effect of the water by a stone roadbed, or even corduroy where the logs can be kept well submerged and therefore free from decay. Moisture is of such great importance during the dry season in preventing dust that it is not desirable to drain it from the ground.

The bridges are made both of wood and steel. With the wooden bridges the abutments and piers are wooden cribs filled with rock. In steel construction, which is now being largely adopted, solid concrete abutments or tubular piers are used.

The number of culverts required is enormous. These have hitherto been constructed of wood, and are a never-ending source of annoyance on account of breakages and the necessity of sending to have them repaired. The use of iron and vitrified-clay pipe has been begun and will eventually replace wood entirely.

As in all road construction, one of the most difficult matters to handle successfully is that of securing a good surface. The soil, as already explained, is of the most heterogeneous character imaginable, and as a general thing of inferior quality. Surfacing material in natural deposits is rarely sufficient, either in quality or quantity, to supply the needs of the roads. There is little good rock, all of it being of a volcanic character and most of it too friable to resist the wear of the wheels. Ordinary gravel, which would answer well in a moister climate, is of much less value here because of the extreme dryness of the atmosphere, which effectually destroys the bond.

The road-surface problem in the park is therefore a very serious one. The scheme for handling it, so far as funds will permit, is as follows: Where there is rock of good enough quality and within reasonable distance, the roads will be regularly macadamized. In other places the effect of travel upon different kinds of soil is observed, and where a good material is found quarries are opened and it is hauled as far in each direction as it will economically reach. In this way very satisfactory results have been obtained. It may be mentioned as a singular fact that wherever "formation" of a pinkish color is found it makes a good surfacing material.

Hitherto the small appropriations for the work have never permitted the question of surfacing the roads to be taken up in a systematic manner. But as travel

increases, the intolerable annoyance from dust during the rainless season is becoming such as to make this work an imperative necessity. The dust problem is now, in fact, the most serious with which we have to deal. Not only is the dust a vexatious drawback to the pleasure of the tourist, but it is a constant source of injury to the roads. During the season of 1900 an average depth of 2 inches of the road surface over the entire system was blown away. To replace it with ordinary surfacing material would cost fully \$25,000.

The problem, serious as it is, however, is one that can be successfully solved. The proper surfacing of the roads will, in large part, do away with the dust, and the rest can then be gotten rid of by sprinkling. The experiment has been successfully tried during the present year upon a stretch of thoroughly constructed roadway. Large tanks were provided at intervals of from one-half to three-fourths of a mile wherever water could be found. The sprinkler was equipped with a large diaphragm force pump fixed on a platform in rear so as to be operated by two men. The tank holds 750 gallons and can be filled in fifteen minutes. Wherever overfall flumes could be provided these were used. The entire distance sprinkled being a hill road a four-horse team was required. Besides the driver there was one man, who, when not helping fill the sprinkler, followed behind with a shovel, clearing loose stones from the track, filling ruts, and doing other useful work. This equipment passed over the road twice a day. It started at daylight and finished the first course before 9 a. m. The return trip began at 4 p. m. and finished about dusk. By thus sprinkling in the cool of the day the water had a chance to soak into the road surface instead of being lost in evaporation, as it would have been in the middle of the day. The cost of this work for seventy-five days during the dry season was about \$125 per mile. It was, however, partly offset by the great preservative power of the water on the road. It is probably a safe estimate to say that one-half of the cost was saved by preventing deterioration of the surface due to dry weather.

The use of oil on the roads has been considered, but the great distance from any source of supply and the cost of transportation will probably prove an insuperable obstacle.

The matter of snow would naturally seem to be a serious one in roads of so elevated a region. This would be the case were it not for the fact that the tourist season lasts only from June 1 to September 30. By the 1st of June the snow has disappeared from the greater part of the system. The few remaining drifts are shoveled through, but the heavy snows in the forests on the high elevations may hold back travel in those places for a week or two. For the reason above given, very little attention is paid to snowdrifts, and a road location, if otherwise satisfactory, is rarely changed on account of them. In the case of the only road in the park which is traveled in the winter the use of removable snowsheds may be resorted to. The most serious effect of the heavy snows (which in the upper park are of such depth as absolutely to stop all winter travel except upon snowshoes) is in the floods which they produce when melting off in the spring.

The main roads are all provided with mileposts. These are numbered only with reference to the nearest stations on either side. The distance between any two stations is taken at the nearest full number of miles and the posts are set accordingly. On the face which the approaching traveler sees is placed the distance to the next station in the direction in which he is going, and on the opposite face is placed the distance to the first station in rear. The sum of the two numbers is, of course, the distance between the stations. Signs are also provided at all road junctions so as to give full information to travelers, and other signs give the names of all important objects of interest.

The means hitherto provided for the park road work have permitted but very little to be done in perfecting and embellishing the system; but this is a matter of the very highest importance and one that, when properly attended to, will greatly

enhance the beauty and value of the roads. All dead and down timber will be cleared back for the distance of a hundred feet; the living trees will be thinned out so that grass can grow among them, thus not only beautifying the roadside, but making pasture which the game will learn to frequent. The retaining walls will be mostly rebuilt of fine masonry, and at all dangerous points strong but neat guard rails will be provided. The slopes of cuts and fills will be carefully aligned and all irregularities of grade and direction corrected. Wherever practicable small water courses will be carried along the roadside. In these and many other ways the roads will themselves be made one of the interesting features of this most interesting region.

In the matter of annual repairs, a satisfactory system has not yet been arrived at. When the roads are finally macadamized and sprinkled, the system of small repairs may be adopted—that is, small parties may be stationed all along the roads, each with a certain stretch assigned to its care. In the present imperfect state of the roads this has not been found entirely practicable on account of the heavy character of much of the repair work. A condition of serious importance which is present in all work on the system is the necessity of supplying working parties from a single distant point and of providing them with shelter and conveniences for subsistence. The dinner pail is not a practicable proposition on this work where only camp cooking is available, and the necessities of camp life require the concentration of parties as much as possible.

At the present time the work of maintenance and repair is conducted about as follows: As soon as danger from melting snow arrives, small isolated parties are sent on snowshoes to a few of the narrow canyons where washouts are feared. These parties watch the roads, turn off the water, guard the bridges, and prevent extensive damage which might otherwise occur. As soon as the season is far enough advanced one or more good-sized parties start out to shovel through the deep snows and repair all serious damages. When the roads have dried off sufficiently to permit more thorough work the entire system is gone over and carefully smoothed up with grading machines, the ditches are cleared out, culverts are repaired, and all other necessary work is attended to. This general repair work does not ordinarily extend beyond the middle of July. After that any new work on the roads injures them for the time being on account of the dry weather, which does not permit the fresh material to pack. After the tourist season is over the roads are all crowned up with grading machines, and in this condition are thoroughly packed by the winter snow.

The plant employed in the park road construction is that ordinarily used in similar work. It includes a large portable rock crusher, a complete portable saw-mill outfit, a pile driver and engine, a heavy derrick, several road graders, stone wagons, dump wagons, carts, sprinkling wagons, wheel and slip scrapers, plows, and an extensive equipment of smaller implements. All work is carried on by hired labor, the Government furnishing shelter and subsistence and the workmen providing their own bedding. The working parties live exclusively in camp. The prices paid are \$1.50 per day for laborers' wages and \$1.95 for single teams without drivers, the owner furnishing the oats. Animals are allowed to graze under certain restrictions in the matter of herding. The cost of subsistence is about 40 cents per day for an excellent ration consisting of the best quality of food stuffs which the market affords.

It is not the policy of the Government to permit any undue extension of the road system of the Yellowstone National Park. On the other hand, it is intended to restrict the roads to the absolute necessities of making the more important features accessible. But while it is not proposed to build any roads not actually needed, nor to change in any unnecessary way the original face of the country, it is proposed to make such roads as have to be built as perfect as any mountain roads in the world.

The influence of a complete road system upon the future welfare of the park will be very great—far more so than is generally supposed. It is the purpose of the Government to maintain these reservations as far as possible in their original condition, unchanged by the hand of man. It will not permit railroads within their limits, nor even electric railways. It is considered better to keep these modern innovations out altogether. There are constant efforts being made to introduce them, and these efforts are generally based upon the alleged discomforts of travel under present conditions. With hard, smooth highways, free from dust, all argument for railways of any sort will disappear. A coaching tour through the Yellowstone will then be the most complete and satisfactory to be had in any country, and the tourist will have no occasion to ask for anything better. Even in the present imperfect state of the roads scarcely one tourist in ten desires the introduction of steam or electricity. With a perfected system even that small proportion will disappear.

The chairman then introduced William T. Creasy, secretary of the legislative committee, Pennsylvania State Grange, Catawissa, Pa., who read the following paper:

FARMERS' VIEWS OF GOOD ROADS, AND HOW TO GET THEM.

By WILLIAM T. CREASY, *of the Pennsylvania State Grange.*

It is not often that practical farmers have a voice at such a great international gathering on so important a subject, and for this reason the Pennsylvania State Grange, representing the largest organized body of farmers in our State, through its legislative committee, feels highly honored to present the views of the farmers of Pennsylvania on the subject of good roads.

The time to question whether good roads are desirable has gone by. All are agreed on this point. On the proposition as to whether good roads the year through are worth what they would cost there is an honest difference of opinion.

Better roads are a matter of evolution and education on the one hand, and of getting all wealth to contribute to such improvement on the other. How to make good roads with the different kinds of material available is not so much the question as how to get the means to do it. The farmers of the State justly feel that they should not be forced to undergo any larger expenditure under existing tax laws. Scarcely one-fifth of the wealth of the State is in farm property, and this practically pays all the taxes levied for road purposes in the townships. Not only are farmers almost exclusively taxed for road maintenance, but they are compelled to furnish the land for roads for merely nominal damages, if any, and are obliged to pay taxes on land set apart for public use.

Conditions have changed: wealth has shifted from the farm to the city in a large degree. Fifty years ago there was but little wealth in mining, manufacturing, and transportation. To-day the money invested in these various enterprises far exceeds the money invested in farm property and, moreover, brings larger returns. The highways of the State, like the public schools, belong to all the people and all should be willing to contribute to their maintenance. With the shifting of wealth in the State our tax laws have not been materially changed, except in so far as real estate is exempt from State taxation. Farmers believe, and very justly, that wealth other than the wealth in farms should be taxed to support a thing in which all are equally interested.

The maxim, "You can not get something for nothing," is as true of road building as it is of anything else. The farmers take this view of it, and our organization at its last annual gathering, December, 1900, had the following to say on this question:

The burden of road construction has been on the farmer since the foundation of the Government; in fact, the farmer has been the pioneer in the construction

of roads. While he has borne the burden of constructing and maintaining highways other classes have been equally benefited and have contributed little or nothing to their support. Even at this late day, when primitive methods of road construction and primitive government should be superseded by a higher civilization and more equitable laws in constructing and maintaining public highways, the farmer finds himself confronted with a proposition to force upon him a costly method of State control, with expensive county engineers, and a scheme to fasten upon the farmers county and township bonds that would be a burden upon the agricultural class for the next century. If public roads were only for the benefit of the agricultural class there might be an excuse for this, but as they are used by all classes and industries the first requisite in improved road construction should be a method of raising the needed revenues that would tax all classes of corporate and personal property as well as real estate. The idea of constructing public roads and maintaining them by taxation on real estate alone is fallacious. We therefore insist that if any road legislation is to be enacted, all personal and corporate property should be taxed alike with real estate for this support. We do not wish to be understood as opposing good roads, but we are emphatically opposed to any system of road construction that will increase the burdens of the already over-taxed farmer.

At its annual meeting, December, 1899, the State grange reiterated the position it had taken at previous meetings, as is shown by the following quotation from the annual proceedings:

Your committee wish to reiterate and emphasize the position which the State grange has constantly held as to the different road-law schemes that have developed in recent years.

We want good roads—will welcome better roads than we have—but insist that as better roads are mainly a question of more dollars the law which may provide for them shall also provide for equal taxation for that purpose of all kinds of property.

It is a *sine qua non* with us that any road law shall either provide for an equal taxation of all forms of property (except that exempted by the constitution) for road purposes, or that it shall contain as a prerequisite an appropriation by the State under conditions essentially similar to those governing the public school appropriation.

The latter method does not seem very feasible in our State for the reason that the expenditures of our State government will equal the receipts for some years to come; then, again, as the appropriation would have to be made at every succeeding session of the legislature, which meets biennially, there would be much uncertainty.

In fact, a new road law was passed in Pennsylvania in 1897 and a proviso was inserted by the farmers of the State that said law should not go into effect until \$1,000,000 should be appropriated annually, "to be distributed, under the direction of the department of agriculture, among the several townships of the State in proportion to the number of miles of public roads in each township." Though more than four years have elapsed no appropriation has been made and the act is not in force.

Therefore we advocate that while at present real estate is taxed alone for road purposes, a special State tax be assessed and collected by the State on all corporate property and personal property for a road fund for the improvement of the public roads of the State. It would be the best investment ever made.

Having this end in view, the State grange instructed its committee to prepare a bill on these lines and present the same to the legislature of 1901. The bill was prepared but not presented, as there had been a bill presented by the department of agriculture that was so amended as to create a permanent road fund for the improvement of the public roads in conformity with the ideas of the State grange. This amended bill would probably have raised nearly \$2,000,000 annually. With the aid of the grange it passed the lower branch of the legislature, but failed in the senate on account of the opposition by the great corporate interests of the State, and that counts for a great deal in Pennsylvania, from officials down.

This defeated measure was indorsed by the advocates of good roads as being the

best and the only practical solution of the problem in our State that had at any time been presented.

At present in Pennsylvania township roads are managed by road supervisors, and the tax is worked out, though there are many special acts differing from this in some particulars, but road tax is assessed only on real estate.

In 1895 an act was passed known as the county road act, which empowered the county commissioners to macadamize or otherwise improve the main or principal roads in the townships of the county, and gives them power to assess annually a special tax of one-half mill on all real estate in the county for road purposes. This law has been further amended to allow the county commissioners to borrow money not exceeding 1 per cent on the valuation of the real estate of the county. This law of 1895, while applicable to all the counties, is only in operation in two of them. In Allegheny County it is costing over \$12,000 for each mile of road made under this act. The act leaves the methods, etc., entirely in the hands of the county authorities, and cheaper roads can be built if desired.

Under this law it would be wise to allow counties to tax all kinds of property and franchises for road purposes. If this could be done the law would come into general use in nearly all the counties in the State.

Many bills have been presented to the lawmaking bodies of our State. At the last session a State commission prepared a bill, but as it failed to provide any means of raising revenue outside of taxing real estate, it received very little consideration, and never got out of the committee to which it was referred.

Pennsylvania has nearly 1,600 townships and 100,000 miles of township roads. In many sections roads are good; in others the material is close at hand to make better roads; in still other parts it is expensive to build good roads; but upon the whole the township roads of Pennsylvania are better than they were twenty years ago.

The local and county taxes on real estate increased from \$30,000,000 in 1892 to \$45,000,000 in 1899. Real estate is paying an average of 16 mills; corporate and personal property is paying less than an average of 3 mills. This inequality of taxation leads the farmers to oppose any laws creating additional burdens until all kinds of property are placed on the same basis for the purposes of taxation.

State control of the roads is opposed. It would create a horde of officials, and in many instances be turned into the worst kind of a political machine. The control of the public roads as well as other matters should be as near the people as possible. It is essential to good citizenship.

In conclusion, I will reiterate that in Pennsylvania the first requisite toward good roads is a proper revenue measure taxing all personal and corporate property for road purposes at the same rate that real estate is taxed; and from what I learned as a delegate to the national tax conference held in this city last May and from various reports on this subject of taxation and good roads I am inclined to think that what is true of Pennsylvania is true of nearly all the States in the Union.

The chairman then introduced Mr. Lucien Souit, of New Orleans, La.

Mr. SOUIT. Mr. President, ladies, and gentlemen, it is with the greatest pleasure I am here to-day. A great many of these gentlemen were in New Orleans several months ago, when they gave a demonstration of road building. We have not the material for good roads that you have, as ours is nearly all clay land, without any stones. At one time we thought it was impossible for us to build good roads, but we found that with proper drainage and management good roads can be made, even in our country, although of course we can not have the roads that you have. But now in every parish we have road machines and scrapers and build our roads as best we can. With the assistance of the Illinois Central Railroad we are enabled to get the gravel which exists in some parts of the State and have roads far better than we have had hitherto.

We shall be proud at any time to have you come to Louisiana and see the progress we have made in road building. [Applause.]

The chairman then introduced Mr. J. C. Van Pelt, of Louisville, Ky., who addressed the congress as follows:

ORGANIZATIONS FOR GOOD ROADS IN KENTUCKY.

By J. C. VAN PELT, *Louisville, Ky.*

MR. CHAIRMAN AND LADIES AND GENTLEMEN: I will briefly state to you what has been done and is now being done for good roads in Kentucky.

The Louisville Commercial Club (of which I am the secretary) was organized for promoting the industrial and all other interests of the city of Louisville and the State of Kentucky, and claims more than 1,000 members in good standing.

About four years ago this club undertook the enterprise of organizing a State commercial convention for developing throughout the State of Kentucky the same benefits and good results that it sought to obtain for the city of Louisville.

A letter was addressed to the mayor of each city and town in the State requesting him to appoint a delegate to this convention. A similar letter was addressed to each county judge requesting him to appoint three representative men from his county as delegates. The meeting was a great success, as representatives came from each one of the 119 counties of the State. A day was set apart for the discussion of the all-important question of good roads. Then and there our good roads work began in earnest. A great interest was at once awakened throughout the State, and it began to dawn upon the minds of the people that nothing would promote the prosperity of the State more than good roads.

The following year a second convention was held, and a greater attendance and a greater interest resulted therefrom. We succeeded in enlisting the sympathy and hearty support of our commissioner of agriculture at Frankfort, Hon. Lucas Moore. Through his active cooperation two very intelligent lecturers and organizers were secured to canvass the State, delivering lectures and educating the people on the question of good roads. In a short time 65 good roads and agricultural improvement associations were organized, and the work was progressing very rapidly when the State election came on and the work was necessarily postponed. This was only temporary, however, and the club has again taken up the work and will push it with redoubled energy.

The visit of President Moore, Secretary Richardson, Mr. Eldridge, and Senator Dodge to Kentucky, with the good roads train, was all that was needed to awaken the enthusiasm which organized the Kentucky Good Roads Association, which held its first meeting in Louisville last July.

The State association was thoroughly organized; our present commissioner of agriculture, at Frankfort, Hon. I. B. Nall, was elected president, and your humble speaker is the secretary. President Nall has begun his administration with zeal and energy, and would have been present at this congress but for sickness.

Good lecturers will again be put in the field, and I hope at our next annual meeting of the National Good Roads Association to report that a good roads society will be organized in every county in the State of Kentucky. In these county societies the women are greatly interested as members and good workers for the cause.

Yesterday a gentleman explained that three things were necessary to make good roads—first, drainage; second, better drainage; third, best drainage.

I will add that, before we begin to make good roads, the three first requisites are organization, better organization, and best organization.

SATURDAY, SEPTEMBER 21, 1901—"GOOD ROADS DAY" AT THE PAN-AMERICAN EXPOSITION.

This meeting was held in the Temple of Music, and was called to order at 10.30 a. m.

Hon. Martin Dodge, Director of the Office of Public Road Inquiries, United States Department of Agriculture, acted as president of the day.

Addresses of welcome were delivered by Hon. W. I. Buchanan, director-general of the Pan-American Exposition, and Hon. Conrad Diehl, mayor of the city of Buffalo, N. Y.

WHAT IS OUR DUTY?

By Col. W. H. MOORE, *President of the National Good Roads Association.*

MR. CHAIRMAN, LADIES AND GENTLEMEN: It is a great satisfaction to me to have the privilege of appearing before you this morning. It is a great satisfaction to know that so many States are represented in this international congress, especially under the circumstances and the difficulties that you are all so well aware of. It is a great satisfaction also to know that the Government is participating in the congress; that Europe to the east of us, Canada to the north of us, Mexico to the south of us, and other countries are interested in this congress and have delegates here, some of whom will speak to you this morning.

It is most fitting that the International Congress on Good Roads should close at the Pan-American Exposition and in this particular building. Only two weeks ago we looked upon a man standing in this building who was one of the greatest men the world has ever known. He came here to do good to this nation, and how well I remembered, as I looked upon him, his recommendation on good roads in his message to the Fifty-sixth Congress. Through the Department of Agriculture and the National Good Roads Association we sought to have him do that. To our martyred President we give honor.

There is a great lesson here. Standing on the beautiful esplanade, as I did last night, and looking at the many buildings that were about me, I saw that everything had been wrought out in detail and with system. It is grand. Stand on the esplanade or on either side of the lagoon and observe the landscape; look at the buildings and their architecture; look at the shrubbery and all the surroundings, and take this lesson of system to your hearts and to your homes, and apply it to the question of good roads. How much the Department of Agriculture and the people of the cities could do to beautify the roads between our cities by planting trees and shrubs is shown by what we see upon these beautiful grounds. It would not cost much to plant fruit trees along the road upon your farms, and why you are not doing it I can not see.

The people should come to such places as this. They need the education. The greatest gardens of America are here. The greatest gardens of the Pan-American Republics and of the world are here. All of us need such education as that. I am glad that the closing session of our congress is held here. We are mapping out other roads, roads leading to the great expositions of the future and to the great educational features that will make them even greater than this.

I presume that there never has been a time in the history of this Government, or of this world, when better opportunities for doing good existed. There is more charity in the world to-day than there has ever been. And you should take up this good roads question and find out what is your duty. You agriculturists from Colorado, Washington, and other far-away States, you people here in the State of

New York, you in the city of New York, who are paying \$133,000,000 annually to run your city government, what is your duty? The city of Chicago, paying \$29,000,000 to run its government, what is its duty? Look at our streets; look at our rivers; look at \$18,000,000 we gave out in charity last year, and then say what is your duty. It is not necessary to bring the lesson to Buffalo, because she stands well to the front in public improvements and the things we are speaking of. But I say to all the people of all our States and cities, "What is your duty? Will you continue to house your convicts in jails and penitentiaries; to feed your poor in soup kitchens, as is being done to-day? You should organize in your precincts, your cities, your States, and go to your councilmen and say, 'Give us better streets;' and to your legislators and Congressmen, 'Give us roads; give us canals and harbors; irrigate the arid lands; build the Isthmian canal; put these people to work whom you are housing in your soup kitchens and in your jails!'" [Applause.]

We must organize. You, who are going back to your precincts, wards, cities, counties, and States, must organize and lay the facts before your lawmakers; must come back to the primary problem of the condition of the roads. Ninety-nine per cent of all the farmers' surplus products have to pass over these roads before they reach the railroads or other means of shipment. What can agriculturists do with roads? The great example of transportation is set to-day by railroad companies, but they have only learned the lesson within the last ten years. The Illinois Central, over which we are so proud to send the splendid trains of the Southland, has constructed its road so that there is now but one-half per cent grade between Chicago and New Orleans, and they are teaching us the lesson of how the common roads should be constructed. I am glad to say that the president of the Illinois Central, Mr. Stuyvesant Fish, is here this morning. He knows what he is doing for this cause and he has said to me that his road would spend \$500,000 to aid the people of the Southern lands to make better roads in order that his company might have their trains running twelve months of the year instead of seven.

You have able speakers here and the lesson of road building is before you. It is your duty to take up this work, to organize and seek to have Congress provide a suitable appropriation to carry on this work. In the years to come, as the work progresses, as you see the factories springing up in the West, in the South, and in the Central States; as you see schools being built, newspapers distributed, and the rural mails coming to the farmer in his home; as you see boys and girls staying on the farm instead of being forced into our cities there to drift into crime; as you see all these things you will realize the truth of what I tell you to-day. It is your duty to go home and take up this question in your own neighborhood and see what you can do for this cause. In doing that you will be enjoying one of the greatest privileges of your life, doing all that any man or woman can do, and that is filling the sphere of your own life with benefit to yourself and to others. [Loud applause.]

President DODGE. I now have the pleasure of introducing to you the Hon. Andrew Patullo, a very distinguished member of the Canadian Parliament, and president of the Ontario Good Roads Association. I have had the pleasure of hearing him before, and it may be interesting for you to know that he left his home and country and traveled 1,500 miles to the city of New Orleans in order to address the good roads meeting which assembled there last May, and to assist in the inauguration of this great movement whereby the good roads train was run through the lower valley of the Mississippi.

THE ROAD PROBLEM.

By Hon. ANDREW PATULLO, *Ontario, Canada.*

MR. CHAIRMAN, LADIES AND GENTLEMEN, FELLOW-CITIZENS OF THIS GREAT NORTH AMERICAN CONTINENT: Meeting as we do this morning in this beautiful building dedicated to sacred song, where the masters of music during the memorable days of this memorable year have been interpreting for you the divine harmonies of the world, we come together to consider a very plain and practical question, a subject on which I fear I shall have some difficulty in interesting you, a question which I fear the ordinary citizens of your country and mine deem of little interest, but which is one of the great problems of the day. This association, of which Colonel Moore is the president, has been doing a work which some people at least in this country appreciate, and which in after years, I believe, will be appreciated by all the people of this great nation. We are now in the beginning of a new century. We think this an age of progress, of marvelous invention and advancement; but it is an extraordinary fact that away back in the distant ages the Romans were able to make good roads, and did make good roads, on scientific principles. And even on this hemisphere, centuries ago the original inhabitants of South America were great road builders. There still exist in South America monuments of their skill and genius. During the Middle Ages the making of good roads seems almost to have been forgotten. It is only with the beginning of the last century, with the advent of Macadam and Telford, that the people of Europe began to make good roads. But what a marvelous effect those good roads have had in England, in Germany, and in France upon the progress of those countries. I have no hesitation in saying that Telford and Macadam, and their coadjutors who taught the people how to make good roads, contributed as much to the social and material progress of the world as did Stephenson, who invented the steam engine, because the prosperity of the British Isles, the prosperity of Belgium (whose representative is here to-day), the prosperity of France, and other European countries has depended not alone upon railroads and other large means of transportation, but upon the common highways of the people.

Those of you who have not been in those old lands can scarcely realize not only the beauty of the landscape, but the perfection of the rural roadways, which have contributed largely to the prosperity and wealth of the people. The French peasants are very poor, as compared with you; but after their great war these peasant proprietors of France were able to take up a great part of the national loans. One of the chief factors making for their prosperity is the perfection of the rural roads. Let me illustrate the difference between their roads and the roads of this country. One of your eminent fellow-citizens, Mr. James Gordon Bennett, was able, some years ago, to drive a coach and four along the roads of France 144 miles in ten hours. What would become of a coach and four driven over the rural highways of this great country in that way? [Applause and laughter.] How is it that you who have made such marvelous progress in invention, in industries, in commerce, who are going ahead by leaps and bounds, in many parts of the country, have scarcely emerged in the matter of road building from a semibarbarous condition? There are, of course, in the State of New Jersey, in Massachusetts, and in the great State of New York, some beautiful roads; and wise and sagacious men have secured some good laws, at least in reference to this great question. But these places are the little oases in the great desert of inefficiency, ignorance, and incompetency under which the common highways of the country, as well as the streets of your cities and towns, have been built during all those years. I do not hesitate to say that through the lack of education, through the lack of organization, through the lack of method, from 10 to 25 per cent of the

vast sums of money spent in the cities of this country on streets and pavements has been thrown away: that from 20 to 50 per cent of the millions of days' labor and the millions of dollars that have been spent in the rural districts of the United States might as well have been thrown into the sea. Is not that an appalling fact? But you all realize it. I state a fact to show you the vast importance of this question. It has a direct bearing upon your public expenditure, upon your material progress. Let me illustrate it in this way: This is a day of specialization as well as of marvelous advancement. You are specializing in everything; you are reducing everything to a science.

If you had conducted the commercial enterprises of your cities on the same principles as the common roads of the country are conducted, how long would the business houses of this city or any other city stand? You put every industry, every business, into the hands of specialists, while you put the road making of the country into the hands of the incompetent and those who know nothing whatever about the principles of road making. Similarly handled no new industry in this country would have the least chance of success. Your railways are managed by great men, by men of skill and genius: every department works with mechanical perfection. If the railways were managed as the rural highways are managed, and the streets in many of your cities, traffic would be paralyzed, and the wealthiest of these corporations made bankrupt. I venture to say that if the great Steel Trust of this country were to manage its business as we do our road making, within three years every shareholder in that corporation would be bankrupt. [Applause.] Surely, when you have made such progress in the arts and sciences, in commerce, industry, and invention, you are able to organize the forces of the country in order to improve your streets and chief rural highways.

It is sometimes thought that in agitating the making of good roads we are urging the expenditure of vast sums of money. We are not doing anything of the sort. It is not a question of any new expenditure. The expenditure is being made now. It is a question of economy. It is a question, not of throwing money away, but of saving the incalculable loss there now is in the industries of the country. Let me illustrate it in this way: I have been officially connected with the cheese industry in Canada, where we make from \$20,000,000 to \$25,000,000 worth of cheese a year. And, by the way, when we go to your expositions we generally take from 90 to 100 per cent of the prizes. [Laughter and applause.] Now I believe that we are losing in haulage in connection with the cheese industry of Canada, at least \$1,000,000 a year. Apply that to your incalculably greater output of grain and wheat and other products, and the wealth of Croesus is a trifle in comparison to the loss that the people of the United States are sustaining every year by having bad roads where they could easily have good ones. [Applause.] Our appeal to you is that after you have solved the great question of transportation in relation to your canals, in relation to your steamships, in relation to your great railways, you solve the equally important branch of the transportation problem which embraces the common highways of the country. Of what importance is it if the great arteries of commerce be perfect, if the little veins leading to them be not also perfect? What matter it if you cheapen the rate from the railway station to Liverpool, if it costs as much to get grain from the farm to the station as to take it from the station to the great markets of the world? There is the problem of road making in a nut shell. [Applause.]

But beyond these material and economic considerations there are many phases of this question affecting the social as well as the material well-being of the people. The most sagacious men of the present day, the thinkers, the acute observers, see many dangerous tendencies in this age of marvelous progress. One of the dangers is that the boys and girls are leaving the farm and going into the towns and cities. What is to become of the world when many of our great cities are ten times as great as they are now? It is true that the trolley is to some extent dispersing

population, but only in a suburban way. I believe that in this question of road improvement lies the solution to a great extent of this difficult problem. In those old lands to which I referred the love of rural life is far more highly developed than it is in this country. In England, in Scotland, in France, and in Germany, when men become wealthy they are anxious to get out on the farm rather than into the cities. One reason for that is found in the beauty of the landscape, the beauty of the roadways and the roadsides. It is very different here. An English poet anticipated what we see in this country to-day when he said:

Ill fares the land, to hastening ills a prey,
Where wealth accumulates, and men decay.

Wealth is accumulating in this country with marvelous rapidity, but men are deserting the farm. You ought to turn them back. But if you want to keep the intelligent, brainy boys and girls of the country upon the farm instead of bringing them into the towns and cities amid the glare of the gaslights and the dangers of city life, you will assist us in this great movement, which means not only the making of highways, but the beautification of the roadsides and the rural homes of this great country of yours. [Applause.]

And now, having endeavored to show or to suggest the importance of the good roads problem, the enormous economy of good roads, the incalculable loss through bad ones, to suggest the many sides and phases of this vast problem of transportation—affecting, as they do, the social as well as the economic well-being of the people; let me for a moment draw your attention to another, to what I may call a national and international consideration. You in this country, like ourselves across the line, have been having unexampled prosperity of late. The wheels of industry have been running fast. It will not always be so. Stagnation will come, and with it distress and social disturbance. In the olden days in other lands the cure which wicked rulers sometimes sought for social disturbance was foreign war. There is little fear, I trust, that your rulers will ever seek such a remedy, for the lives of a long line of great and good Presidents have made it improbable that any but a good man shall ever fill the position of Chief Magistrate of this nation. [Applause.]

We are dealing with a problem of transcendent national and international importance. If all the men and the millions engaged in that greatest of all conflicts in your history could have been engaged in improving the highways of the country, how much better it would have been for this fruitful land to-day. And so we suggest to the governments of these great States that when men in this land of varied resources ask for work they need not be without bread. Let your governments spend the millions, the tens, the hundreds of millions which in other lands have been wasted in war in the promotion of local improvements. Without displacing a day's labor in any branch of industry, every unemployed man in the country could be given work on your streets and highways. This would be no charity, from which manly men shrink. It would yield you dividends a hundred-fold in the profits on agriculture and every branch of commerce and industry dependent upon it. And beyond this you would find a remedy for another ill, worse and harder to eradicate than the misfortune of poverty.

Instead of soup kitchens for the unemployed, give them honest labor. Instead of wasting your resources in watching the lawless element in your cities, or in keeping it in idleness in your jails, offer it on public works, on national highways, the alternative of labor or the lash. [Applause.] I submit with all seriousness that in the development of the municipal, State, and national highways, in the improvement of the streets of your cities, there is offered to you the easiest, the wisest solution of some of the great and difficult problems that confront you. And it is a solution that does not involve the throwing away of money, but its wise investment. It is expenditure which, while curing social and national ills, will yield you an ample economic return. [Applause.]

I have attended four great conventions in this country on behalf of good roads. We are only beginning to attract attention. But don't suppose that, because you don't see much about our work in the press, good work is not being done. I believe that a work has been taken up by such men as Hon. Martin Dodge, Colonel Moore, and their coadjutors which will spread over all the continent and in time transform the streets and rural highways of this and my own country. We have had eminent men here, and although their utterances in this congress may not have excited as much interest or been given as much space in the press, perhaps, as some current incidents of minor importance, yet they are doing a great and glorious work. I come here representing the Good Roads Association of my own country to show that in everything you do for the well-being of the people of this great Republic we Canadians, we Britons, are heart and soul in sympathy with you. [Applause.]

President DODGE. I now have the pleasure of introducing to you a distinguished representative from a more distant country across the seas. We have with us to-day a delegate from Belgium, the Hon. Victor Valliant, a civil engineer in charge of many roads in that country. Mr. Valliant does not speak the English language and will address you through the medium of an interpreter, the Hon. J. H. Sullivan, of Quebec, Canada, who speaks French.

THE ROADS OF BELGIUM.

By M. VICTOR VALLIANT, *C. E., Verviers, Belgium.*

The public roads in Belgium, although well built, are being improved every year. Generally speaking, the highways are about 18 feet wide with a depth of stone of some 12 inches in the center, and trees are planted on either side. The roads are built in about the same way as they are here, the large stones being put in the bottom and the finer grades put on as the surface is approached. Formerly stones were spread in the fall of the year, but of late it has been found better to do that work in the spring. The work is generally given out by contract and the contractor guarantees the work for three years, unless the conditions are very unusual, when a certain allowance is made. I wish to congratulate you on your very splendid country. I hope that a good roads congress may be held in my own land, and, if so, I would be happy to receive you gentlemen as cordially as you have received me here. I thank you all most sincerely for the welcome I have received and the kindness that has been shown to me by everyone I have met in this country. [Applause.]

President DODGE. We will now hear from a characteristic American delegate from Michigan, and one who has long devoted himself to the advancement of the cause of road improvement, not only in his own State but in many other States of the Union. I have the pleasure of introducing to you the Hon. Horatio S. Earle, a member of the State senate of Michigan, and representing in this congress the city of Detroit.

FACTS AND SUGGESTIONS.

By Hon. H. S. EARLE, *President, League of American Wheelmen, Detroit, Mich.*

MR. CHAIRMAN, DELEGATES, LADIES, AND GENTLEMEN: I am proud of the privilege of addressing an audience made up of representatives of many countries

of the world, all engaged in the work of making the world better. It has been said that beneath the turbulent waves of old ocean all countries are united; beneath the turbulent waves of politics all States of the Union are united, and thus we are all met together working hand in hand for the betterment of these common roads over which it is necessary for us all to travel, on horse or on foot, from State to State, and from country to country, all over the world.

I realize the fact that we are not the first good roads advocates, for we find that, many centuries before Christ highways were being built and communications extended, and that those people made their country great, and were successful because they built roads. I realize the fact also that Alexander the Great never would have been great if he hadn't built the roads he did.

When the bicycle was adopted by the young men of America, and they came in competition with the horse, they began to find out the difference between good roads and mud or sand roads, and so you may give credit to the bicycle as the horses' savior; and I am sure that every horse in the United States of America within the reach of my voice would cry out, if he could, in the good old Methodist way, "Amen!" [Laughter and applause.]

Now, I want to call your attention to a new kind of money that I have invented. I am an inventor, too, if you please, and the reason I give so much of my time to the good roads cause is because I have one of those trusts, all my own, that the United States has given me, and the royalties are able to place doughnuts on my plate and coffee to go with them, so that much of my time I can give to the people in the good roads cause. The new kind of money I have invented is called "rock coin." It is not of silver or gold, but rock. It shall be coined by every State in the Union, and furnished to the towns and counties as State aid. In other words, the thirty-six million days' work performed by the convicts of the United States of America shall be used in crushing stones and furnishing them to the towns and counties as State aid. [Applause.] The thirty-six million days' work now performed by the criminals in this country is robbing the honest family-supporting men of thirty-six million days' work which I would be glad to see them do. If you take that thirty-six million days' work that the convicts are performing to-day upon goods that are made in competition with honest labor away from him and give it to the honest men, then the honest family-supporting men will get thirty-six million more days' work than they have now. When the convicts coin this rock and it is furnished to the towns and counties, then thirty-six million more days' work will be required to use it, and the honest men who make roads will get seventy-two million more days' work per year than they are getting at the present.

Let me call your attention to the fact that in five States of the United States we have raised this year in the road cause \$1,500,000. I am glad and proud that the State of Michigan, of which I have the honor to be a citizen, has this year raised \$338,000 for building macadam roads. [Applause.]

There is another thing that I am going to give you this morning, and I am glad that Hon. Martin Dodge, Director of Public Road Inquiries, representing Uncle Sam, is here. Now, Uncle Sam's initials are U. S., and that stands for "US." If I could invent a scheme that will benefit "US." I am sure that the Office of Road Inquiries at Washington will be willing to adopt it and put it in force. It is this: Let the Office of Road Inquiries, in cooperation with the Post-Office Department at Washington, send to every postmaster in the United States of America a cardboard diagram of the district in which the post-office is situated, dotted off into quarter-mile squares, with instructions to the postmaster to locate his office at the center and then map out the main roads to the towns near him, putting them in three colors: Red for a good road, purple for a medium road, and black for a poor road. Let those diagrams be handed over by the Post-Office Department to the Office of Road Inquiries, and let maps be made therefrom and furnished to the people

at cost. When a road has been changed from a poor road to a good road, let it be changed to a different color. Then when some one wants to buy a farm he will not buy it where the roads are marked black, but will purchase in a section where the roads are red; and then the farmers will realize the fact that, in order to enhance the value of their property, they must get on the red-line roads.

President DODGE. We are under many obligations to the press for the publicity it has given these proceedings from time to time, especially at this time. We have with us a distinguished journalist from the State of New York who will address us from the standpoint of a newspaper man, and I take great pleasure in introducing to you Mr. A. H. Battey, of the New York Tribune.

WORK OF THE PRESS FOR GOOD ROADS.

By A. H. BATTEY, *editor Tri-weekly Tribune, New York.*

MR. CHAIRMAN, DELEGATES TO THE INTERNATIONAL GOOD ROADS CONGRESS, LADIES AND GENTLEMEN: I read, when I was a boy, of three kinds of men—one born great, another who achieved greatness, and a third who had greatness thrust upon them. I am included in the last class, and this honor was entirely unexpected when I came to Buffalo; but I will do the best I can.

The good roads organization, as Mr. Dodge has said, has been helped by the press, and many more people would be benefited by good roads if they would only realize that the press can help them to that thing. There is a well-known saying, "The pen is mightier than the sword." There is a chance now to modify or alter that a little bit, and I would like to impress upon everyone here who is in favor of good roads that the pen is mightier than the jaw. We may go to our conventions, and five hundred or a thousand or five thousand people may meet together, and at least some good is done. But if these people would get at the editors of their country papers and their city papers, and impress upon them the fact that they want them to advocate good roads, then, instead of reaching 500 or 5,000 people, they will appeal to millions all over the country. [Applause.] The press is in favor of everything that will tend to elevate and improve life in the United States and other countries as well; and there are some far-seeing men connected with the press who thoroughly realize that one of the best ways in which this work can be done is by improving the public roads. So far as my own humble efforts are concerned, I have given what aid I could to the work of Colonel Moore, Mr. Dodge, Mr. Richardson, and others who are engaged in the same good work; and I trust there are many others in my profession who will follow the same plan and thus benefit themselves as well as the whole country.

I didn't come prepared with a speech, and I simply want to make one or two little suggestions which it may be worth while to remember. While all these suggestions which have been made by the different speakers are good, in that they tell us we should get at our Congressmen and our legislators, and write letters to this man, that man, and the other man, seeking aid in the good roads cause, there is a far more powerful way for them to act, and that is to get the editor of the paper in the district in which they reside to take up the good roads question and show that the people are interested in it. When that is done, the Representatives in Congress are going to use their best efforts to put through a good roads measure, because they know if they don't they will lose their jobs. [Laughter and applause.] This work will be done just as soon as the people demand it, and they can demand it better through the press than by addressing audiences, however large.

President DODGE. I desire at this time to reintroduce to you the Hon. John H. Sullivan, of Valleyfield, Quebec, Canada, the gentleman who interpreted to us the remarks made by M. Valliant, of Belgium.

Mr. SULLIVAN. Ladies and gentlemen, I did not expect to be here when I left home, but I think it is proper to say a few words to you. In the Province of Quebec we nearly all speak French and English. You have many of our French-Canadians over here in the United States, and those who come back return with the best impressions of your country; and I am glad to say that they make very good citizens when they come over here. I am speaking now for the French-Canadian part of our population.

Our government in the Province of Quebec is giving aid to public roads, and spending a great deal of money on them. We are awakening to the knowledge of the benefit of good roads, just as you are in the United States.

Since I came here to the city of Buffalo everyone that I have met has striven to enlighten me and give me all the information that I require. They have impressed me with the fact that the people of Buffalo and the citizens of the United States are willing to aid me in every way they can. Thanking you for your kind reception, I will close by saying that I go back to my own country with the very best impression possible of the people of Buffalo and the United States. [Applause.]

President DODGE. Several allusions have been made in the remarks we have heard to the problem of applying prison labor to the road question. We know that in some portions of our country that has been done with considerable success, especially in the Southern States. We have with us to-day a gentleman from the State of New York, where it is supposed to be much more difficult to make a profitable application of that labor, but he is prepared to give us some definite information as to what they have done in that matter and what success they have had along these lines. I therefore am glad to introduce to you Mr. Frank W. Lyon, of Binghamton, N. Y.

USE OF CONVICT LABOR.

By Mr. FRANK W. LYON, *Binghamton, N. Y.*

LADIES AND GENTLEMEN: I will not attempt to take up your time with the theoretical part of the question of road building. For a few minutes I will endeavor to give you the practical part of it as we find it existing in Broome County, in this State.

Less than a year ago we took up the question of the organization of a good roads league. Citizens of the county and of the city of Binghamton took hold of the matter with zealous interest. They recognized the fact that they must have better roads. In our meetings and discussions the question arose how we should improve our highways, and we came to the conclusion that it was necessary for us to utilize to the best advantage our local material, thereby getting the minimum cost in the construction of the highways in that section. We applied to the board of supervisors; we applied to the common council of the city. We finally got the board to take advantage of a law which is on the statute books of this State authorizing them to furnish employment for prisoners under sentence confined in the county jail, and to pass a resolution arranging for the employment of these prisoners in breaking of stone by hand. We found that the work proceeded in that way to poor advantage. The good roads league advocated the wisdom of using the full force of prisoners under sentence in crushing stone by machinery.

The members of the league purchased the machinery, the board of supervisors furnished the service of the prisoners, and to-day we are constructing highways from our local product by the use of prison labor in preparing the material for the highways. [Applause.]

We are now working on the most important of our local streets, Front street. It is 36 feet wide, and 2,300 feet of road have been completed by following the State engineer's specifications and by the use of our local product. The prisoners from the jail take out the stone, load it into the wagons, and take it to the crusher, and we turn the crushed stone over to employed laborers, who construct the street. We do not use the prisoners on the streets in the city. We are now preparing two cars 32 feet in length, 8 feet in width, and 8 feet high, each sufficiently large to bunk 30 prisoners, in one of which they may sleep while the other is to be equipped with range, table dishes, etc., in order that we can feed these prisoners in the car. It is our purpose to take these prisoners and the cars to places outside of the village or city limits and there construct roads by the use of prison labor. [Applause.]

I have been asked whether the plan is practical; whether labor organizations object to it or not. I simply desire to state that our little city is quite a manufacturing city, being the second in the production of cigars in the United States, and our labor union organizations are very strong. I therefore took this question up in the meeting of the Central Labor Union organization and showed them the advantages of the employment of prisoners under sentence in our county jail; I showed them that by utilizing their labor in producing material we would be able to employ teamsters and hands to put the material into place, thereby giving employment to honest labor. Before this system went into effect the average number of prisoners in Binghamton was 37; the average number since the 1st day of last February—that is, since we used the system of working these prisoners—has been 11. [Laughter and applause.] Therefore you will see that we are saving the taxpayers of the county of Broome in the neighborhood of about \$8,000 a year in the maintenance and care of prisoners. [Applause.] The citizens of the county and city are alive to the fact that there is a saving created by the good roads league, and they are perfectly willing that legislation should be had for the appropriation of money for the benefit of highways.

We are now having some State aid roads built in the county. Our purpose is not, however, to interlace the entire county with macadam roads. But before we get through with the work it is our purpose to have macadam roads reaching from the east to the west and from north to south to the extent of 35 or 40 miles, which will be adequate for Broome County. Then we will take up the rest of the roads in the county and work them in our own way as we get light on this subject. Now I am after the good-roads train, and I expect it will be with us about the 20th of October.

President DODGE. I am sure the delegates must be very much pleased with this very favorable report. It may be interesting for you to know that in California work has been done under the system referred to at one-half of the ordinary cost of the production of such material, and the product is furnished to the various counties of the State for road making.

It is also reported to us by Professor Holmes of, North Carolina, that convict labor is utilized to so good an advantage there that good roads have been produced for less than \$200 per mile. Of course, they are not macadamized, but are made from a mixture of sand and clay, and are very suitable for that section of the country. Indeed, I may say

that reports are extremely encouraging from every section of the country where convict labor has been put in use.

We are now about through with our regular programme, and I take this opportunity to extend the thanks of the managers of the association to the delegates and their friends for the patient hearing and polite attention which have been given to this somewhat prosaic subject.

Before adjourning the secretary desires to make some important announcements, and I beg to introduce to you for that purpose Mr. Richardson, of Illinois, the secretary of the National Good Roads Association. [Applause.]

Mr. R. W. RICHARDSON. I desire to announce that the "good roads train," equipped with the very best modern road-making machinery, furnished by the F. C. Austin Company, Harvey, Ill.; the Western Wheel Scraper Company, of Aurora, Ill.; Austin & Western Company, Chicago, Ill.; J. J. Case Manufacturing Company; and the Buffalo Pitts Company, Buffalo, which came over the Lake Shore and Michigan Southern Railway from Chicago for exhibition work during this congress, is now in the Exposition grounds, situated on tracks between the Stadium and the Transportation Building.

On behalf of the National Good Roads Association, Hon. W. H. Moore, its president, and myself, who have had the honor to promote and arrange the details of this meeting, I desire to extend to you our thanks and appreciation of the uniform courtesy that has been extended to us in our work, as well as for the cooperation that has been given to us from all quarters. We trust that this movement will grow, as it has so largely done in the last six months, and that our next meeting will find it very greatly augmented.

We extend our hearty thanks to the Exposition management for the courtesy shown this association in promoting this congress and to all others who have contributed to its success.

This work is on the rising tide of progress. At no other age or time has the subject of good roads so much occupied the minds of the American people. Every State in the Union is alive to this question, and we know that in this era of industrial prosperity it will occupy its place.

APPENDIX.

The following addresses prepared for the congress were not delivered, but were ordered printed:

RURAL FREE MAIL DELIVERY IN RELATION TO ROAD IMPROVEMENT.

By Hon. A. W. MACHEN, *General Superintendent Free-Delivery System, Post-Office Department.*

No other branch of our great postal system is as far-reaching in its effect as the rural free-delivery service. It means the extension of the post-office to the doors of the people. The rural letter carrier is in fact a traveling post-office, performing practically all the functions of a postmaster. Besides delivering and collecting ordinary mail, he delivers registered letters, registers letters, sells stamps and stamped envelopes, cancels the stamps on the letters he collects, and receives money en route for the purchase of money orders. He is an anticipated and welcomed visitor to the country home and becomes a fixture in farm life.

It is no wonder, then, that the people want a service of this kind, and that the

demand for it has gradually become more and more urgent until to-day it is practically universal and not to be resisted. The people are determined to have it, and after receiving it are bound that it shall be efficient and satisfactory. This it can not be unless the roads over which it is operated are in good condition. Good roads are indispensable to a really efficient rural service. It is essential that the service be performed with regularity and punctuality. It must be a daily service, and the patron must be reasonably sure that the carrier will pass the gate at about the same time every day. A well-built and well-kept road will permit of such a service; over bad roads it can not be maintained. Even though a carrier is able to cover his route over bad roads, the time consumed is often from one to three hours in excess of what it should be were the highways in proper condition. A good rural service, then, means good roads, and, as the people insist upon the former, they must eventually obtain the latter.

It should therefore be apparent to anyone who gives the subject careful consideration that the good roads propaganda, which started some years ago with the progressive business people of our country, must receive a powerful impetus from the establishment of this new and popular service.

It may be said that the only obstacle now encountered in the extension of rural free delivery is the unimproved condition of our country roads. In many sections of this country the roads are what are called dirt or mud roads. They are narrow and tortuous, and the only work done on them is practically confined to going over them with a road machine or scraper once a year. The principal effect of this work is to pile up in the middle of the road all the muck and rubbish which has accumulated on the sides during the rest of the year, so that in wet weather, unless the soil is very sandy, the whole surface becomes rutted and is soon converted into a series of mud holes. This is particularly the case in most of the farming sections of the Middle West and to a large extent in the South; also as far east as western New York and Pennsylvania.

The Department soon became convinced that steps should be taken to remedy these conditions if a desirable rural service was to be provided. When it was demonstrated that the rural free-delivery service would become a permanent feature of the postal service of the United States, the Post-Office Department promptly laid down as one of the requirements for the establishment of rural free delivery that the petitioners for the same must agree to place the roads to be traversed by the proposed service in a passable condition and keep them in repair throughout the year. Petitions including the agreement that the Department's requirement in this particular will be met are promptly referred to special agents for investigation. A special agent drives over the highways of a proposed route, and is required by the regulations to make a special report on their condition. In many instances special agents find themselves obliged to exact a pledge from road supervisors or other officials having charge of the building and maintenance of public highways that the roads will be improved before the service is established, and kept in proper condition after the same has been put in operation. In Iowa alone over 100 agreements have been entered into between county commissioners and special agents of the rural free-delivery service to open, repair, and maintain roads.

This plan is producing very good results. Reports come from all sections of the country to the effect that, prompted by a strong desire to obtain rural free delivery, the people are not only insisting on the improvement of roads in advance of the service, but that creeks have been bridged, in many instances by substantial stone bridges, for the especial accommodation of the rural letter carriers.

Now that I have shown what the Department is doing to bring about an improvement of the public highways in advance of the establishment of rural free delivery, I will briefly explain the efforts it is putting forth to effect a betterment of the roads where the service has been in operation for some time, and where failure in

the past to maintain daily trips on account of the poor or impassable condition of the roads during certain seasons of the year has brought forcibly to the attention of the Department the absolute necessity of repairing these roads to insure a continuance of the rural free-delivery service. After routes have been established and in operation for some time, route inspectors are sent out at regular intervals to make a general investigation of the rural system. Among other points on which they report are the quality and condition of the highways traversed. These inspectors are required to specify definitely such portions of the highways traveled by rural carriers as are impassable, and to give the names and addresses of the road supervisors or others in authority who are responsible for their repair and maintenance. In addition to this information the Department has gathered data from more than 2,400 of the rural free-delivery post-offices bearing upon the condition of the public roads. This information has been received in answer to the following questions:

What is the condition of the roads traveled by the rural carrier?

Were the roads impassable at any time during the past winter; if so, for how many days and for what cause?

Are the roads being properly repaired this year?

If any roads need attention, give name and address of road supervisor or other official.

The replies received show that the roads from 666 post-offices were in bad condition; at 1,814 they were fair, passable, and good. The names and addresses of 1,104 road supervisors were also furnished, and their attention has since been called to the condition of the highways under their supervision, with an urgent request that repairs be made before winter weather again sets in. The letter written to road supervisors reads as follows:

DEAR SIR: An investigation by this office discloses the fact that the roads traveled by the rural carrier from _____ post-office are not being attended to as post-roads should be; they are in bad condition. The postmaster at _____ has this day been notified to inform the patrons of route _____ that the lack of care given to the roads covered by it will, if continued, endanger the permanency of the service there. A rural carrier can not possibly make regular time or perform efficient service over bad roads, particularly during winter and spring.

Now is the time to mend these highways, and it is the hope of the Department that the roads over which you have direct supervision will be repaired before winter weather sets in, so that the continuance of the rural free-delivery service may be insured.

For Government publications and full information on road building apply to Director, Office of Public Road Inquiries, Department of Agriculture, Washington, D. C.

Respectfully,

General Superintendent.

Every one of the postmasters of the 666 post-offices referred to received the following instructions bearing upon the question of roads:

DEAR SIR: Reports recently received from your office show that the roads traveled by rural carrier _____ are in bad condition.

You will please notify the patrons of route _____ that the present lack of attention to these roads will, if continued, be likely to endanger the permanency of the rural free-delivery service there.

A rural carrier can not possibly make regular time or perform efficient service over poor roads, particularly during the winter and spring months. The summer is the time for mending these highways, which are really serving as post-roads, and which should always be passable for the transport of the mail. It is the hope of the Department that the patrons who are receiving the benefit of the service appreciate it, and that they will promptly cooperate in an effort to repair all deficient portions before winter sets in, so that the permanency of rural free-delivery service may be insured.

For Government publications and full information on road building apply to Director, Office of Public Road Inquiries, Department of Agriculture, Washington, D. C.

Respectfully,

General Superintendent.

In a large number of localities this letter has had the effect of directly enlisting in the cause of better roads those who are particularly interested in an efficient rural free delivery, namely, the patrons of the service, and they have not been slow to second the efforts of the Department to arouse the road supervisors to a full appreciation of the necessity of promptly complying with the Department's request for an improvement of the highways. While replies to the foregoing letters were not requested, a large number of them have been received from postmasters and road supervisors, indicating that the communications have had the desired effect. The following letters may be quoted as samples:

NEWARK, ILL., *October 1, 1901.*

GENERAL SUPERINTENDENT FREE-DELIVERY SYSTEM,
Washington, D. C.

SIR: I am pleased to inform you on rural delivery routes Nos. 1 and 3 there has been and is now being done more work on the roads than any one year for some years past. This is undoubtedly due to the notice sent to the road commissioners by your Department. The commissioner on each route inquired of the carrier where he considered the worst roads on his route, and then proceeded to repair these portions expressly. The carriers are highly pleased.

_____, *Postmaster.*

MEDIAPOLIS, IOWA, *September 24.*

GENERAL SUPERINTENDENT,
Washington, D. C.

DEAR SIR: The roads have been recently repaired and are now in good condition. Very respectfully,

J. K. MATHEWS, *Postmaster.*

BONNER SPRINGS, KANS., *October 25, 1901.*

GENERAL SUPERINTENDENT FREE DELIVERY.

DEAR SIR: Referring to yours of October 22, would like to say that the work which was delayed on route on account of inability to secure enough team, and men to do the work is being pushed now with all possible speed; good arched culverts are being put in and the surface leveled down and the roads put in good shape. They have never been in so good shape before.

The postmaster, Mr. Maxwell, told me to say that he had been over the road, and that it was in better shape than he had expected to find it. The work will be done as fast as possible.

Yours, truly,

W. G. MAUPIN, *Trustee.*

KANSAS, ILL., *September 26, 1901.*

GENERAL SUPERINTENDENT FREE-DELIVERY SYSTEM.

DEAR SIR: The road commissioners have agreed to put in the bridge and fix the roads. Thanks.

Yours, truly,

W. S. GRINNELL, *Postmaster.*

Such letters are being constantly received from all sections of the country, more especially from New England and the West and Middle West.

It is the intention of the Department to continue on these lines, and by every possible means to point out to the people that a prompt and regular service can be provided only where good roads are maintained. Postmasters will be requested to report from time to time on the condition of the roads, and in that way the Department will be kept continually and intelligently in touch with existing conditions. The need for this work may be more clearly shown and the effect of it on the highways of the entire country may be better understood and appreciated by considering a few figures relative to the rural free service as it exists to-day.

The total number of carriers employed in the rural free-delivery service at present is about 5,700; total population served by them daily, about 3,500,000; total number of miles traveled each day, about 140,000.

When one considers that no two carriers (with few exceptions) travel over the same roads, it becomes clear that if the Department succeeds in its efforts for good

roads on the routes now traveled by the 5,700 carriers there will be 140,000 miles of good roads in the country districts now enjoying the benefits of rural delivery. At the present rate of increase the rural service will be practically doubled within the next twelve months, and as it is the distinct policy of the Department to extend the service and keep pace with the demand for it (which is constantly increasing), we may look forward to the time when all sections of the country in which this service may be feasibly maintained will be covered by a network of rural routes.

Wherever there is a systematic extension of the service throughout a whole county it is found that fully nine-tenths of the public highways are covered by rural free delivery. If, therefore, reliable statistics were at hand showing the total number of miles of public roads in rural districts of the United States, an interesting estimate might be made showing the total number of miles of public highways of the United States that will eventually be covered by rural free-delivery service and consequently become good roads. All, I think, will agree that the rural free delivery is proving a potent factor in the construction of good highways and their proper maintenance. It is obvious, too, that the people, by insisting upon a universal extension of the service, have in their hands the most effective means possible for bringing about the general improvement of nine-tenths of the public highways of this country. This has been the object for which good roads commissions and other kindred organizations have been working for years, and a propaganda is still being vigorously carried forward not only by these organizations, but by the Government itself, through the efficient management of the Office of Public Roads Inquiries of the Department of Agriculture.

While it is true that the good roads movement has received a great impetus and made rapid strides during the past few years on account of the very efficient support it has received from the Department of Agriculture through the publication of literature on road building, securing the construction of object-lesson roads, etc., I think all will concede that the Post-Office Department is not overstepping the bounds of modesty when it claims that the solution of the whole question lies largely in the rapid and systematic extension of the rural free-delivery service.

METHOD OF CONSTRUCTION AND COST OF GRAVEL ROADS IN HENNEPIN COUNTY, MINN.

By GEO. W. COOLEY, *County Engineer.*

All county roads (meaning the principal thoroughfares, amounting to about 500 miles in length in this county) are under the control of the board of county commissioners, who determine the amounts to be expended and the location of the work, all of which is done by contract, under the supervision of the county engineer, who has entire charge of such work from beginning to end and who is answerable only to the board.

Specifications require the best quality of gravel obtainable within hauling distance, and either require a sample to be submitted with the bid or a statement of the location of the pit or bank from which it is to be obtained.

Roads are built from 8 to 16 feet in width and from 4 to 8 inches thick. The roadbed is first dressed to a width of 20 to 30 feet with a road machine and rolled wherever necessary to provide a good bed; as most of the work has been done on old, compacted roadbeds, this has not always been necessary. Gravel is then laid on in one layer to the width and depth prescribed by the specifications, and under the supervision of an inspector, who is kept on the work until it is finished. Gravel is measured in wagon boxes as delivered on the work and a check given for each load, showing the number of cubic feet, name or number of driver, date and station of delivery. The inspector retains the check stubs and from them the estimates are made. All work is done to line and grade previously established by the engineer; and, in case of any necessary cutting and filling, the subgrade is

thoroughly compacted before graveling. No rolling is done until three months or more after the gravel is laid on, but the road is thrown open to travel immediately and dressed occasionally with a road machine to fill up the ruts, etc. After the road has been a few months in use it is gone over with a road machine and 5-ton horse roller three separate times, each time after a rain, when such proceeding is practicable. The roller is required to pass over the road until it is compacted to the satisfaction of the engineer in charge, and never less than five times over every portion of the gravel at each of the three dressings. Such treatment, ending as late in the fall as possible, has been found to result in excellent roads in the spring, as they harden very rapidly when dressed and rolled as above.

Preliminary estimates are based on the following data, which are found to vary but very little from actual cost:

	Cents.
Gravel in pit or bank, per cubic yard.....	10
Loading, per cubic yard.....	10
Preparing roadbed, distributing, and dressing, per cubic yard.....	10
Hauling, at 20 cents per cubic yard per mile.....	20
Contractor's profit, 15 per cent.....	8
Total cost per cubic yard (1 mile haul).....	58

These items may vary occasionally as follows: Gravel inside roadway limits is given to the contractors free of charge. Loading from a trap and hopper will cost much less than the above, but snatch teams are frequently required to haul the loads out of the pit. The third item is a fair average where no grading is required. Cost of haul varies from 15 to 30 cents per cubic yard per mile, depending on the condition of roads.

Cost of roads as per contracts let in 1899, 1900, and 1901.

No. of contract.	Width of road.	Depth of gravel.	Cost of finished road.			Distance gravel was hauled.	Remarks.
			Per square yard of surface.	Per cubic yard of gravel.	Per mile.		
19	<i>Feet.</i> 12	<i>Inches.</i> 6	<i>Cents.</i> 11.18	\$0.67	\$787	2½	Contractor lost money. Haul cost 10 cents per yard per mile.
23	12	6 to 8	17.40	.87	1,494	3½	
31	12	6	30.83	1.85	2,381	5	Haul cost 25 cents per yard per mile.
34	12	4 to 6	6.71	.47	459	1	Haul cost 22½ cents per yard per mile. Free gravel. Do.
41	12	4 to 6	10.43	.73	712	-----	
42	12	4 to 6	5.71	.40	391	¾	
60	14	6	19.17	1.15	1,715	3½	
61	14	6	14.50	.87	1,194	2½	
65	12	4 to 6	10.5	.75	792	1¾	
66	12	6	5.5	.33	383	¾	
80	12	6	7.5	.45	465	¾	
88	8	4 to 6	9.0	.63	409	1	
91	10	4 to 6	8.14	.57	467	¾	

In all contracts except Nos. 66 and 80 the gravel was paid for at 10 cents per cubic yard measured in the wagon boxes as delivered on the work. The best gravel was that which contained a slight admixture of iron and lime, with a small percentage, say 5 per cent, of clay. This gravel generally showed its tenacious qualities by standing vertically in the pit; when cut into it frequently required the use of a pick to dislodge it. River or water-worn gravel is always rejected, and no sand is allowed in the gravel, except when under 5 per cent of the total, and accompanied by an equal quantity of clay, carefully mixed. As a result of road work done in this vicinity, the cost of transportation has been reduced to the following figures:

For ordinary dirt roads, 20 to 25 cents per ton per mile.

For gravel roads 1 year old, 7 to 12 cents per ton per mile.

For macadam roads, 6 to 8 cents per ton per mile.

The last two items were the result of actual calculations from measured loads, distance hauled, and contractor's pay rolls.

The plans for maintenance for 1902 contemplate dividing up the gravel and stone roads into sections of from 3 to 5 miles in length and placing a man in charge of each section to keep up continual repairs.

A SIMPLE PLAN FOR A BETTER ROAD SYSTEM.

By F. A. POLSLEY, *Port Gibson, Miss.*

One great obstacle to the betterment of most of our country roads, paradoxically enough, comes from the very impetuosity of a large class of good roads enthusiasts. Too many of them look for the full fruition of their hopes and wishes ere yet the seeds of the faith have been fully sown. They too often expect to see the towering and majestic oak standing in his full beauty and strength on the vacant spot where but yesterday was planted the acorn. Such miraculous developments as that of the perfected asphalted road springing at one jump from the naked desert may have occasionally been seen in some of the "boom towns" of the West, but instances like these can never be looked upon as pioneering a path for the whole country to follow. The ball of revolution for better roads must be set rolling in a more rational manner. In striving to hasten the evolution of highways we must not forget to direct all our best efforts in harmony with environment, and to make easy and help out all of the steps of development as we come to them in their regular, natural order. For complete success over a broad territory we must first learn to thoroughly realize and practically recognize the essentiality of each and every step in the work. The observance of this law is as necessary in the construction of economical fabrics as it is in the erection of buildings and works. Our free schools, it is true, attained their present high standard in a few of the States with great rapidity, but nevertheless the growth was orderly and acquired step by step. There was no short cut to this most glorious achievement of all the ages: good time was made by the patient wisdom as well as by the persistent energy of its promoters. So, too, if the good roads movement will systematically follow along parallel lines to those followed in the development of the public schools there need be no doubt that the result will be equally happy, while possibly attained in much less time.

What is the condition of the field? How nearly is it ripened to the harvesting? Thanks to the untiring work of a wide-awake and far-seeing press, we have a people who, if not yet eager for the best, are certainly clamorous for better roads. We have also legislatures in nearly all the States which are willing to enact suitable laws. Such is now the situation, and the opportunity stares us in the face. All now needed is the right set of men, placed in the right position, to formulate and recommend to the State legislatures the right plans. Now, what class or classes of men, who by reason of their business training, ought to be best equipped for forming such plans, drafting them into legislative bills, and advocating their adoption by the legislatures of the various States? Evidently the work should be done by a convention of men composed, for the most part, of broad-minded business men, progressive farmers, level-headed members of State legislatures, representatives of the executive departments of the States, and civil engineers.

Before attempting to outline a feasible road system, I must allude to a popular error, the disastrous effects of which have been largely overlooked by good roads advocates, i. e., the notion that, given the tools, the money, the teams, and the hands, and almost any man can make good roads. Never was there a graver error: and it is an error which, I am sorry to have to note, the manufacturers and salesmen of many really excellent road machines have made the mistake of helping to propagate. Of course the mistake has acted, and for some time I fear will continue to act, as a boomerang to them. If they succeed in selling machinery in a section of country where this error is strongly entrenched, there are many chances

that it will be operated by some man who undertakes the superintendence, not because he is possessed of special training for it, but merely because he happens to be out of work, and is, while any supposedly "soft jobs" are "lying around," too good a political heeler to allow himself to be overlooked. The result is necessarily disastrous to the roads, and discouraging to taxpayers, and the blame is laid, not where it belongs—on the incompetent superintendent—but on the misused machinery. That section, it is almost superfluous to add, will henceforward be poor territory in which to sell road machinery.

The question is often asked, How is it that railroads can so well keep up repairs and a general high state of efficiency on countless miles of earth roadbed, when it seems difficult for most county authorities to maintain even one continuous mile of fairly good road? The answer is easy and simple. Most of our present road laws place the control and management of country roads in the hands of county commissioners or boards, the business education and training of whose members have been along other lines than that of studying bridge structures, geological formations, capacity of water pipes, and the relative cost per cubic yard of excavating and moving the different kinds of earth and rock. Good and true men though most of them are, still they can not reasonably be expected to excel as superintendents over a character of work for which they have little natural taste and no technical training. On the other hand, railroad companies place the management of their affairs in the hands of men who employ real carpenters to do their wood work, civil engineers to superintend the construction and maintenance of their roads, doctors to superintend their splendid hospitals, and practicing lawyers to attend to their legal interests. We also have scattered all over this broad country school boards, trustees, and superintendents who try to emulate this business method of railroad officials, in that they employ teachers to teach their schools; indeed, they even go so far, through fear of being imposed upon by bogus teachers, as to employ only such persons as have acquired teachers' certificates in a fixed and regular way provided by the State school laws. Hence the great efficiency of our public schools.

This reference to schools brings us to the gist of this paper. It is true that each of the States has its own distinctive school laws; nevertheless, they are all patterned more or less closely after a common model. And that model may well be followed in planning a better road system than we have ever yet had in this country. To correspond with our State school superintendents, let each State have its superintendent of roads and bridges, in whose office should be filed and kept copies of certain of the periodical reports—including maps, bridge plans, etc.—of the various county superintendents of roads and bridges. Of course these offices should be filled by thoroughly competent engineers. These reports will after a while prove valuable. Perfect freedom of consultation should be provided for as between State and county superintendents, and mutual courtesies and consultations encouraged among the various county engineers themselves. Under the management of such a competent road directory there need be but few, if any, mistakes as to which roads should be graveled; which macadamized, paved, or asphalted, as the road fund will permit; and which should be only graded, oiled, and rolled, or possibly simply drained and cross-sectioned. Under the observant and constant supervision of an intelligent civil engineer, it is sometimes astonishing to note how nearly perfect in many of the States a simple dirt road can be made and kept.

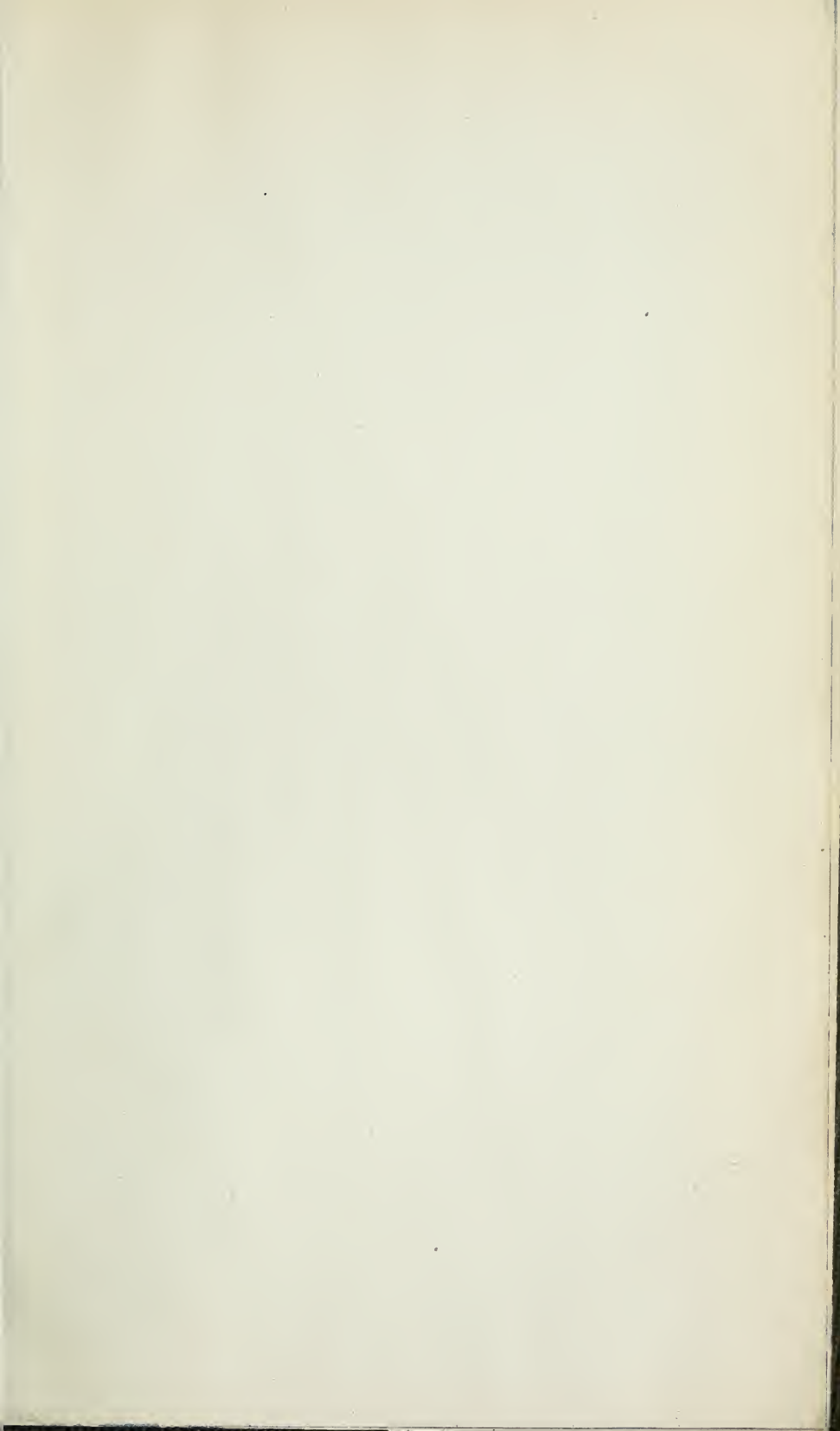
To facilitate the rapid reconstruction of the roads, as also to provide for economically and properly keeping up repairs, the county engineers should be required to divide them all into sections and to employ foremen on these sections carefully selected from a set of men who, like themselves and like teachers, have shown by a public examination their competency and fitness for the position. Just here is where a highly beneficial feature could be added to the curriculum of all our agricultural experimental stations, and of all mechanical and industrial

schools: that is, a course for the special training of students to fill these positions. Much may be learned of the importance of having fit men in these positions by noticing the practice of railroad companies in this respect. Their section foremen are always selected from among the most intelligent of those employees who have served long apprenticeships as section hands. Much more, then, should the training of our common road supervisors be comprehensive, practical, and thorough.

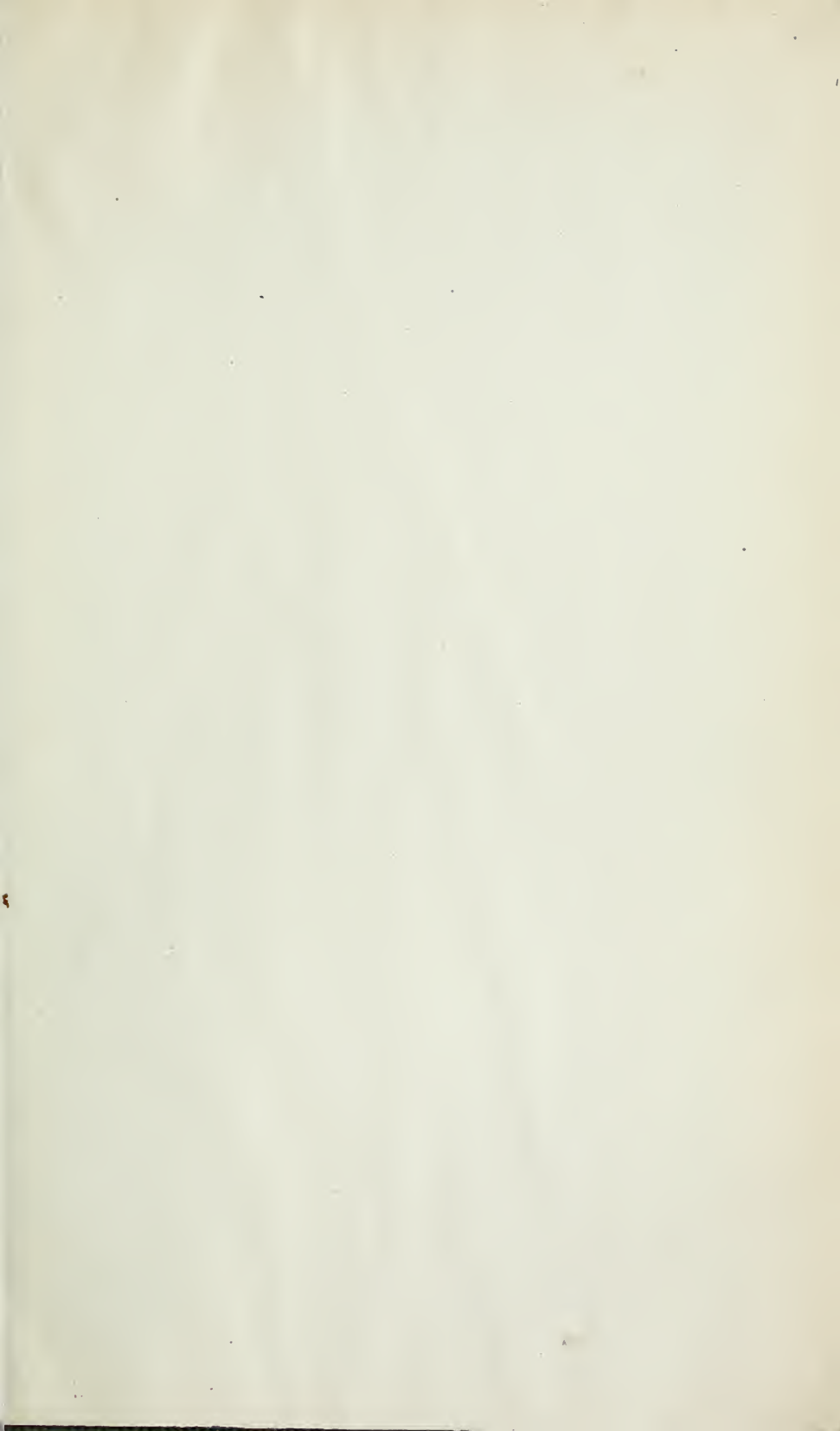
With this, or some like and equally simple system, a general convention composed of representative men from all the States can go before the legislatures and the people of the several States and initiate the work of road improvement along the whole line almost at one stroke, and that, too, in a thoroughly businesslike and methodical way. After years of study and reflection upon this subject and of careful observation over a wide extent of territory, I am convinced that a law providing for the efficient working of some such system placing the entire management and superintendency of our roads, bridges, and similar public works in the hands of a responsible corps of experts and specialists would more speedily, economically, and satisfactorily build them up to a high standard of excellence than any method ever yet tried in this country.

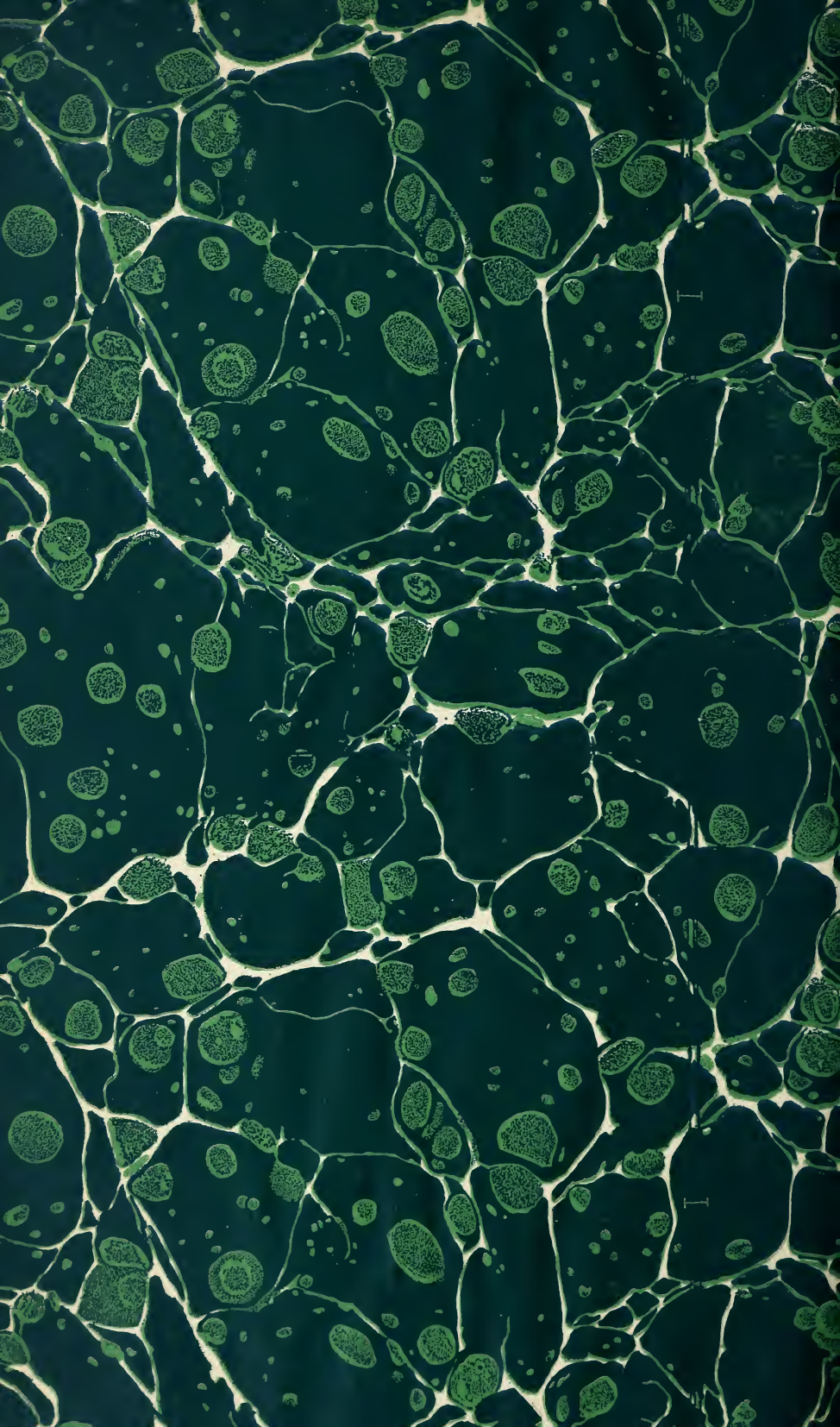
The fear, which in some quarters has been so often and so loudly expressed, that any attempt to substitute the raising of a road fund in lieu of the ancient custom of once or twice a year calling out the able-bodied men and boys of a neighborhood to work its own roads would meet with a veto from the so-called "back districts" is wholly groundless. It is nothing but the worn-out relic of an old slander (the origin and effrontery of which are self-evident) to say that it ever has been the poorer people and the people from the rural districts who oppose a property tax for road purposes. I believe an impartial canvass of opinion will show all classes to be willing to support anything like a feasible and equitable plan by means of a tax, partly capitation and partly on both real and personal property. Already all thoughtful men realize that good roads and commerce, like education, are pillars of the temple of civilization. Congress, the Department of Agriculture, and, in fact, the whole Federal Administration, are every year showing more and more by positive action their keen appreciation of this fact: and we need have no fear, the step once taken, about the question of revenue. A convention called by you will be able to devise and suggest to the State legislatures feasible and equitable plans of creating a road fund.

The objection raised occasionally by oversuspicious obstructionists to the creation of a road fund results from their fear that it will only prove a system of spoils for schemers and for venders of patent road materials and of patent road machinery. Of course this contention is too phantasmagorical to be answered by anything so real as a solid argument. But as recent newspaper interviews have shown, there are also many thoughtful and prudent men living in thinly settled, but already heavily taxed, counties who fear that good roads undertakings involve the immediate purchase of much high-priced machinery and materials, and that their people are not yet prepared for the outlay. And I am free to admit that if I thought these fears well grounded I would add to theirs my own voice of protest. But the very education and training of the classes of men suggested as the ones from whose ranks should be selected delegates to attend the proposed conventions is a guarantee that any plan recommended by it will amply provide against this, as against all other such dangers. Again, it is a far-fetched fear to suppose men will be chosen to fill the offices of State and county engineers who are so devoid of business understanding as to recommend the purchase of any machinery not adaptable to the requirements of their respective territories, or to recommend the immediate purchase of surfacing material (metaling) so inaccessible or so high-priced that its importation would be unwise. Of all men, well-trained engineers are surest to count the cost and to consider whether the proposed undertaking would inure to their honor or merely brand them as incompetents.









Public roads.

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